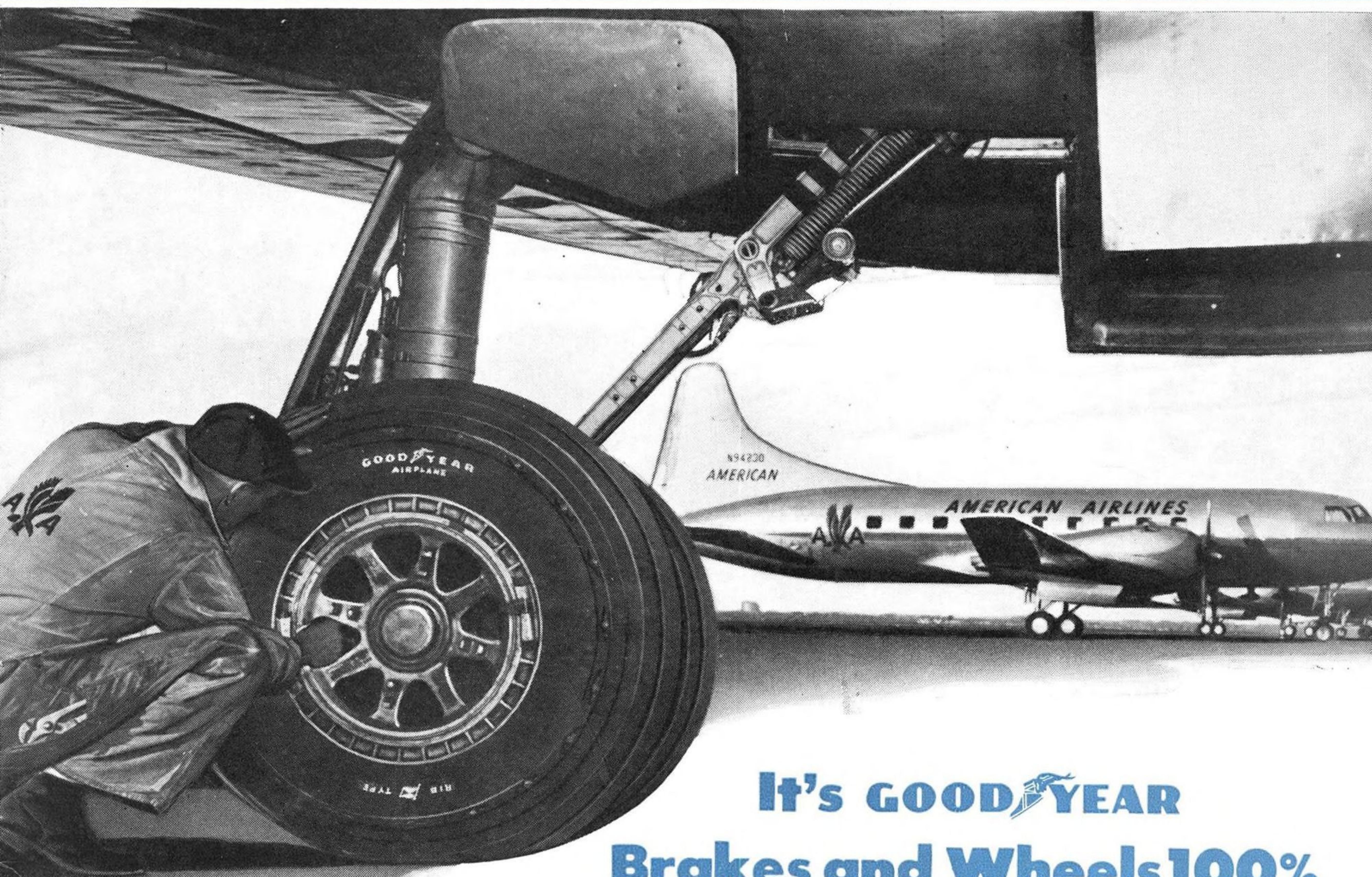


AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAY 29, 1950



**It's GOOD YEAR
Brakes and Wheels 100%**

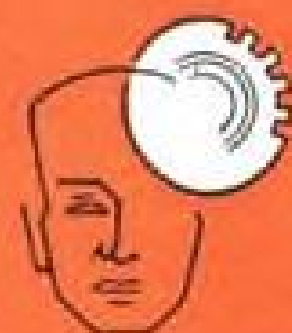
on A A



WE think it is highly significant that American Airlines, Inc., world's largest operator of passenger aircraft, has *every* ship in its Flagship Fleet equipped with world-famous Goodyear disc-type brakes and lightweight magnesium alloy wheels. Because these brakes have proved their superiority for stopping power, safety, dependability, *more modern commercial aircraft disc-type brakes than any increasing steadily!*



*Dependable
controls cost
less than
service*



CREATIVE ENGINEERING

Makers of the Famous M-H
Electronic Autopilot, Fuel Gage,
and Turbo Supercharger
Controls, Standard on Many
Types of USAF Aircraft

MINNEAPOLIS
Honeywell
AERONAUTICAL CONTROLS

RADIAL LOADS & THRUST From Any Direction



Taken by ONE
Single Row Ball Bearing
(either sealed-for-life or plain)

One easily applied, unit bearing, requiring no adjustment, provides ideal radial support and axial location in both directions for an infinite variety of shaft mountings. If a ball bearing is used at the other end of the shaft, it floats — takes radial load only. Or the other bearing may be a plain bushing, or any radial, anti-friction type the designer may elect. No headaches over shaft expansion or normal machining errors.

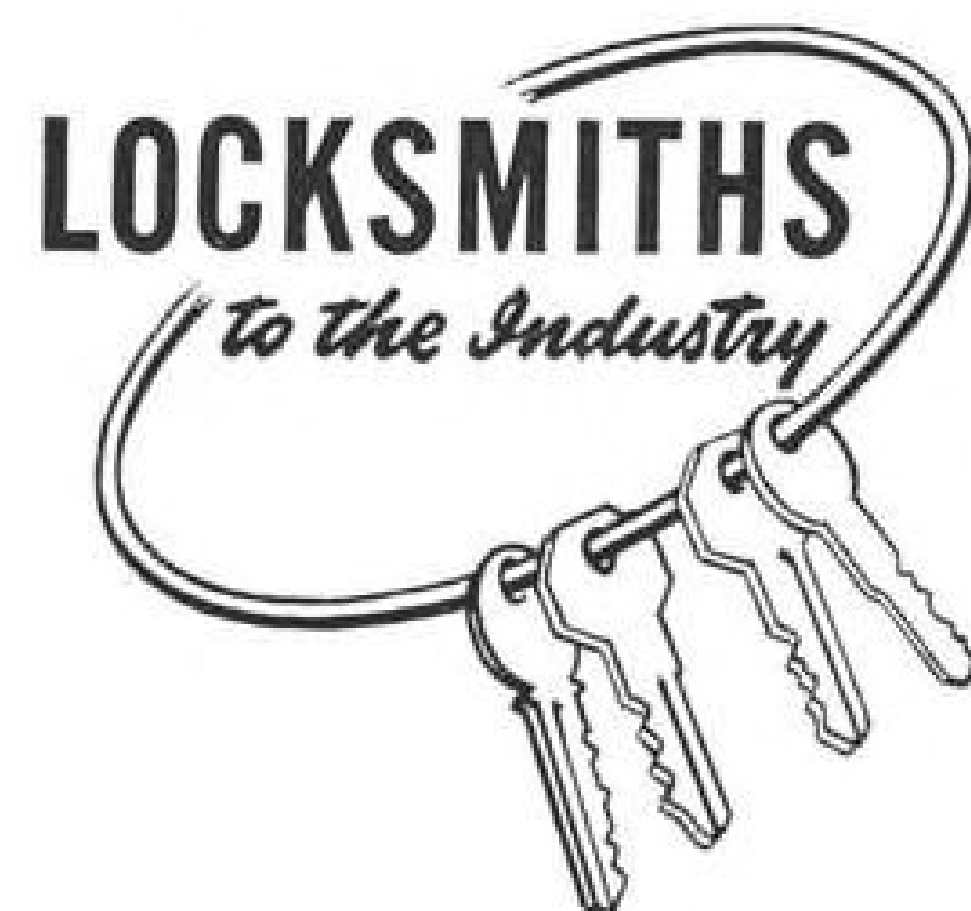
Check into this for greatest simplicity and economy in your designs. The famous New Departure rear wheel bearing* on leading cars is an example. . . . Remember — no other bearing not of dual type or not used in opposed pairs can equal this load service.

*Nothing Rolls
Like a Ball*

*Send for booklet RW showing this application.

NEW DEPARTURE BALL BEARINGS

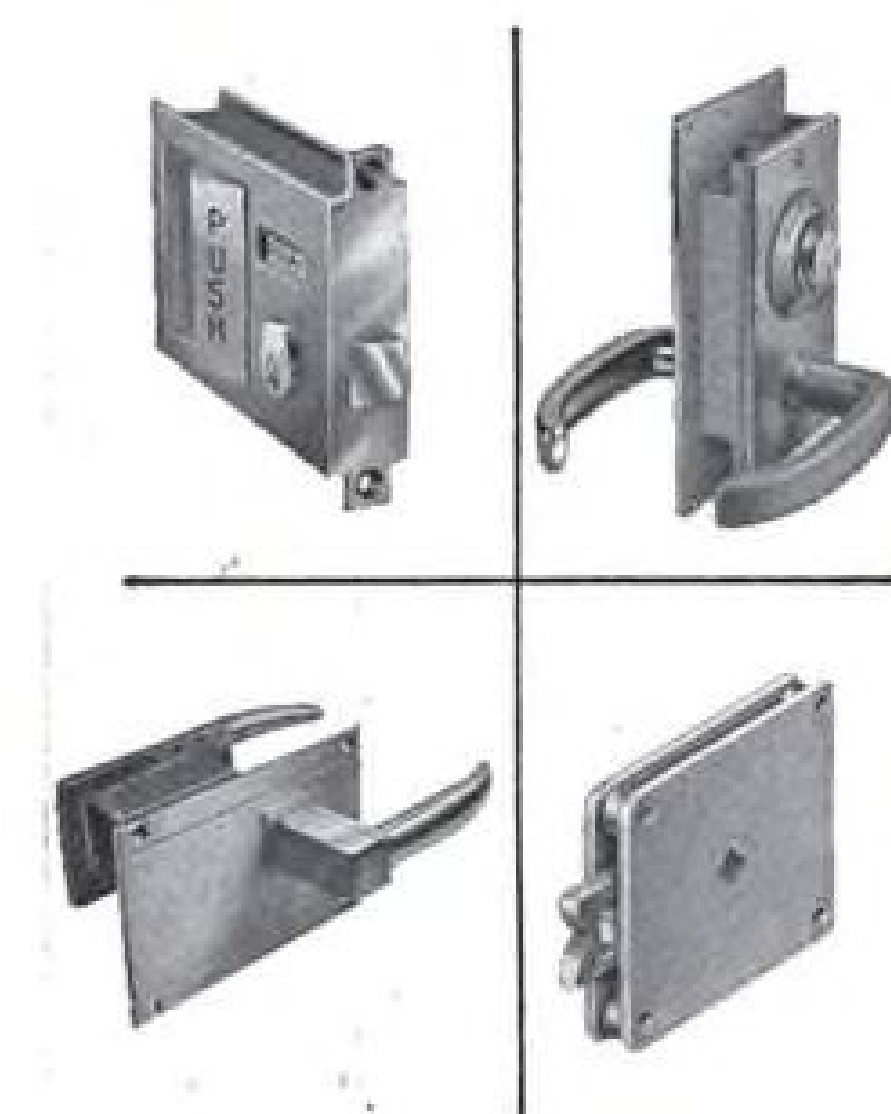
NEW DEPARTURE • Division of GENERAL MOTORS CORPORATION • BRISTOL, CONNECTICUT • BRANCHES IN ALL PRINCIPAL CITIES



Adams-Rite is headquarters for locks, latches and closures for securing fuselage, compartment, lavatory, galley and bulkhead doors.

We manufacture over 600 separate locking devices which are regularly specified and used on 80% of aircraft in service today. In addition, Adams-Rite engineers are always available to design any type of lock, latch or closure to meet your specific requirement — a service backed up by experience in designing more than 3500 individual locks and latches since 1927.

A comprehensive catalog of standardized Adams-Rite equipment is available by requesting it on your company's letterhead.



**FOR REPLACEMENT...
OR FOR CONVERTING AND MODERNIZING
AIRCRAFT, USE ADAMS-RITE EQUIPMENT**
Adams-Rite locks, sanitary plumbing and Wedlits are designed and built for aircraft use exclusively! Insist on genuine factory equipment for replacement or when converting or modernizing aircraft. Both in first cost and in upkeep you'll find it cheaper to do business with Adams-Rite. (For Wedlits outside California please contact United-Carr Fastener Corp. who are licensed manufacturers.)



Aviation Week

Volume 52

May 29, 1950

Number 22

Headline News

Atlantic Pact Means More Planes.....12
Airline Engineers Told About Jets.....13
Airlines Study New Systems.....14
Symington Tightens Planning.....16

Avionics

Ticket Machine With A Memory.....37

New Aviation Products

Fuel Measured With High Accuracy...39

Air Force Contracts

GE Tops March Contract Awards.....17

Air Transport

Another Record Year Coming Up?...41
Early Action On Subsidies Unlikely...43
MATS' Peacetime Mission—Training...44
Overseas Charter Flights Approved...45

Aeronautical Engineering

Compound Engine Goes Into Service...27
Jet Transport Overhaul Needs.....34
Test Chamber Aids Package Design...34

Editorial

Johnson-Lee Subsidy Proposals.....54

Departments

Who's Where 7
Industry Observer 7
Aviation Calendar 8
News Digest 9
What's New 52
Pictures of IATA Conference.....11
Shortlines46
Letters51
Strictly Personal52

Robert H. Wood
EDITOR

Merlin H. Mickel.....MANAGING EDITOR

William Kroger.....Assistant Managing Editor
Alexander McSurely.....Assistant Managing Editor
Irving Stone.....Technical Editor
Charles L. Adams.....Transport Editor
Ben Lee.....Military Editor
G. L. Christian, III.....Equipment & Maintenance
David A. Anderton.....Engineering
Thomas M. Self.....Los Angeles Correspondent
Katherine Johnsen.....Congress
Henry Lefer.....News Desk
Peter Munves.....Editorial Assistant
Marie Adams.....Editorial Assistant
Scott H. Reiniger.....Editorial Assistant
Victoria Giaculli.....Editorial Assistant
Erwin J. Bulban.....Editorial Assistant

Executive and Editorial Offices: 330 West 42nd St., New York 18, N. Y., Phone Longacre 4-3035; National Press Bldg., Washington 4, D. C., Phone National 3414.

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

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

Robert F. Boger
PUBLISHER

J. G. Johnson, *Business Manager*; R. W. Martin, Jr., *Sales Manager*; Sales Representatives: J. C. Anthony, New York; M. J. Storz, Philadelphia; V. K. Disette, Cleveland; L. J. Biel, Chicago; W. E. Donnell, St. Louis; J. H. Allen, Dallas; R. C. Maultsby, Atlanta; J. W. Otterson, San Francisco; C. F. McReynolds, Los Angeles. Other sales offices in Pittsburgh, Detroit, Boston, London.

Anita Scaffo, *Research and Marketing.*

Member of Associated Business Publications, Inc., and the Audit Bureau of Circulations

Aviation Week May 29, 1950 Vol. 52, No. 22
McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. Publication office—99-129 N. Broadway, Albany, N. Y. CURTIS W. McGraw, President; WILLARD CHEVALIER, Executive Vice-President; JOSEPH A. GERARDI, Secretary and Treasurer; PAUL MONTGOMERY, Senior Vice-President. Publications Division; NELSON BOND, Vice-President and Director of Advertising; J. F. BLACKBURN, Jr., Vice-President and Director of Circulation. Published Weekly in U. S. A., price 50¢, a copy, 50¢ in Canada. Subscription rates—United States and possessions, \$6 a year, \$9 for 2 yr., \$12 for 3 yr. Canada, \$8 for 1 yr., \$12 for 2 yr., \$16 for 3 yr., payable in Canadian currency at par. Pan American countries, \$10 for 1 yr., \$16 for 2 yr., \$20 for 3 yr. All other countries, \$20 for 1 yr., \$30 for 2 yr., \$40 for 3 yr. Address all communications about subscriptions to 99-129 N. Broadway, Albany 1, N. Y., or Director of Circulation, 330 W. 42nd St., New York 18, N. Y. Please indicate position and company connection on all subscription orders. Allow at least ten days for change of address. Entered as second-class matter, July 16, 1947, at Post Office, Albany, N. Y., under Act of March 3, 1879. Copyright 1950, McGraw-Hill Publishing Co. Cable address "McGraw-Hill New York". Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL, ENGINEERING AND AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

To assure passengers the greatest possible comfort and safety, the fleets of Martin Model 4-0-4 transports ordered by Trans World Airlines and Eastern Air Lines will be *completely* pressurized and air conditioned by AiResearch.

Thus, The Glenn L. Martin Company and two of the world's leading air lines have called on the outstanding designer and manufacturer of pressurizing and air conditioning equipment for high-altitude, high-speed aircraft. They have found by experience that similar equipment on leading types of commercial and military aircraft delivers the ultimate in dependable service over long periods of time.

It must be stressed that AiResearch is creating entire pressurizing and air conditioning systems—tailor-made for the Martin 4-0-4. These are not simply components, but complete systems embracing all critical elements for pressurizing, cooling and controlling the temperature of aircraft passenger cabins to provide maximum safety and comfort.

Into the design, engineering and manufacture of this equipment goes more than a decade of experience. *Only* AiResearch has this backlog of "know how" and skilled manpower, which already has created pressurizing and air conditioning equipment for a majority of all post-war high-altitude and jet aircraft.



AiResearch Manufacturing Company, Los Angeles 45, California

ZERO reader

available NOW for
immediate installation

THE INSTRUMENT which has received such high acclaim from all who have flown it . . . the Sperry Zero Reader . . . is now available for immediate delivery after years of flight testing.

- Developed by Sperry with the co-operation and encouragement of All-Weather Flying Division, USAF, and the Air Transport Association, the Zero Reader greatly simplifies the pilot's job of routine flying as well as making

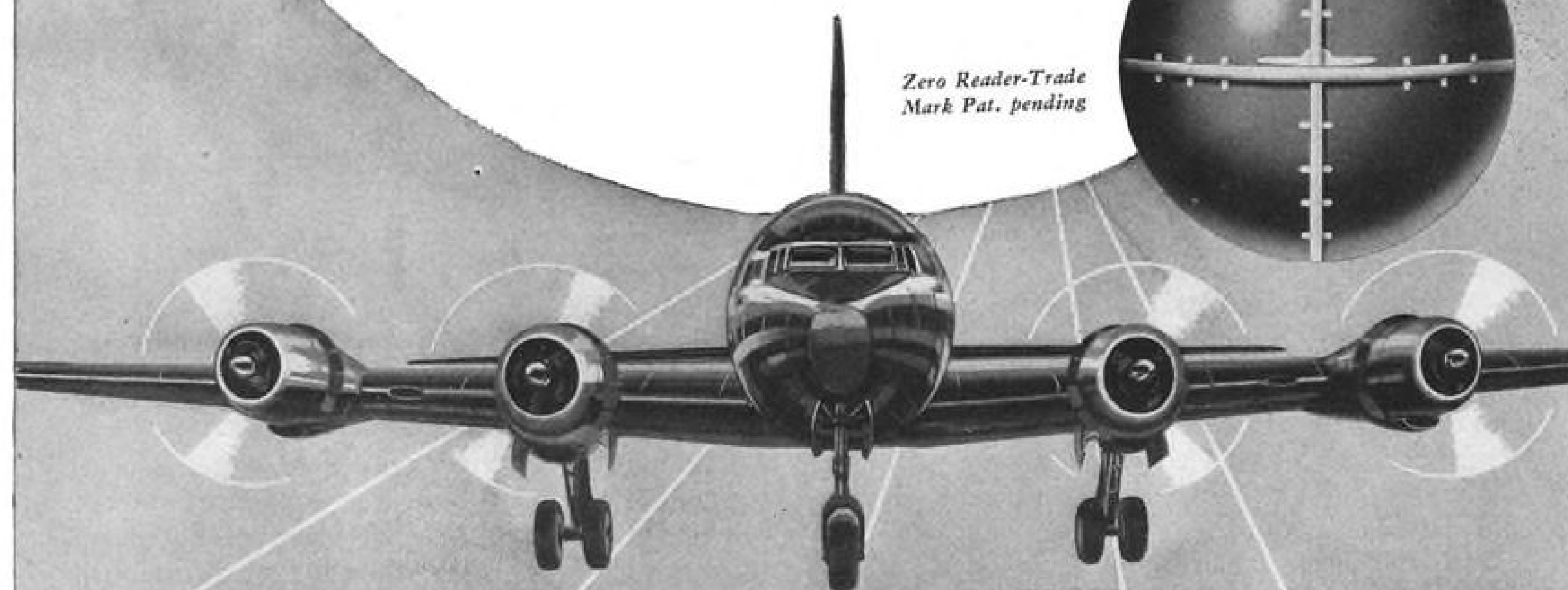
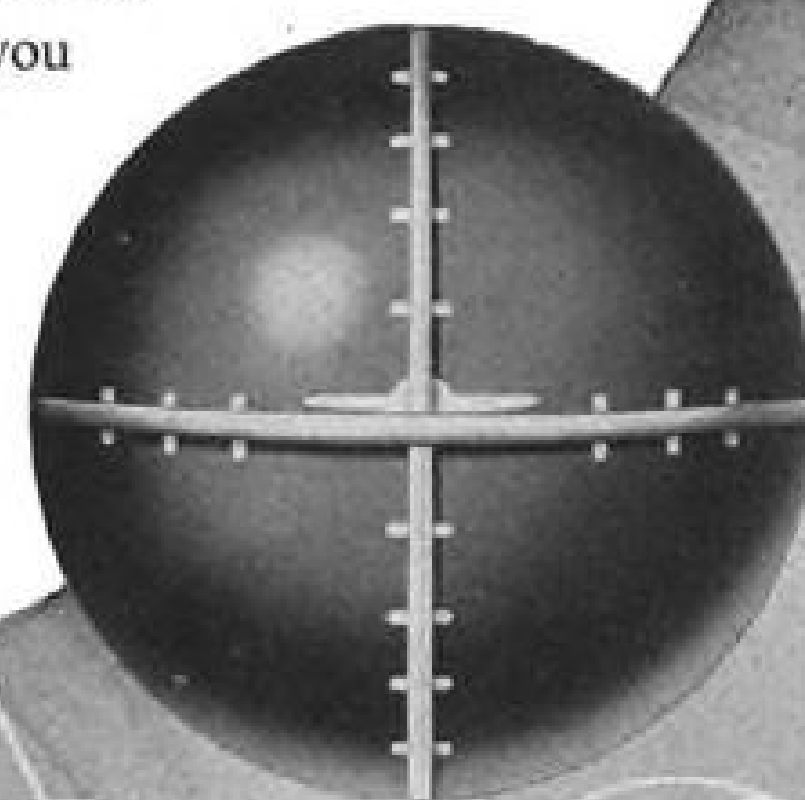
manual approaches on Instrument Landing Systems.

- The Zero Reader shows on one indicator . . . heading, attitude, altitude and instrument landing information . . . data normally supplied by five essential instruments. By merely keeping the two pointers of the instrument at zero, the pilot has at his fingertips the only manual system approaching the performance of stabilized automatic flight control.

- This simpler technique for flying, navigating and making manual instrument approaches is another step in the attainment of all-weather operations.

- Our nearest district office will be glad to give you full information.

Zero Reader-Trade
Mark Pat. pending



SPERRY

GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION • GREAT NECK, N. Y.
CLEVELAND • NEW ORLEANS • NEW YORK • LOS ANGELES • SAN FRANCISCO • SEATTLE

WHO'S WHERE

In The Front Office

John J. "Jack" Keaveny, chief test pilot for Bellanca Aircraft, has been promoted to director of sales, succeeding Clarence D. Chamberlin, who has resigned. Keaveny also retains his former position. Before joining Bellanca seven years ago, he was a pilot with Eastern Air Lines for three and one-half years.

Dr. George Sachs has been named vp. of Horizons, Inc., an experimental research lab for private industry. Dr. Sachs is well known for his work on the fundamentals of the metallic state and on the properties of ferrous and non-ferrous materials for such items as aircraft parts, weld metal and cartridge cases.

Arne Foss has been named president of Frank B. Hall & Co., Inc., insurance brokers, succeeding the late Arthur J. Sullivan. Edward S. Benfield has become chairman of the company's board.

Changes

Among the Manufacturers—Dr. Ralph P. Johnson, former deputy director of the Atomic Energy Commission's Washington research division, has joined the Howard Hughes research and development labs as associate technical director. E. Van Vechten has been placed in charge of the company's newly organized material department subcontract section. . . . G. L. Phillippe has been appointed comptroller for General Electric Co.'s apparatus dept. C. C. Clymer has been named manager of materials handling and testing division of GE's industrial engineering divisions, replacing M. A. de Ferranti, who has been assigned as asst. to the manager of the parts division, aircraft gas turbine divisions.

Charles L. Freel has been appointed administrative asst. to the general sales manager of Lord Manufacturing Co. . . . Kearney G. Robinson is new manager of Wilson Radio Co. . . . Paul Hetenyi has been named export manager of Aerovix Corp. . . . Carl A. Anderson has been promoted to head a new separate division in Minneapolis-Honeywell Regulator Co.'s aeronautic sales dept. to manage service activities across the country. . . . Wayne D. Cannon has joined the European sales staff of Lockheed Aircraft Corp. . . . Dr. Albert C. Hall of MIT has been appointed associate technical director of Bendix Aviation Research Laboratories.

Around the Airlines—John Long is manager of Braniff Airways' new office in Buenos Aires, Argentina; Don Grefe is manager for Panama and Ecuador; Pedro A. Diaz is acting traffic manager in Panama; and Paul Parsons, Jr., is new manager at Guayaquil, Ecuador. . . . C. L. Stewart has been named asst. secy. of Western Air Lines, and Kenneth O. Smith has been appointed news bureau manager replacing Rocky Spicer who recently resigned.

INDUSTRY OBSERVER

Wright Aeronautical Corp. is coming back into the military engine picture rapidly. Latest deal is sale of 3250-hp. Turbo-Cyclone compound engines. For the 79 Boeing B-29 four-engine bomber-tanker conversions to be renovated under the additional 1950 funds to be provided by Congress. Essentially the same powerplant is going on the latest Lockheed P2V-4 twin-engine patrol bomber. (See Page 27.)

Avro Canada's Jetliner was flown on a single engine for the first time with Trans-Canada Airlines' pilot Al Edwards at the controls for the first time during recent seven-minute trial. Flight was made with the No. 3 engine. Indicated air speed was 200 mph. at 6000 ft. at 14,100 rpm. (Full rpm. for takeoff is 14,700.) Plane flew at 240-mph., indicated air speed in a later similar trial.

Jetliner passenger fare will be at least as low as fare on present transports for 400-to-1200-mi. range—perhaps lower—according to Avro Canada executives and technicians. They estimate that an operator will be able to make more money with this type of craft than with piston-engine transports.

Second Avro Jetliner is now being constructed, and should be flying in October. First Jetliner has had no engine change for defects after over 100 hr. of test flying.

Vickers Viscount successfully tested techniques of operating with two of its four Rolls-Royce Dart turboprop engines cut off during its recent 4400-mi. European demonstration tour. Overall fuel consumption was 17,423 gal. of kerosene in 61 flight hr., including cross-country and demonstrations. Plane was flown at 24,000 ft. with a two-engine descent to conserve fuel. At two destinations the Viscount went into a holding pattern because of weather and again used the two-engine operation successfully.

Technique of towing short-range helicopters behind fixed-wing aircraft for long-range rescue missions is being abandoned by USAF. Although towing, as tested at Wright Field, is technically feasible, copters can be towed only at their relatively slow never-exceed forward speeds. Time can be saved by disassembling the copters, hauling them in transports to landing fields near the rescue locations, and reassembling them. This gives the Sikorsky H-19 a new competitive advantage for long-range missions, since it is designed for quick take-down to be carried in Fairchild C-119 Packet.

Flying wire cutters are incorporated in the experimental agricultural plane designed by Prof. Fred Weick at Texas A&M College. Sharpened leading edges of the spring-steel landing gear struts would cut wires for low-flying duster and sprayer pilots who occasionally catch their gear in a sharp pull-up out of a field, and might otherwise be catapulted into a crash.

First regular helicopter airmail service on the continent of Europe will be inaugurated with two Bell 47Ds by Sabena on Aug. 1. Service will be under contract with Belgian Post Office. Operation will cover Antwerp, Libramont, Bastogne, Liege, Tangres, Hasselt, Beeringen, Turnhout and Herenthals, from the terminal at Brussels. Sabena's copters cost \$28,400 complete, with VHF communication and mail bins.

Sabena is interested in the speed and payload characteristics of Sikorsky S52-2 for its helicopter mail program, now based on five-year experimental plan. But the Belgian carrier will analyze USAF and Navy experience with the craft before deciding. Sabena sees a big future for copters in the Congo.

Air Materiel Command technicians do not expect to have an electronic air rescue beacon, for incorporation in planes, developed to the stage where it will be ready for production before 1954. Beacon would be a homing device enabling rescue planes to fly directly to aircraft which was forced down.



*10

EXAMPLE PROJECTS

*4

ADJUSTABLE EXHAUST NOZZLE

Problem:

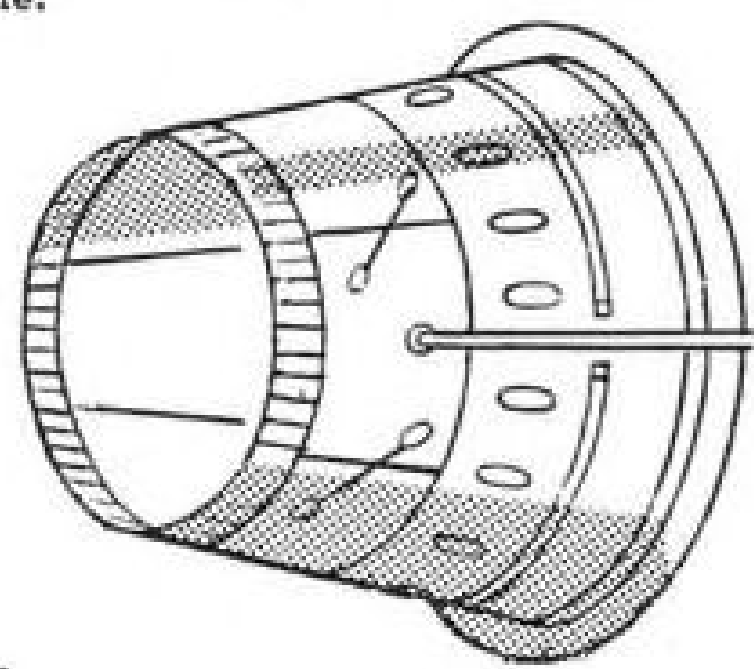
Solve customer fabrication design problems on intricate functional exhaust nozzle.

Solution:

Origination of practical functional shapes.

Result:

Trouble free operation with extended life.



AUnique
sub-contractor
EXPERT FABRICATORS OF
METAL AIRCRAFT PARTS



AIRCRAFT CORPORATION
NEWTOWN, Bucks County, PENNA.

AVIATION CALENDAR

- May 29-31—21st annual meeting, Aero Medical Assn., Palmer House, Chicago, Ill.
- May 30—Beginning of fourth session of the Assembly of the International Civil Aviation Organization, and the 6th session of the ICAO legal committee, Montreal, Canada.
- June 1-2—American Society for Quality Control, fourth national convention and fifth midwest conference, Milwaukee Auditorium, Milwaukee.
- June 1-4—Aviation Writers Assn. annual convention, Hotel Mount Royal, Montreal, Canada.
- June 3-4—Air fair and industrial exposition, Shawnee, Okla.
- June 8—Pratt & Whitney distributor operation and maintenance meeting, Airwork Corp., Millville, N. J.
- June 10-13—National Aeronautics Assn., annual convention, Hotel Statler, St. Louis, Mo.
- June 10-25—International aero exhibition, Centenary Palace, Brussels, Belgium.
- June 12-14—Mid-year meeting of Aviation Distributors and Manufacturers Assn., La Salle Hotel, Chicago.
- June 12-16—Conference on costs, budgeting and economics of industrial research, department of industrial research, Columbia University, New York.
- June 12-16—AIEE summer and Pacific general meeting, Huntington Hotel Pasadena, Calif.
- June 21-25—Ninety-Nines 1950 convention, Ft. Clark Guest Ranch, Brackettville, Tex.
- June 22-23—Mid-year meeting of Aviation Distributors & Manufacturers Assn., Edgewater Beach Hotel, Chicago, Ill.
- June 29-July 1—1950 national meeting of Institute of Navigation, San Diego, Calif.
- July 7-8—Royal Air Force 1950 display, Farnborough airfield, England.
- July 10-28—Air Age Institute lecture series, Parks Air College, E. St. Louis, Ill.
- July 12-14—Annual summer meeting of the Institute of Aeronautical Sciences, western headquarters building, Los Angeles.
- July 16—Third efficiency race and air show, sponsored by Mansfield Aviation Club, Inc., Mansfield, O.
- July 21-23—9th annual all-Ohio air tour, sponsored by Cleveland Junior Chamber of Commerce.
- Aug. 2-13—17th national soaring contest, Grand Prairie, Texas.
- Aug. 19-20—California Air Freight Clinic, sponsored by Calif. Aeronautics Commission and Oakland Chamber of Commerce Aviation Committee, Oakland.
- Sept. 5-10—Eleventh flying display and exhibition, Society of British Aircraft Constructors, Farnborough airfield, England.

PICTURE CREDITS

11—Naumair; 13—Lockheed; 14—Good-year; 27, 30—Wright Aero Corp.; 45—PAA.

The Standard of the Industry

WITTEK
STAINLESS STEEL
Aviation
HOSE CLAMPS



TYPE FBSS

Utilizing the basic Wittek Floating Bridge . . . this type has been tested and proven through over ten years of dependable service on all types of aircraft applications.



TYPE WWD

Pioneered in stainless steel construction by Wittek for greater strength and dependability . . . this type is available in all standard aircraft sizes, also in large diameters from 4" to 12" for ducts and special applications.

Wittek Aviation Hose Clamps meet current AN specifications and have C.A.A. approval.

WITTEK
MANUFACTURING CO.

4308 W. 24th Place
Chicago 23, Ill.



Dependability In Hose Clamps
For Over A Quarter Of A Century

NEWS DIGEST

DOMESTIC

United Air Lines wants more coach service, after holding out against it longer than the other major trunks. It has asked CAB to extend its Los Angeles-San Francisco coach run to Portland and Seattle, beginning June 4. Reason: It wants to meet increasing coach competition in that area.

New Designation of the 12 planes Glenn L. Martin Co. is leasing to TWA is model 2-0-2A. First plane is due for ground tests late next month; deliveries should be made during summer and fall. Certification is expected at a gross weight of 41,600 lb. (Present 2-0-2-gross is 39,900 lb.; anticipated 4-0-4-gross is 42,750 lb.)

Government-financed transport plane-testing program (five years, \$250 million) will be pushed hard by Sen. Edwin Johnson, chairman of Interstate and Foreign Commerce Committee. But he said he "would not try" for passage of legislation for government-financed commercial prototype development.

National "heliport" system is asked by New York's Rep. Eugene Keough. He introduced a bill calling for heliports on or near government buildings. Program would be directed by CAA in consultation with Postmaster General, Defense Secretary and Administrator of General Services.

Another jet engine has been licensed commercially. It's Westinghouse's J-34, with a thrust-rating of better than 3000 lb. The J-34 powers the Douglas D-558-II and F3D-1, McDonnell's FH-1 and XF-88, Lockheed's XF-90 and the Chance Vought XF7U-1.

Air Transport Assn. asked Congress to remove the airlines from coverage by the Railway Labor Act and to place them under the Taft-Hartley Law. ATA Executive Vice-President Robert Ramspeck said the Railway Labor Act is tailored for railroads, favors employees in collective bargaining and has not worked in the airline industry. An airline worry: Senate Labor subcommittee is considering an amendment to the Railway Labor Act which would legalize the union shop and dues checkoff system.

Curtiss-Wright's plans for helicopters (AVIATION WEEK Jan. 30) shaped up even stronger when Doman Helicopters, Inc., last week notified its stockholders

that it had entered into a concrete five year engineering agreement with C-W. C-W gets rights to build and sell copters of more than 250 hp., incorporating the Doman rotor system. Doman is completing an eleven-place prototype Artic rescue-type copter, LZ-4, which is expected to be test flown in about 30 days.

Lightplane exports still are falling, according to figure of nine companies reported by AIA. April shipments were 31, valued at \$121,447. March shipments: 37, valued at \$200,674. Monthly average in 1949: 41, valued at \$188,949.

One of busiest and best-known telephone numbers in the nation is going to be changed. Effective June 15, REpublic 6700, the Washington number of USAF and Army, becomes LIberty 5-6700. Another familiar number passes away Oct. 1 when the REpublic 7400, the Navy, goes over to the Liberty exchange. Better check extensions of your Pentagon contacts; 60 percent will be changed in the transfer.

FINANCIAL

United Aircraft Corp. reports profit of \$3,484,517 for first quarter, on income of \$65,639,922. Backlog on Mar. 31 was \$275 million.

Piasecki Helicopter Corp. is seeking additional financing to buy production equipment and expand offices. Agreement for \$1.5-million line of credit has been signed with Philadelphia bank, and the company is trying to increase the mortgage on its plant.

INTERNATIONAL

Columbian Airline Avianca signed a \$2.6-million contract for two Lockheed Constellations, first to be delivered in March, 1951. It has an option on a third Connie.

France's jet helicopter, SO 30-1110 Ariel made first flight at Villacoublay and paved way for two improved prototypes. A Mathias engine operates a compressor feeding air to combustion chambers at each rotor blade tip. Present craft is single-seater, but a three-placer is under study.

International Civil Aviation Organization added two members: Iran and the United States of Indonesia. Membership now is 58.

CLEAR COMMUNICATION OMNI NAVIGATION

WITH **ARC** AIRCRAFT
RADIO
CORPORATION

VHF
EQUIPMENT



Fly Directly
in Less Time—
Keep All Signals
STATIC FREE

Get static-free communication and the added reliability of omni range navigation by installing A.R.C.'s Type 17 2-way VHF Communication and Type 15B Omni Range Navigation Equipment. With the 15B tuned to the VHF omni stations now covering the country, you fly directly in less time. You can receive weather broadcasts simultaneously with the navigation signals—static free! The 15B takes the work out of navigation and provides long, trouble-free life. The Type 17 provides an independent communication system for use while the 15B is busy providing navigational information. Other A.R.C. equipment provides LF range and broadcast reception, and rotatable loop navigation.

All A.R.C. Airborne equipment is Type Certificated by CAA. It is designed for reliability and performance—not to meet a price. Installations for both single and multi-engined planes are made only by authorized service agencies. Write for further details or name of your nearest A.R.C. representative.



Aircraft Radio Corporation

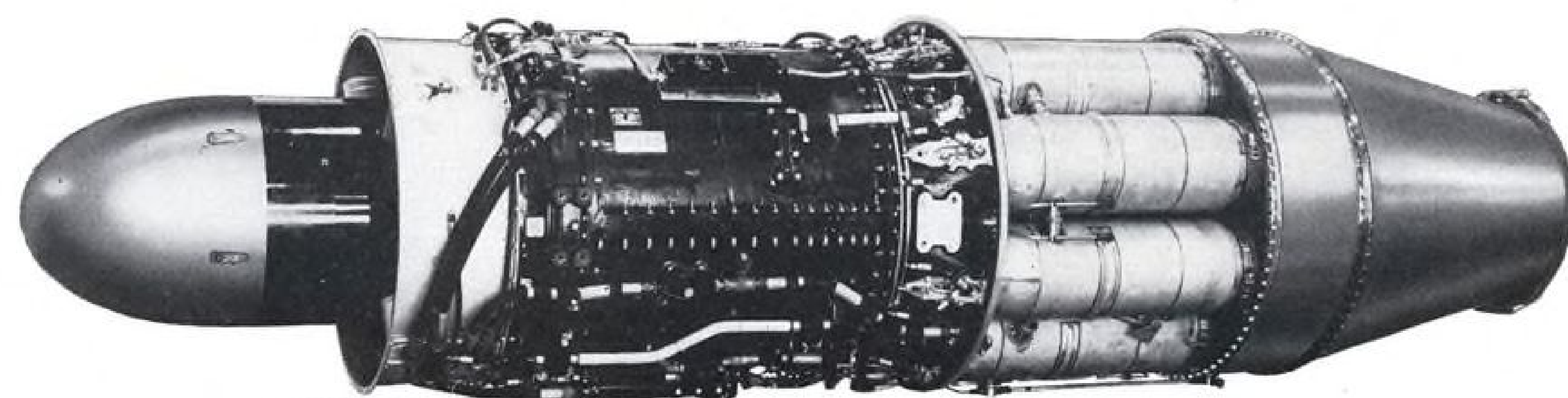
BOONTON, NEW JERSEY

Dependable Electronic Equipment
Since 1928

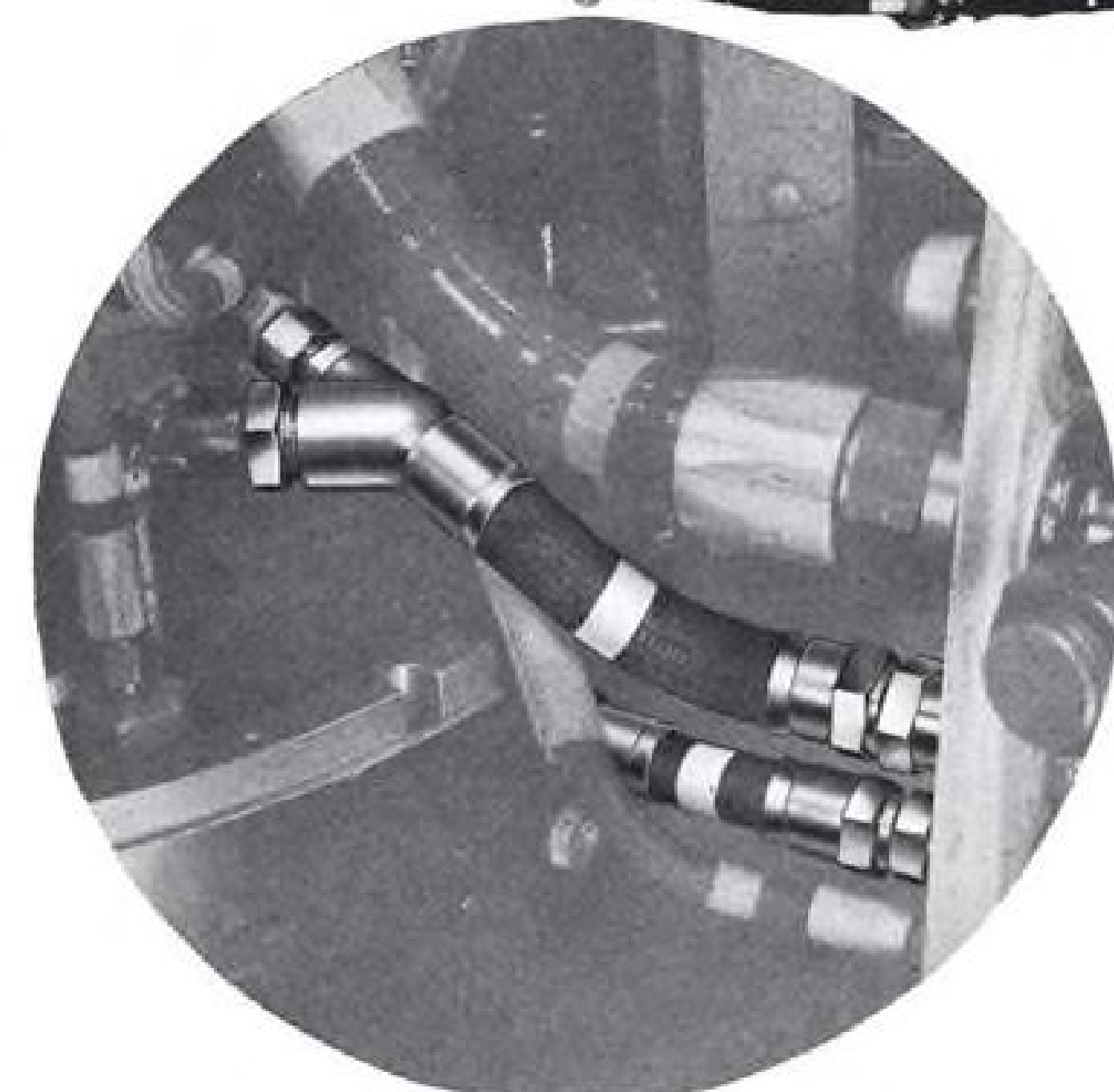
AVICA.....

FLEXIBLE PIPES

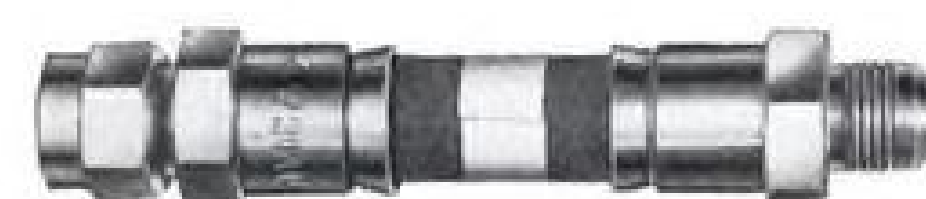
With AVICA CUSTOM DESIGNED END COUPLINGS



GENERAL ELECTRIC J-47 TURBO-JET ENGINE



CUSTOM MADE AVICA PIPE ASSEMBLIES
FOR J-47 TURBO-JET ENGINE



These AVICA Flexible Pipes with AVICA custom-made special-purpose end couplings are in production for the J-47 Turbo-Jet engine. They were designed to overcome installation problems and to absorb vibration which the rigid tubing they replaced could not withstand. AVICA Flexible Pipes using gasoline and oil resistant synthetic rubber hose or flexible metal hose can be supplied with straight, integral angle on special purpose couplings to suit your requirements.

SEND US YOUR BLUEPRINTS
OR SKETCHES FOR QUOTATIONS.

← SEND FOR ILLUSTRATED AVICA FOLDER



AVICA CORPORATION

(formerly AVICO INCORPORATED)

PORTSMOUTH, NEWPORT, RHODE ISLAND

International Experts At IATA Meeting (Story starts on page 12)



COMMUNING: Communications Working Group—George R. Petty, IATA; J. J. Kenny-hertz, TWA, vice chm., Pierre Fromheim, Air France, chm.; W. J. McKnight, IATA, sec.



OPENER: KLM's Karel Steensma, opens IATA's annual technical conference.



SURPRISE: ICAO Pres. Dr. Edward Warner (right) surprise visitor, with Norwegian Airlines' H. W. Ree.



BEAM: Sir Robert Watson-Watt, "father of radar" (center), with E. W. Pike (left) and H. H. Fenton, BOAC.



MIDDLEMAN: Harold R. Harris, general manager, AOA, and chairman of the conference, between Donald Nyrop, CAA (left), and John C. Leslie, PAA vice-president.



ON DECK: Adm. Paul H. Smith, U.S. representative to ICAO, talks up.

Atlantic Pact Means More Plane Buying

New collective security plan likely to up procurement funds as much as \$3-6 billion.

All signs point to a big step-up in military aircraft procurement starting with fiscal 1952 (July 1, 1951). How big depends on planning now in progress.

Size of the boost can only be tentatively estimated at this time.

But the outlook is definitely for one of three possible levels of increase:

- **Integrated defense**—Under the collective security plan adopted last week in London by the North Atlantic Council, top policy group of the 12 Atlantic Pact nations, the U.S. would accept responsibility for strategic air defense of the western Europe-Canada-U.S. community. This plan was blueprinted by the Defense Committee, the second-flank policy group composed of defense ministers, at a meeting at The Hague more than a month ago. Estimates are that it would boost the U.S.'s current \$14.5 billion-a-year defense bill by \$3- to \$6-billion-a-year, with most of the increase going to the strategic air arm. Present expenditure is \$13.5 billion for the U.S. and \$1 billion for European assistance.

The 1951 fiscal year budget, still pending in Congress, allocates \$2.5 billion for USAF procurement (including guided missiles, electronics, and the \$200-million supplemental recently recommended by the administration). The Hague plan would mean increases of \$1 to \$2.5 billion. Total would then be \$3.5 to \$5 billion.

- **Reduced Plan**—A 12-member Strategy Board, representing the 12 ministers of the North Atlantic Council, will soon start functioning permanently in London. Its task will be to whittle down the cost of the Hague plan as far as possible and allocate costs among the nations.

Practical observers here believe that the board, after consideration of the nations' financial limitations, will come forth with an acceptable trimmed-down version of the Hague plan. Achievement of its ultimate goal of a formidable and completely integrated western defense would probably be spread over several years. They estimate that this development will entail a modest increase of from \$1 to \$2 billion in

the immediate U.S. defense bill. Most of the increase would go toward the strategic air arm, with some increase in aid to assist European nations build up their forces. Informed sources estimate that this development, considered the most probable, would mean "an increase of several hundred million dollars" for plane procurement in the 1952 fiscal year over the 1951 fiscal year level.

- **48-Group Program**—Even without any build-up of the USAF for its role in such an integrated plan, a substantial increase in plane procurement will be required to maintain the 48-Group Air Force program. And Secretary of Defense Louis Johnson is now committed to this program.

Out of \$2.5 billion for USAF procurement in the 1951 fiscal year budget, \$1565 million will be available for new plane obligations. USAF has informed the House Appropriations Committee that to sustain 48 modern groups, an increase of \$175 million, or an availability of \$1740 million, would be needed in the 1952 fiscal year. The program would require \$1780 million in 1953, \$1850 million in 1954, and then level off at \$2000 million annually in the 1955 fiscal year and thereafter according to USAF schedules.

The main accomplishment of the North Atlantic Council meeting was to firmly commit the 12 nations of the western bloc to a "single" collective military force. This calls for dropping the concept of "balanced" individual national forces. And it sets up the Strategy Board, "with the least possible delay," to function as a "board of directors" to achieve this goal.

Under the collective plan, the U.S., will assume full responsibility for strategic atomic bombing. USN also, will have major responsibility jointly with Great Britain, for Naval power to keep the sealanes open. Continental nations will have major responsibility for ground forces, and, along with Great Britain, for tactical aviation support. It adds up to an increase in USAF and Naval strength and holding U.S. Army strength at its current level. Mean-

while armies of western Europe are to be expanded.

Any collective plan ultimately worked out by the Strategy Board and approved by the North Atlantic Council will still be subject to acceptance and implementation by the 12 member countries before the "single western force" goal can be realized.

There remains some isolationist opposition in Congress to the policy of collective defense. Also there is substantial opposition from the economy bloc to any increase in the U.S.'s \$14.5 billion-a-year defense spending.

Sen. Edwin Johnson (D., Colo.), voicing the thinking of the isolationist-inclined, said: "I am afraid we are going to be pouring money into Europe for another Maginot Line."

Sen. Harry Byrd (D., Va.), economy leader with a sizeable following, commented: "I am in favor of coordinating defense, but the U.S. cannot afford to spend any more money than it now spends on arms."

International policies however will probably override their objections and require that the U.S. take the lead in implementing a final version of the Hague plan. This will require a substantial increase in U.S. defense funds allocation for 1952.

Advocates of more defense spending are pointing out that the overall U.S. budget will be fattened by several billion dollars in the 1952 fiscal year, made available to defense by tapering off of Economic Cooperation Administration program spending. ECA's 1951 fiscal year authorization is \$3 billion. For 1952, the allocation will be substantially less. And ECA is scheduled to close at the end of the 1952 fiscal year.

Science Foundation

The President has signed legislation setting up a National Science Foundation to promote and coordinate basic research. A 24-member Presidentially-appointed board of eminent scientific leaders would establish policy and the activities of the foundation would be administered by a \$15,000-a-year Presidentially-appointed full-time director.

The new measures authorizes a \$500,000 appropriation to launch the program during the 1951 fiscal year and up to \$15 million annually after that.

Airline Engineers Told About Jets

In two-day symposium at IATA meeting, operators hear what has happened so far to turbine transports.

By Irving Stone

Asbury Park, N. J.—Airline technicians spent two days here listening to meteorologists, manufacturers and military representatives telling them what to expect in the high-flying, high-speed era the turboprop and turbojet will bring.

Occasion was the turbine-powered-aircraft symposium of the International Air Transport Assn. on May 18-19. This searching discussion was admirably chaired by Jack J. Dymont, Trans-Canada Airlines' director of engineering.

Here are some of the things the airline engineers were told they would have to consider:

- **Meteorological factors** are important because sufficient data on the variations of wind and temperature with altitude over the entire world are not yet available to enable accurate evaluation of turbine operations.

- **Operation under icing** apparently requires a non-expendable ice protection system for moderate conditions, and an expendable system to deal with severe icing, as in descent.

- **Air traffic control** must keep in mind passenger comfort in let-down. Merits of the steep descent (about 4000 fpm.)

and gradual letdown (say from about 200 miles out) will have to be studied.

- **Landing factors.** Feasibility of the parachute will have to be evaluated for deceleration in normal landing.

About 200 representatives attended this fourth IATA technical conference which ran from May 9-20 (Page 15). Represented at the symposium were approximately 18 airlines, eight engine builders, ten airframe manufacturers, two propeller companies and numerous builders of avionic equipment.

- **Meteorology**—Technicians are not too sure with what precision meteorological information is required, but in any event, the network of stations must be expanded.

Headwind data on a seasonable basis for Europe, the North Atlantic and North America are available up to 40,000 ft. with sufficient degree of accuracy.

Meteorologists in Washington are now recording 200-300 millibar charts for winds every 12 hours at 40,000-50,000 ft. within plus or minus 20 knots accuracy, affording a fairly good idea of what to expect at these altitudes, so that practical flight plans can be prepared.

A 20-knot headwind tolerance could result in a 4 percent difference in fuel

consumption, and over a 2000-mi. stage distance, would reduce reserves 7 or 8 min.

Some highly satisfactory results have been attained in jet operations. In a recent flight to Africa, forecasting information enabled the de Havilland Comet to arrive at its destination within two minutes of its estimated time of arrival. Similar accuracy has been experienced with the Avro Jetliner.

- **Temperature Forecasts**—Temperature forecasting will be a vital factor, for temperature apparently is more important than winds, particularly in the early stages of flight. A 15-deg. C. change at beginning of cruise would require comedown from 40,000 to 32,000 ft.

At 25,000 ft., it was reported, it is not unusual to get a 12-deg. C. change.

And higher compression ratios in the turbojet and turboprop will make temperature deviations more important.

The general conclusion was that plus or minus 10 knots and 5 deg. C. is the forecasting accuracy airlines would like to have. But difficulty is expected in attaining these accuracies. Apparently, the higher the altitude, the more inaccurate variations become with present equipment.

Jetstreams, too, enter the high altitude picture, but may not be too serious a factor because the pilot may only have to go 100 mi. across the stream to get out of it. This phenomenon, generally encountered at 20,000-30,000 ft., is in the nature of a strong thermal wind with recorded maximum speeds of about 180-200 mph.

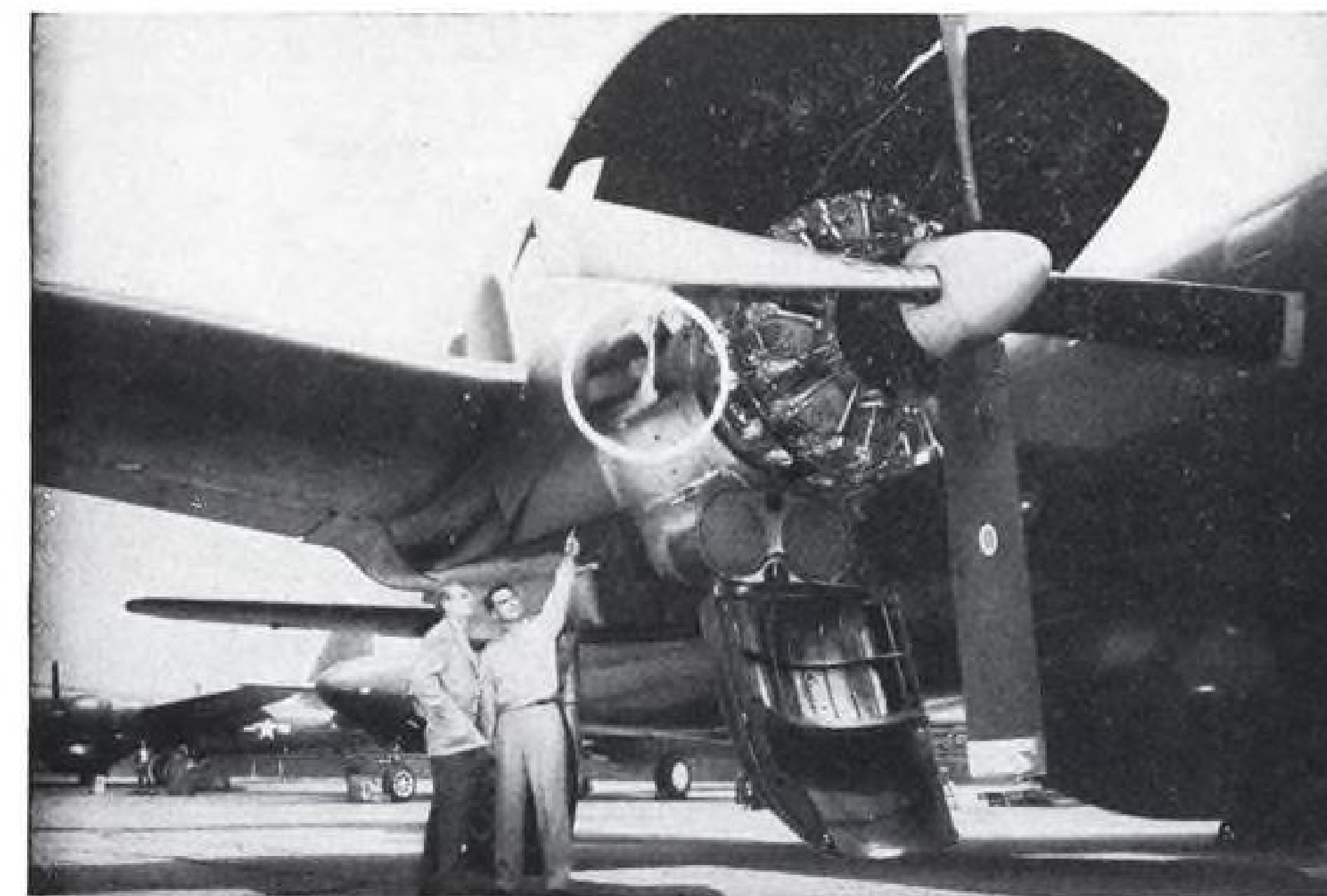
The important part airlines can play to assist the meteorologists is to gather more data enroute. Location of the stream will enable prediction of its location within a succeeding five-day period.

Apparently, clear air gusts will not be a serious consideration. It was reported that the frequency with which a 1-G gust is exceeded would affect only structure, not passengers. Avro Canada engineers observed that the dynamic response of the structure accommodates the gust effect.

In general, it is felt that there is enough gust data available today for builders of civil turbine-craft to cope with the problem. More research is desirable, however, to determine gust-causative factors to enable predictions with some degree of accuracy.

It will be important to avoid cloud turbulence topside at high speeds, and turbine-powered craft may require cloud-warning radar equipment to aid in attaining regularity.

It was said that this disturbance can be radar-detected at distances of 40 mi. Ground-based radar, reported to have afforded data up to 2000 mi.,



TURBO-CYCLONE IN NEPTUNE

First photo of Wright Aero's new Turbo-Cyclone 18 compound engine installed in a Lockheed P2V-4 Neptune patrol plane shows one of the engine's three small turbines and exhaust (inside circle). Initial flights of the compound-engine craft are said to have demonstrated shorter takeoff

runs, more takeoff power and much less engine noise. Considerable reduction in fuel consumption is also indicated. Turbo-Cyclone 18-powered P2V-4s are now in production. A detailed engineering story of the new engine begins on page 27 of this issue.

could be used to lessen the need for airborne radar equipment.

► **Icing, Rain**—No icing problem is considered to exist for the centrifugal-type turbine engine. However, it cannot be assumed that the axial-type can "digest" lumps of ice, and proper protection for the axial may take a year to perfect.

Turboprop propeller icing problem is no different than on the piston engine. American turboprop technicians said it would be necessary to de-ice the prop spinner on axial-flow engines because of the decreased airflow resulting from ice build-up. British technicians were not sure this requirement would be necessary.

Both Allison and General Electric are working with the military to develop satisfactory ice-protection schemes.

The GE representative related that they were conducting research under natural icing conditions on Mt. Washington, with particle size ranging from 3 to 30 microns—well beyond the range expected to be encountered. Inlet screen was first to ice up—within one minute. Electrical requirements for the inlet screen are deemed excessive, hence it may have to be refracted. Hot air anti-icing is being studied for inlet guide vanes, struts supporting the gear-case and the island-fairing. Fitting the engine accessory section with a heating pad has worked well.

► **One Solution**—A water-methanol solution is one answer to the icing problem, but drawing of air for cabin supercharging and heating might make use of the spray impractical.

Descent through severe icing would be an operational criterion because reduced power would give less heat from the engine and reduced rpm. would decrease generator output for electrical requirements. It would seem that operators would not want any ice-protection system tied up with the time element, because although pilot would attempt to get out of icing conditions as quickly as possible, there may still be medium icing over a relatively long distance.

One engineer indicated that airlines would prefer to have a system giving indefinite protection against moderate icing, without a weight penalty, but would be willing to accept such penalty for additional protection against severe icing, as in descent.

Lab tests should not be deemed conclusive. Though these may appear to offer solutions to icing problems, actual operating conditions may bring some severe penalties not now foreseeable.

Rain damage is another high-speed operational factor. Since early F-80 experiments showed that rain took paint off the leading edge, use of this skin covering medium in this location on high-speed turbine would seem to be ruled out.

AOA reported a hailstone hit di-

rectly in the center of a prop dome making a dent 2½ in. in diameter. But likelihood of encountering hail at high altitude is considerably unlikely. In any event, leading-edge skin thickness would seem to be sufficient to meet hail hazard, and sharper leading edges of high-speed craft would give greater probability of hailstone deflection.

Traffic Control

Turboprop holding characteristics do not differ greatly from those of conventional craft, hence the propjet probably could conform to present practice.

For the jet plane, traffic control people would prefer a steep descent to minimize passing through other patterns as in a gradual descent.

Landing methods proposed: Avro Canada and Boeing advocated a steep descent from relatively close to the airport at about 4000 fpm. De Havilland technicians indicated that they preferred to begin letdown about 200 mi. out. Air Force representative said the craft should be brought in over the area, with sharp letdown under radar control.

Prime consideration in commercial operation would be to avoid passenger discomfort. Avro said fuselage angle coming down from altitude would be about 8 deg. at 250 mph. indicated air speed; de Havilland figures it would be about 6 deg.

With the pure jet, it is felt that during letdown it is necessary to maintain 35 to 50 percent of engine power to cope with a go-around situation, maintain adequate pressurization and insure sufficient current for electrical services.

Where there is saturation between terminals, jet craft may well complicate the traffic control problem. Present thinking is that there inevitably will be a compromise arrangement worked out

between the group of airlines serving a particular airport.

However, it was felt that jets should not be designed especially to enter a stack and hold. When it has to, in a particular case, a procedure will have to be evolved to accomplish best feed-in.

Celestial navigation will be practical at high speeds and altitudes with the ordinary sextant, although error may be slightly greater because of speeds involved.

Antennas

It would seem that for high-speed craft, antennas will have to be suppressed or made retractable. Some avionic technicians believe that antennas, in general, can be submerged and will work as well as exposed units, but that they must be engineered into the aerodynamic pattern of the aircraft. Plastic materials present a problem, but it is felt that submerged antennas can be designed for any installation, provided the user is willing to pay the penalty for undesirable materials and where they will have to be placed.

• The HF suppressed antenna has been found practical on the Comet. De Havilland has about 35 hr. of experience with this installation.

• Marconi Wireless has already developed ADF with suppressed loop.

• At least three configurations of VOR suppressed antennas are working as well as the exposed unit.

• Localizer suppression also works well.

In general, the English feel that suppressed antennas in British craft offer adequate performance and sensitivity.

Takeoff, Landing

It was said that with the turbine plant, the major portion, if not all, of the power loss caused by tropical tem-

peratures or high altitude may be regained with water-methanol injection. If injection is not used, the turbine plant is more temperature-sensitive than is the piston engine.

Report was, that at an altitude such as would be encountered at La Paz Airport (over 12,000 ft.), the Viscount turboprop with water-methanol injection could get off with 5 percent loss in takeoff weight.

For the Allison turbojet, it was reported that in the 0-100-deg. F. range, there is a 4 percent change in thrust per 1-deg. temperature change.

For the Comet, at 15-deg. C. above ICAN, runway length is increased 17½ percent, without water-methanol injection.

It was also offered that for a 10-deg. C. rise above ICAN for a given runway length, 3000 lb. of payload must be forfeited to get off without use of water-methanol.

Injection figure given for the Derwent Vs in the Jetliner is 10 gpm. per engine, under takeoff power conditions.

Effects of humidity are still not cer-

tain, but should not be worse than with the piston engine. Bristol says humidity has very little effect on the turboprop, perhaps beneficial. The Rolls-Royce representative held no measurable effect was involved.

► **Parachute Landing**—One suggestion is that the pure jet transport should be equipped with a parachute for emergency use in landing. Device was recommended, by some, for normal landings.

With the B-47 it has been found that time required for operation is 3 sec. from pressing the release button. Release is about 10-12 ft. above runway.

Parachute weight would be about 100 lb. Action is considered to be just as smooth as with reverse-pitch props.

Use of reverse JATO would probably involve prohibitive weight and cost.

It is felt that some form of wheel anti-skid device is needed, particularly with jets, where there is no prop drag. A spoiler might be used to kill the lift, squashing the tire, causing it to give more surface.

For another view of airline worries over jet operations see page 34.

Airlines Study New Systems

First international carrier technical conference held in U. S. argues value of recent methods and devices.

By G. L. Christian, III

Asbury Park—International standardization of aeronautical matters received powerful stimulus at the first IATA Technical Conference held in the U.S.

Convening from May 9 to May 20 at Asbury Park, N. J., some 150 engineers, meteorologists, and other aviation specialists representing 18 airlines from all parts of the world bent to the task of establishing world-wide uniformity of procedures, criteria and policies to reach a basis of common understanding.

Under the chairmanship of Harold R. Harris, vice-president and general manager of American Overseas Airlines, three working groups discussed the problems in the fields of engineering, operations and communications.

Engineering

The engineering group, under K. G. Wilkinson of British European Airways, considered performance requirements which have been under constant study since the 1944 Chicago international civil aviation conference. Stressing high levels of safety plus utmost practicability, the group endorsed the principle of "rationalized" performance.

This means that a reasonable, standardized performance datum line, based on number of incidents should be estab-

lished for each category of future passenger aircraft. These flexible criteria for designer and operator alike would supersede current unrealistic regulations which so often penalize existing aircraft from the point of view cost, range, comfort, etc. If applied intelligently, the nebulous engineering ideal—"crashes due to performance are illegal"—will take on substance. Basic problem is determination of the datum line.

The engineering group is very close to agreeing on all major points and thus creating a sort of "Plimsoll's line" for the aircraft of the world.

The conference agreed that angle of climb was a more valid performance criterion than rate of climb.

► **Loading Procedures**—The "Tabular Critical Cargo Compartment Method" of loading aircraft, now in use by most American carriers, was recommended to member airlines to replace the weight and balance slide rule whose use leads to loading errors.

The tabular method, based on filling out printed forms is rapid and practically fool-proof. It may be used by unskilled personnel and has the added advantage of providing a permanent record of load distribution.

► **Instrument Errors**—Knut Hagerup-Svendsen, vice-president, engineering, of Scandinavian Airlines System, pre-

sented a comprehensive study recommending standard operating and maintenance procedures for radio and pressure altimeters, air speed indicators and outside air temperature indicators.

Evaluating the reliability of these instruments is becoming increasingly important in view of the growing emphasis on pressure-pattern flying, preciseness in determining vertical separation, and the concept of "critical height."

► **Oxygen Requirements**—The conference also endorsed ICAO proposals that oxygen should be provided for passengers at altitudes above 13,000 ft. and for crew members over 10,000 ft. if craft is to remain above that altitude for more than 30 min.

No decisions were reached concerning requirements for very high altitude aircraft.

► **Maintenance Methods**—The engineering working group heard papers by H. W. Ree of DNL on SAS maintenance methods; by J. T. Dymont on the Trans-Canada Air Lines system of progressive overhaul; and by C. H. Jackson on BOAC's procedures.

Operations

W. A. Schrader, of AOA, was chairman of the operations working group whose major point of discussion was air traffic control.

The objectives of air traffic control service, predicated on increased safety, were said to be:

- Elimination of air-to-air collisions.
- Elimination of collisions during ground maneuvering.
- Promotion of orderly traffic flow.
- Obtaining fastest traffic flow possible, consistent with safe operating conditions.

A point still unresolved was: Shall planes fly airways or "as the crow flies"?

To improve and expedite air traffic control the following was considered essential:

- Streamline phraseology. Eliminate every unnecessary word and phrase.
- Crew discipline. Every crew member must be trained to the highest degree of discipline to follow established en route and approach procedures accurately and implicitly.

► **Position Reports**—The conference revised IATA standards for position reporting to limit systematic air-ground transmission of weather data and to avoid overloading communications channels.

It specified and assigned sequence to the six elements of which such reports should consist.

► **Landing Aids**—Representatives agreed that GCA, while an excellent monitoring device, does not provide as rapid aircraft reaction as ILS, due to the inherent lag in controller reading the



GOODYEAR TESTS PLANING HULL

In what is believed to be the first commercial-plane application of NACA's new planing tail hull, a modified Goodyear GA-2 three-place amphibian makes a clean takeoff during company trials of the new configuration. Goodyear Aircraft Co. engineers have been testing the new design since

1948 and are reported to be enthusiastic over results obtained which include shorter takeoff and reduction of porpoising tendencies. These improved safety characteristics would also help shorten familiarization time for pilots having no previous water aircraft experience.

scopes and verbal transmission to the pilot who then must interpret and react to instructions.

Working from the evaluation of equipment by the IATA flight technical group, the conference asserted that the operational value of GCA would be increased by the establishment and maintenance of international competency standards for GCA controllers. Also unsolved from an international standpoint is the language problem.

ILS was generally favored as a primary landing aid. If landing is to be performed manually, the Zero Reader-type of instrument enables the pilot to execute more precise maneuvers than the conventional ILS cross pointer indicator.

Visual ground landing reference for the pilot was deemed essential. Under consideration are the CAA-sponsored slope-line approach light system and the British Calvert system (AVIATION WEEK May 22). As a necessary adjunct to approach lights are:

- Adequate threshold lights.
- Easily distinguishable runway distance markings.
- Clearly defined runway centerline and edge markings.

Automatic coupling (any of the automatic approach systems) was not yet considered sufficiently reliable to bring an aircraft in to point of touchdown.

A permanent subcommittee has been established to analyze pilot reactions while making very low approaches (about 100 ft. and $\frac{1}{2}$ mi.). Purpose is to establish how accurate cockpit instrumentation has to be, how precisely the pilot must react, determine magnitude of maximum allowable maneuvers at low altitudes and exactness required of navigational aids—all with the aim of increasing instrument-landing safety and reducing bad-weather landing intervals.

► **Meteorology**—The volume of specialized meteorological material coming before the conference resulted in a recommendation that an IATA meteorological group be established to deal with these problems between conferences.

Communications

The communications working group was under the chairmanship of Pierre Fromheim of Air France.

• **Radiotelephone**—As a result of extended studies ICAO was asked to take necessary steps to expand the use of radio-telephone as a primary means of communication on long international routes on an equal status with wireless-telegraph.

A special working group was named to study the procedures used in the various regions and to establish universal coordination.

► **Frequency Assignments**—A great stride forward was made in the bothersome matter of world-wide frequency assignments. IATA will present the airline's requirements to forthcoming frequency assignment meetings of the International Telecommunications Union.

The group agreed that, in view of the increasing speed of aircraft and shortage of high frequencies for airborne radio, it would be desirable to proceed with standardizing procedures to integrate air-ground circuits with ground circuits.

Participating actively in the various meetings, symposiums and news conferences were: Karel C. Steensma, head of operations of KLM Royal Dutch Airlines and chairman of the IATA technical committee; Henrik W. Ree, Vice-President, operations and maintenance DNL and vice-chairman of the IATA technical conference; and Stanislaw Krzyczkowski, secretary of the IATA technical committee.

Decisions reached through IATA are subject to review by the technical committees. After approval, they become airline policy and are implemented in several ways:

- Submitted for further study.
- Standardized and coordinated among the member airlines when the airlines are acting on their own competence.
- Policies presented by the airlines to their respective governments when applicable.
- IATA delegations present policies to the appropriate international organizations for study, approval or implementation.

Symington Starts To Tighten Planning

Re-vitalized National Security Resources Board, under its new chairman, W. Stuart Symington, former Air Force Secretary, is expected to move forward rapidly in the field of mobilization planning—largely neglected and victim of inattention in high places since the end of World War II.

President Truman's reorganization plan is expected to implement the new role of the board, and Congress is due to go along with his ideas.

Most high defense officials agreed that "something should be done" about mobilization planning. But divided authority and lack of direction have made National Security Resources Board a pretty ineffective body up until now. The board was set up under the 1947 Unification Act to advise the President "concerning the coordination of military, industrial and civilian mobilization. It was made up of the cabinet members with an appointed chairman. Whatever action was taken, was by the whole board, as a committee.

But the secretaries were busy with the affairs of their own departments, and gave little time to NSRB work. Moreover committee actions were often stymied by conflicts.

The President's reorganization plan would transfer the administrative functions of the board to the \$17,500-a-year chairman, making cabinet members comprising the board, advisory to the chairman. Symington would have authority and responsibility for furnishing the President with a mobilization plan. It would no longer be a committee matter. The reorganization proposal would also set up a \$16,000-a-year vice chairman to assist Symington. It will become effective by mid-July, 60 days after submission, unless vetoed by Congress.

In a talk after his appointment, Symington hinted at the imposition of controls over the economy if the cold war keeps getting warmer: "Because an attack may come now with a warning measured in hours instead of years, emergency controls in the future may well have to be more extensive than in the past." He referred to manpower and profit controls.

Legislation providing for standby controls, which the President could put promptly into effect with the declaration of an emergency, is expected to result from Symington's mobilization plans.

U.S., Britain Study Joint Regulations

A carefully, casual conference of U. S. and British air experts at Washington last week was laying the ground-work for simplifying international airworthiness requirements.

Meeting was called mainly to trade U. S. and British ideas on the subject, with the background thought that: Unless U. S. and Britain agree on basic international aviation requirements, as the two largest air transport operators, what chance is there for world agreement?

Key figures in Washington were R. E. Hardingham, secretary, British Air Registration Board; George W. Haldeman, chief of CAA's aircraft division, Office of Aviation Safety, and Ray Malloy, head of flight test in the aircraft division. British delegation included several other representatives of the Ministry of Civil Aviation, Ministry of Supply and Air Registration Board.

The sessions were agreed upon last year, at the close of ICAO airworthiness division meetings in Montreal.

Discussions are mainly on design and operating features of transport aircraft in relationship to accidents. Special attention is given to such factors as wing loadings, rate of climb, and other performance parameters.

AIR FORCE CONTRACTS

GE Tops March Contract Awards

The Air Force awarded contracts in March totaling more than \$140 million to slightly over 800 firms. This was nearly double the value of February awards, and also a great increase in the number of contracts.

An interesting difference from past procurement actions was the amount allocated during the month on fixed price incentive contracts: only 16 contracts, but calling for expenditure of nearly \$57 million.

A \$24,335,384 contract to General Electric Co. for J-47 jet engines was the largest single order during the month. This, plus smaller contracts, put GE's orders at more than \$26 million, by far the greatest amount of business placed with a single company during the month.

Other large awards went to: Consolidated Vultee, \$1,051,204 (training program rework of GE turbos); and Eastman Kodak Co., \$1,295,956 (film, paper and plates).

Following is the complete list of March contracts, with estimated completion dates given where available.

\$100,000 and Over

Airborne Instruments Lab., Inc., Mineola, N. Y., evaluation program of VHF omnirange DME computer navigation systems, June, 1950, \$139,396.

Allison div., General Motors Corp., Indianapolis, J33 turbo-jet engine spare parts, Apr., 1951, \$312,000; maintenance and overhaul parts for fuel regulators used on J35 turbo-jet engines, Jan., 1951, \$170,000; maintenance and overhaul parts for J35 jet engines, Jan., 1951, \$180,000.

Beech Aircraft Corp., Wichita, T-7 and C-45 aircraft spares, June, 1950, \$321,481; modification kit—K2 heaters, June, 1950, \$125,659.

Bendix Products div., Bendix Aviation Corp., South Bend, wheels and brakes spare parts, Dec., 1950, \$307,551; wheel and brake assemblies spare parts, Jan. 1951, \$198,431.

Blederman Motors Co., Cincinnati, spare parts for truck tractors, trailers and cranes, Jan., 1951, \$137,837.

Boeing Airplane Co., Seattle, spare parts for B-17, B-29, B-50 and C-97 aircraft, July, 1950, \$311,000; one each C-97A mobile training unit, Sept., 1950, \$275,000; mobile training unit for B-47 airplane, Sept., 1950, \$449,722.

Carrier Corp., Cincinnati, furnish necessary technical services, labor supervision and material for operation of environment testing facility, May, 1951, \$111,086.

Champion Spark Plug Co., Toledo, spark plugs, July, 1950, \$201,875.

Clark, David, Co., Inc., Worcester, Mass., valves, Dec., 1950, \$101,133.

Collins Radio Co., Cedar Rapids, components of radio receiving set, Dec., 1950, \$2,191,889.

Consolidated Vultee Aircraft, Ft. Worth, kits of parts for B-36 airplanes, Nov. 1950, \$310,943; B-36 mobile training units and/or parts, Nov., 1950, \$229,848; training program rework of G. E. turbos, Nov., 1950, \$1,051,204.

Curtiss-Wright Propeller div., Curtiss-

Wright Corp., Caldwell, N. J., propeller spare parts, June, 1951, \$200,000.

Douglas Aircraft Co., Inc., Santa Monica, one each C-124A mobile training unit, Sept., 1950, \$219,684, spare parts for maintenance of C-74 and B-26 aircraft, Apr., 1950, \$200,000; maintenance spare parts for B-26 aircraft, Apr., 1950, \$100,000; maintenance spare parts for C-74 and B-26 aircraft, Apr., 1950, \$100,000; maintenance spare parts for C-47 and C-54 aircraft, Apr., 1950, \$300,000.

Du Pont de Nemours, E. I. Co., Wilmington, photographic film and paper, (Aviation Navy), Sept., 1950, \$477,175.

Eastman Kodak Co., Rochester, photographic film, paper and plates, (Aviation Navy), Sept., 1950, \$1,259,956.

Elcor, Inc., Chicago, 100 VA 3 phase inverters, Sept., 1950, \$175,317.

Electric Storage Battery Co., Cleveland, aircraft storage batteries, June, 1951, \$161,178.

Fairchild Aircraft div., Fairchild Engine and Airplane Corp., Hagerstown, Md., maintenance spares for C-82 and C-119B aircraft, June, 1950, \$320,057.

Fairchild Camera-Instrument, Pasadena, astrocompasses, Dec., 1950, \$120,000.

Firestone Tire and Rubber Co., Akron, casings, May, 1950, \$124,653.

General Electric Co., Schenectady, turbo-superchargers type BH-1 spare and spare parts and data, June, 1952, \$1,388,528; J47 turbo-jet engines, spare parts, tools and data, no estimated completion date, \$24,335,384; modification and overhaul of fuel regulators for J47 engines, Nov., 1950, \$532,260.

Goodrich, B. F., Co., Akron, wheels and brakes spare parts, June, 1951, \$344,022; casings, Aug., 1950, \$134,314.

Goodyear Tire and Rubber Co., Akron, wheels and brakes, Jan., 1951, \$136,162.

Grant Photo Products, Inc., Cleveland, photographic paper, (Aviation Navy), Sept., 1950, \$195,132.

Haloid Co., Rochester, photographic film and paper, (Aviation Navy), Sept., 1950, \$681,353.

Hamilton Standard Propeller div., United Aircraft Corp., Hartford, Conn., reports of various investigations—propeller blades and slip ring assembly, Nov., 1951, \$298,545.

International Business Machine, Dayton, tabulating equipment and/or devices, June, 1950, \$500,000.

Jack Bill Scientific Co., Solana Beach, Calif., K-42 aerial camera, Apr., 1951, \$293,870.

Jack-Heintz Precision Industries, Cleveland, inverters, Sept., 1950, \$471,637; F-35 inverters, Oct., 1950, \$136,581.

Jumbo Steel Products Co., Azusa, Calif., 16 each stand assembly empenage for B-26, Sept., 1950, \$254,656.

Lite Mfg. Co., Inc., New York, large and small type P-1A helmets, Sept., 1950, \$100,511.

Lockheed Aircraft Corp., Burbank, initial radar spares for F-94A aircraft, Nov., 1950, \$450,000; spare parts for C-121 aircraft, June, 1950, \$337,000; spare parts for F-80 aircraft, June, 1950, two contracts, \$600,000, \$100,000.

Lorenzo Del Riccio Labs, Los Angeles, F-2 aerial roll film projectors and spares, Aug., 1950, \$134,140.

Marchant Calculating Machine, Dayton, calculating machines, Apr., 1950, \$122,168.

Massachusetts Institute of Technology, Cambridge, research on turbulence and diffusion of particulate matter in the lower layers of the atmosphere, Nov., 1951, (Watson Lab.), \$102,320.

Melpar, Inc., Alexandria, Va., telemeter transmitting set, Nov., 1950, \$610,032.

Metal Hose and Tubing Co., Dover, N. J., gasoline hose, July, 1950, \$264,471.

Minneapolis-Honeywell Regulator Co., Minneapolis, modification kits for modification of components of B-4 regulator system, Jan., 1951, \$166,281; components and component modification of B-4 turbo regulator system, July, 1951, \$102,191; services of overseas and domestic technical representatives, Sept., 1950, \$132,071; spare parts for C-1 autopilot, Dec., 1950, \$113,820.

Monroe Calculating Co., Inc., Dayton, adding and calculating machines, May, 1950, \$154,766.

North American Aviation, Inc., Los Angeles, mobile training units for the F-95A airplane, Mar., 1951, \$175,000; spare parts for the F-86 airplane, Jan., 1951, \$1,000,000; increase in spare parts for B-45 airplane, Dec., 1950, \$600,817; mobile training unit for the F-86 airplane, Nov., 1950, \$350,000; spare parts for T-6, T-28, F-51, F-82, F-86 and B-25 aircraft, June, 1950, \$288,889; spare parts for T-6, T-28, F-51, F-82, F-86, B-25 and B-45 aircraft, June, 1950, \$491,971.

Northrop Aircraft, Inc., Hawthorne, Calif., spare parts for the YC-125A and B aircraft, Dec., 1950, \$500,000.

Pioneer Parachute Co., Inc., Manchester, Conn., aerial delivery kits, Apr., 1950, \$238,876.

Piper Aircraft Corp., Lock Haven, Pa., oxygen servicing trailer, May, 1950, \$109,967.

Radio Corp. of America, Camden, N. J., radio set, (Navy 1949), Jan., 1952, \$879,450.

Radioplane Co., Van Nuys, Calif., 500 each OQ-19A aerial targets, 35 each auto pilots, spares, packaging and data, Mar., 1951, \$1,320,466.

Remington Rand, Inc., Dayton, visible files, May, 1950, \$253,745.

Republic Aviation Corp., Farmingdale, N. Y., spare parts for F-84 aircraft, July, 1950, \$138,998.

Sikorsky Aircraft, Bridgeport, spare parts for H-5 aircraft, July, 1950, \$149,000.

Sperry Gyroscope Co. div., Sperry Corp., Great Neck, N. Y., C-5 directional gyro, Jan., 1951, \$462,556.

Surface Combustion Corp., Toledo, F-4 portable ground heater, Dec., 1950, \$1,738,659.

Titeflex, Inc., Newark, N. J., maintenance and overhaul of magneto and ignition harnesses, July, 1950, \$149,030.

United States Gauge Corp. div., American Machine and Metals, Inc., Sellersville, Pa., oil pressure transmitters, Jan., 1951, \$123,983.

U. S. Rubber Co., Detroit, casings and tubes, Oct., 1950, \$115,369.

United Truck-Equipment Co., Baltimore, A-1 airborne cooler, Aug., 1950, \$486,497.

Waco Aircraft Co., Troy, Ohio, aerial delivery kits, Apr., 1950, \$212,346.

Whittaker, Wm. R., Co., Los Angeles, modification kits for valves, Sept., 1950, \$390,684.

Less Than \$100,000

A. C. Spark Plug div., General Motors Corp., Flint, Mich., spare parts for fuel servicing trailers, tractors, cranes, heaters, coolers, fire trucks, power plants, etc., May, 1950, \$12,389; components for K-14B gun-sights, June, 1950, \$13,168.

A and Z Mfg. Co., Covington, Ky., photographic cans and reels, Apr., 1950, \$4533; storage container, Aug., 1950, \$24,120.

Abrams Instrument Corp., Lansing, 3 digit counters, Jan., 1951, \$6751.

Accurate Mfg. Co., Garfield, N. J., rubber tape 1-2 in. wide, Apr., 1950, \$2694.

Acme Visible Records, Inc., Cincinnati, visible file cabinets, May, 1950, \$48,133.

Addressograph-Multigraph, Dayton, addressing and duplicating machines, May, 1950, \$40,479.

Adel Precision Products Corp., Huntington, W. Va., integrally aluminum bonded clips, June, 1950, \$5978.

Aerial Machine-Tool Corp., L. I. C., N. Y., tow target accessories, May, 1950, \$85,910.

Aero Supply Mfg. Co., Inc., Corry, Pa., aircraft bolts, June, 1950, \$2317.

Aeronca Aircraft Corp., Middletown, Ohio, spare parts for the L-16 aircraft, July, 1950, two contracts, \$3379, \$2000.

Aeropproducts div., General Motors Corp., Vandalia, Ohio, propeller blade filler material, June, 1951, \$33,191.

Aeropproducts div., General Motors Corp., Dayton, spare parts for propeller, Dec., 1950, \$4645.

Aeroprojects, Inc., W. Chester, Pa., research on the effects of ultrasonics on metals, Mar., 1951, \$13,711.

Ahlberg Bearing Co., Chicago, ball bearings, May, 1950, \$5665.

Air Cruisers, Inc., Clifton, N. J., life raft canopies, July, 1950, \$2929; life rafts, June, 1950, \$3000.

Aircooled Motors, Inc., Syracuse, spare parts for 0-335-5 engines used in H-13 aircraft, June, 1950, \$16,076.

Aircraft Radio Corp., Boonton, N. J., maintenance data, June, 1950, \$19,434.

AirResearch Mfg. Co. div., Garrett Corp., Los Angeles, refrigeration turbines, July, 1950, \$50,000; regulator system, Mar., 1951, \$13,706; modification of aircraft generator GFP equipment, Oct., 1950, \$22,348.

Airquipment Co., Burbank, cover assembly-tail turret, June, 1950, \$1198.

Akeley Camera, Inc., New York, type B-9 intervalometers, July, 1950, \$3900; type B-9 intervalometers, May, 1950, \$5446; bore-sight unit for type B-6 camera, July, 1950, \$2625.

Allison div., General Motors Corp., Indianapolis, aircraft engine spare parts used in F-82 aircraft, Mar., 1951, \$75,000; parts required to modify J35-C3, A5 and A15 jet engines, Jan., 1951, \$15,200; screwdrivers, fixtures, wrenches, etc., Mar., 1950, \$4120.

Allmetal Screw Products Co., New York, various screws, July, 1950, \$1033.

Alperin, Morton, Pasadena, expert consultant services, June, 1950, \$2000.

Aluminum Co. of Amer., Washington, aluminum alloy tape, June, 1950, \$6785.

American Brass Co., Waterbury, Conn., brass and copper wire, June, 1950, \$15,914; flexible shielded $\frac{3}{4}$ in. and-or $\frac{1}{2}$ in. conduit, May, 1950, \$9700.

American Chain, Detroit, terminal, May, 1950, \$1883.

American Chronoscope Corp., Mt. Vernon, N. Y., chronoscope model 110 and adapter and handbook, July, 1950, \$1365.

American Electro-Metal Corp., Yonkers, N. Y., investigation of molybdenum-aluminum intermetallic compounds, Sept., 1950, \$25,391.

American Institute of Research, Pittsburgh, measurement of non-intellectual aspects of officer aptitude, June, 1952, \$20,300; research on aircraft accidents, Oct., 1950, \$13,750.

American Marsh Pump, Inc., Battle Creek, repair kit-model GF60 American Marsh pumps, Apr., 1950, \$4998.

American Metal Hose branch, American Brass Co., Waterbury, Conn., flexible aluminum tubing, Apr., 1950, \$2168.

American Optical Co., Buffalo, lantern slide projectors, June, 1950, \$21,117.

American Rivet Mfg. Co., Cleveland, rivets, July, 1950, \$1467.

American Television-Radio Co., St. Paul, miniaturized power supplies, Apr., 1951, \$54,591.

Ampex Electric Corp., San Carlos, Calif., model 300 Apex magnetic tape recorder, May, 1950, \$7540.

Andrews-Alderfer Processing Co., Akron, cylinder and valve assembly, Sept., 1950, \$2613.

Angell Mfg. Co., Dayton, identification tags and metallic drive screws, June, 1950, \$7264.

Anso div., General Aniline Film Corp., Binghamton, N. Y., photographic film, (Aviation Navy), Sept., 1950, \$34,502; photographic chemicals, May, 1950, \$2384; photographic film, May, 1950, two contracts, \$1384, \$1096.

Apex Color Works, Inc., Jersey City, enamel, June, 1950, \$1670.

Arel, Inc., St. Louis, cellulose photo sponge, Mar., 1950, \$1345; photographic hanger, Apr., 1950, \$3500.

Armco Steel Corp., Middletown, Ohio, steel, Apr., 1950, \$1841.

Armour and Co., Chicago, rubber bound hair, June, 1950, \$8800.

Aro Equipment Corp., Bryan, Ohio, motor assembly, July, 1950, \$27,888; spare parts for maintenance of oxygen regulator, July, 1950, \$14,239; repair of type AN6004-1

oxygen regulators, Sept., 1950, \$14,574; valve and hose assembly, June, 1950, \$7398.

Art Metal Construction Co., Jamestown, N. Y., filing cabinets, June, 1950, \$29,960.

Atlantic Metal Hose Co., New York, flexible metal hose, Aug., 1950, \$9150.

Auburn Spark Plug Co., Auburn, N. Y., sleeve spark plug terminal, July, 1950, \$31,000.

Audio Electric Co., Chicago, connector-slotted spade tip small size black sleeve malleolate easy-to-attach terminal for No. 16 or 18 B and S wire, May, 1950, \$1109.

Automatic Electric Sale's Corp., Chicago, services of domestic technical representatives, Apr., 1950, \$4302.

Barden Corp., Danbury, Conn., ball bearings, June, 1950, \$9275.

Barnes Mfg. Co., Mansfield, Ohio, aircraft nozzles, June, 1950, \$27,569.

Barth Mfg. Co., Milldale, Conn., sheet metal brake, July, 1950, \$5082.

Battelle Memorial Institute, Columbus, Ohio, titanium alloy research, Aug., 1951, \$85,000; research—elevated temperature testing of structural plastic laminates, June, 1952, \$29,956.

Bausch and Lomb Optical Co., Rochester, focalscope aerial camera and main data, July, 1950, \$6120.

Bearings Co. of America, Lancaster, Pa., ball bearings, July, 1950, \$10,400.

Beaumont-Crandell, Inc., Kansas City, Mo., gun barrel covers, July, 1950, \$1170.

Beech Aircraft Corp., Wichita, spare parts for T-11 aircraft, June, 1950, \$9464; T-7, T-11 and C-45 aircraft spares, June, 1950, \$2365.

Behr-Manning Corp., Troy, N. Y., abrasives, July, 1950, \$16,201.

Belden Mfg. Co., Chicago, welding cable, May, 1950, \$1078.

Bell-Howell Co., Chicago, spare parts for photo equipment, Sept., 1950, \$1747.

Bell Aircraft Corp., Buffalo, special air frame tools (Aviation Navy), June, 1950, \$8034; skid—ski assemblies, May, 1950, \$3000.

Bell Aircraft Corp., Niagara Falls, spare parts for the YH-13, 13-A and H-13B aircraft, June, 1950, \$16,017; spare parts for the YH-12, and H-13 aircraft, June, 1950, \$74,000; spare parts for H-13B aircraft, June, 1950, \$52,000.

Bendix Aviation Corp., Pacific div., N. Hollywood, Calif., maintenance data, May, 1950, \$1207.

Bendix Aviation Corp., Red Bank div., Red Bank, N. J., miniaturized power supplies, Apr., 1951, \$55,400.

Bendix Products div., Bendix Aviation Corp., South Bend, Ind., brake assemblies, Sept., 1950, \$1807.

Bendix Radio, Baltimore, test set, July, 1950, \$9629.

Berkeley Scientific Co., Richmond, Calif., decoder timer, Sept., 1950, \$3000.

Biederman Motors Co., Cincinnati, spare parts for C-2, F-1 and F-2 truck tractors, crash fire trucks, M-2 electric tractor, P-1 cranes, B-8 and C-12 powerplants, Oct., 1950, \$12,609.

Boeing Airplane Co., Seattle, spare parts for B-29 aircraft, July, 1950, \$29,480; extension of maintenance period for B-50 airplane 46-080 to enable AMC flight crews to complete 450-hour accelerated flight test program, Apr., 1950, \$49,920; installation of Sperry engine analyzers in one government-owned B-50A airplane, Mar., 1950, \$16,955; MTV S parts or portions thereof to be ordered for B-50D airplanes, Aug., 1950, \$89,020; rework of 339 GFF Westinghouse generators, rework of oil inlet feeder screws in R4360-35, May, 1950, \$21,649.

Boice-Crane Co., Toledo, 110 each bench type drill press, May, 1950, \$9680.

Bone Engineering Corp., Glendale, Calif., electronic vibration measuring instruments, Aug., 1950, \$6500.

Breeze Corp., Newark, N. J., clamps, May, 1950, \$2354.

Breslee Mfg. Co., New York, container assembly, Sept., 1950, \$15,040.

Bristol Mfg. Corp., Bristol, R. I., winter flying shoes, Aug., 1950, \$28,979.

Brown, Arthur, and Bro., Inc., New York, drawing tables, Apr., 1950, \$1170.

Browning Laboratories, Inc., Winchester, Mass., magazine adapters, Apr., 1950, \$1110.

Brush Development Co., Cleveland, stop and pin, Apr., 1950, \$1585.

Buckeye Iron and Brass Works, Dayton, maintenance parts for fuel servicing nozzles, June, 1950, \$10,518.

Buffalo Forge Co., Buffalo, floor type drill press, May, 1950, \$29,301.

Bureau of Federal Supply, Cleveland, office equipment furnished to government owned facility, June, 1950, two contracts, \$70,000, \$50,000.

Burke Drug Supply Co., Dayton, medical drugs and first aid supply, Mar., 1950, \$1789.

Burndy Engineering Co., New York, lugs, terminals, etc., June, 1950, \$21,897.

Burroughs Adding Machine Co., Dayton, calculating machines, Apr., 1950, \$52,200.

Burton Electric Engineering Co., El Segundo, Calif., right angle battery connector, Apr., 1950, \$1005.

Burton Mfg., Los Angeles, development and construction of improved visual photometer, Jan., 1952, \$15,000.

Canadian Commercial Corp., Montreal, spare parts required for maintenance of C-47 aircraft, Apr., 1950, \$60,000.

Capewell Mfg. Co., Hartford, Conn., parachute hardware, July, 1950, \$1775.

Capitol Awning-Shade Co., St. Paul, field maintenance shelter Type A1-A, June, 1950, \$14,415; field maintenance shelters, Sept., 1950, \$32,488.

Carborundum Co., Niagara Falls, paper, Aug., 1950, \$7114.

Carey Electronic Engr. Co., Springfield, Ohio, aluminum wool, July, 1950, \$24,600.

Carnegie Illinois Steel Corp., Cincinnati, structural steel, Apr., 1950, \$6990.

Carr Corp., Culver City, Calif., film developing hanger, Apr., 1950, \$1220.

Celanese Corp. of America, New York, plastic sheet, June, 1950, \$2071.

Cessna Aircraft Co., Wichita, spare parts for LC-126 aircraft, July, 1950, \$4500.

Champion Blower and Forge, Lancaster, Pa., blacksmith forge, May, 1950, \$6000.

Champion Spark Plug Co., Toledo, spark plugs, Aug., 1950, \$37,544.

Chicago Pneumatic Tool Co., Detroit, portable pneumatic compression riveter, May, 1950, \$5000.

Cincinnati Milling Machine Co., Cincinnati, applying the hydro form principle to a metal forming press, Nov., 1950, \$40,000.

Cine Products Supply Co., Ashland, N. J., miscellaneous spare parts for projectors, June, 1950, \$4198.

Clark Brothers Co., Olean, N. Y., spare parts for after cooler blower and turbo-expander components of large scale liquid oxygen plant, June, 1950, \$5713.

Clark, David, Co., Worcester, Mass., anti G suits, July, 1950, \$8097.

Collyer Insulated Wire Co., Pawtucket, R. I., extra flexible No. 00 cable composed of 3381 strands of No. 34 copper wire 754 in OD with cotton paper and rubber insulation, May, 1950, \$1652.

Columbia Steel-Shifting Co., Dayton, carbon steel drill rod, June, 1950, \$1629.

Conlon, Emerson W., Ann Arbor, manuscript report on aeronautical sciences, Sept., 1950, \$7500.

Continental Electric Co., Newark, N. J., spare parts for the C-1-B powerplant, Nov., 1950, \$7767.

Continental Motors Corp., Muskegon, Mich., maintenance parts for use on 0-470 and 0-190 engines installed in L-16 and L-17 aircraft, June, 1950, \$5298; spare parts for 0-205-1 and 0-470-7 engines used in L-16 and L-17 aircraft, June, 1950, \$33,263; spare parts for maintenance of 0-190 engines used in L-16A and B aircraft, May, 1950, \$3195.

Cook Research Laboratory, Chicago, modifications of one Government owned model CR-6 playback equipment, Aug., 1950, \$15,000.

Cooper Precision Products, Los Angeles, aircraft bolts, May, 1950, \$9716.

Cooper Tire and Rubber Co., Findlay, Ohio, extrusion—synthetic rubber, June, 1950, \$1485.

Cornelius Co., Minneapolis, compressors, Dec., 1950, \$25,730; air compressors, Dec., 1950, \$21,822; air compressors, Sept., 1950, \$30,250; air compressors, Nov., 1950, \$14,300.

Cornell Aeronautical Lab., Buffalo, cyclic stressing and heating tests of aircraft struc-

tural materials, Apr., 1952, \$34,408.

Coxhead, Ralph C., Corp., Dayton, variety type machines, Mar., 1950, \$3764.

Cramer Posture Chair Co., Kansas City, seats, July, 1950, \$6650.

Crouse-Hinds Co., Syracuse, 24 in. duplex rotating beacon lamp assembly, July, 1950, \$5519.

Curtiss-Wright Propeller div., Curtiss-Wright Corp., Caldwell, N. J., propeller assembly, spinner assembly and set of controls to replace MTU propeller, Nov., 1950, \$36,062; maintenance propeller parts, Nov., 1950, \$13,856; vibration stress survey on C746S-A-1129-24 propeller on R4360-53 test stand engines, Mar., 1950, \$3510; spare parts for C-121 airplane, Oct., 1950, \$16,962.

Davey Compressor Co., Kent, Ohio, maintenance parts for John Bean crash fire trucks, July, 1950, \$10,375.

Davies Laboratories, Inc., Riverdale, Md., vibration measuring equipment, Jan., 1951, \$51,735.

Davidson Chemical Corp., Baltimore, large and small humidity indicators, Sept., 1950, \$85,400; dehydrating agent, May, 1950, \$37,190.

Dayton Blue Print Co., Dayton, photo paper, July, 1950, \$3850.

Deardorff, L. F., and Sons, Chicago, studio camera, Mar., 1950, \$9733.

Delco Products div., General Motors Corp., Dayton, generator assemblies, June, 1950, \$63,700.

Delta Mfg. Co., Milwaukee, wood jointer, Nov., 1950, \$21,650.

Denison Engineering Co., Columbus, stand assembly—portable HYD high pressure, June, 1950, \$4173; valves and foot mounted pump, June, 1950, \$1374.

Design Fabricators, Inc., Dayton engineering squadron cases, July, 1950, \$15,544.

Detroit Corp., Detroit, trichlorethylene, July, 1950, \$87,048.

Devilbiss Co., Toledo, paint spray outfit complete with gun, Sept., 1950, \$1442.

De Vore, Lloyd T., Urbana, Ill., manuscript report on electronic sciences, Sept., 1950, \$7500.

Diamond Metal Products Corp., Blairsville, Pa., liner locking rings, Apr., 1950, \$1745.

Dick, A. B., Co., Chicago, duplicating machines, Mar., 1950, \$6944.

Ditto, Inc., Chicago, duplicating machines, Mar., 1950, \$7532.

DoAll Cincinnati Co., Cincinnati, machine contour metal sawing maintenance data, etc., July, 1950, \$70,040.

Doetsch, Hans K., Wright-Patterson AFB, services of technical consultant, June, 1950, \$2750.

Double T Products, Hawthorne, Calif., clevis, May, 1950, \$3430.

Douglas Aircraft Co., Long Beach, Calif., installation of low tension ignition system and radio equipment, June, 1950, \$25,000.

Douglas Aircraft Co., Santa Monica, spare parts required for maintenance of B-26 airplanes, Apr., 1950, \$50,000; spare parts for maintenance of C-47 aircraft on Turkish Aid Program, Mar., 1950, \$1093; spare parts required for modification of C-47, C-54, C-117, C-118 airplanes, Apr., 1950, \$48,173.

Dover Stamping Co., Boston, funnels, May, 1950, \$2398.

Draper, Charles S., Cambridge, Mass., consultant services, June, 1950, \$1500.

Dubetta Metals Corp., L.I.C., N. Y., aluminum alloy tubing, June, 1950, \$1594.

Du Pont de Nemours, E. I., Wilmington, photo film, Aug., 1950, \$17,049; photographic film, Mar., 1950, \$4690.

Duophoto Corp., New York, photographic paper, Sept., 1950, \$1272.

Dura Steel Products Co., Los Angeles, film cans, Apr., 1950, \$11,441.

Eastern Rotorcraft Co., Willowgrove, Pa., cargo tiedown item 3, Apr., 1950, \$16,200; tiedown cargo aircraft, Aug., 1950, \$3500.

Eastman Kodak Co., Rochester, photographic film and plates, May, 1950, \$69,790; photographic paper film and plates, June, 1950, \$12,185; miscellaneous photographic equipment, Apr., 1950, \$1196; microfilm readers, Nov., 1950, \$57,973; photographic film and paper, May, 1950, \$15,876; photographic film (Aviation Navy), May, 1950, \$34,358; film and chemical kits, July, 1950, \$5557; photographic chemicals, May, 1950, \$10,962; 16mm motion picture camera

(Aviation Navy), Apr., 1950, \$27,192; binding tape photographic, Apr., 1950, \$1309; photographic paper, May, 1950, \$1135; colors spotting cellulose card photo, Apr., 1950, \$3627; tacking irons, Sept., 1950, \$3000; Kodak master printer, June, 1950, \$3505; recording paper, May, 1950, \$1379; filters, May, 1950, \$2760; photographic film, May, 1950, \$2719.

Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, pressure indicators and transmitters, July, 1950, \$15,671; anti-G valve, May, 1950, \$4787; fuel pressure indicators, Nov., 1950, \$6814; design and fabrication of liquid oxygen converter, Bendix type, Oct., 1950, \$11,917; fuel system flow meter, Dec., 1951, \$50,761; direct cranking starters, Oct., 1950, \$11,481; fuel flow rate indicator, July, 1951, \$34,145.

Edison, Thomas A., Inc., West Orange, N. J., fire detection kit, quick engine change unit, June, 1950, \$5561.

Eisemann Magneto div., Jack-Heintz Precision Industries, Cleveland, miscellaneous spare parts, assemblies and sub-assemblies, June, 1950, \$2000.

Elastic Stop Nut Corp of Amer., Union, N. J., self locking nut, June, 1950, \$1599; self locking stainless steel nut, June, 1950, \$10,967.

Electric Auto-Lite Co., Port Huron, Mich., low tension aircraft cable, May, 1950, \$5451.

Electronic Brazing Co., Montclair, N. J., aviation ignition tester assembly, July, 1950, \$1646.

Engineering Research Assoc., St. Paul, development of a dielectric recorder, Mar., 1951, \$22,491.

Engineering Research Corp., Riverdale, Md., mild steel sheet metal former, Oct., 1950, \$56,475.

Fafnir Bearing Co., New Britain, Conn., ball bearings, May, 1950, two contracts, \$19,673, \$17,110; ball bearings, July, 1950, \$16,130; bearings, July, 1950, \$8000.

Fairchild Aircraft div., Fairchild Engine and Airplane Corp., Hagerstown, Md., kits to change fire detector wires to Rockbestos No. 16 gage on C-119B aircraft, Apr., 1950, \$1263; kits to extend hot air duct around oil lines on C-119B aircraft, Apr., 1950, \$2519; maintenance spares for C-82 and C-119B aircraft, June, 1950, \$1750; maintenance spares for C-82 aircraft, June, 1950, \$13,847.

Fairchild Camera-Instrument Co., Jamaica, N. Y., zenith camera control, Nov., 1950, \$23,411; miscellaneous parts of photo equipment, Nov., 1950, \$21,014; 24 in. cone assembly, Sept., 1950, \$67,871; mounting and dial, Sept., 1950, \$20,755; collimator and focusing microscope, Sept., 1950, \$3787.

Faust, Alan M., Ann Arbor, Mich., manuscript report on propulsion sciences, Sept., 1950, \$7500.

Federal Mfg. and Engr. Corp., Brooklyn, microfilm projectors, Aug., 1950, \$14,400.

Federal Mogul Corp., Coldwater, Mich., spare parts—bearings various engines, Oct., 1950, \$13,282.

Federal Motor Truck Co., Detroit, spare parts for truck tractors, trailers and cranes, Oct., 1950, \$15,139.

Federal Prison Industries, Washington, brushes, May, 1950, \$1388.

Federal Supply Service, Ft. Worth, office furniture, June, 1950, \$90,000.

Federal Telephone and Radio Corp., Clifton, N. J., spare parts for control monitor set, May, 1950, \$1124.

Fellows Gear Shaper Co., Springfield, Vt., involute measuring instrument, May, 1950, \$8454.

Felt Tarrant Mfg., Compt. div., Dayton, office machines, Apr., 1950, \$27,301.

Fett, Gilbert Howard, Champaign, Ill., manuscript report on electronic sciences, Sept., 1950, \$7500.

Firestone Tire-Rubber Co., Akron, aircraft casings, July, 1950, \$6405.

Fletcher Aviation Corp., Los Angeles, fuel tanks, July, 1950, \$98,160.

Fogarty Electric Co., Cincinnati, connection installation, Apr., 1950, \$2400.

in armament laboratory, May, 1950, \$1212.

Helmeo, Inc., Chicago, bracket, July, 1950, \$6830.

Herbach and Rademan, Inc., Philadelphia, fixed wire-wound resistors, Sept., 1950, \$1960.

Hewlett-Packard Co., Palo Alto, Calif., electronic voltmeters, May, 1950, \$6464.

Hoffman Radio Corp., Los Angeles, antenna and spare parts, Aug., 1950, \$13,337.

Homelite Corp., Port Chester, N. Y., spare parts for C-7B powerplants, Aug., 1950, \$18,589; spare parts for ground equipment, June, 1950, \$7399.

Howe Machinery Co., Passaic, N. J., gear case, Nov., 1950, \$7208.

Hubbell and Miller Co., New Rochelle, N. Y., photographic powders, June 1950, \$20,125.

Huffman Mfg. Co., Dayton, funnels, May, 1950, \$3722.

Hughes Aircraft Co., Culver City, Calif., factory familiarization training, Feb., 1951, \$2847; chuting and adapters, May, 1950, \$2089.

Hughes-Simonson Engrg. Co., Dayton, additional time and materials, maintenance and repair of technical equipment, Dec., 1950, \$14,000; materials and services to repair and maintain technical equipment, July, 1950, \$20,000; boiler and oil burner, Mar., 1950, two contracts, \$9005, \$9205.

Hughes Tool Co. div., Hughes Aircraft Co., Culver City, Calif., operational and familiarization flight training, Apr., 1950, \$6086.

Hunt, Philip A., Co., Brooklyn, photographic powders, May, 1950, \$14,927.

Hunter Mfg. Co., Cleveland, miscellaneous photo equipment, June, 1950, \$5988.

Hycon Mfg. Co., Pasadena, modification of one K-40 camera, July, 1950, \$29,679.

Ilex Optical Co., Rochester, miscellaneous photo equipment, Mar., 1950, \$2453.

Independent Engr., Ofallon, Ill., testing machine, June, 1950, \$3586.

Independent Pneumatic Tool, Aurora, Ill., portable electric hammer, June, 1950, \$7183.

Industrial Engr. Co., Philadelphia, water brake and blue prints, Aug., 1950, \$13,380.

Industrial Precision Products Co., Chicago, tow target accessories, Apr., 1950, \$12,978.

Industrial Sales Co., Washington, bench type slip roll former, Oct., 1950, \$1457.

Industrial Shredder, Salem, Ohio, paper shredder, Oct., 1950, \$5390.

Industrial Sound Control, Hartford, Conn., additional sound control equipment, Mar., 1950, \$15,012.

International Business Machine, Dayton, clocks and time stamps, Apr., 1950, \$9722.

Interstate Engrg. Corp., El Segundo, Calif., aircraft valves, June, 1950, \$4410.

Jack Heintz Precision Industries, Cleveland, direct cranking starters, Dec., 1950, \$79,371; special tools, June, 1950, \$1397.

Jacobs Aircraft Engine Co., Pottstown, Pa., maintenance data, June, 1950, \$15,249.

Jamestown Metal Corp., Jamestown, N. Y., weather station equipment, June, 1950, \$55,986.

Jarrell-Ash Co., Boston, stereoscopic microscope, June, 1950, \$1760; X-ray powder camera, May, 1950, \$1427.

Jessop Steel Co., Washington, Pa., carbon steel drill rod, June, 1950, \$2622.

Johns-Manville Sales Corp., Dayton, tape, Aug., 1950, \$1194.

Jones Lamson Machine Co., Springfield, Vt., bench type optical comparator, July, 1950, \$16,400.

Jordan, Edward C., Urbana, Ill., manuscript report on electronic sciences, Sept., 1950, \$7500.

Jumbo Steel Products Co., Azusa, Calif., outrigger platforms for the B-36 empennage stand, Sept., 1950, \$89,898; 30 ton axle jacks, Sept., 1950, \$31,435.

Kaplan, Joseph, Los Angeles, consultant services, June, 1950, \$1500.

Kayfetz, Victor, New York, 35mm camera and accessories (Aviation Navy), July, 1950, \$29,675.

Kearfott Co., New York, indicator, Sept., 1950, \$15,521.

Kemp-Kincaid, Dayton, development and fabrication of lamp assemblies, Aug., 1950, \$4999.

Kidde, Walter, and Co., Belleville, N. J., valve, July, 1950, \$4699.

Kober, Carl, Wright-Patterson AFB, consultant services, June, 1950, \$2960.

Koch, H., Son, San Francisco, carrying cases, May, 1950, \$6030.

Koehler Aircraft Products, Dayton, technical data, May, 1950, \$13,588.

Kollsman Instrument div., Square D Co., Elmhurst, N. Y., type A-3 airflow indicator, June, 1950, \$2914; pressure altimeter, Apr., 1951, \$77,492; airspeed indicator, Dec., 1950, \$78,695; pressure indicators, Feb., 1951, \$77,820; special tools, May, 1950, \$3880; Kollsman type motor drag cup, June, 1950, \$1959.

L B Electric Supply Co., Brooklyn, portable lamp guard, May, 1950, \$2456.

Laird Engr. Co., Charlestown, W. Va., cabinet thermometer test, July, 1950, \$7964.

Lamson and Sessions Co., Cleveland, aircraft bolts, June, 1950, \$5818.

Lanagan and Hoke, Philadelphia, bench type undercutter, July, 1950, \$2052.

Lawson, F. H., Co., Cincinnati, funnels, May, 1950, \$1049.

Lawyers Co-op Publishing Co., Rochester, law books, Apr., 1950, three contracts, \$2898, \$1112, \$1899.

Lemeco Products, Inc., Bedford, Ohio, multi-purpose grinder, complete head grinder data, Sept., 1950, \$14,720.

Lester, Henry M., Photography, New York, continuous flash lighting (Research Navy), May, 1950, \$2325.

Lewis Engineering Co., Naugatuck, Conn., type G-8 temperature indicator, Aug., 1951, \$81,353; type G-7 temperature indicator, July, 1951, \$57,549.

Libby-Owens-Ford Glass Co., Toledo, spare parts for B-29 and B-50 aircraft, July 1950, \$49,372.

Lieb-Jackson Co., Columbus, O., remove overhaul and reinstall 6 Pomona fuel pumps, June, 1950, \$2733; design, furnish and install a fuel servicing equipment test facility, June, 1950, \$35,466.

Link Aviation Devices, Inc., Binghamton, N. Y., spare parts for C-8 trainer, Sept., 1950, \$9495.

Liquidometer Corp., L. I. City, N. Y., indicators and tank units, June, 1950, \$11,148.

Lite Mfg. Co., New York, type P-1A flying helmet, Aug., 1950, \$86,350; helmets, Aug., 1950, \$14,586.

Little, Arthur D., Inc., Cambridge, Mass., test of large mobile liquid oxygen generator and training of government personnel in its operation, Mar., 1951, \$49,864.

Lockheed Aircraft Corp., Burbank, spare parts for F-80 aircraft, June, 1950, two contracts, \$95,091, \$52,250.

Lowenstein, Fred H., Inc., New York, thread, Aug., 1950, \$1728.

Mallory, P. R., and Co., Indianapolis, type XT tantalum capacitors for extreme temperature, Sept., 1950, \$6370; rectifier, July, 1950, \$1504.

Manhattan Lighting Equipment Co., New York, high power factor fluorescent lamp ballast, fluorescent lamp starter switch, May, 1950, \$1573; power cable, May, 1950, \$51,285.

Mansfield Aircraft Products Co., Mansfield, O., food warming oven, Aug., 1950, \$19,750.

Marman Products Co., Inglewood, Calif., clamps, Apr., 1950, \$9259; clamps, May, 1950, \$7008.

Marquette Metal Products Co., Cleveland, wiper assembly, July, 1950, \$6207.

Marsh Sten Machine Co., Belleville, Ill., felt tip markers, Mar., 1950, \$1145.

Martin, Glenn L., Co., Baltimore, repair of damaged aircraft, Feb., 1950, \$37,197.

Martindale Hubbell, Inc., Summit, N. J., directory, Apr., 1950, \$1517.

Mathers Lamm Paper Co., Washington, photographic paper, May, 1950, \$3440.

Maxson, W. L., Corp., New York, amplifiers, Aug., 1950, \$19,688.

McConaughy Stationers, Springfield, O., tabulating card files, July, 1950, \$14,746.

McDonald, Norman, Co., Chicago, engineering services and fabrication of one percussion type gun charger, Dec., 1951, \$20,000.

McIntire, F. V., Brass Works, Boston, valves, Sept., 1950, \$6750.

Medicus, Gustav K., Wright-Patterson AFB, consultant services, June, 1950, \$2200.

Melkus, Harald, Wright-Patterson AFB,

consultant services, June, 1950, \$2032.

Melpar, Inc., Alexandria, Va., isolation networks, Nov., 1950, \$80,891.

Menasco Mfg. Co., Burbank, spare parts for C-1B powerplants, July, 1950, \$1014.

Miami Stationers, Inc., Dayton, receptacles, Apr., 1950, \$4125.

Micromatic Home Corp., Detroit, small parts honing machine, July, 1950, \$39,333.

Miller Products Co., New York, rubber parachute band, May, 1950, \$3290; synthetic rubber gloves, June, 1950, \$3184.

Milwaukee Valve Co., Milwaukee, nozzle, fuel servicing, aircraft, May, 1950, \$6250; spare parts for fuel servicing nozzles, June, 1950, \$12,731.

Mine Safety Appliance Co., Pittsburgh, oxygen mask parts, June, 1950, \$2096.

Minneapolis-Honeywell Regulator Co., Minneapolis, flight schedule controller and reports, May, 1950, \$6383.

Minnesota Mining-Mfg. Co., St. Paul, photographic Scotch Tape, Mar., 1950, \$17,315.

Miracle Paint Rejuv., St. Paul, paint mixing machine, Aug., 1950, \$8843.

Mole-Richardson Co., Hollywood, cable box plug lug barndoor lamp, etc., May, 1950, \$2517; miscellaneous lighting fixtures, Apr., 1950, \$2365.

Monadnock Mills, San Leandro, Calif., fasteners, May, 1950, \$6037.

Monsanto Chemical Co., Everett, Mass., dope, July, 1950, \$15,108.

Monument Engineering Co., Indianapolis, developer assembly, June, 1950, \$49,987.

Moody, D., and Co., Tulsa, control bomb release type B-3A, Apr., 1950, \$3000.

Moore-Eastwood Co., Wilmington, Ohio, spring scoop assembly, segregator assembly, float assembly, Nov., 1950, \$9077.

Morse Instrument Corp., Hudson, O., printing unit and drawings, Aug., 1950, \$27,451; photographic washer, Oct., 1950, \$73,047.

Motch-Merryweather Machine Co., Cleveland, machine, lapping, individual, May, 1950, \$4755.

Muirhead and Co., Ltd., Beckenham, G. B., picture transmitters and receivers, Dec., 1950, \$20,810.

National Battery Co., Depew, N. Y., aircraft storage batteries, July, 1950, \$72,842.

National Carbon Co. div., Union Carbide and Carbon Corp., New York, photographic carbon, May, 1950, \$2765.

National Safety Council, Chicago, ground safety, June, 1950, \$16,000.

National Screw and Mfg. Co., Cleveland, rivets, July, 1950, \$1479; various screws, July, 1950, \$2078.

Navy Dept., Philadelphia, parachute assemblies, Mar., 1950, \$59,700.

New Center Studios, Inc., Detroit, retouching art, Mar., 1950, \$1814.

New Departure div., General Motors Corp., Bristol, Conn., needle bearings, May, 1950, \$2599.

New Mexico College of A-M Arts, State College, N. M., research on effects of exposure to actinic agents on additional types of USAF materials and equipment, July, 1951, \$9650.

New Products Engineering Co., Dayton, tachistoscope parts, data, reports and services, Aug., 1950, \$3460.

Newman Machine Co., Greensboro, 16 in. floor type wood jointer and maintenance data, Nov., 1950, \$20,988.

News Map of the Week, Inc., Chicago, publication, Apr., 1951, \$4379.

Nichols Products Co., Moorestown, N. J., 40 each guide wave, Aug., 1950, \$6960.

Nobles Engrg. and Mfg. Co., St. Paul, chuting and adapters ammunition, May, 1950, \$5160.

Norma-Hoffman Bearing Corp., Stamford, Conn., ball bearings, June, 1950, \$1020.

North American Aviation, Inc., Los Angeles, kits for B-45A service airplanes, Dec., 1951, \$28,020; spare parts for T-6, T-28, F-51, F-86, F-82, B-25 and B-45 aircraft, June, 1950, \$20,000; technical data, June, 1950, \$3620; oil cooler covers, July, 1950, \$3414.

Northrop Aircraft, Inc., Hawthorne, Calif., design and fabrication of a slotted wing model 5 ft. x 3 ft., with approximately 31 suction slots on top and bottom of wing, Mar., 1951, \$50,018; data on an existing single stage compressor of the high mass flow type, Nov., 1950, \$42,480.



Eaton Has Developed Highly Specialized Equipment For the Production of Jet Engine Compressor Blades



EATON MANUFACTURING COMPANY
CLEVELAND, OHIO
VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

EATON PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springlifts • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

The "Hiller 360"



"Hiller 360" helicopter, made by United Helicopters, Inc., of Palo Alto, California, is another user of Clifford Feather-Weight All-Aluminum Oil Coolers. A "Hiller 360" achieved fame in July, 1949, by accomplishing a spectacular rescue which entailed going over the 10,000-foot peaks of Yosemite Park's high Sierras and making a nearly vertical descent and ascent of 2000 feet.

...and its Oil Cooler

The "Hiller 360" helicopter has joined the rapidly growing roster of famous conventional and jet-propelled aircraft which rely on the superior performance of Clifford Feather-Weight All-Aluminum Oil Coolers...the only all-brazed type of oil cooler. Two of the reasons for Feather-Weight superiority are: Clifford's patented brazing process and Clifford's wind tunnel laboratory... largest and most modern in the aeronautical heat exchanger industry. Your inquiry is invited. CLIFFORD MANUFACTURING COMPANY, 136 Grove Street, Waltham 54, Massachusetts. Division of Standard-Thomson Corporation. Sales Offices in New York, Detroit, Chicago, Los Angeles.



CLIFFORD



ALL-ALUMINUM OIL COOLERS
FOR AIRCRAFT ENGINES

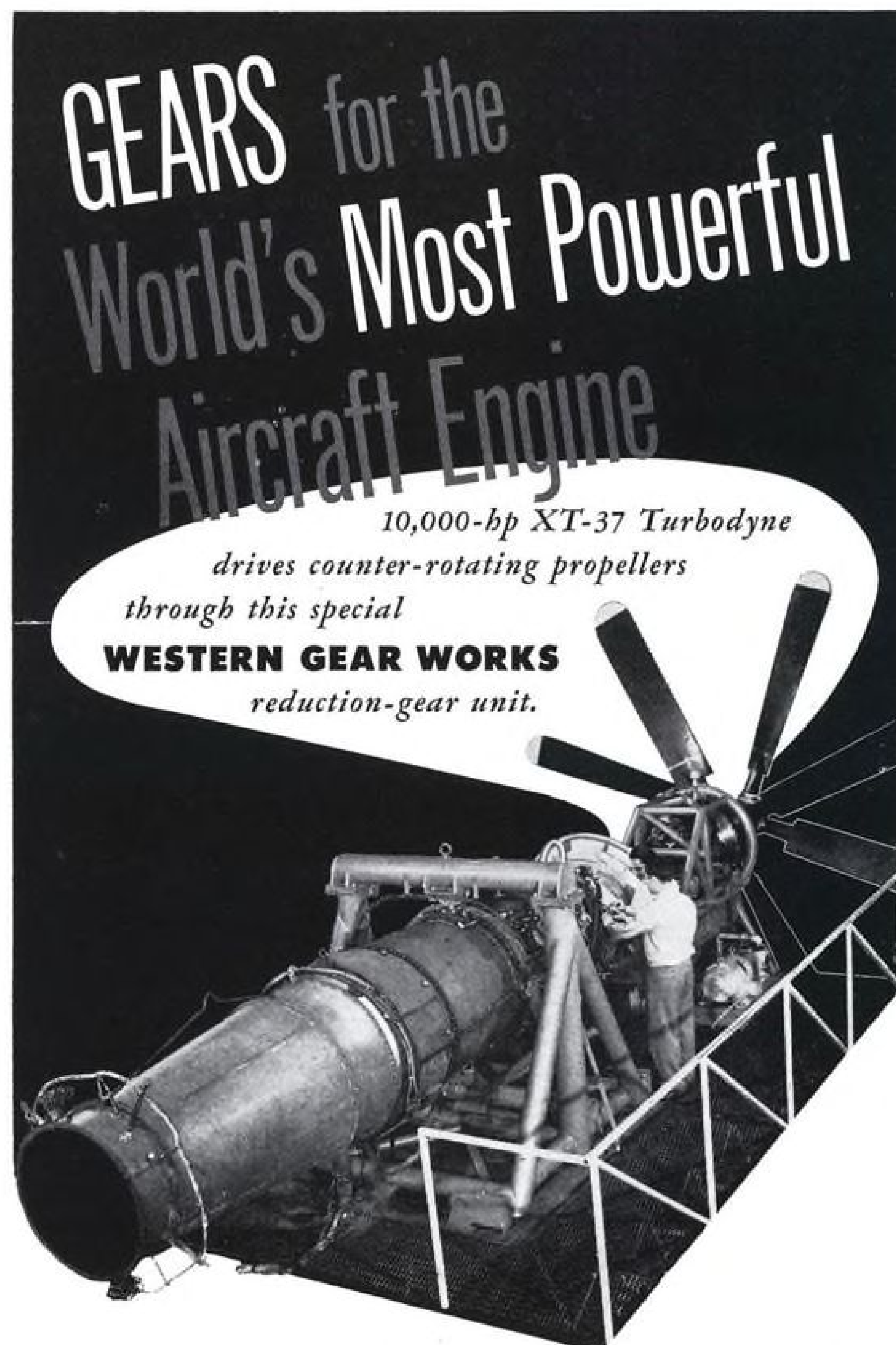
HYDRAULICALLY-FORMED BELLOWS
AND BELLOWS ASSEMBLIES



O-Cel-O, Inc., Buffalo, sponges, June, 1950, \$4888.
Ohio Nut Washer Co., Mingo Jct., O., washers, June, 1950, \$2418.
Ohio State University Research Foundation, Columbus, psychological research, Apr., 1952, \$88,134; conduct investigation of methods for increasing the performance of rocket centrifugal pumps, May, 1951, \$24,897; theoretical study of the laminar boundary layer in accordance with three specified objectives, Apr., 1951, \$19,244.
Okonite Co., Chicago, heavy duty stranded power cable, May, 1950, \$15,152.
Onan, D. W., and Sons, Minneapolis, generator set, June, 1950, \$2598.
Oro Mfg. Co., Adrian, Mich., troop seat, May, 1950, \$18,824.
Pacific Alrmotive Corp., Burbank, regulator system, Mar., 1951, \$9540; reconditioning and preparation for shipment overseas of 5 each T-7 aircraft, Mar., 1950, \$62,725; technical data, June, 1950, \$1996.
Pacific Parachute Co., Seattle, controlled vent type parachutes, Sept., 1950, \$50,000.
Pacific Piston Ring Co., Los Angeles, reducer and tee, June, 1950, \$1188.
Pacific Scientific Co., Los Angeles, unit assembly, Sept., 1950, \$1947; maintenance data, June, 1950, \$2180.
Pako Corp., Minneapolis, print dryer spares, June, 1950, \$3696.
Paragon-Revolute Corp., Rochester, 54-in. dryer, jumbo print, June, 1950, \$1926.
Parker Appliance Co., Cleveland, aluminum alloy flared tube tee, June, 1950, \$1470; aircraft hardware, May, 1950, \$3617.
Peck, Stow and Wilcox Co., Southington, Conn., squaring shear, July, 1950, \$6850.
Peerless Camera Stores, Inc., New York, miscellaneous photographic equipment, Apr., 1950, \$3779.
Peirce, Carroll J., Worthington, O., manuscript report on aeronautical sciences, Sept., 1950, \$7500.
Penjaska Tool Co., Owosso, Mich., bushings, June, 1950, \$3008.
Pennsylvania State College, State College, Pa., services—continuation of research work on biological effects of high intensity sound waves, June, 1951, \$47,470.
Pesco Products div., Borg-Warner Corp., Bedford, Ohio, miscellaneous pump parts, June, 1950, \$5000; booster pumps, Sept., 1950, \$13,250; fuel pumps, Oct., 1950, \$7470; valve modification kits, Aug., 1950, \$10,594.
Philadelphia Mfg. Co., Philadelphia, photo carrying case, Apr., 1950, \$1335.
Pittsburgh Plate Glass Co., Pittsburgh, spare parts for B-29 and B-50 aircraft, Aug., 1950, \$16,392.
Plastic-Rubber Products Co., Los Angeles, gaskets and packing, June, 1950, \$1200.
Polarad Electronics Co., New York, precipitation static filter, June, 1951, \$37,000.
Prepared Photo Chemicals Co., Orange, N. J., photographic powders, May, 1950, \$23,429.
Purdue Research Foundation, Lafayette, Ind., study of fire extinguishing agents to determine their suitability for use in extinguishing rocket propellant fires, May, 1951, \$14,000.
Pyramid Mfg. Co., New York, scarf, July, 1950, \$4088.
Radioplane Co., Van Nuys, Calif., modification turntable assembly, July, 1950, \$1564; telemetering calibration equipment, Mar., 1950, \$4275; spare parts for OQ-19B aerial target, June, 1950, \$15,716; flotation kits, spare parts, data and waterproofing of OQ-19 targets, Nov., 1950, \$98,643; modification of 18 transmitters and cables, June, 1950, \$7440; modification kits, starter cart spares and data, July, 1950, \$2155.
Rapids Standard Co., Grand Rapids, B-1 tie-downs, Apr., 1950, \$5770.
Raybestos-Manhattan, Inc., Manheim, Pa., tape, May, 1950, \$1226; packing, Sept., 1950, \$24,888.
Raygram Corp., New York, filter mount, Apr., 1950, \$1890.
Raytheon Mfg. Co., Waltham, Mass., receiver tuning assembly, June, 1950, \$8596; transformer pulse, June, 1950, \$1250.
Recordak Corp., New York, photo spare parts, Sept., 1950, \$1420; photographic film, Sept., 1950, \$14,261; enlarger, reader and camera, June, 1950, \$8196.
Reed-Prince Mfg. Co., Worcester, Mass., rivets, July, 1950, \$1755; screws, Aug.,

1950, two contracts, \$11,613, \$1341.
Remington Rand, Inc., Dayton, photographic paper, June, 1950, \$14,545; photographic paper, Sept., 1950, \$2045; machine rental, Mar., 1950, \$5080; adding and calculating machines, Apr., 1950, \$85,963.
Republic Aviation Corp., Farmingdale, N. Y., spare parts for F-84 aircraft, July, 1950, \$27,678; spare parts for F-47 aircraft, July, 1950, \$41,941; spare parts for F-84 aircraft, July, 1950, \$1430; joining of light metals by cold welding, Dec., 1950, \$32,057; optical measuring and checking equipment for use with tooling dock, Sept., 1950, \$27,162; spare parts kits required to support Fox Able, June, 1950, \$2658.
Republican Press, Hamilton, Ohio, procurement forms, June, 1950, \$30,000.
Rhodes Lewis Co., Culver City, Calif., develop complete environmental control of K-22 aerial camera, Oct., 1950, \$24,750.
Rockford Paint Mfg. Co., Rockford, Ill., enamel, June, 1950, \$2618.
Rogers Industries, Inc., New York, screen assembly, Nov., 1950, \$1980.
Roller-Smith, Bethlehem, Pa., analyzer, selsyn zeroing, portable type, June, 1950, \$10,467.
Roth Office Equipment Co., Dayton, miniscopes and stands, Mar., 1950, \$2122.
Royal Electric Co., Jamestown, Ohio, radar receiver, etc., Apr., 1950, \$21,260.
Ryan Aeronautical Co., San Diego, installation of fuel shut-off valve, Oct., 1951, \$2367; spare parts for L-17 aircraft, June, 1950, two contracts, \$31,254, \$1000.
Sacomo Mfg. Co., San Francisco, packing, Sept., 1950, \$12,800.
St. Regis Sales Corp., New York, phenolic, sheet, Aug., 1950, \$2756.
Samson and Rowland, Inc., Philadelphia, various screws, July, 1950, \$1443.
Saron Packing Co., Cleveland, dismantling, packing, crating, hauling and loading into freight cars items of equipment, May, 1950, \$4785.
Schenut, Frank G., Rubber Co., Baltimore, casings, May, 1950, \$2392; casings and tubes, July, 1950, \$28,555; casings and tubes, June, 1950, \$11,263.
Schrader, A. Sons, Brooklyn, tire valve caps, May, 1950, \$1381.
Selaky Bros., Inc., Chicago, improved resistance welding, Oct., 1950, \$14,000.
Selntilla Magneto div., Bendix Aviation Corp., Sidney, N. Y., transformer, contact spark gap spring plug, July, 1950, \$12,467; tools, pullers, gages, wrenches, yokes, disc assemblies, etc., Dec., 1950, \$11,464; overhaul and maintenance spare parts for magnetos and ignition systems, Oct., 1950, \$52,953.
Seoville Mfg. Co., Waterbury, Conn., brass and copper wire, June, 1950, \$5910.
Seamless Rubber Co., New Haven, Conn., miscellaneous photographic equipment, Mar., 1950, \$4371.
Searle Leather-Packing Co., Los Angeles, packing, leather, Nov., 1950, \$10,656; packing rings, July, 1950, \$12,813.
Security Steel Equipment Corp., Avenel, N. J., filing cabinets, May, 1950, \$9904.
Serbin, Hyman, Ph. D., W. Lafayette, Ind., research on the interaction of rigid body modes with elastic modes in flutter, Apr., 1951, \$11,850.
Shafer Bearing Corp., Downers Gv., Ill., bearings, June, 1950, \$61,502.
Sheffield Corp., Dayton, comparator gage block Precisionaire, May, 1950, \$1275.
Shoults, David R., Baltimore, consultant services, May 1950, \$1500.
Sikorsky Aircraft, Bridgeport, Conn., spare parts for H-5 aircraft, July, 1950, \$18,281.
Simmonds Aerocessories, Inc., Tarrytown, N. Y., technical data, June, 1950, \$5030.
Simmons Bros., Inc., L. I. City, N. Y., projection printer parts, Apr., 1950, \$3965; spare parts for photographic equipment, May, 1950, \$2940.
Smith, William Armstrong, Co., East Point, Ga., enamel, Jun, 1950, \$2976.
Solar Aircraft Co., San Diego, spare parts for F-80 aircraft, July, 1950, two contracts, \$5000, \$47,720; spare parts for C-54 aircraft, July, 1950, \$21,764.
Solar Electric Co., Chicago, transformer, constant voltage, Apr., 1950, \$1200.
South Wind div., Stewart-Warner Corp., Indianapolis, installation of CAB inclosure

kits on government-owned vehicles, May, 1950, \$1801.
Southwell Co. div., San Antonio Rubber Stamp Co., San Antonio, decals, May, 1950, \$2377.
Sperry Gyroscope Co. div., Sperry Corp., Great Neck, N. Y., strobodine-balancing rotor, Apr., 1950, \$7000; magnetic azimuth detector, Feb., 1951, \$24,500; mounting kits, Jan., 1951, \$2247.
Sperry Products, Inc., Danbury, Conn., hydraulic range and sight control components used with K-14 sight, Oct., 1950, \$10,182.
Sprague Electric Co., North Adams, Mass., resistors, Apr., 1950, \$6871.
Springfield Tent-Awning Co., Springfield, O., tarpaulins, June, 1950, \$56,075.
Standard Duplicating Machine Agency, Dayton, sealing machines, Mar., 1950, \$1113.
Standard Electric Products Co., Dayton, fixed resistors, July, 1950, \$1043; bakelite couplings and rotary joints, June, 1950, \$3158; packaging switches, June, 1950, \$3713; coil, June, 1950, \$1213; resistors, Sept., 1950, \$1317.
Standard Electric Time Co., Springfield, Mass., timer assembly—Curtiss propeller synchronizer, June, 1950, \$4350.
Standard Envelope Mfg. Co., Cleveland, photographic preserver, May, 1950, \$2912.
Standard Pressed Steel Co., Jenkintown, Pa., self locking nut, May, 1950, \$3580; aircraft bolts, June, 1950, \$1471.
Standard Steel Works, N. Kansas City, handle and door assembly, Sept., 1950, \$4157.
Stanhope Products Co., Brookville, O., chamber assembly—vacuum RH, June, 1950, \$3840; ring assembly, June, 1950, \$3546.
Stanley Aviation Corp., Buffalo, manifold oxygen transfer, wall type, July, 1950, \$8382; development of a steering system including all control components utilizing the B-25, Dec., 1950, \$29,101; tracking device helicopter main rotor blade, Dec., 1950, \$35,175.
Steinthal, M., and Co., New York, fabrication of experimental parachutes, June, 1950, \$50,000.
Stever, H. Guyford, Cambridge, Mass., consultant services, June, 1950, \$1500.
Stewart-Sperry, Inc., New York, cotton bunting, Aug., 1950, \$22,164.
Stewart-Warner Corp., Indianapolis, maintenance data, May, 1950, \$2040; spare parts for C-2, F-1 and F-2 truck tractors, M-2 Cletrac tractors, crash fire trucks and P-1 cranes, Nov., 1950, \$8507.
Stillwell, Henry Sheldon, Urbanan, Ill., manuscript report on aeronautical sciences, Sept., 1950, \$7500.
Stimpson, Edwin B., Co., Brooklyn, grommets, aluminum brass, May, 1950, \$1153.
Stronghold Screw Products, Chicago, various screws, June, 1950, \$1208; screws, Aug., 1950, \$1249.
Sun Ray Photo Co., New York, miscellaneous photo equipment, June, 1950, \$8574.
Super Electric Products Corp., Jersey City, transmitting equipment, Sept., 1950, \$49,038.
Superior Piston Ring Co., Detroit, piston ring sets, July, 1950, \$7800.
Surface Combustion Corp., Toledo, heater assembly, July, 1950, \$19,516; igniter assembly, June, 1950, \$2467.
Swan Construction, Inc., Cincinnati, installation of movable roof and extended craneways, June, 1950, \$27,821.
Syracuse University, Syracuse, investigation of the fatigue characteristics of aircraft extruded aluminum alloys, July, 1951, \$18,200.
Taylor, Thomas, and Sons, Hudson, Mass., elastic cord, May, 1950, \$4707.
Telectro Industries Corp., L. I. City, N. Y., frequency meter, June, 1950, \$3750.
Temple University, Research Institute, Philadelphia, services, research and development of heat and oxidation stable materials as lubricants and elastomers, Apr., 1951, \$15,094.
Tenney Engineering, Inc., Newark, N. J., furnish radio frequency shielded room, May, 1950, \$3439.
Test Research Service, Bronxville, N. Y., development of additional forms for the cadet-exam, June, 1952, \$29,858.
Textile Thread Co., Watertown, Mass., thread, Aug., 1950, \$3571.



10,000-hp XT-37 Turbodyne
drives counter-rotating propellers
through this special
WESTERN GEAR WORKS
reduction-gear unit.

WESTERN GEAR WORKS was selected by The Turbodyne Corporation to design and build the reduction gear unit that transmits the Turbodyne's tremendous power as well as provides support for the counter-rotating propellers. The Turbodyne is a turbo-prop type of aircraft engine.

WESTERN GEAR WORKS has the experience and facilities to design, produce and test every conceivable type of precision-quality aircraft gear product. Write or call for consultation on your current problems. Western Gear Works, Lynwood (Los Angeles County), California.



WESTERN GEAR WORKS
Manufacturers of PACIFIC-WESTERN Gear Products

Pacific Gear & Tool Works

Plants at:
Seattle
San Francisco
Lynwood
(Los Angeles County)
Representatives:
Portland
Denver
Houston

Thews Specialty Co., Milwaukee, reduction unit, June, 1950, \$2820.
Thierer, Alfons, Wright-Patterson AFB, consultant services, June, 1950, \$1675.
Thompson Products, Inc., Cleveland, open contract, miscellaneous pump parts, June, 1950, \$5000; spare parts for pump assembly, June, 1950, \$23,720.
Thormachien, Karl F., Wright-Patterson AFB, scientific consultation services, June, 1950, \$1675.
Titanine, Inc., Wichita, enamel, June 1950, \$1784.
Torrington Mfg. Co., Torrington, Conn., needle bearings, June, 1950, \$30,463.
Triumph Mfg. Co., Chicago, electronic shutter tester, June, 1950, \$2000.
Tufts College, Trustees of, Medford, Mass., design of aviation maps for legibility under low level red lighting, May, 1951, \$19,197.
Turnbull Enterprises, Inc., Baltimore, passenger airplane seat, Aug., 1950, \$4032.
Underwood Corp., Washington, adding machines, Mar., 1950, \$36,432.
United Aircraft Corp., E. Hartford, Conn., modification of GFP propeller blade assemblies, May, 1950, \$69,720.
United Mfg. Co. div., United Advertising Corp., New Haven, Conn., aircraft test stand, Oct., 1950, \$48,323.
U. S. Filter-Plastics Corp., Stirling, N. J., deployment bag covers, June, 1950, \$4221; vacuum packing of 300 sleeping bags, Apr., 1950, \$1186.
U. S. Gauge Corp., div., American Machine and Metals, Inc., Sellersville, Pa., airspeed indicator, Jan., 1951, \$18,871.
U. S. Rubber Co., Detroit, casings, June, 1950, \$55,134; casings and tubes, May, 1950, \$3415; casings and tubes, June, 1950, \$9031.
U. S. Rubber Co., Mishawaka, Ind., pneumatic mattress pads, July, 1950, \$2200.
U. S. Rubber Co., New York, 1/2 in. rubber splicing tape, Apr., 1950, \$2507.
Universal Gear Corp., Indianapolis, gear, July, 1950, \$4528.
University of California, Regents of, Berkeley, resonator tube development, Apr., 1952, \$39,683.
University of Illinois, Urbana, research facilities and materials necessary to evaluate fluorinated compounds as fungicides, Apr., 1951, \$9000.
University of Maryland, College Park, services, theoretical and experimental study of compressible and incompressible gas jets, Nov., 1952, \$63,000.
University of Minnesota, Minneapolis, additional wind tunnel investigation on boundary layer control at high subsonic speeds, Dec., 1950, \$39,992.
University of Pennsylvania, Philadelphia, services, research studies on solid solution alloys, Mar., 1951, \$26,000.
University of Texas, Austin, psychological statistical study, Mar., 1951, \$3534; development of spatial and visualization tests, Jan., 1952, \$32,636.
University of Washington, Seattle, development of solution data on a non-linear differential equation, May, 1951, \$4950.
Utility Electronics Corp., Newark, N. J., multimeter, Oct., 1950, \$26,479.
Valley, George E., Jr., Cambridge, Mass., consultant services, June, 1950, \$1500.
Van Karman, Theodore, Washington, consultant services, June, 1950, \$1500.
Variety Aircraft Corp., Dayton, reduction unit, May, 1950, \$1303.
Victor Adding Machine Co., Dayton, adding machines, Mar., 1950, \$28,397.
Vinson Mfg. Co., Van Nuys, Calif., maintenance data, May, 1950, \$1910.
Visual Society for Education, Chicago, spare parts for photographic equipment, May, 1950, \$7185; miscellaneous spare parts for photographic equipment, Apr., 1950, \$1163.
Von Eschen, Garvin L., Worthington, O., manuscript report on aeronautical sciences, Sept., 1950, \$7500.
Vulcan Tool Co., Dayton, design, data, fabrication of 1 set of modification parts and 1 set of original tracings, May, 1950, \$1888.
Wagner, E. R., Mfg. Co., Milwaukee, hinge, July, 1950, \$8025.
Wagner, Ferd. Co., Cincinnati, photographic film, Sept., 1950, \$44,750.
Wagner, Ferd. Co., Dayton, dry film dupli-

icator machine, June, 1950, \$4518.
Wahl, Eberhard W., Wright-Patterson AFB, technical consultation services, June, 1950, \$2460.
Waldes-Kohinoor, Inc., L. I. City, N. Y., rings, Aug., 1950, \$3426.
Washington University, St. Louis, study on pilot repeater accidents, Apr., 1951, \$12,160; development of category keys, Dec., 1950, \$11,740.
Waterbury Tool div., Vickers, Inc., Waterbury, Conn., grinder valve seat, wet type, maintenance data, Sept., 1950, \$63,360.
Waukesha Motor Corp., Waukesha, Wis., spare parts for bearings for various engines, Oct., 1950, \$2635.
Wayne University, Detroit, training and analysis at strategic air command, Sept., 1950, \$10,000.
Weber Showcase-Fixture, Inc., Huntington Park, Calif., aircraft seat, engineer, June, 1950, \$9777; food storage box, July, 1950, \$6355.
Wehle Electric Co., Buffalo, portable hand lamp guard with reflector, May, 1950, \$1032.
Welch, Allyn, Inc., Auburn, N. Y., No. 2 bulb for Welch Allyn general diagnostic instrument, June, 1950, \$1983.
Weldon Tool Co., Cleveland, fuel heater pumps, July, 1950, \$2736.
West Publishing Co., Washington, law books, Apr., 1950, \$1363; law books, Dec., 1950, two contracts, \$2064, \$2507.
Western Electric Co., New York, miscellaneous parts and components, Jan., 1951, \$50,000; Vacuum tubes, Apr., 1950, \$94,767; range meter, Sept., 1950, \$1359; resistor assemblies, Jan., 1951, \$85,436; motion picture cameras, Apr., 1950, \$52,620; plug-in sub-assemblies, Jan., 1951, \$64,928.
Western Mfg. Co., Detroit, spares for F-1, F-1A, F-2 and F-2A fuel servicing trailers, Sept., 1950, \$9000; spare parts for gear level shaft assembly, June, 1950, \$3045.
Western Reserve University, Cleveland, development of a B-50 AVN mech. exam, Dec., 1950, \$10,125.
Western Washer-Stamping Co., Los Angeles, gaskets, washers, May, 1950, \$2270.
Westinghouse Electric Corp., Dayton, modification, maintenance and overhaul of XJ-30, J-30, XJ-34, J-34, XJ-40 and J-40 aircraft engines, June, 1950, \$60,800; analysis and technical report of the stability of the autopilot-boost control modification called for in the basic purchase order, Dec., 1950, \$14,843; technical data, May, 1950, \$8022; additional work and equipment, May, 1950, \$1080; rate gyro servo amplifier power supply chassis, June, 1950, \$2522.
Westinghouse Electric Supply Co., Dayton, power cable, May, 1950, \$6457.
Weston Electric Instrument Corp., Newark, N. J.; spare parts for thermometer indicators, July, 1950, \$10,677; bulb electrical resistance, Mar., 1951, \$8026.
Weston Hydraulics, N. Hollywood, technical data, May, 1950, \$7354.
Wickland Mfg. Co., Pasadena, toilet assembly, June, 1950, \$20,535.
Wild, John, Ithaca, N. Y., consultant services, June, 1950, \$4500.
Wilkening Mfg. Co., Philadelphia, piston ring sets, July, 1950, \$3448.
Williams Co., London, O., steel wool, July, 1950, \$2902.
Wilmington College, Wilmington, educational services, May, 1950, \$4419.
Wilson Mech. Instrument Co., New York, machine, hardness testing, vertical gap, July, 1950, \$2790.
Wolverine Diesel Power Co., Detroit, gasket and cable, June, 1950, \$4327.
Wright-Aeronautical Corp., Wood-Ridge, N. J., wrenches, plugs, tools, discs, pointers and screw driver, Jan., 1951, \$35,717; design and supervision of ramjet facility, Mar., 1951, \$63,747.
Yale University, New Haven, research on multiple classification, Oct., 1950, \$7778.
York Corp., Cincinnati, 12 reciprocating type compressors, Aug., 1950, \$9384.
York Supply Co., Dayton, spare parts, bearings, various engines, Oct., 1950, \$2326.
Young, Raymond W., Hohokus, N. J., consultant services, June, 1950, \$4500.
Young, Robert E., Rockville, N. Y., rocket engines for model aircraft, Oct., 1950, \$19,950.

World's Largest Manufacturer of Commercial Helicopters presents...

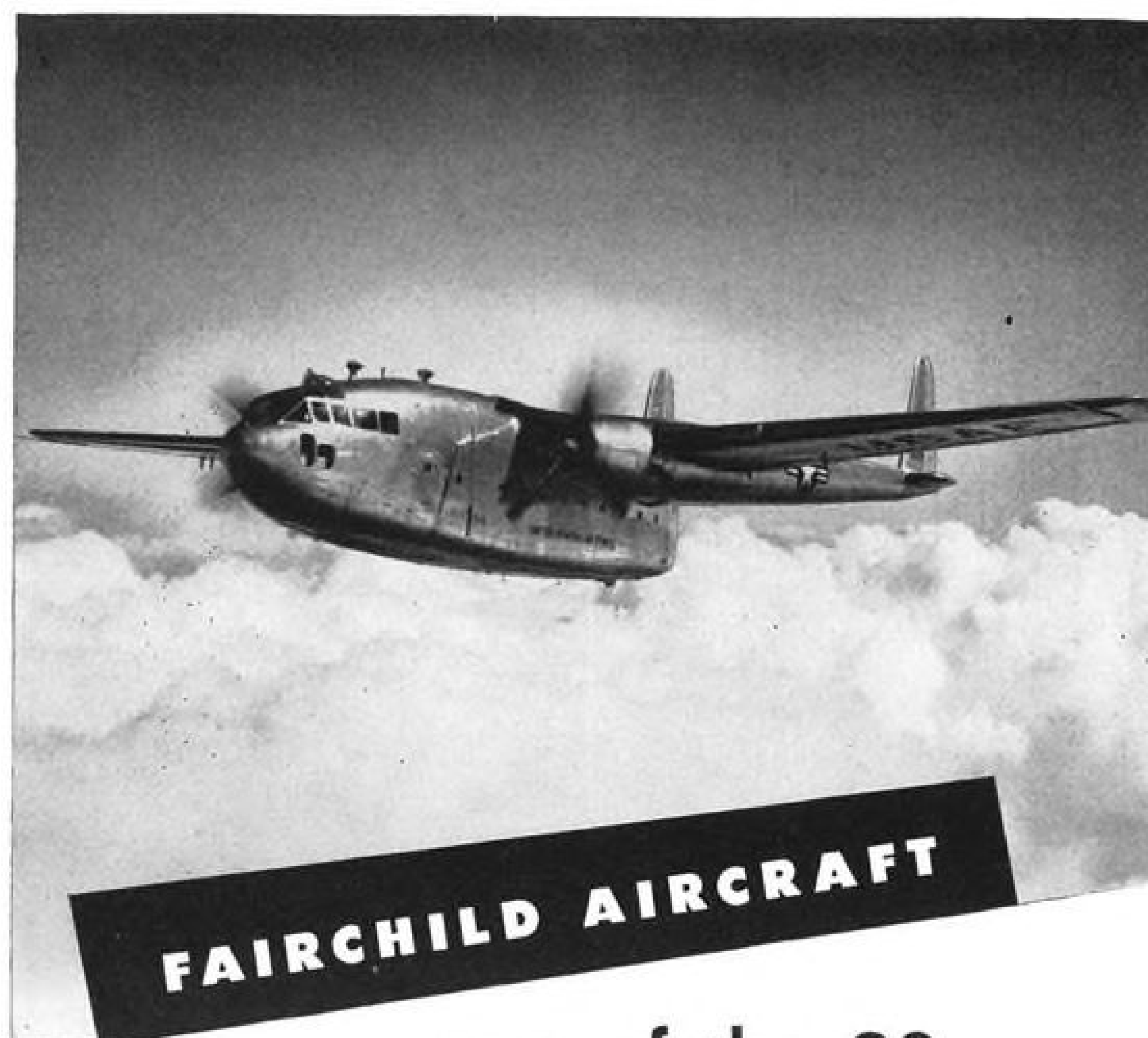


The new 1950 *Utility* Hiller 360
The new 1950 *Executive* Hiller 360



Higher performance; increased useful load; lowest priced helicopter; only basically stable helicopter; lowest insurance rates of any helicopter.

Hiller Helicopters.....
UNITED HELICOPTERS, INC.
PALO ALTO • CALIFORNIA



one of the 38
aircraft manufacturers
currently specifying

TINNERMAN
*Speed Nuts**

Because:

1. SPEED NUTS weigh less than any other self-locking aircraft fasteners.
2. They're easier to install.
3. They're easier to remove for servicing.
4. Provide greater resistance to vibration loosening.

Thousands of SPEED NUTS*, SPEED CLIPS*, and SPEED CLAMPS* are designed specifically for aircraft applications, and provide lower costs, increased production, and improved product quality. For more details, phone your Tinnerman representative—he's listed in major city directories. Tinnerman Products, Inc., Cleveland, Ohio. Distributor: Air Associates, Teterboro, N. J.

TINNERMAN



Speed Nuts
*Trade Mark Reg. U. S. Pat. Off.



FASTEST THING IN *Aircraft* FASTENINGS

Cambridge Labs

Ace Engr.-Mach. Co., Philadelphia, room filterette, Apr., 1950, \$9400.

Applied Physics Corp., Pasadena, electrometer vibrating reed holder resistor, June, 1950, \$8790.

Armstrong Electronic Co., Red Bank, N. J., power supply regulated 0-500 volts, Mar., 1950, \$3250.

Atomic Instrument Co., Boston, analyzer coincidence amplifier power supply, Mar., 1950, \$1860.

Browning Laboratories, Inc., Winchester, Mass., oscilloscope cathode ray, Mar., 1950, \$1275.

Brumac Electronic Corp., New York, oscilloscope, May, 1950, \$9405.

Canner, J. S., Co., Boston, research tests, Apr., 1950, \$1832; research tests, July, 1950, \$5043; research tests, Mar., 1950, \$1552.

Cornell University, Ithaca, extension of services, Apr., 1951, \$75,000.

Dumont, Allen B. Labs, Inc., Clifton, N. J., oscillograph cathode ray supply power high voltage, Mar., 1950, \$4538.

Electronic Tube Corp., Philadelphia, camera oscillograph record adapter mount, Mar., 1950, \$2932.

Franklin Institute, Philadelphia, engineering study and evaluation of use of wooden warhead on Blossom IV G, Apr., 1950, \$24,824.

General Electric Co., Syracuse computer components, Aug., 1950, \$24,951.

Hewlett-Packard Co., Palo Alto, Calif., generator signal, May, 1950, \$6214; oscillator low frequency oscillator audio, Mar., 1950, \$2015.

Johnson, Walter J., Inc., New York, research texts, Apr., 1950, four contracts, \$14,936, \$10,544, \$15,681, \$1650; research texts, June, 1950, \$6726.

Kemtron Electron Prod. Co., Salem, Mass., crystals, June, 1950, \$2050.

Kraus, H. P., New York, research texts, Apr., 1950, \$3001; research texts, Mar., 1950, two contracts, \$1275, \$4488.

Northeastern University, Boston, extension of services, Jan., 1951, \$29,219.

Parke, Nathan Grier, III, Concord, Mass., professional consultant services for communications and relay lab and antenna lab, Oct., 1950, \$6975.

Raytheon Mfg. Co., Waltham, Mass., tube type RK-5586, Apr., 1950, \$1487; Raytheon tube, July, 1950, \$2450.

Rose, E. J., Son, E. Braintree, Mass., transmitter housing unit, Apr., 1950, \$9874.

Sensitive Research Inst. Corp., Mt. Vernon, N. Y., wattmeters, Apr., 1950, \$1057.

Statham Laboratories, Inc., Beverly Hills, transducer pressure model, May, 1950, \$1809.

Stechert-Hafner, Inc., New York, research texts, Mar., 1950, \$3990; research texts, Apr., 1950, \$1862.

Stoddard Aircraft Radio Co., Hollywood, meter power supply antenna probe impedance cable tripod, May, 1950, \$5355; meter power supply antenna probe impedance meter cable, Apr., 1950, \$2335.

Watson Labs

American Mineral Spirits Co., New York, kerosene, Apr., 1950, \$1111.

Dooley, L. R., Inc., New York, antenna positioning unit, July, 1950, \$13,381.

Elk Electronic Lab., New York, RF amplifier, Aug., 1950, \$4670.

Great American Industries div., Connecticut Telephone and Electric Corp., Meriden, communication equipment for antenna group, Aug., 1950, \$7485.

McKey, Dixie B., Washington, investigation of L. F. Ioran antennas, Feb., 1950, \$2413.

Measurements Corp., Boonton, N. J., test oscillator set, July, 1950, \$1825.

Mutual Contracting Co., Atlantic Highlands, N. J., shaping and finishing of main access road, Apr., 1950, \$3200.

Network Mfg. Corp., Bayonne, N. J., modification of receiving equipment, Aug., 1950, \$2000.

Syracuse University, Syracuse, research and investigation directed toward study of directional antenna systems for radio purposes, Nov., 1951, \$54,000.

AERONAUTICAL ENGINEERING

Compound Engine Goes into Service Use

First details disclosed
on Turbo-Cyclone now
flying in Navy planes.

By Irving Stone

Throughout aircraft history, speed and range have been prime companion factors. But the turbojet has highlighted speed to such a degree that new engine refinements accenting range have received comparatively little notice.

Now range is again brought into sharp focus with Wright Aeronautical Corp.'s compound engine, the 3250-hp. Turbo-Cyclone 18, powering the latest production model of Lockheed's anti-submarine patrol bomber, the Navy's P2V-4 Neptune.

The TC-18s have probably been flying in the Neptune for the past five or six weeks. It is estimated that with these engines, the distance record set by the P2V "Truculent Turtle" could have been increased from 11,236 to 13,483 miles (AVIATION WEEK, May 15).

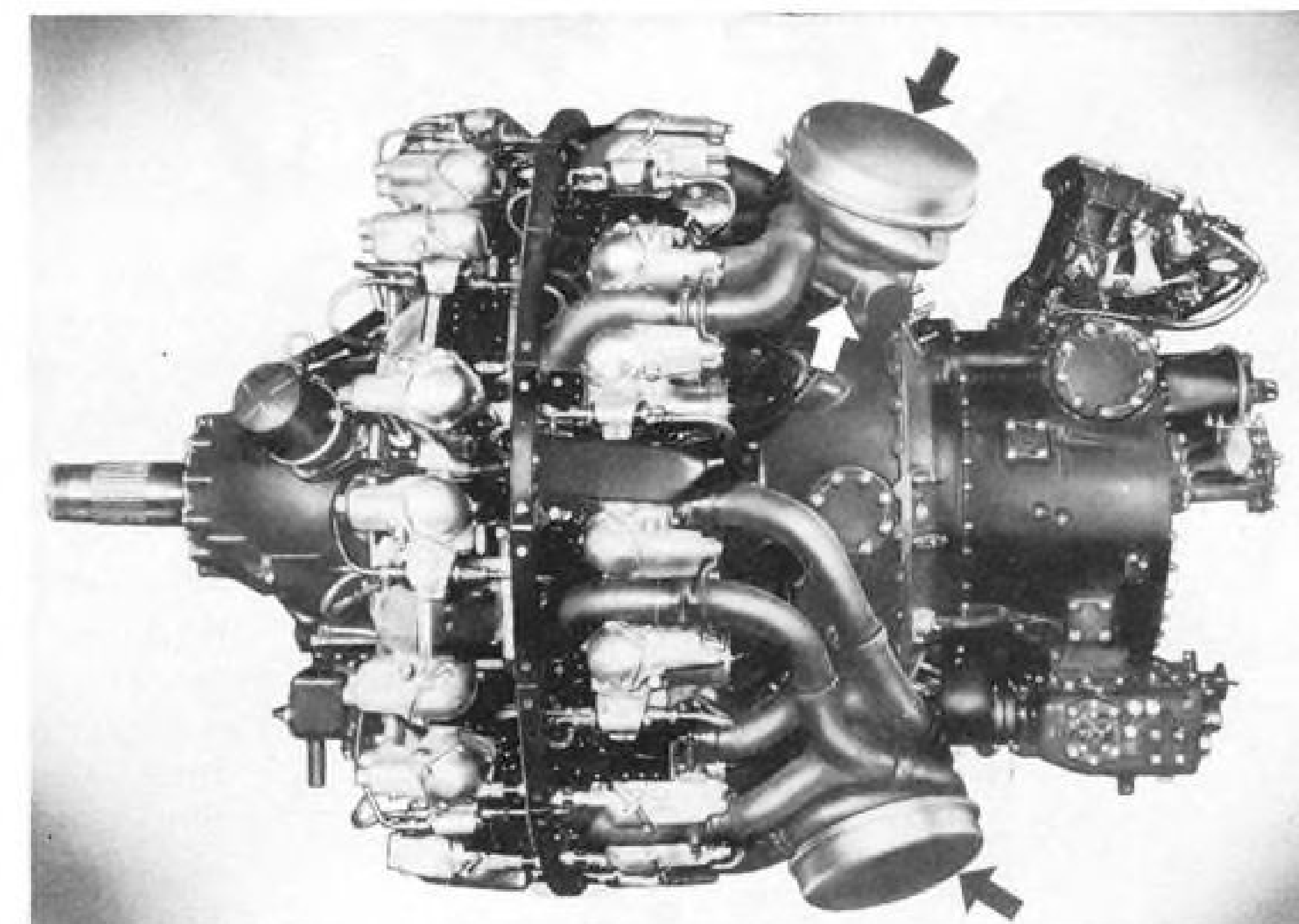
Wright Aero has already received \$18-million worth of orders for the TC-18. It is slated for Martin's P5M patrol bomber also.

The powerplant is the only compound engine to pass a military acceptance test, and first of its type to be put in quantity production and flown in a production airplane. It is a basic R-3350 piston engine combined with three blowdown turbines to provide a compound-power source mechanically recovering energy normally expended in the exhaust gas. Result: Lower fuel consumption for the same power of the basic engine, or higher power with the same fuel consumption.

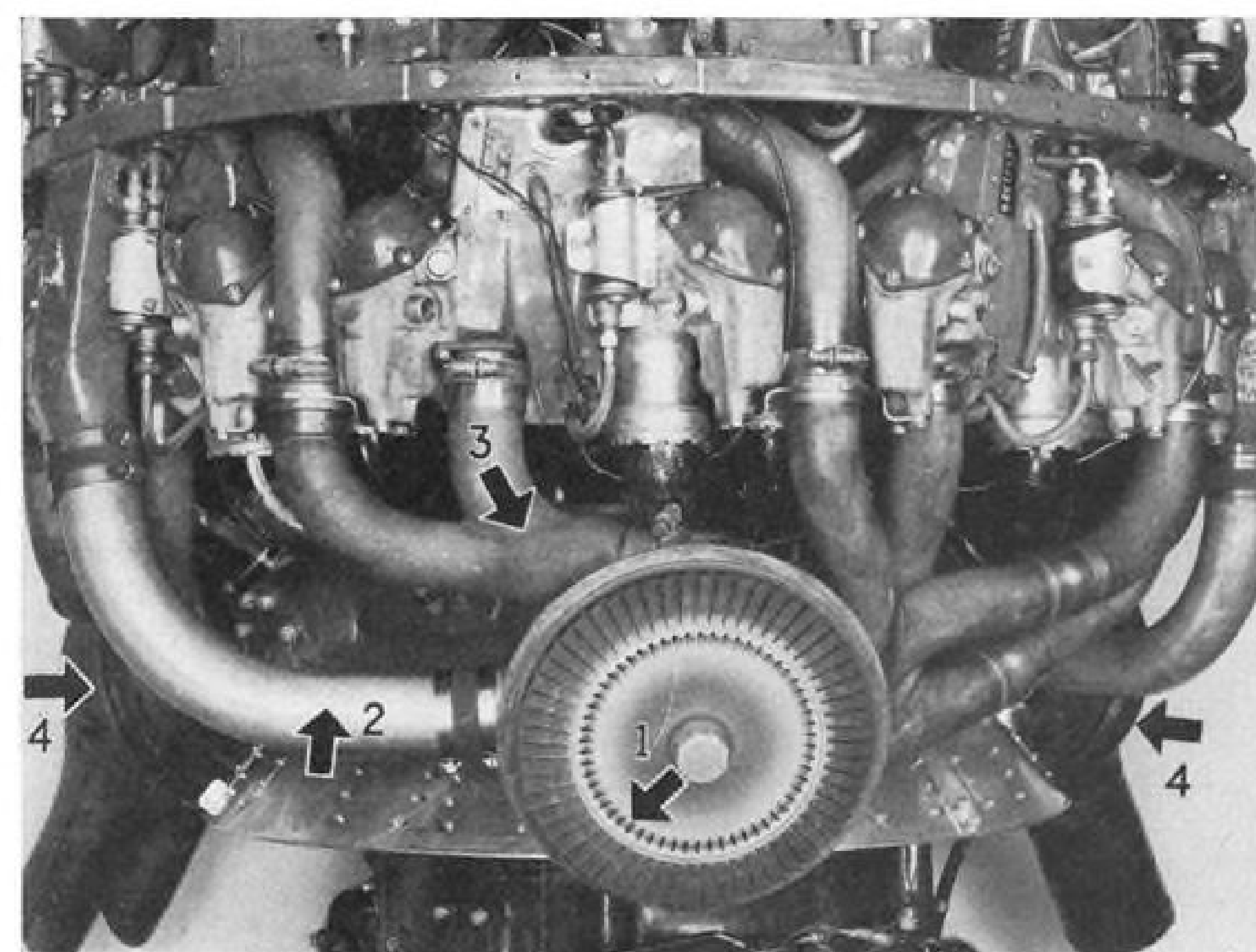
This compound engine is reported to afford these advantages:

- Up to 20 percent less fuel consumption over the operating range of the basic engine, or
- Up to 20 percent power increase.
- 5 percent decrease in specific engine weight. Specific weight now is about 1 lb./hp.
- No increase in cowl diameter. Actual diameter of the compound engine is 58 in. as against 55.62 in. for the basic piston plant (R-3350). Length of the TC 18 is 91.8 in., whereas R-3350 is 81.93 in.
- No additional controls for pilot.

► **Beginnings**—History of this com-



Left side view of Turbo-Cyclone 18. Two of engine's three turbines are shown covered with shipping caps (black arrows). V-clamp (white arrow) eases turbine disconnection.



Turbine and piping hookup: 1, cooling air outlet holes at base of buckets; 2, air duct to turbine fan; 3, aspirated exhaust connection for front and rear cylinder combination; and 4, turbine hoods, one carrying single exhaust outlet, the other a double type.

ound engine dates back to June, 1946, when the Navy authorized Wright Aero to proceed with a design study of the engine, coupled with performance estimates for two types of aircraft—bomber and attack planes. Meanwhile, the en-

gine was built and first test-stand trial was in May, 1947.

Because of a rearrangement of government procurement schedules, work was continued on a low-priority basis (on company funds) for about a year.

The story of the 6-in-1 man

In this day of specialists, we'd like to tell you about a 6-in-1 man. He's a technical adviser, engineer, liaison officer, mechanic, educator, expeditor, in one neat package labeled "Chance Vought Field Service Representative".

Wherever Vought airplanes fly, at operations bases, training stations, test centers or carriers, these many-talented field service men are serving in one or more of those roles. They are a most valuable aid to the Navy and Marine Corps in the daily task of maintaining Vought planes at peak efficiency — always ready to fly.

As a combined technical adviser-engineer-mechanic, the field service man is the on-the-spot source of timely facts and figures when a "quick-fix" is required, as well as during major maintenance and overhaul jobs. As liaison officer, he is the direct link for interchange of information between the operating squadrons and Chance Vought Aircraft. As educator, he conducts classes to keep ground crews abreast of maintenance and repair procedures. As expeditor, he keeps to a minimum the time between a demand for spare parts and their installation.

In effect, each service representative is practically a "one-man" aircraft factory. He is a walking encyclopedia of detailed technical information. He knows every rivet and seam, every working part and accessory of

Corsair, Pirate and Cutlass fighters. And every day he uses that special knowledge to maintain the 33-year tradition of Vought dependability, availability and fly-ability. To Navy and Marine fliers and ground crews, this 6-in-1 specialist is Chance Vought.

Each of the 21 Vought field service men works at one end of a two-way pipeline that sometimes extends back thousands of miles to the factory in Dallas. They keep tabs on daily airplane performance, listen to fliers and crews and relay information back home. Their reports are frequently translated into engineering changes that pay off in better operational aircraft. And through the same pipeline the field service department pours a steady stream of engineering changes, service manuals, "how-to-do-it" suggestions and answers to urgent questions.

Periodically, Vought's 6-in-1 experts return to Dallas for refresher courses, adding important chapters to their book of knowledge. For some time they have been making exhaustive studies of Pirate and Cutlass jet fighters, learning what makes them tick, preparing themselves to meet the problems that can arise when the planes go into actual service.

The work of our 6-in-1 men really pays off. It helps the Navy and Marine Corps keep Vought airplanes always ready to fly — and at top operating efficiency.

CHANCE VOUGHT AIRCRAFT
DALLAS, TEXAS
 ONE OF THE FOUR DIVISIONS OF
 UNITED AIRCRAFT CORPORATION



The Chance Vought field service man is on duty where he is needed most — where service squadrons are operating.



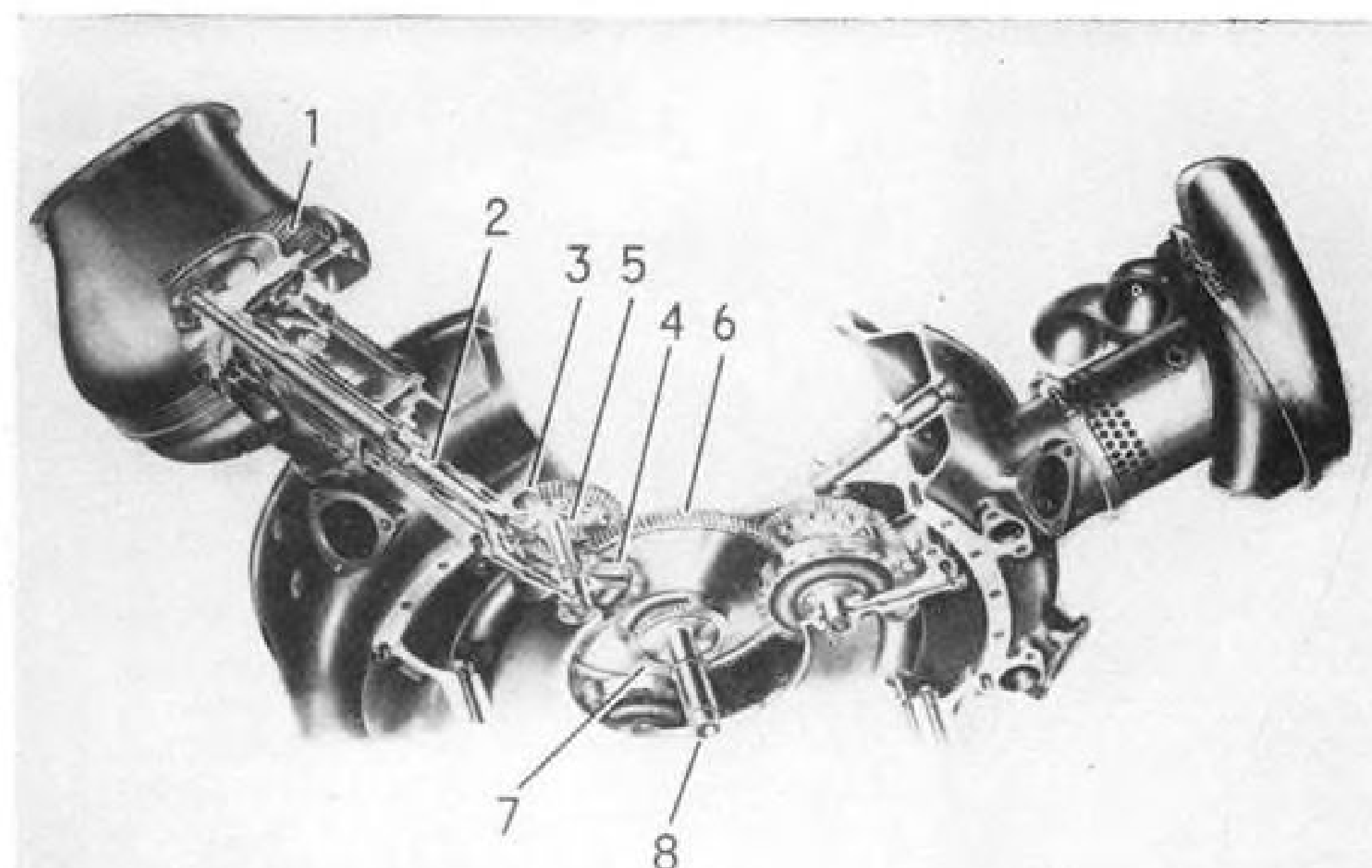
Vought field men are great travelers. Using planes, cars, trains and ships, last year they covered 420,860 miles on land and water, in cold climates and hot, in the performance of their job. More than 65,000 miles of this travel was aboard Navy aircraft carriers.



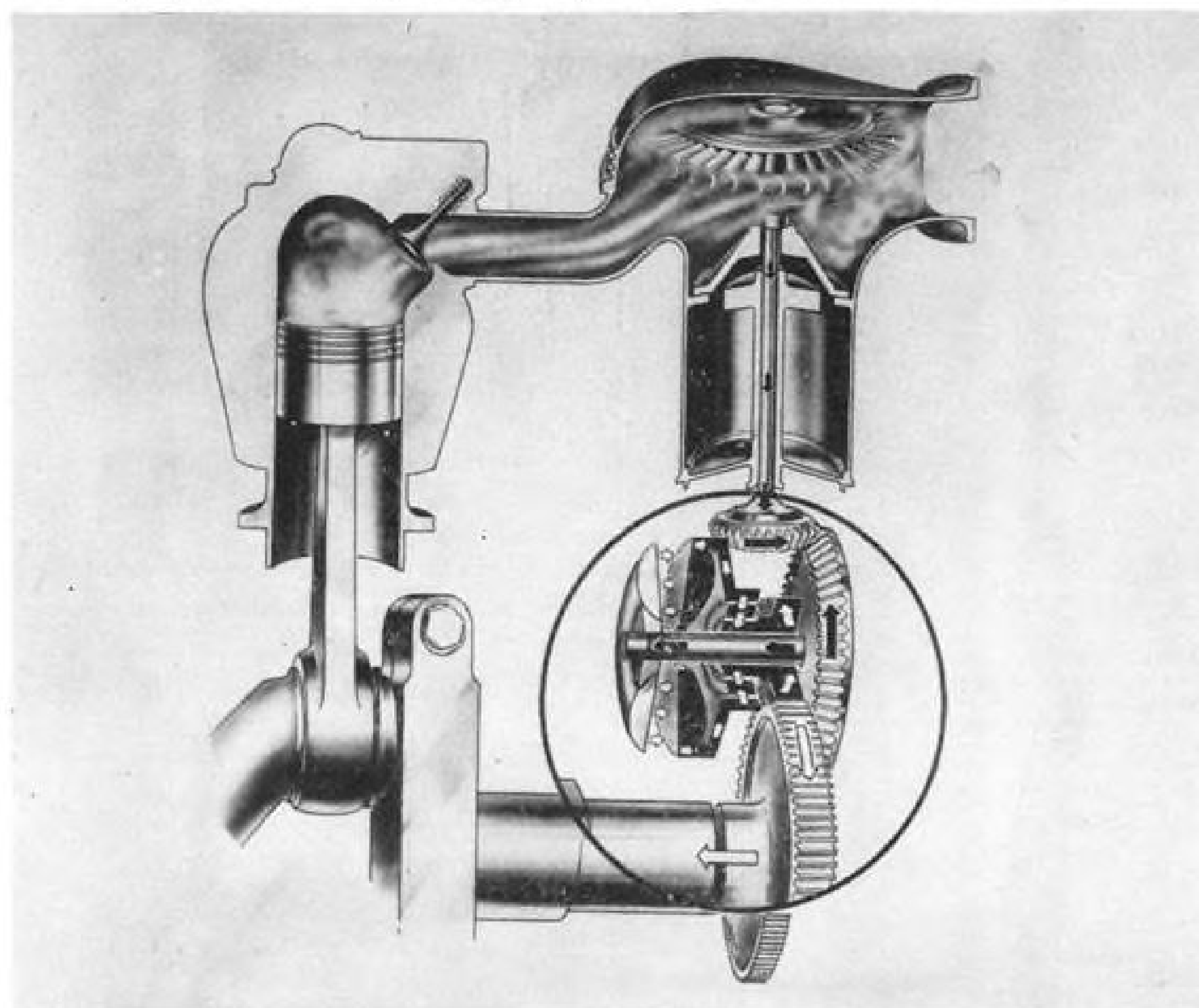
Vought service men are frequently aboard carriers during maneuvers. They're always ready for the loudspeaker call: "Now hear this — Vought Service Man, report to hangar deck!" It's a summons for their special kind of help as problems arise during the job of getting planes in A-1 shape for flight.



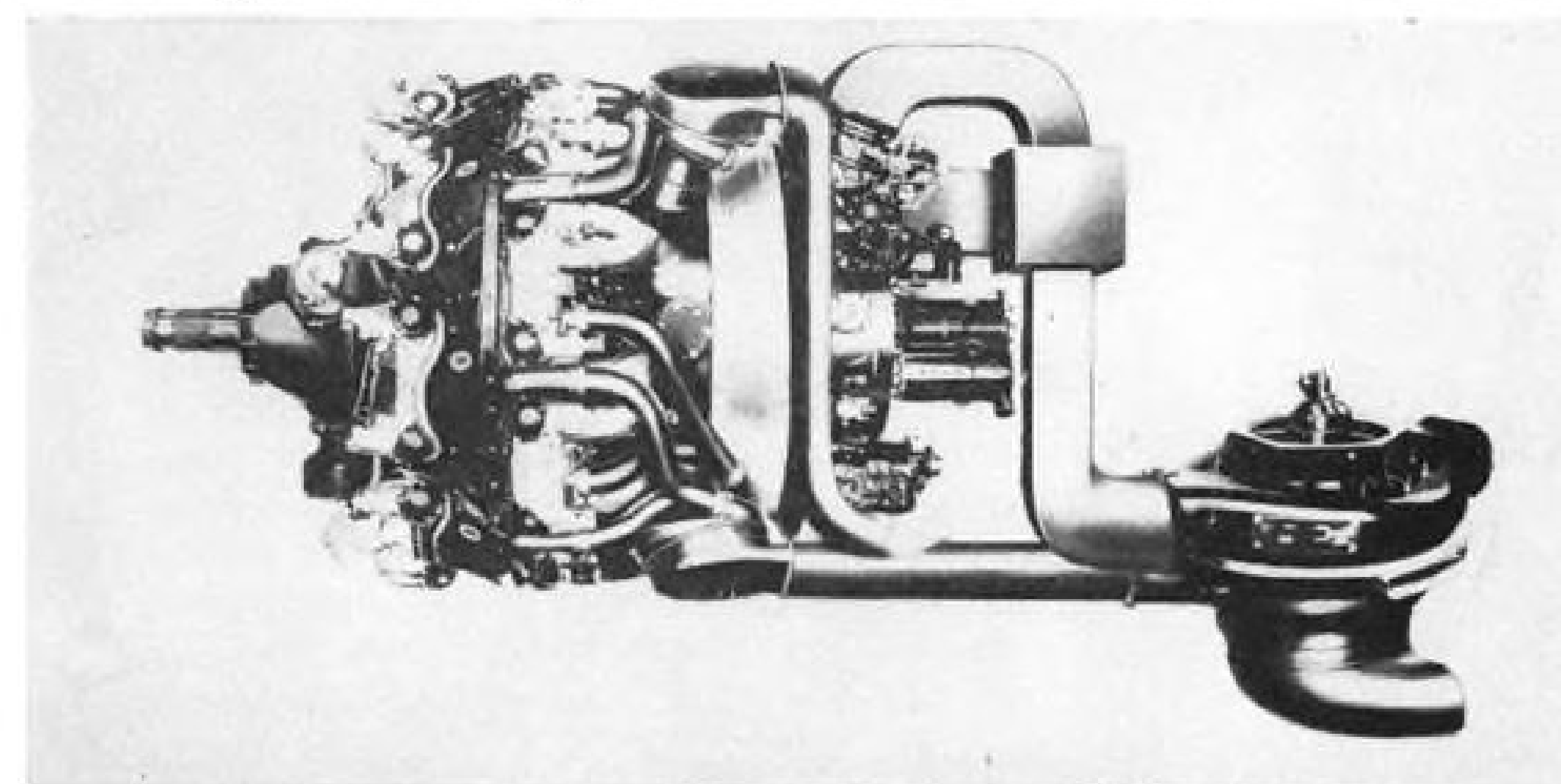
The Field Service Department here in Dallas keeps field men informed of engineering changes and expedites shipment of spare parts. Service manuals are compiled for distribution to military squadrons. Courses are conducted in maintenance and operation of new Vought fighters for our own field men and for Navy and Marine Corps personnel.



Drive system: 1, Turbine; 2, quill shaft; 3, shaft bevel gear connection; 4, fluid coupling; 5, spur gear; 6, crankshaft gear; 7, gear spline; and 8, crankshaft extension.



Schematic representation showing blowdown turbine and drive mechanism to the crankshaft.



Compound version under study. Turbosupercharger uses energy remaining in turbine exhaust.

In August, 1948, an initial order was received for the engine from the Navy. This amounted to about \$9½ million.

In July, 1949, a 350-hour endurance test was made at max. cruise power.

In October, 1949, a 50-hour flight approval (ground) test was held. And in the same month, the engine powered a Boeing B-17 flying test lab, as an extra engine in the nose. In this installation a concave dish was used behind the prop to restrict the air inlet. This, in combination with flaps, controlled the amount of air to the engine, so that cylinder temperature could be boosted to simulate tropical operating conditions; also, to create airflow conditions resulting from use of shutters in arctic operations.

In February and March of this year, a 150-hour AN model test was conducted for final approval.

► **Cylinder-Turbine Hookup**—The basic engine (R-350) has two banks of nine cylinders each. To avoid long snaking connections from cylinders to turbines, a simple arrangement was used.

Six exhaust pipes feed each of the three turbines. Two front cylinders are siamesed to a common exhaust; a similar arrangement is used for two rear cylinders, and another for one front and one rear.

This last combination created a basic problem. There was adverse scavenging because the front cylinder had an overlapping exhaust. The condition was corrected by an aspirated hookup between front and rear cylinder pipes.

► **Drive System**—The turbine wheel has a mean diameter of about 10½ in., outside diameter approximately 11 in., and turns at about 8 times crankshaft speed. It is mounted on a shaft hooking to a quill shaft carrying a Zerol bevel gear. This gear contacts another Zerol gear on a shaft hooked to a fluid coupling operating on engine oil. Runner of the fluid coupling is connected to a spur gear contacting another gear on the engine crankshaft.

The coupling keeps the turbine under load at all times, controls turbine speeds, eliminates need of synchronizing engine and turbine speeds, and isolates the turbine and shafting from vibratory forces.

In addition to the fluid coupling effect, the forces transmitted to the turbine-shaft mount are damped by a spring-loaded friction plate arrangement surrounding the shaft mounting pedestal. The friction disks are of dissimilar material (bronze and steel) and lubricated.

► **Turbine Cooling**—This is accomplished by a fan mounted below the turbine wheel, which pumps air (taken from a scoop at the front of the engine) through holes at base of blades.

The air is collected on the aft face of the wheel in a cooling cap connected



WILCOX ...FIRST CHOICE of HAWAIIAN AIRLINES

VHF AIR-BORNE COMMUNICATIONS

Hawaiian Airlines selected the WILCOX TYPE 361A COMMUNICATIONS SYSTEM for all aircraft. This consists of a 50 watt transmitter, a high sensitivity receiver, and a compact power supply, each contained in a separate ½ ATR chassis. Transmitter and receiver contain frequency selector with provisions for 70 channels . . . ample for both present and future needs.

VHF GROUND STATION PACKAGED RADIO

Hawaiian Airlines selected the WILCOX TYPE 428A FACTORY PACKAGED STATION for all ground stations. This consists of the WILCOX 406A fixed frequency 50 watt transmitter, the WILCOX 305A fixed frequency receiver, the WILCOX 407A power supply, the WILCOX 614A VHF antenna, telephone handset, loudspeaker, desk front, typewriter well, and message rack.

DEPENDABLE COMMUNICATIONS FOR THE WORLD'S AIRLINES

During recent months, many of the world's foremost airlines, UNITED, EASTERN, TWA, MID-CONTINENT, BRANIFF, PIONEER, ROBINSON, and WISCONSIN CENTRAL have placed volume orders for similar communications equipment. No greater compliment could be paid to the performance, dependability, and economy of WILCOX equipment than to be "FIRST CHOICE" of this distinguished group.

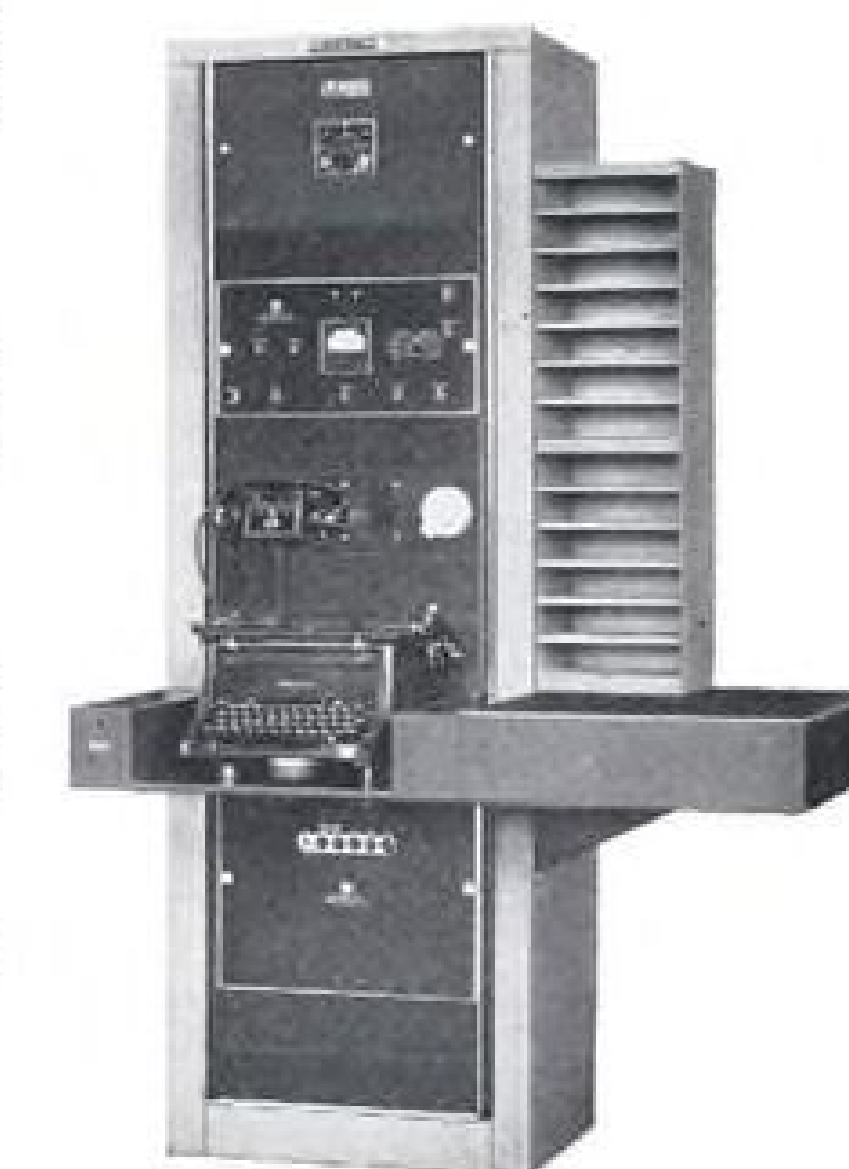
Write Today for complete information on the Type 361A VHF Air-borne Communications System and the Type 428 Packaged VHF Ground Station.

WILCOX ELECTRIC COMPANY

KANSAS CITY 1,



MISSOURI, U.S.A.



Type 428 Packaged VHF Station

Glidair Finishes



FAVORED by the FAMOUS!

- Pan American World Airways
- United Air Lines
- Eastern Air Lines
- Curtiss-Wright Corporation
- Piedmont Airlines
- Mid-Continent Airlines, Inc.
- Chicago & Southern Air Lines, Inc.
- Trans World Airlines
- Northwest Airlines
- Southern Airways
- Beech Aircraft Corporation
- Pratt & Whitney Aircraft
- Chase Aircraft Company, Inc.
- Bellanca Aircraft Corporation
- Globe Corporation, Aircraft Division
- Edo Corporation
- Lockheed Aircraft Service

This impressive list of leading aviation companies is evidence of the outstanding acceptance of Glidair Finishes.

Accustomed to meeting the highest industry standards throughout 23 years of service, Glidair Finishes continue to provide unexcelled performance—the end result of development leadership.

THE GLIDDEN COMPANY

AVIATION SALES HEADQUARTERS
11001 MADISON AVENUE • CLEVELAND 2, OHIO



to a snout. This protrudes into the turbine exhaust outlet to achieve an aspirating effect for the cooling system and to prevent afterburning when the air is mixed with any unburned exhaust.

► **Turbine Data**—The Stellite buckets are welded to the turbine wheel. Wright Aero engineers have found that this gives lighter weight than does mechanical attachment of these wheels.

They report no difficulty with this welded attachment. If it becomes necessary to replace a bucket, the new unit can be welded on, they say. Experiments continue on wheels which have had buckets replaced.

In early development testing, turbine wheel operation was possible with as many as 6 to 7 blade tips (half blade sections) missing, emphasizing the ruggedness of the design, it is reported. The unbalance was taken up by the spring-loaded damper plates.

When valves failed and pieces went through the turbine in overload stress testing, it is claimed that no damage that would necessitate immediate shut-down resulted. And failure of a turbine quill shaft because of sludging created by an insufficient oil flow to coupling caused an overspeed condition of the free-turning turbine, which is reported to have had no adverse effect on the basic engine, except for the loss of power from this turbine. It is claimed that the buckets or wheel did not stretch, and that the wheel was used again for further testing.

Gas velocity at the turbine is supersonic. Temperature is about 14-1500 F., but varies with mixture strength. Wheel speed at cruise is about 16,000 rpm.

Disconnection of the turbine and shaft down to the quill shaft is facilitated by removal of one bolt which holds a circumferential V-clamp at the base of the turbine.

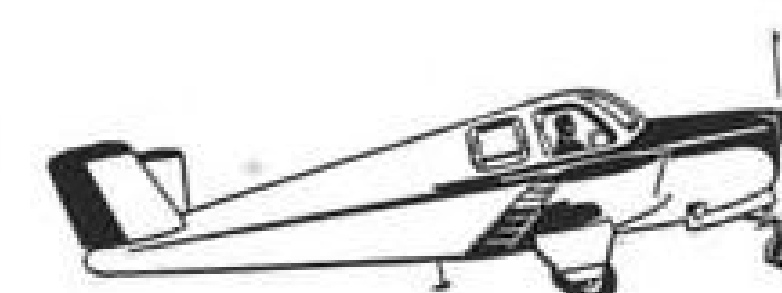
► **Turbosupercharging Possible**—Generally, there remains in the turbine exhaust about one-third of the thrust which normally would have been available without compounding.

The P2V turbine exhaust stack is a single unit. The Martin P5M will utilize a double configuration.

Best range conditions for the TC-18 are reported by Wright Aero to be at 10,000-15,000 ft. For higher altitude operation, the present compound engine could be turbosupercharged, utilizing the remaining energy in the exhaust gases. This is being studied.

Other engine manufacturers have also shown interest in compounding the piston powerplant. Pratt & Whitney is now working on a new version of a compound engine embodying the R-4360 as the basic unit. They previously had built a VDT version.

Allison division of General Motors also has experimented with a compound version of the V-1710.



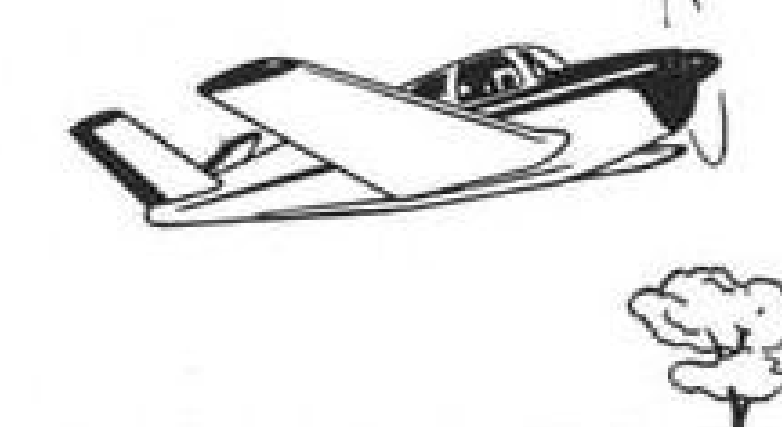
Increased Horsepower Rating at Take-off

Take-off horsepower rating is now 196 hp at 2450 rpm, providing improved take-off performance without sacrifice of long engine life, low operating and maintenance costs.



Increased, Faster Flap Travel, New Beechcraft Propeller

Improved short field take-off and landing performance is made possible by greater degree of flap travel and the greater static thrust of the new Beechcraft propeller.



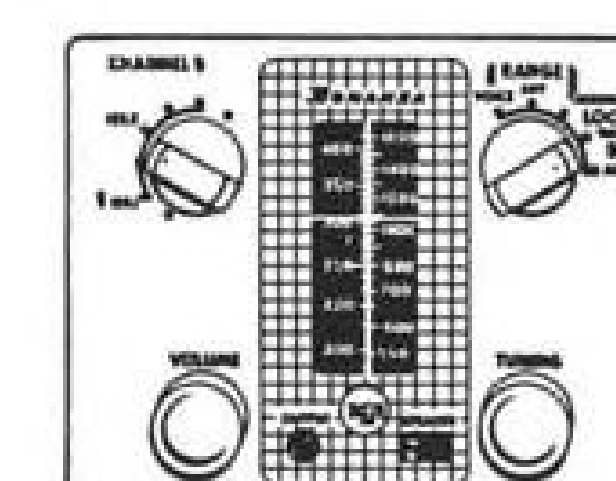
Faster Landing Gear Action — Both Up and Down!

The already quick action of the Bonanza's retractable tricycle landing gear has been speeded up even more. At 105 mph the gear lowers in 7½ seconds, goes up in 8½ seconds!



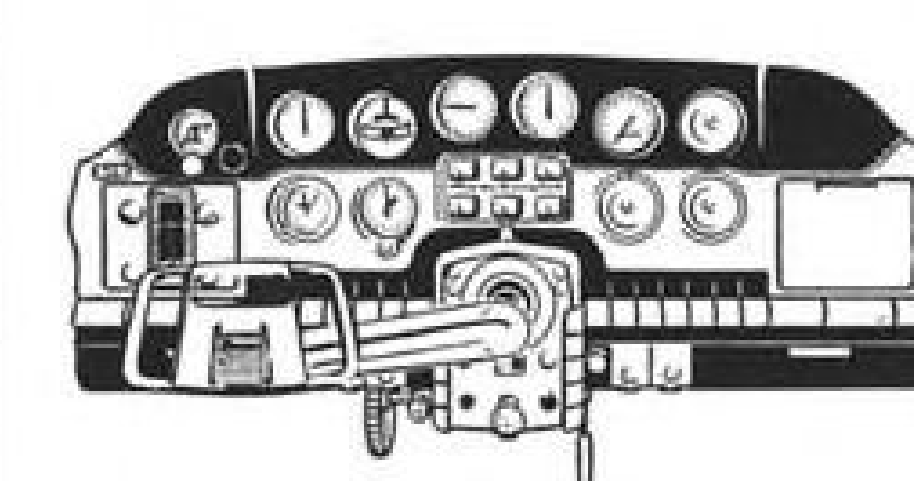
New Upholstery Combinations and Interior Designs

New combinations of blue, green and brown materials of warmth and beauty especially chosen to blend with the new range of exterior colors. Smart leather seat caps, new arm rests for all passengers.



New Radio Includes VHF Marker Beacon

The selection of the RCA 116 transceiver as standard equipment provides regular low-frequency operation for navigating four-course radio range, homing on range and standard broadcast stations; adds VHF channels.



New Instrument Panel Design, Safety-Type Wheel

New instrument panel design retains famous Bonanza operating convenience and efficiency, adds smarter-than-ever note to cabin appearance. And there's a new safety-type control wheel to match!

It has no equal in performance, speed, economy, strength, safety, style and comfort!

The new B35 Beechcraft Bonanza exceeds all promises for a speed-with-economy plane that's roomy, comfortable and easy to fly! New performance features at moderate horsepower add to its versatility and safety, hold operating and maintenance costs at a *business economy*

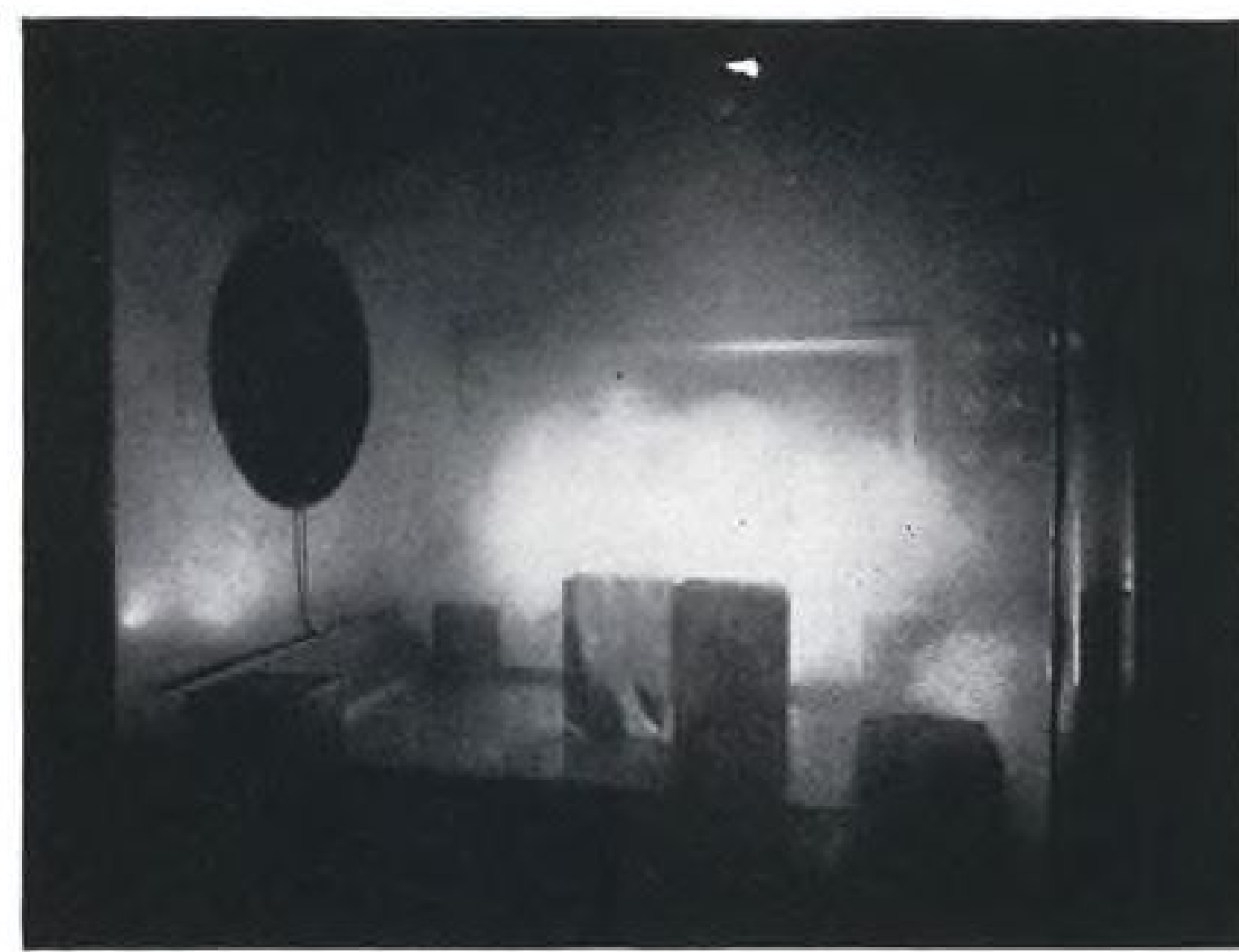
level! New operating conveniences and luxury appointments plus scores of refinements call for a personal inspection because there's room here to show only a few. See it! Get all the facts! You'll agree this greater-than-ever Beechcraft Bonanza is a better-than-ever value!

★ **Get all the facts!** There are hundreds more — about the extra advantages of the new Model B35 Beechcraft Bonanza. Check with your nearest Beechcraft distributor or dealer, or write for complete information on your company letterhead to Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

Top speed, 184 mph
Cruising speed, 170 mph
Range, 750 miles
Fuel economy, 9.5 gph



BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS



Air Materiel Command's test chamber (left), where packages are "flown" for safety check. View (right) shows package "flight" reaction.

Test Chamber to Aid Air Packaging Design

Container engineers, air shippers and carriers may profit by research being conducted by the Packaging Branch of the Materials Laboratory, Engineering division, Wright-Patterson AFB, Dayton, Ohio.

The answers to special packaging problems are being sought in a new test chamber which simulates flight conditions by introducing conditions of temperature, altitude and vibration.

The test chamber—a large walk-in vault—can be made to undergo an altitude change from sea level to 50,000 ft. in 3 min. Temperature variations

are accommodated within the range of 165 to -65 F. And a special table will support loads up to 1000 lb. and impose vibration cycles ranging from 600 to 3600 per min.

Presently, the Air Materiel Command is particularly interested in designing proper packaging for "dangerous" items which it must transport for itself and other branches of the service. These substances include such hazardous substances as acetone, acids, naphtha, varnish, ether, cleaning fluid and some photographic materials. Though a particular package may be

suitable for surface shipment, it is not always adequate for air transportation. Rarefied atmosphere and high altitude cold can cause reactions increasing the hazard attached to "dangerous" items.

Special containers and cushioning are prescribed to meet the specific needs for each material. Outer packages are generally made of metal, fiber or wood, while cushioning may be cellulose fiber, sponge rubber, Fiberglas, curled hair or latex. Insulation is afforded by cork, asbestos, or any other medium that will prevent transfer of heat and cold to the contents of the package.

Jet Transport Overhaul Needs

Airline engineers told chief servicing problems are flow path fouling, failure of burners and guide vanes.

The transition from piston engines to turbine engines in the air transport field will be made with no turmoil, no upheaval.

First indications that there will be no new magic to learn came from the recent National Aeronautic Meeting of the Society of Automotive Engineers. What is known up to now about overhaul and maintenance experiences with turbine power plants was summarized to prepare airline engineers for the eventual use of turbojets and turboprops.

Primary interest centered, as would be expected, around three questions:

- What service problems are anticipated with these new engines?
- What changes will have to be made in standard maintenance and overhaul procedures?
- What are the cost factors in maintenance, repair, and replacement?

Out of the answers to these questions came the definite indication that introduction of turbine engines into the air transport field will be accomplished with no turmoil, no upheaval.

► **Expert Views**—Turbine engine experts who presented their views included J. W. Bailey, Allison division, General Motors Corp. ("Turbojet Engines—Service Experience"); R. N. Dorey, Rolls-Royce Ltd. ("Extended Life of Propeller Turbine Engines"); and R. B. Rogers, Aviation Gas Turbine division, Westinghouse Electric Corp., who answered the questions of J. B. Borger of Pan American World Airways ("Turbojet Powerplant Maintenance and Overhaul").

► **Service Problems**—Troubles generally expected by engine manufacturers are not numerous, but are different from those peculiar to the piston engine.

Chief sources of servicing problems are expected to include:

- **Engine flow path fouling**, presently more severe in axial-flow turbines. No completely satisfactory method now exists for cleaning the flow path parts during operation, according to Rogers (Westinghouse).
- **Burner can failures**, either by cracking or buckling. The basic solution here is to keep the metal skin cool, either by air bleed or insulating coatings on the metal can. Bailey (Allison) felt that 200 hours of trouble-free service could be obtained. This was indirectly substantiated by Dorey (Rolls-Royce) who showed pictures of failures in burners after 400 hours of flight time.
- **Nozzle guide vane failures**, which result from temperature variations and damage from foreign matter. Dorey held that operating temperature of the guide vanes was the power limiter for the Dart turboprop engine, but foresaw improvement with the introduction of hollow vanes of nearly constant section, which show improved resistance to thermal shock.

He also felt that an increase in vane life could be obtained at the price of

increased specific fuel consumption and decreased power. Bailey claimed that easing of physical damage limits could be tolerated without compromise of engine performance or reliability.

• **Auxiliaries**, such as engine controls, fuel, lubrication and electrical systems, were expected by all to rank high on the list of troublemakers. Complete cleaning, seal replacement and re-calibration of the fuel control system topped Rogers' list. Bailey recalled similar early troubles on the Allison J33 and J35, but claimed that the present control system is free of major difficulties.

► **Changes in Procedures**—No major changes were foreseen in standard maintenance and overhaul procedures. Consensus was that 500 hours would be the initial time between overhauls and that basic procedures for overhaul would remain much the same as for piston engines.

Bailey claimed that Allison's experience showed servicing of turbine engines to be much simpler than that for piston engines. His division's turbojets required inspections primarily for the turbine section, fuel and oil filters, and ignition components. These routine inspections can give a more reliable indication of the engine condition than is possible with piston engines.

The engineers believed that line maintenance would be confined to inspections, except for possible replacement of some components in the hot end. In terms of manpower and equipment required, Rogers felt that parts replacement on the line would be dictated by the various sizes of the components.

Repair work will generally mean engine removal. Typical repairs would include replacement of heat-distorted parts and components whose changed dimensions indicate a limited remaining life.

Accessories would be completely bench-checked, or perhaps turned in for replacement.

These repairs can be made, it was agreed, with a relatively small expenditure in both man-hours and need for special tools. Although some new overhaul facilities, such as a high-speed spin test pit, will be needed, the complexity of such equipment is not expected to exceed that required for piston engine checking.

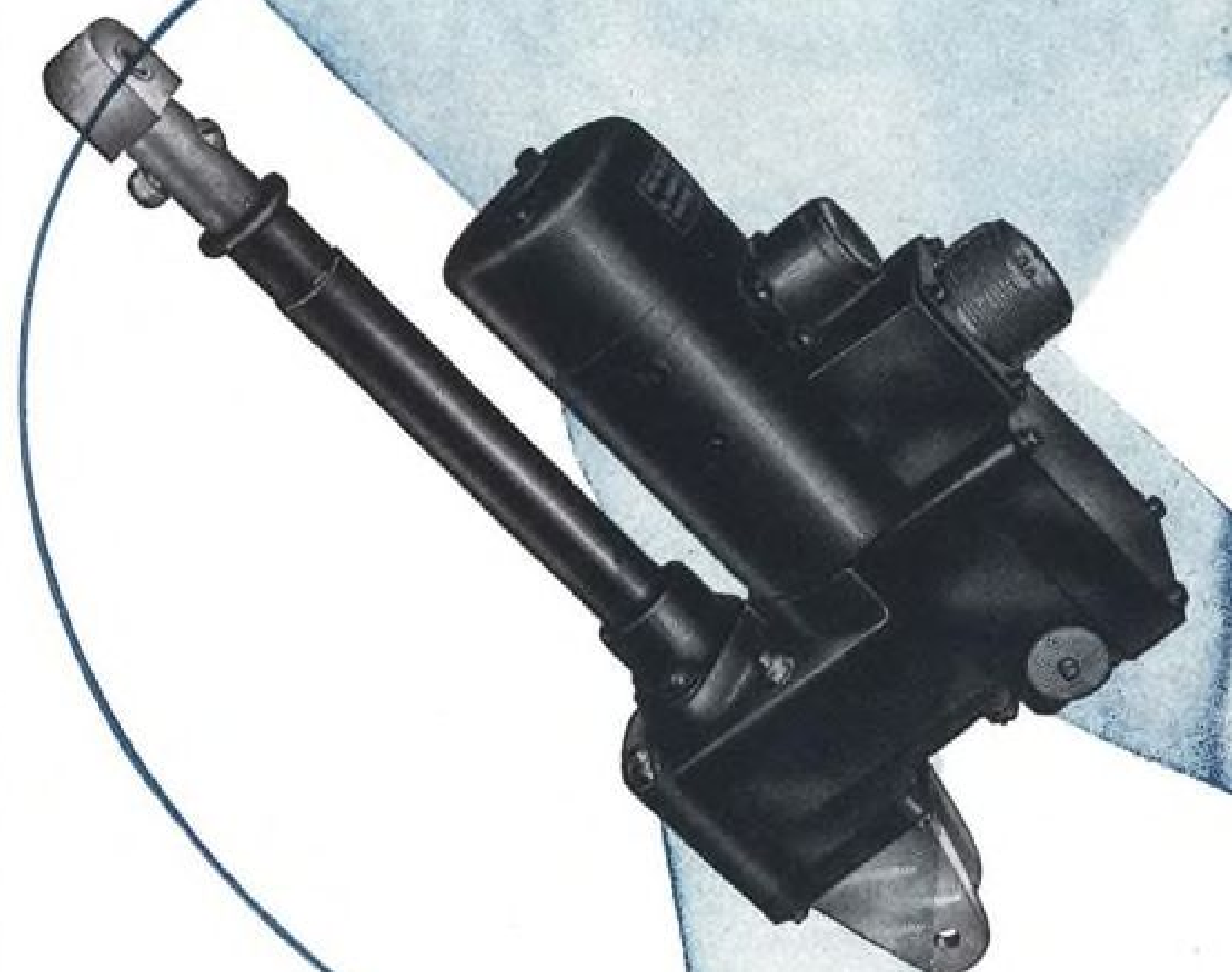
Rogers predicted the use of a trouble-shooting test gear which could be connected into the engine system to duplicate all operational signals for any required electrical and mechanical checks.

► **Cost Factors**—Actual data on maintenance and repair costs were not available, but some comparisons were made with existing piston engine requirements. Necessarily nebulous, these

AIR ASSOCIATES

POSITIVE POSITIONING

ACTUATORS



Positive positioning control is assured in Air Associates actuators by using internal load-limiting switches. The back-pressure exerted adjusts the actuators automatically. This counteracts backlash and eliminates surface flutter as well as switch adjustments at installation and in service. Air Associates non-jamming actuators meet, or exceed, applicable AN specifications.

Air Associates designs and manufactures *electronic, hydraulic, electro-mechanical, pneumatic and miscellaneous* devices.

Also, twenty-two years' experience supplying the needs of manufacturers, airlines and airport operators has established Air Associates as the leading distributor of aircraft supplies.

Write For ENGINEERING CATALOG



AIR ASSOCIATES

INCORPORATED

Teterboro, New Jersey

DALLAS, TEXAS • CHICAGO, ILLINOIS • GLENDALE, CALIF.
EXPORT DEPARTMENT • CABLE ADDRESS 'AIRSOC, TETERBORO'

Serving the Nation in Aviation

IN THE AIR...

You're always right

with **AUTO-LITE**

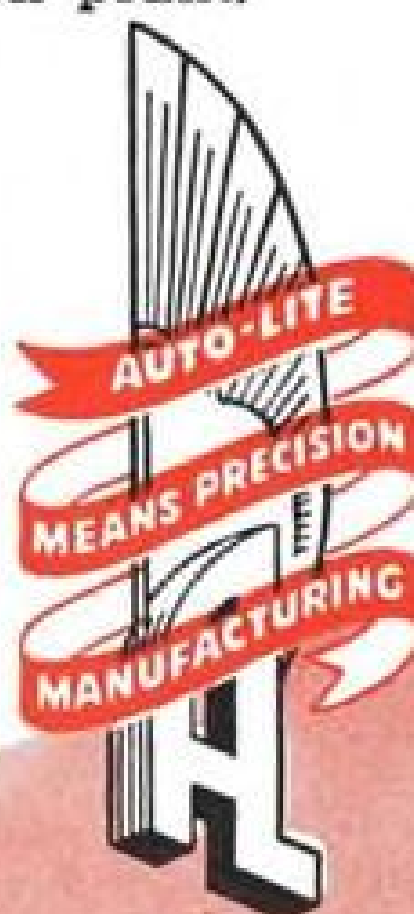
AIRCRAFT WIRE AND CABLE



You are invited to write for our informative catalog.

If IT'S quality you're after—if its quantity you want—if it's a special specification you need, Auto-Lite has the answer. In 39 years' experience, Auto-Lite research and advanced laboratory skills have assisted leading aircraft manufacturers in meeting difficult wire and cable problems. Today, the tremendous output of the new Hazleton plant, combined with the now increased facilities at the Auto-Lite Port Huron plant, makes it possible to accept additional aircraft wire and cable business. Money cannot buy better wire and cable.

THE ELECTRIC AUTO-LITE COMPANY
Wire and Cable Division
Port Huron, Michigan Hazleton, Pennsylvania



LOW TENSION

Aircraft Low Tension Cable Specification AN-JC-48a. Aircraft Low Tension Cable shielded Specification ANC-168.
Aircraft Low Tension Cable aluminum conductor Specification ANC-161.

HIGH TENSION

Aircraft High Tension Ignition Cable sizes 5MM, 7MM and 9MM Specification ANC-130a, also to commercial standards. Magnet wire to Specification JAN-W-583 and commercial standards.

figures represented the best opinions available. But it was emphasized by Dorey that there was the ever-present risk of being forced to eat one's words at a later date.

Initial life of turbine engines in 1955 was estimated at 500 hours. An additional life of 1500 hours with three overhauls was estimated by Rogers, with the further comment that more than three overhauls would be made eventually.

The upper limit of the number of major overhauls permissible would be set by tolerance factors of the hot end components, such as intolerably large clearances or fits after several reworks of the equipment.

An estimated labor requirement of 350 to 500 man-hours for overhaul of transport-type turbojets was also advanced by Rogers.

Production line methods, he felt, would further reduce this number by as much as 30 percent. (A typical large piston engine currently requires about 400 man-hours per overhaul, using production-line techniques at the manufacturer's plant.)

Rogers estimated that cost of the first turbojet overhaul would equal about 10 percent of the initial engine cost, with the second and third overhauls not much more expensive.

Dorey thought that first overhaul cost of the Dart (turboprop) would be about 20 percent of the first cost of the engine, less propellers. Difference between this figure and Rogers' estimate probably is due to servicing of the complex gear reduction required with a turboprop.

► **Parts Costs**—There was disagreement on the cost of replacement parts for turbine engines as compared to piston types.

Rogers' opinion was turbine engine replacements would be no costlier—and probably less costly—than piston engine replacements.

Bailey presented data for Allison's J-22, J-35 and V-1710 engines showing that the cost of replacement parts for the J-35 was more than 2½ times that for the V-1710 parts.

Bailey's figures, however, were adjusted to reflect parts price based on comparable production quantities.

Moreover, Rogers' estimate was a prognostication for a 1955 transport engine, while Bailey's data came from actual past performance figures.

Another factor affecting the cost picture is the interchangeability of parts. As a specific example, 41 percent of serviceable parts for the J-35 engine are usable in earlier models. This reflects directly in reduced cost of spares through the use of production tooling, and minimizes spares inventory and supply problems.

AVIONICS

Ticket Machine With a Memory

Electronic reservation unit being built for American Airlines gives instant data on system-wide bookings.

An ingenious electronic reservations machine is under construction for American Airlines by the Teleregister Corp., New York City.

Known as the "Reservisor," the device was developed from a patent for automatic reservations systems which the airline has held for some years.

A pilot model, in use at Boston for more than four years, has enabled American Airlines' and Teleregister's engineers to ferret out many of the original deficiencies of the unit. They feel confident that the current model will be trouble-free.

► **No Human Errors**—Use of the Reservisor is supposed to result in faster passenger handling at ticket counters, shortened telephone conversations for reservations, and the elimination of human errors in accounting for millions of airline seats.

Ticket and reservations agents will be able instantly to obtain space availability information and book passage on flights throughout the system. The machine will do the bookkeeping required to maintain and provide availability data on more than 1,250,000 seats on 10,000 different "legs" of the company's flights and some connecting services.

Much of the reference material now needed to process an average sale will be eliminated. Information on routes, arrival and departure times, fares, extra sections, connections with other flights, and other data, can be determined directly by the agent.

At the push of four buttons and the flip of a switch, a sale can be made and space confirmed—in a small fraction of the time now required to handle the process by telephone.

► **Penny a Passenger**—Total cost of the Reservisor will be approximately \$150,000. However, since its cost plus operating, amortization, replacement and maintenance charges will be less than one cent per passenger, (a saving of about one-third the cost of existing methods) the machine should more than pay for itself over its expected life of ten years, assuming a 60 percent utilization.

The equipment consists of a centrally located "master unit" which, with the "memory" and inventorying component, measures 24 feet by 2 feet by 7 feet; and as many agent sets as required

by ticket counters, telephone reservations centers and possibly even travel agents.

Agent equipment is 9 inches wide by 14 inches long while the chief reservations agent's unit is twice as wide since it will be used to set up and remove flights from the machine and will be able to read all information stored in the Reservoir at any time.

► **Room for Expansion**—The Reservisor will be capable of handling planes with a seating capacity of 125, which maximum can be increased by means of a simple adjustment.

The first installation will be made in the New York-Newark area, and will be placed in operation next year.

Antenna Research Aims at Compactness

Miniaturization is being stressed in fundamental research on flush-mounted cavity antennas being carried out at the Stanford University Microwave Laboratory Stanford, Calif. The program sponsored by the USAF.

A cavity resonator is a hollow antenna, whose geometry is such that electromagnetic waves are reflected in a phase relationship which increases their amplitude.

Although the general theory of such antennas has been known for many years, practical application had to await the development of techniques for the generation of ultra-high and microwave frequencies. This development was greatly accelerated in World War II.

One specific antenna design in the miniaturization program is half a cylinder of 1½-in. diameter and 1½-in. height. A rod and disk assembly protrudes on the cylinder centerline. The whole device can be filled or covered with a dielectric.

Testing of these antennas is being done with a series of aluminum hemispherical reflectors, an experimental technique which is also the subject of research. These are placed over the antenna, which has been mounted on a flat metal table, and total reflection of the transmitted wave is obtained. From phase and amplitude measurements, impedance, bandwidth and efficiency of the antenna can be determined.



IT'S PESCO ON THE AVRO JETLINER North America's first jet passenger plane

Designed to cruise at 450 m.p.h. at 30,000 feet, the new Avro Jetliner of A. V. Roe Canada Limited promises to be one of the swiftest, quietest passenger airliners ever to fly the skies.

The four Derwent jet engines, mounted in pairs, and each rated at 3500 lbs. static thrust at sea level, can push this huge, 30-ton, 50-passenger plane up into the air at a climb rate of 6,000 feet a minute . . . faster than most World War II fighters!

It takes fuel, and lots of it, to deliver this kind of power, and four Pesco fuel booster pumps, one for each engine, make certain that no engine ever goes hungry for its full share of kerosene. Pesco vacuum pumps and a Pesco oil separator are other Pesco units on this history-making passenger plane.

Ever since pressurized power and controlled flow of fuel brought greater safety, automatic operation and finger-tip control to aircraft, Pesco skills and craftsman-

ship have been providing the precision-made fuel and hydraulic pumps and controls that are now standard equipment on all types and makes of planes. It is experience and know-how that can help you.

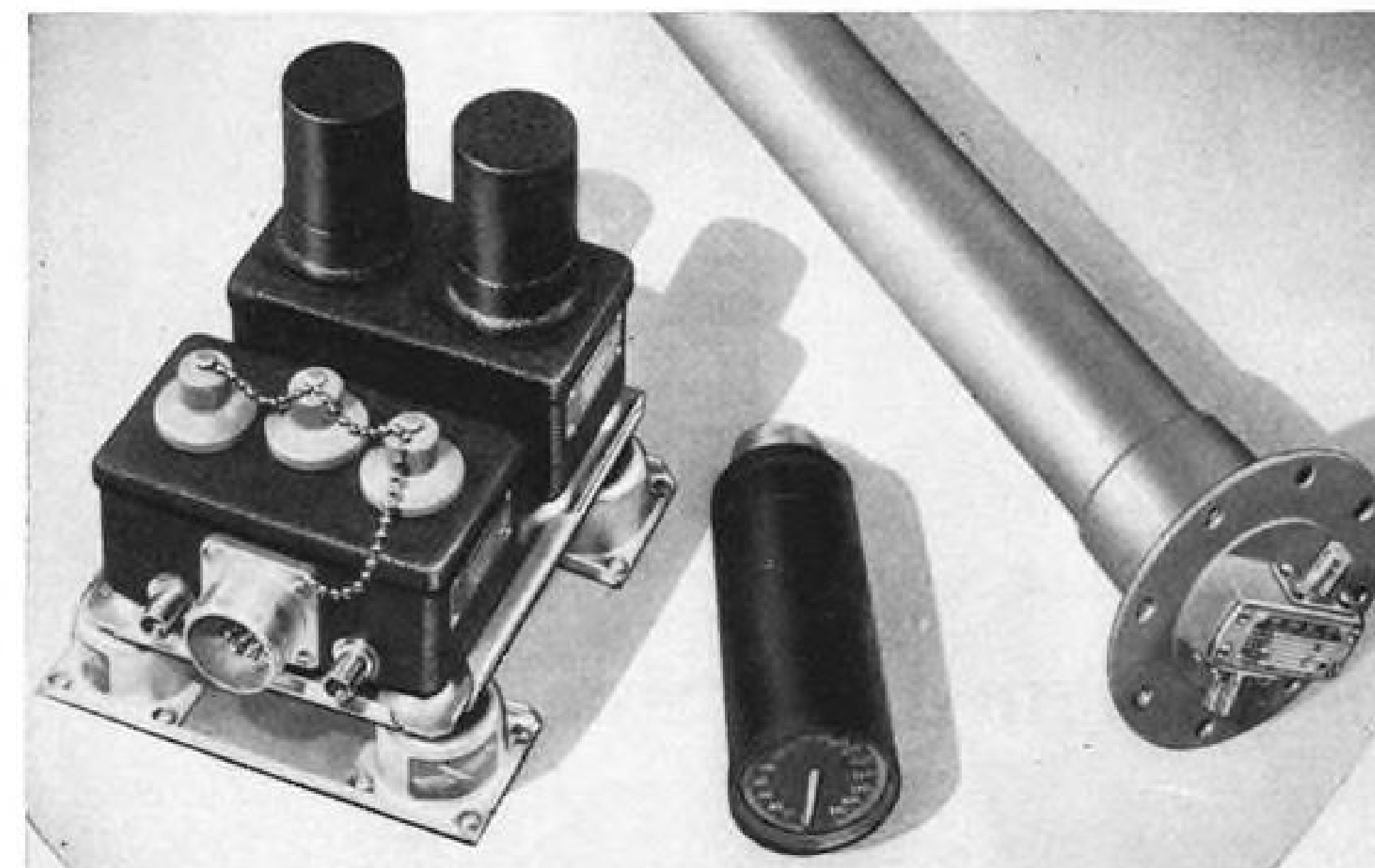
Other Pesco Equipment for Jet Planes

1. High Pressure Fuel Pumps
2. Suction Relief Valves
3. Pressure Relief Valves
4. Electric Motors for Cabin Ventilators, Cabin Heaters, Windshield Defrosters, etc.
5. Landing Gear Operation:
 - a. Engine-Driven Hydraulic Pump System
 - b. Electric Motor-Driven Hydraulic Packages
 - c. Electric Motor Actuators
6. Engine-Driven Hydraulic Pumps
7. Motor-Driven Emergency Hydraulic Pumps
8. Motor-Driven Surface Booster Pumps
9. Hydraulic Flow Equalizers
10. Hydraulic Pressure Reducing Valves
11. Hydraulic Pressure Relief Valves



BORG-WARNER CORPORATION
24700 NORTH MILES ROAD BEDFORD, OHIO

NEW AVIATION PRODUCTS



PACITRON consists of bridge calibrator and amplifier joined by plug-in connection, hermetically sealed indicator unit, and tank unit (right) which signals the amount of fuel available.

Fuel Measured With High Accuracy

Claim Pacitron minimizes errors due to change in fuel, irregular tank shape, temperature variation.

A new linear-reading capacitor-type fuel gauge, designed to give previously unattained accuracy in measurement of fuel by weight, has been developed by Simmonds Aerocessories, Inc., Tarrytown, N. Y.

Errors caused by variations in temperature, type of fuel used, flight attitude, and difficulties in measuring fuel content in irregularly shaped tanks are minimized, the maker claims.

Simmonds calls the new gauge the "Pacitron." It consists of a motor-driven indicator showing fuel quantity in pounds, a bridge calibrator, amplifier, tank unit (transmitter) of variable capacitance, and two auxiliary units—a fuel compensator which corrects for the use of various fuels and a totalizer which indicates total fuel.

These devices are said to be the first of their kind to be offered as part of a fuel quantity measuring system. Simmonds says use of the fuel compensator has become mandatory because of the wide range of jet fuels now used, while the totalizer will be required only for certain types of installations.

► **Advantages**—Simmonds claims these advantages for its equipment:

- Tank unit gives linear output regardless of tank geometry.
- It is the first capable of operating other auxiliary devices such as high- and low-level warning lights, fuel transfer

pumps, tandem and counter-type indicators.

- The high-voltage rectifier tube has been eliminated, doing away with a common source of trouble, and reducing to two the number of vacuum tubes needed.

- Separate amplifier is designed for speedy replacement with no effects on calibration.

► **Continuous Rebalance**—The Pacitron system operates on the principle of a continuously rebalanced bridge circuit in which the capacity of the tank unit is constantly compared with a fixed-capacitance reference capacitor. The voltage signal resulting from the difference in capacitance is then amplified to operate a motor-driven potentiometer which restores the system to balance.

Since fuel quantity as sensed by the tank unit determines the position of the potentiometer wiper, an indication of the fuel quantity is provided by an indicator pointer attached to the potentiometer shaft.

The tank unit incorporates conducting tubular elements which are separated by a relatively large air gap, and surrounded by a grounded cylinder to remove effects of stray capacitance.

► **Lineatour**—To obtain a linear reading in terms of angular degrees against fuel contents in irregularly shaped tanks, Simmonds has employed the Lineatour

technique. In this process, the inner electrode of the tank unit is made of an insulating material. A film of aluminum is applied to the tubing in a manner which provides conformance with tank geometry.

Close adjustment of the tank unit to permit interchangeability is made possible by constructing the conducting elements, or electrodes, with helical depressions of equal pitch. When one of the electrodes is rotated by the adjusting screw at the top of the tank unit, the relationship between the helical depressions is altered, thus varying capacity without affecting normal linearity of tank unit.

► **Major First**—A major "first" claimed for the Pacitron is the fuel compensator. This unit is one of the main keys in achieving high flexibility in the system. It is a correcting circuit designed to offset relatively high errors caused by use of fuels other than those for which the system is calibrated. The compensator enables the Pacitron to measure fuel mass over a wide range of jet fuels, through a temperature range of -54°C . to 71°C . Simmonds says accuracy of measurement with this device is within $3\frac{1}{2}$ percent.

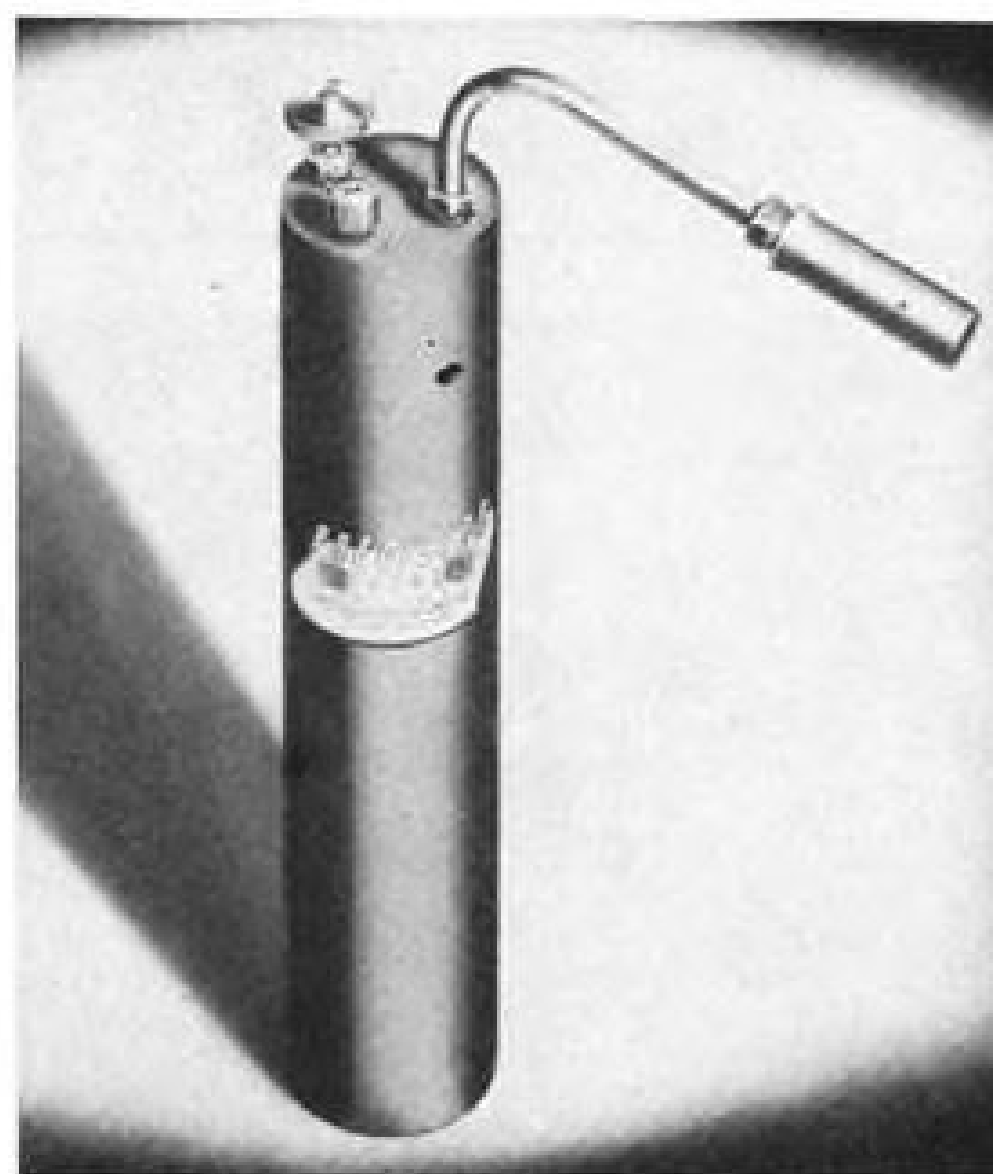
Present systems, calibrated for one specific fuel, could give a reading as high as 11 percent in error if another fuel was used, according to Simmonds.

Although it is now listed as optional equipment, not the least important of new developments in the Pacitron system is the Totalizer unit. This device is designed for operation of equipment which must depend on a signal representing total fuel quantity flight-duration indicators, for instance. The totalizer unit is capable of adding individual tank signals in correct ratio and any combination of individual signals can be summed up in the final indicator reading.

The totalizer unit combines readings from four input channels and displays their sum on the motor-driven indicator.

The Simmonds indicator employs a 2-phase motor which operates 2 potentiometers, two switching contacts and the pointer through a gear train. Also included as standard equipment on the indicator is an additional output potentiometer, normally used for totalizing and high and low level switches. Indicator is hermetically sealed and filled with an inert gas.

Amplifier and bridge calibrator are joined by a plug-in connection which is pressurized to keep out moisture. The bridge calibrator unit houses the bridge transformer, reference condenser, empty and scale adjustments and the range selector switch. Quick-removing sealing caps protect empty and scale adjustment controls and range selector switch located on cover of bridge calibrator.



Small Hand Torches Designed for Small Jobs

A rash of small, lightweight, hand blow-torches, which carry their own fuel supply and replace use of heavy, expensive equipment for minor metal heating jobs, have arrived on the market.

One is the 1½-lb. "Prepo" torch (left), which utilizes a disposal can of special fuel. This unit is offered by Pressure Products Corp., 140 N. Dearborn St., Chicago 2, Ill.

Maker says it lights instantly, gives a clean, blue flame (more than 2200 F.) within 36-60 sec. and does away with all pouring, pumping and priming. Fuel used is a compound of hydrocarbons, developed specially for maker by Phillips Petroleum Co., which is self pressurizing and self-vaporizing at "normal" temperatures. Fuel is carried in a lightweight, seamless steel container developed by the Crown Can Co.

Container is the size of a beer can. Fuel cannot be poured out, since there is no way container can be opened. It is quickly sealed into place by means of a rubber valve on top which mates with fixture on torch. When fuel runs out, container can be removed, thrown away, and replaced by new one in about 30 seconds.

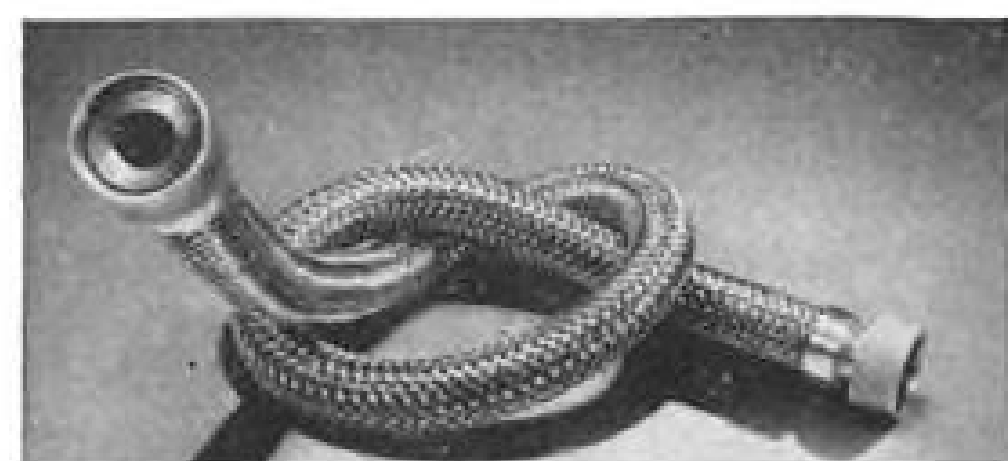
Maker claims torch is safe enough for the home. A model for industrial use comes with two tips, one giving a broad flame, the other a long pin-point flame. Company says 50,000 have been sold on the basis of field tests alone.

Tests of Prepo fuel, container and torch were conducted by W. B. Colman Laboratories, Philadelphia, and an evaluation was made by the Armour Research Foundation of the Illinois Institute of Technology.

Another portable unit is the Precision Torch (center) offered by the Precision Engineering & Mfg. Co., 205 Center St., Saginaw, Mich. This is a refill unit using butane-propane gas. It generates 2200 F. heat, weighs 4 lb. fully loaded. Fuel is carried in a 10½ × 2½-in. cylinder. This is enough to give 7 hr. continuous operation at a cost of less than 4¢, the maker states.

Unit features gas filter, burner shield, universal tip and finger tip control of pressure valve to permit changing from pin-point to large flame.

A third unit produced by Otto Bernz Co., 280 Lyell Ave., Rochester 6, N. Y., is "cartridge refill" hand torch (right) that burns in both cold or warm temperatures. Empty cartridges can be quickly replaced with full one. It operates at 3600 F., weighs 2½ lb.



Flexible Steel Hose

Corrosion-resistant flexible stainless steel hose, made in several types by Chicago Metal Hose Corp., 1304 South Third Ave., Maywood, Ill., is designed to withstand high temperatures and pressures, and is used for conveying corrosive or searching liquids and gases where motion is required.

Maker says extreme flexibility gives hose ability to withstand extreme cycles of vibration, flexation and variplane motions. For constant flexing, hose with closed corrugation pitch is recommended; for infrequent flexing, misalignment or slight movement, open corrugation pitch hose is available.



Lightplane Flasher

NARCO navigation light flasher for personal and executive aircraft having gross weight under 12,500 lb. is offered

by National Aeronautical Corp., Wings Field, Ambler, Pa.

Single-circuit unit weighs only 2 oz. and is designed to meet all specifications "as outlined in the recent CAB draft regarding mandatory installation for all aircraft flown during hours of darkness," according to company. It can be installed in aircraft using 12 or 24v. systems.

Flashing action begins automatically when navigation lights are turned on. Unit is hermetically sealed and is stated to be failproof with only one moving part requiring no servicing or adjustment. Device is designed for operation up to 25,000 ft., and is sold with year's guarantee from date of delivery.

Specifications: operating voltage range, 5 to 8, 10.5 to 15, 21 to 30; design lamp load, two 21 candlepower plus one 15 candlepower lamp; speed, 70 to 120 flashes per minute; ratio, 60 percent on; temperature range, -40 to 100 C.; mounting, 4-point vibration absorbing.

AIR TRANSPORT

Domestic Airline Earnings and Traffic (First-Quarter Operations)

Carrier	1950 Net Profit	1949 Net Profit	1950 Rev. Pass. Miles*	1949 Rev. Pass. Miles*
American	\$(1,381,409)	\$(287,008)	286,967	309,384
Braniff	(75,377)	(178,096)	45,095	41,070
Capital	(151,901)	(499,199)	86,630	58,273
Chi. & So.	(55,859)	(84,225)	23,117	22,343
Colonial	(293,273)	(119,973)	8,720	8,985
Continental	(151,274)	(169,873)	13,967	12,525
Delta	272,643	238,478	69,998	55,291
Eastern	1,861,887	1,723,549	315,066	272,215
Inland	39,517	26,058	6,764	5,838
Mid-Continent	39,484	2,452	21,666	20,813
National	1,058,062	688,577	71,635	49,176
Northeast	(271,132)	(195,587)	10,939	10,268
Northwest	(3,907,777)	(1,530,060)	85,293	58,566
TWA	(1,828,830)	(2,962,931)	189,669	177,697
United	(1,648,849)	(3,413,592)	244,123	237,398
Western	(77,224)	(154,588)	25,915	22,475
	\$(6,571,312)	\$(6,915,938)	1,487,564	1,362,317

Note: Parentheses indicate deficit. * 000s are omitted.

Another Record Year Coming Up?

Domestic carriers' first quarter topped 1949, but lower rates, rising costs cloud earnings outlook.

By Charles Adams

The U. S. air transport industry has a leg up on another record traffic year. But there's still no indication that dividend-starved airline stockholders should start rejoicing.

Profits have failed to keep pace with the higher volume of business. Falling rates and fares—combined with a possible new round of rising costs—are likely to cloud the industry's 1950 earnings picture for some time.

► **Domestic Traffic Up**—The 16 domestic trunklines flew 9 percent more scheduled revenue passenger-miles during first-quarter 1950 than in the same period last year. Express ton-mileage jumped nearly 19 percent; freight rose more than 15 percent; and mail gained about 1 percent.

Yet deficits during this normally poor winter quarter were trimmed only slightly from 1949 levels. The 16 carriers reported a \$6,571,312 net loss, compared with a \$6,915,938 net loss for the first three months of last year.

The same five companies that made money in first-quarter 1949 were again in the black this year. They were Delta, Eastern, Inland, Mid-Continent and National, all of which increased their earnings.

► **Deficits Cut**—Several other carriers whacked large amounts from their winter deficits. United Air Lines' domestic net loss for first-quarter 1950 was only \$1,648,849, compared with \$3,413,592 last year. TWA's domestic deficit fell from \$2,962,931 to \$1,828,830; Braniff's from \$178,096 to \$75,377; Capital's from \$499,119 to \$151,901 and Western's from \$154,588 to \$77,224.

Biggest domestic deficit was shown by Northwest Airlines. Largely because of shakedown expense and low utilization on its new Stratocruisers (AVIATION WEEK May 22), NWA's first-quarter net loss rose from \$1,530,060 in 1949 to \$3,907,777 in 1950.

American Airlines' net deficit increased from \$287,008 in first-quarter 1949 to \$1,381,409 in 1950. This was largely the result of the strike last March.

► **Overseas Results**—U. S. flag lines this year have turned in a spotty performance both from a traffic and profit standpoint. While their first-quarter 1950-revenue passenger-mileage inched upward 1.5 percent and freight leaped 99 percent, express fell off 17 percent and mail 5.5 percent.

The three trans-Atlantic carriers made a good showing. Their combined revenue passenger-mileage was up about 13 percent over first-quarter 1949.

American Overseas Airlines cut its net loss from \$939,574 to \$799,025; TWA's overseas deficit fell from \$301,604 to \$15,218; and Pan American Airways estimated its Atlantic division made an \$830,423 profit in first-quarter 1950, compared with a \$561,030 profit in the same period last year.

Pan American and Northwest also showed higher profits on their Pacific operations. But PAA's Latin American and Alaskan profits dipped. Earnings reported early last year by American on its Mexican link and United on its Hawaiian route contrasted with deficits in first-quarter 1950. Braniff's losses on South American service doubled.

► **Feeder Progress**—With more short-haul route mileage in operation, the feederlines made substantial traffic gains during the first three months of this year. Revenue passenger-miles flown soared nearly 43 percent over 1949 levels, express volume rose 80 percent, freight 60 percent and mail 21 percent. Earnings showed little change, with deficits predominating.

The "Big Four" domestic trunklines' mail pay continued to decrease during the first part of this year. Whereas their total operating revenues rose from \$69,183,000 in first-quarter 1949 to \$70,757,000 in first-quarter 1950, mail pay fell from \$5,237,000 to \$5,097,000. "Big Four" passenger revenue increased nearly \$1 million, and cargo revenues were also up substantially.

► **Good Second Quarter**—Early indications are that second-quarter 1950 will be favorable for the airlines.

American Airlines has already reported a \$1,450,000 profit before taxes for April—a sizeable improvement over the same month last year. May traffic should also be good for AA, which carried thousands of additional passengers as a result of the six-day strike of firemen on four major railroads.

National Airlines had a \$344,793 net profit in April, and its passenger traffic for the month was up 63 percent over 1949. During the first half of May (normally a slack period for NAL), the carrier's business was 53 percent ahead of last year.

United Air Lines said its April revenue passenger-mileage was 2 percent ahead of last year. Express volume was up 45 percent and mail 3 percent, but freight traffic was off about 1 percent.

► **Cutrate Worries**—Despite these encouraging reports, some top industry executives are worried.

TWA late last week was slated to start transcontinental air coach service

Complete power package . . .
designed and built by ROHR for
the Chase C-122 Cargo Airplane

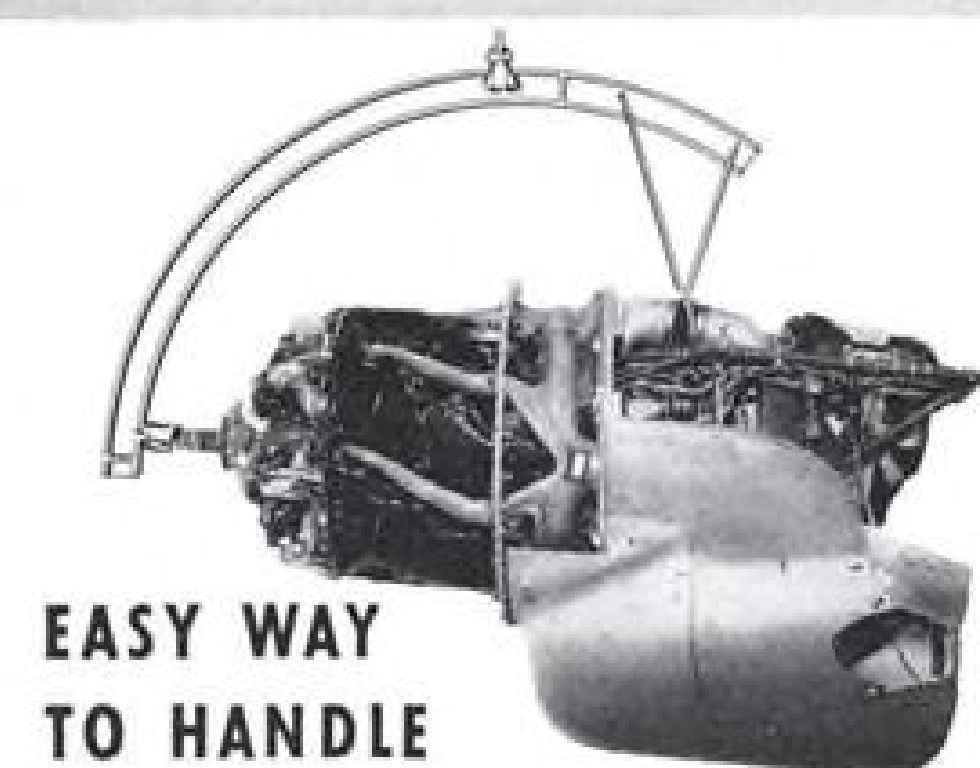
ROHR

DESIGNS IT
AND
BUILDS IT
better!
faster!
cheaper!

Here's the Wright-ROHR power package . . . designed by ROHR — built by ROHR . . . for the Chase C-122 Avitruc Airplane. ROHR's complete engineering department . . . its complete production facilities, its half-million square foot plant . . . all are available to you, too. When it's made of metal . . . and you want it better! faster! cheaper! — come to ROHR.

ROHR

AIRCRAFT CORPORATION
in Chula Vista, California . . .
9 miles from San Diego . . . home of the '53 World's Fair



EASY WAY
TO HANDLE
EQUIPMENT (Details Free)

ROHR's patented tilting arc . . . the invention that swings power packages and equipment to any angle, horizontally or vertically. Makes working easy . . . makes handling easy. Ideal for shop, airport or plant. Write for prices and details.

with high-density Constellations. But on the eve of the new operation, President Ralph S. Damon said he was not at all certain that air coach will prove profitable except under special circumstances.

American Airlines, which started transcontinental DC-6 air coach service early in April, has had an 87.5 percent load factor on the operation and has made money on it. But load factors may drop off sharply as a result of the new competition offered by Trans World Airline.

► **EAL Calls Tune**—Eastern Air Lines, which until recently was bucking the bargain fare trend, has now become a leader in the cutrate movement and is giving its competitors severe headaches. Over the protests of Braniff, Capital and Chicago & Southern Air Lines, the Civil Aeronautics Board recently approved new EAL 4-cents-a-mile coach tariffs from Chicago and Detroit to New Orleans and Houston; from Miami to New Orleans and Houston; and from New York to New Orleans.

EAL also wants to institute coach fares between Miami and San Juan, Puerto Rico. At the same time, Pan American is seeking CAB permission to cut its roundtrip tourist rates from New York to San Juan and from Miami to San Juan.

► **Surcharge Fight**—Delta and Chicago & Southern have protested to CAB against EAL and National requests to remove the 10 percent extra fare on DC-6s and Constellations starting next month. Braniff also plans to lift the surcharge.

Chicago & Southern said that when it ordered Constellations for delivery this fall and in the spring of 1951, it had planned on the extra revenues derived from the surcharge. C&S said it is discriminatory for a DC-3 or DC-4 passenger to be required to pay the same fare as a rider on the most modern, high-speed craft.

Delta agrees with C&S that all carriers eliminating the surcharge will suffer a heavy revenue loss. C. E. Woolman, Delta president, said Eastern received about \$2.9 million in revenues from its Connie surcharges last year. This, he said, represented 75 percent of EAL's operating profit for the fiscal year.

The \$524,512 revenue from DC-6 surcharges taken in by Delta last year equaled 74 percent of that carrier's net operating profit. Woolman said any increase in business resulting from elimination of the extra fare would be small compared to the revenue lost by such a move.

Both Delta and C&S have filed tariffs to remove their own surcharges, but the step was taken only as protection against the recent EAL and NAL moves.

Compensation or Subsidy?

Table, from Sen. Edwin Johnson's report to the Senate Appropriations Committee, showing for the 1949 fiscal year, (1) compensatory mail payment to each domestic airline, (2) subsidy payment to each carrier, and (3) amount of the subsidy payment allocable to cities being rendered uneconomical service:

Airline	Compensatory mail pay	Resulting subsidy measured by amount of present CAB mail pay	Portion of subsidy allocated to cities
Domestic Trunk Lines:			
American	\$5,531,200	\$200,165	\$200,165
Eastern	2,908,266	312,427	312,427
TWA	5,333,121	1,435,004	1,435,004
United	6,126,762	1,643,990	1,643,990
Braniff	616,167	1,701,743	937,735
Capital	588,023	4,392,392	2,126,566
Chicago and Southern	320,854	1,482,470	1,383,665
Colonial	115,056	1,110,122	1,110,122
Continental	196,730	1,186,807	1,109,905
Delta	558,992	1,875,896	1,875,896
Inland	71,380	569,108	569,108
Mid-Continent	247,762	1,054,200	1,054,200
National	314,306	1,164,836	1,164,836
Northeast	155,050	1,429,122	991,688
Northwest	1,409,853	1,706,290	1,432,069
Western	256,764	1,416,212	625,993
	\$24,750,286	\$22,680,784	\$17,973,369
Feeder lines:			
Challenger	118,614	952,102	722,365
Empire	66,151	581,582	511,245
Monarch	139,322	1,103,056	804,404
Piedmont	156,931	1,077,564	709,254
Pioneer	183,327	1,591,149	1,191,706
Southwest	83,996	1,233,842	965,892
Trans-Texas	248,193	1,222,879	906,995
West Coast	72,941	743,557	743,557
Wisconsin Central	152,521	637,310	550,409
	\$1,221,996	\$9,143,041	\$7,105,827
Total, trunk and feeder carriers	\$25,972,282	\$31,823,825	\$25,079,196

Early Action On Subsidies Unlikely

Report to Senate committee declares most 'subsidies' should be charged against communities, not carriers.

Congressional leaders have abandoned hope of enacting legislation at this session separating "service" mail pay from subsidies to air carriers.

"There is not enough time remaining to thresh out the matter to a final logical conclusion," Sen. Edwin Johnson, chairman of the Senate Interstate and Foreign Commerce Committee, told AVIATION WEEK. In a report to the Senate Appropriations Committee, Johnson has stated that "subsidies" to air carriers are, for the most part, subsidies to the small communities which they are required to serve uneconomically.

Johnson proposed a system of separation under which all pay above a compensatory rate to each carrier would be earmarked as subsidy. This subsidy would then be re-allocated as subsidy to the communities to which uneconomical service is being furnished.

Johnson said that both the Civil Aeronautics Board and the Post Office Dept. look "with favor" on his plan.

For the 1949 fiscal year, Johnson's report found:

• **Domestic trunk lines.** Of the \$47,431,070 mail pay to the 16 domestic trunk lines, \$24,750,286 was compensatory pay and \$22,680,784 subsidy. Of the subsidy, \$17,973,369 was to communities being rendered uneconomical service and \$4,707,415 was to carriers.

• **Feeder lines.** Of the \$10,365,037 in mail pay to the nine feeders operating throughout fiscal 1949, \$1,221,996 was compensatory pay and \$9,143,041 subsidy. Of the subsidy, \$7,105,827 was to communities and \$2,037,214 to the carriers.

Other points made in Johnson's report were:

• **Mail pay to the domestic trunk air carriers** mounted from an average of 55

cents per ton-mile in fiscal 1946 to \$1.17 in the 1949 fiscal year; the feeder rate increased from \$17.22 in 1946 to \$28.44 in 1949; and the international air mail rate decreased from \$3.75 in 1946 to \$2.69 in 1949.

• **Surface carriers** moved 77.1 percent of domestic first-class mail at an average of 31.4 cents per ton-mile in fiscal 1949, and ocean vessels received 17.75 cents per ton-mile.

United Will Stick With Its DC-3s

United Air Lines, potentially the biggest domestic customer for postwar, twin-engine transports, says it still has no replacement plans for its 68 DC-3s.

"Where we fly DC-3s today, we don't need more speed or seats," claims UAL President W. A. Patterson. He says the DC-3 still fits service requirements on schedules to intermediate cities. New transports costing around \$500,000 each could save only a few minutes on short hops even though their cruising speed might be nearly 100 mph. faster than the Douglasses.

► **Unprofitable Territory**—Patterson conceded that UAL's DC-3 operations are not profitable. This, he declared, is not because of the DC-3, as such, but because of the territory it serves.

Recent purchase of 65 Martin 4-0-4s by Eastern Air Lines and TWA left United as the only "Big Four" trunk operator still without DC-3 replacements.

UAL also disclosed that it does not plan to use its Stratocruisers in domestic service unless there are changes in the competitive or economic situation. The company hopes to get increased utility from the Boeings on its West Coast-Hawaii run, especially if it receives a Los Angeles-Honolulu link.

In response to stockholders' questions, Patterson declared:

• **Turboprops** probably will not be obtainable in quantity for at least two years. UAL would favor buying enough turboprop engines to equip one DC-6 for cargo service. The domestic jet transport may still be at least five years away.

• **Feederlines** serving the same points as United, and using the same equipment (DC-3s), receive 40 times as much mail pay. Despite this situation, UAL will not engage in any activity deliberately designed to sabotage the well-being of feeders now operating. United opposed establishment of feeders, calling them economically unsound, but now believes the short-haul carriers are CAB's responsibility.

• **Aircoach**, despite misleading publicity, has still not proved itself as a money-maker. UAL studies have continued to show economic hazards of ex-

cessive competition in the aircoach field, but the company is prepared to enter the transcontinental coach business in a matter of days if forced to do so by competitive conditions.

• **Trans-Atlantic competition** is so stiff that United is grateful every day that it did not enter the field. "This is emphasized by the fact that American Overseas Airline seems quite anxious to sell out to Pan American."

• **Pilots' pay scales** are justified, and \$10,000 a year is not "entirely too much," as argued by one stockholder. "If we could not attract men of sufficient caliber to the piloting profession it would result in severe losses to stockholders." Because of his responsibility for human life the pilot is in the same professional category as a doctor.

England-New Zealand Race Entries Filed

Canterbury International Air Race Council, sponsors of a 12,000-mile England-Christchurch, New Zealand, contest scheduled for October, 1953, says four international airlines have made provisional entries in the transport handicap section of the event. They are British European Airways, British Overseas Airways, KLM and Australia's Qantas Empire Airways.

The council said airlines competing in the transport handicap section are likely to fly their planes to New Zealand with full loads of tourists. Two British manufacturers, de Havilland and Armstrong Whitworth, reportedly will participate in the transport handicap section of the race, the latter firm considering entry of its Apollo turboprop airliner.

MATS' Peacetime Mission is Training

Military Air Transport Service's revised peacetime mission—putting emphasis on training rather than maintenance of scheduled airline-type operations—has been announced formally by the Department of Defense (AVIATION WEEK Apr. 24).

Gen. Hoyt S. Vandenberg, USAF Chief of Staff, said MATS would discontinue scheduled transport service within the U. S. except for air evacuation and such trunkline cargo operations as may be found necessary. Discontinuance or reduction of scheduled flights to South American points is also planned; but in general MATS will maintain its overseas services.

► **Lift Increased**—There will be no cut in MATS' present ton-mile capabilities. In fact, airlift available to the Defense Department will increase during the next fiscal year as additional crews are trained and larger planes (C-97s and C-124s) become available.

About 72 percent of the by-product airlift produced in the training mission will be available to the Joint Military Transportation Committee of the Joint Chiefs of Staff for carrying armed forces cargo and personnel. Balance of MATS' training flights will be strictly local in nature.

MATS' realignment is based on an efficiency survey made by the Defense Department's management committee during the past six months. While MATS' personnel will be cut between one and two percent, the Defense Department believes the changes in mission will permit more rapid and effective expansion to meet M-Day requirements.

Italy's Carriers Are Hopeful, Makers Sad

Italian airplane manufacturers are suffering from a headache that will take more than aspirins to cure.

• **The headache**: Little business, due to limited market, prohibition against the manufacture of military craft, and the glut of surplus Allied planes sold to the government and private airlines since the war's end.

• **The remedy**: A long-term Italian-government program giving the industry definite orders covering a specific number of years.

► **Transport List**—Italian transport lines now use 16 four-engine, 15 three-engine and 30 twin-engine craft, the majority of which are American-built. Seven additional four-engine craft have been ordered from abroad. These will be added to Italy's present total of 306 civilian planes of all types. It is with this limited market that the airplane manufacturers must deal, although customers are being sought in Spain and the Middle East where Italian production has a good reputation and payment can be made in Italian currency.

► **Carriers Look Ahead**—There is more optimism in the transport sector. Linee Aeree Italiane plans to inaugurate its Rome-New York (via Shannon and Gander) flights this summer with three DC-6s. LAI, alone of Italian airlines, has posted a profit during each of the last four years. Its association with Trans World Airline and access to TWA's facilities have played a part in this.

► **Other Plans**—Aerolinee Italiane Internazionale (Alitalia) has purchased Douglas Skymasters for use in its South American service. Plans are underway to merge with Linee Aeree Transcontinentali Italiane (LATI), with a view to improving this service. Service to West Africa is due to be increased in the near future.

Alitalia is 40 percent British-owned. LATI is a trans-South Atlantic operation working fortnightly between Rome and Caracas.

DC-4s are also scheduled to replace Alitalia's four Avro Lancastrians being used on its South American run. The company has recently transferred five of its Fiat G 121s to the Italian Air Ministry.

► **LAI Lease**—Italian Air Lines (LAI) are renting two DC-6s from Douglas at a reported \$20,000 per month for each to assure facilities for the heavy Holy Year traffic, while awaiting delivery of its DC-6s from the United States where they have been on order.

► **Ajax Folds**—Ajax Air Express Co. in Milan plans to wind up its affairs. Capital is noted at 37 million lire. The concern flew light transport and air-taxi services, and also ran an aviation school.

Canadair Studies Turboprop Transport

Canadair, Ltd. at Montreal, largest Canadian aircraft factory, has started development on a turboprop transport, as successor to its North Star version of the DC-6 Douglas transport.

Meanwhile employment at Canadair is down to 3300 from 5800 a few weeks back following completion of commercial orders for BOAC and CPA. Only remaining ship to be delivered in the North Star series on basis of present orders is the special plane built for the Prime Minister (AVIATION WEEK Mar. 27) using Pratt & Whitney R-2800 engines instead of the regular Rolls-Royce Merlin installation.

Canadair's principal production business now is its RCAF contract to produce 100 jet fighters of the North American F-86 Sabre design, under license. Contract spreads \$30 million over three years. While first planes will be powered with General Electric J-47 turbojets of 5200-lb. thrust, similar to those used in the American fighter, it is expected that later planes may use the Canadian Avro Orenda turbojet powerplant instead.

Canadair is also continuing to market spare parts for C-47 and DC-4 planes.

Overseas Charter Flights Approved

Two uncertificated airlines and a domestic all-cargo carrier have nailed down more than a million dollars worth of trans-Atlantic passenger charter business this summer.

The Civil Aeronautics Board has granted special exemptions to The Flying Tiger Line, Seaboard & Western Airlines and Transocean Air Lines authorizing about 80 roundtrip flights between June 1 and Sept. 30. Flights will be made in four-engine equipment (probably DC-4s), and will carry an average of 45-50 passengers.

► **Opposition Overruled**—Educational, religious and charitable groups will be carried to Europe and Israel at rates considerably below the regular fares on certificated trans-Atlantic airlines. The regular U. S. operators—Pan American Airways, American Overseas Airlines and TWA—had asked CAB to throw out all the requests for special exemptions.

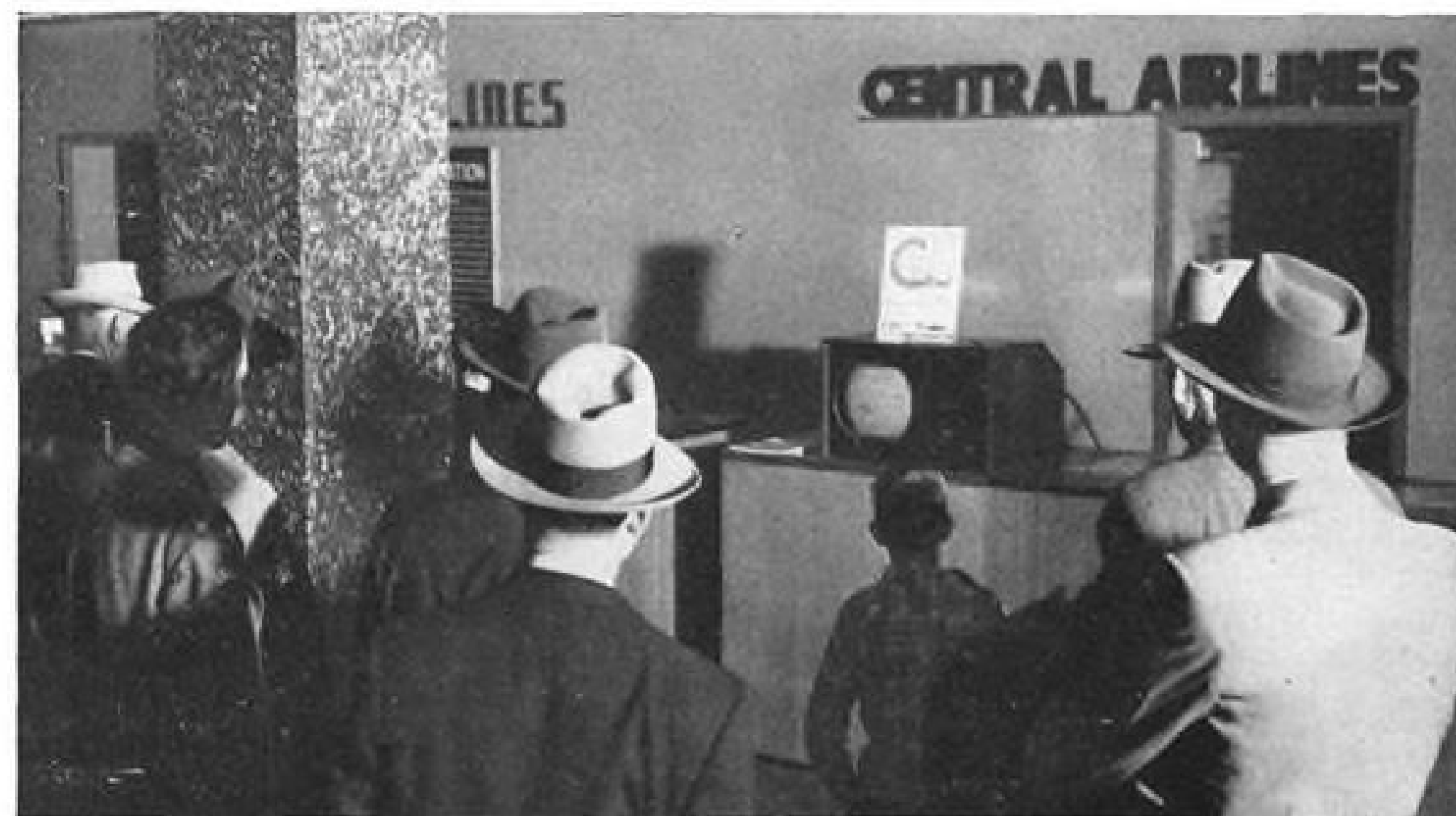
But the Board decided the 80 flights would not have any substantial adverse effect on the certificated airlines. It said that the regular operators would be unable to afford adequate accommodations for large groups during the peak summer season.

CAB added that most of the people to be carried under the special exemptions would not be able to make the trip at all except for the low group rates. The Board pointed out that the U. S. Department of State, Department of Commerce and the Economic Cooperation Administration had stressed the importance of encouraging travel to Europe, particularly by individuals of moderate means.

► **Applications Denied**—Six other carriers—Federated Airlines, S. S. W., Inc., U. S. Aircoach, European Atlantic Airlines, Resort Airlines and Airline Transport Carriers—had also applied for special exemptions to make flights to Europe this summer. But CAB said it was in the interest of safety to limit its authorization to those companies which own four-engine aircraft and have adequate experience with them in trans-Atlantic operations.

Last January, CAB denied Pan American Airways' application to conduct Holy Year charter trips to Rome under an agreement with Felix Roma, an Italian travel organization. The Board found that PAA's proposed flights would be made at a loss—necessitating higher mail pay—and the Felix Roma traffic would not be confined to limited groups.

► **Youth Argosy Flights**—Board's latest orders provide that Youth Argosy, a non-profit educational organization promoting student travel abroad, may make



FREE TELEVISION LURES CUSTOMERS

Central Airlines, the new feeder serving Oklahoma, Texas and Kansas, hit upon the sales merchandising idea of using a television set installed at its ticket counters. Set is clearly visible to passersby, and attracts attention to Central's new service. The air-

line says that the set installed in its Dallas office attracts about 200-400 people during late afternoon and early evening for various lengths of time. Central President Keith Kahle states that the new service has been responsible for sale of a number of tickets.



NEW ARGENTINE TERMINAL OPEN

Modern five-story administration building is the architectural keynote around which the Buenos Aires new Ministro Pistarini airport revolves. It is named after Argen-

tina's Minister of Public Works. The new airfield, built for \$30-million, has runways ranging from 7000 to 7500 and 10,000 ft. long and 300 ft. wide.

DARNELL CASTERS & WHEELS

*Pre-tested for
Performance*



• **Save Money, Floors, Equipment and Time by using DARNELL Casters and Wheels . . . Always dependable, these low-cost floor protection products have been made to give you a long life of efficient, trouble-free service.**

**FREE
DARNELL
MANUAL**

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

arrangements with the Flying Tigers, Seaboard & Western and Transocean for a total of 40 U.S.-Europe and U.S.-Israel roundtrips. In addition, Seaboard & Western was authorized to make 33 trans-Atlantic roundtrips and Transocean six roundtrips for other religious, educational, non-profit or charitable groups.

Flights authorized by CAB were far fewer than had been requested by the three exempted carriers. They had applied to make about 107 roundtrips for Youth Argosy alone.

The Board noted that bona fide educational, religious and charitable groups which selected an unqualified carrier for trans-Atlantic transportation may file new applications for special flights via the three authorized lines. It is believed that approval of some of these requests may boost the total number of special trans-Atlantic group flights scheduled for this summer to about 100.

► **Warning Issued**—CAB emphasized that it was not happy over the way some organizations and travel agents had sought to drum up low-fare charter business even before applications were filed with the Board for such transportation. The Federal agency said it granted special exemptions last year because the regularly-certificated operators had not completed their new equipment program; and declared that the Catholic Holy Year in 1950 had created another unusual circumstance which had to be taken into consideration.

"Therefore," CAB warned, "similar action may not necessarily be taken in future years. Carriers and the traveling public are cautioned not to lay plans based on the Board's 1950 action being a precedent." CAB Member Josh Lee concurred in the Board's majority opinion permitting the Flying Tigers to make special trans-Atlantic trips this summer. But he said the same privilege should not be extended to Transocean and Seaboard & Western because CAB enforcement actions are presently pending against these two carriers.

Merger Approved

Final details in the merger of three Rocky Mountain area feeders into a single operation have been approved by the Civil Aeronautics Board.

Effective June 1, the temporary certificates of Monarch Air Lines, Challenger Airlines and Arizona Airways will be transferred to Frontier. Merger of Monarch and Challenger was approved by CAB last December, and the Monarch-Arizona consolidation received conditional sanction in April (AVIATION WEEK Apr. 24).

CAB denied the petition of Bonanza Air Lines, another feeder operator, for reconsideration of the Monarch-Arizona decision. Frontier's new system runs nearly 5000 miles from the Mexican border almost to Canada.

Duchess Costs

Saunders-Roe, Ltd., Cowes, England, figures its new Duchess turbojet-powered flying boat now under study (AVIATION WEEK May 15), would offer very attractive direct operating cost characteristics.

On 2000-mi. stage lengths, cost per ton-mile is estimated at about 21 cents, with 14-cent cost for 1300-1500-mi. lengths. Cost per passenger-mile is just over one cent on routes of 1300-1500-mi. stage lengths, and a fraction over 2 cents on a stage distance of 2000 mi.

SHORTLINES

► **Air France**—Completed all New York-Paris flights of its new luxury service, "The Parisian", on a nonstop basis during the first month of the operation, thus avoiding refund of any of the \$25 extra fares paid by the passengers. Starting May 31, the de luxe Constellation flights will run twice weekly.

► **All American**—Has resumed its summer schedules to Cape May, Wildwood, N. J., and Rehoboth Beach, Cal.

THIS PROPELLER GIVES 1/4 SHORTER TAKE-OFFS



Boost your plane's sales appeal with AEROMATIC® . . . world's only automatic variable pitch propeller for personal planes! Saves fuel, adds safety, makes a plane get up and go! Find out for yourself, write for story to KOPPERS CO., INC., AEROMATIC PROPELLER DEPT., 365 Scott St., Baltimore 3, Maryland.

The propeller with a brain for personal planes

Aero matic

(Licensed under patents of Everet Propeller Corp.)

► **American—Civil Aeronautics Board** has approved the interlocking relationship resulting from election of James Bruce as director of Avco Manufacturing Co. while serving as a director of American.

► **British European Airways**—Passenger traffic increased 30 percent in the fiscal year ended Mar. 31. Company carried 751,512 persons on its continental and domestic routes during the year.

► **California Eastern**—Is converting five DC-4s to be used by Overseas National Airways in its charter operations. George W. Tompkins, ONA president, says the planes will be available for flights anywhere in the world. ONA has opened a New York office in the Empire State Bldg.

► **Civil Aeronautics Board**—Has amended Part 61 of the Civil Air Regulations to permit a 200-ft. reduction in ceilings for scheduled carriers at alternate airports equipped with a radio range and either ILS or GCA. The Board said Part 61 heretofore has failed to recognize the additional contribution to air safety afforded by these systems. . . . CAB has approved an agreement between 27 scheduled airlines providing for a tender to U.S. military agencies which would permit carrying military personnel at a 10 percent discount during the year ending June 30, 1951.

► **ICAO**—Iran and Indonesia have become members of the International Civil Aviation Organization, boosting total membership to 58 nations.

► **Interstate Commerce Commission**—Estimates the railroads suffered a \$649-million operating deficit on passenger service last year—\$89 million more than in 1948.

► **Northeast**—Early next month plans to inaugurate service to Laconia and Berlin, N. H.; Brunswick and Rockland, Me.; and New London, Conn.

► **Northwest**—CAB has granted NWA a one-year exemption to serve the Chinese Nationalist city of Taipei, Formosa, as an intermediate point on the carrier's Pacific route. Request had previously been denied. . . . CAB has suspended, pending investigation, NWA's tariff proposing removal of the departure time limitation on air coach flights, which now leave terminals during the night.

► **Pan American**—Has received CAB permission to suspend scheduled service on its Boston-Bermuda route except during the peak traffic months of March



The XC-123 twin-engine cargo and troop-carrying transport built by Chase Aircraft Co., West Trenton, N. Y.

are favorites with
**Aviation Mechanics because of the speed
and ease with which they can be used . . .**

The Ferret Reversible Ratchet (illustrated below) is a real time-saver. It has such outstanding features as hardened bearings inserted in the head, plus surface carburized steel base plates to prevent wear . . . precision machined gears and pawls for free-working action . . . a hand-fashioned grip for comfort . . . and a fine chrome finish. In every way, it is built to outlast and outperform similar ratchet wrenches.

Snap-on tools are available through a nation-wide, direct-to-user tool service. Ask your "Snap-on man" . . . or write for the new catalog of 4000 Snap-on tools.

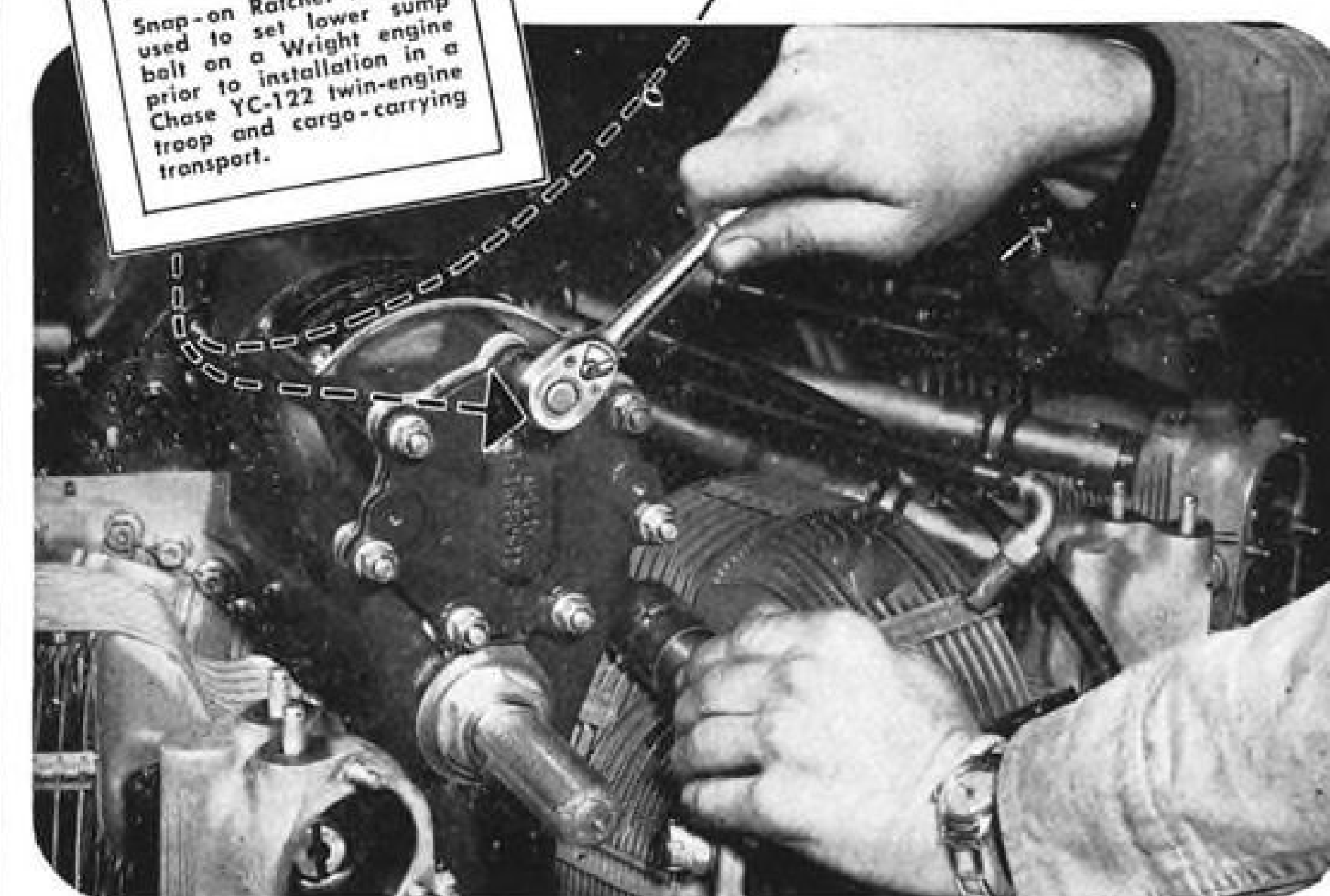
*Snap-on is the trademark of Snap-on Tools Corp.

**SNAP-ON TOOLS
CORPORATION**

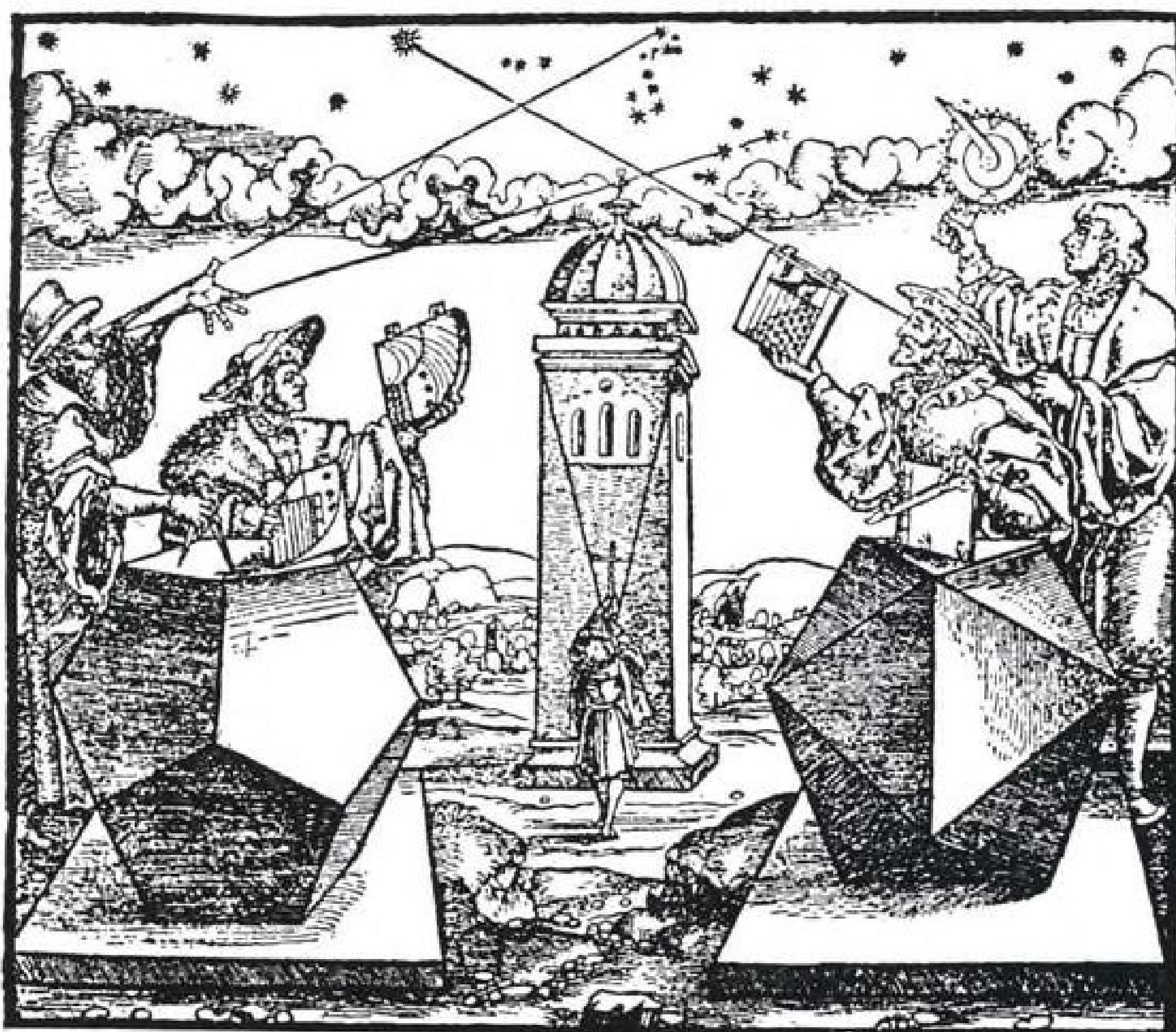
8020-E 26TH AVENUE
KENOSHA, WISCONSIN



Snap-on Ratchet is being used to set lower sump belt on a Wright engine prior to installation in a Chase YC-122 twin-engine troop and cargo-carrying transport.



Photos courtesy of Chase Aircraft Co., Inc.



WOODCUT CIRCA 1530

BETTMANN ARCHIVE

Written in the stars

For centuries, man has looked to the universal constants, the stars, to establish his location on the earth's surface.

The advent of modern, high-speed aircraft, however, raised a new problem in celestial navigation—that of plotting, instantly and accurately, the position of a rapidly moving object. Time-honored nautical methods proved inadequate.

The recently developed Kollsman Periscopic Sextant, with special automatic averager, enables the airborne navigator of high-speed craft to obtain a series of extremely accurate sights. It also eliminates the need for an astrodome.

The Periscopic Sextant reflects Kollsman leadership in the fields of precision instrumentation and fine optical systems. The same high standard of manufacturing and engineering skill marks the complete Kollsman line of Sard marine, sport, and opera binoculars. No finer prismatic binoculars are made.

KOLLSMAN AIRCRAFT INSTRUMENTS

PRODUCT OF

SQUARE D COMPANY

ELMHURST, NEW YORK

GLENDALE, CALIFORNIA

and April each year. Last year, PAA's passenger-load factor on the new route was only 40 percent—far below expectations. . . . PAA has asked CAB permission to serve Grand Bahama Island on its Miami-Nassau route. Several other carriers also want to serve the point because of a new million-dollar resort located there.

► **Piedmont**—Has begun service to Myrtle Beach, S. C.

► **Pioneer**—Declared a 25-cents-a-share dividend payable June 30. It is the second such dividend paid by the feeder in a six-month period. Passenger revenues in first-quarter 1950 gained 27 percent over the same 1949 period.

► **Qantas Empire Airways**—The Australian carrier expects to start direct service across the Indian Ocean to South Africa next month.

► **Skytrain Airways**—The New Orleans-based nonsked has applied for a CAB exemption to operate cargo service from New Orleans and Houston to Guatemala City, Guatemala; San Salvador, El Salvador; and Belize, British Honduras, without regard to restrictions on regularity.

CAB SCHEDULE

May 31—Prehearing conference on Mid-Continent Airlines' application to make its Route 80 certificate permanent. (Docket 2693)

June 1—Hearing on CAB's investigation of unauthorized cargo operations by Metropolitan Air Freight Depot, Inc. (Docket 4319)

June 1—Prehearing conference on renewal of Monarch Air Lines' and Challenger Airlines' feeder certificates and suspension of United Air Lines' authority to serve Rock Springs and Cheyenne, Wyo. (Docket 4340)

June 1—Renewal of hearing in National Airlines route transfer case. (Docket 3500 et al)

June 5—Resumption of CAB's enforcement hearing involving Trans American Airways, Great Lakes Airlines, Golden Airways, Edward Ware Tabor and Sky Coach Airtravel, Inc. (Docket 4161)

June 8—Hearing on CAB's investigation of unauthorized cargo operations by American Shippers, Inc. (Docket 4296)

June 12—Hearing on approval of Transocean Air Lines' agreements with Loftleider, h.f., and Trans-Asiatic, Ltd. (Docket 4344)

June 12—Oral argument on additional service to Puerto Rico. (Docket 2125 et al)

June 19—Hearing on CAB investigation of Northwest Airlines' tariff practices and uncertificated operations of Fly Freight, Inc., and Sterling Freightways. (Docket 4290)

June 26—Hearing in Florida-Bahamas service case. Postponed from June 5. (Docket 2824 et al)

July 17—Hearing on Lehman Brothers' interlocking relationships case involving partners of firm holding various airline directorships. (Docket 3605 et al)

Jan. 8, 1951—Hearing in Big Four mail rate case and CAB investigation of the carriers' economy and efficiency. (Docket 2849 et al)

LETTERS

Comet's Inward Door

I am interested to read Mr. H. W. Richardson's letter published in your issue of April 24. I think de Havilland have the perfect answer to Mr. Richardson in the doors of the pressurized cabin of the Comet. They open inward, and while in flight it is virtually impossible for them to fly open.

J. McEWAN KING
Chairman & Managing Director
King Aircraft Corporation
Glasgow, Scotland

What Causes Fires?

Your May 8 issue prints an article in which I have extreme interest: "How You Can Cut Aircraft Fire Danger," by H. L. Hansberry.

For two and one-half years I have attempted to impress upon all of the organizations immediately charged with this problem of aircraft engine fires that the maximum effort of this study should not be exerted towards extinguishing engine fires, but should be directed towards determining the true cause factors for ignition of those leaking combustibles that may originate in the vicinity of the power plant.

It is admitted that Mr. Hansberry's organization has rendered opinions in regard to this latter statement; however, it is my definite conclusion that his organization, and all others concerned, have essentially "missed the boat" since their work in 1944.

To further describe my attitude in regard to engine fires, I believe in the old adage that it is wasted effort to "lock the barn after the horse is stolen." Whether or not you buy this statement, it is my opinion that it well describes the approach to the problem that has been assumed by such organizations as Mr. Hansberry's.

I should also like to point out that the above opinions are personal opinions, on which I welcome constructive criticism at any time. After all, hesitate one second, and I challenge you to produce evidence of any information provided the Air Force, Navy or CAA that explains to these organizations, how to prevent ignition of leaking combustibles.

JOHN A. ROBERTSON, Major, USAF
Operational Engineering Section
Hq, 7th Bombardment Wing, H
Carswell Air Force Base
Fort Worth, Texas

Inter-City Copters

Congratulations on your article April 17 based on studies made by Eastern Air Lines' Charlie Froesch. I have been intrigued for some time with possibilities outlined in his article for short-haul air transportation between major communities.

It is entirely possible that the future of Robinson Airlines and some of the other short-haul operators serving the major

metropolitan areas of the country may be dependent upon the helicopter.

I am writing to request additional copies of the article. . . . I would like to familiarize our own top management and board of directors with the whole idea.

JOHN R. CARVER, Vice President
Robinson Airlines
Ithaca, New York

Government 'Help'

Vince Meloy just called my attention to your editorial May 15 ("Transport Revolution and Statesmanship"). I trust it has wide circulation over and above that of the publication itself. We here are going to call it to the attention of everybody we can. Both Vince and I think it is a great job.

Your sentence, "Those in aviation who favor more government help simply are asking for more government regulation," should be posted in the offices of every aircraft company in the nation.

LAUREN D. LYMAN, Vice President
United Aircraft Corp.
230 Park Avenue
New York, N. Y.

J-47 Overhaul

Your March 13 issue, Industry Observer, makes the statement relative to the General Electric J-47 engines used in the outboard pod installation, that the overhaul time is pegged at 92 hours.

The J-47 as used on this installation is basically a standard production version,



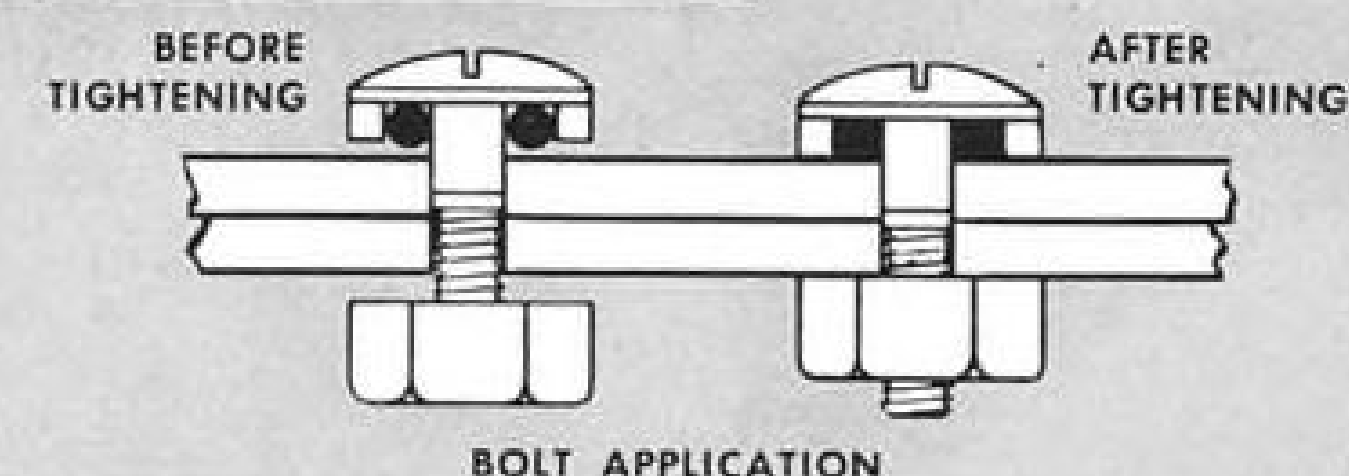
Miniature thermal overheating warning switch used extensively as an overheat warning on helicopter and other gear box assemblies, aircraft generator overheat warnings or wherever temperature warning is desired. Extremely rugged construction and sealed against moisture and dirt. Supplied with wire or AN Type Fitting. Call or write for complete information or discussion of special problems.

CONTROL PRODUCTS - INC

306 SUSSEX STREET • HARRISON, N. J.

DESIGNERS AND MANUFACTURERS
OF THERMAL DEVICES

Lock O Seal*

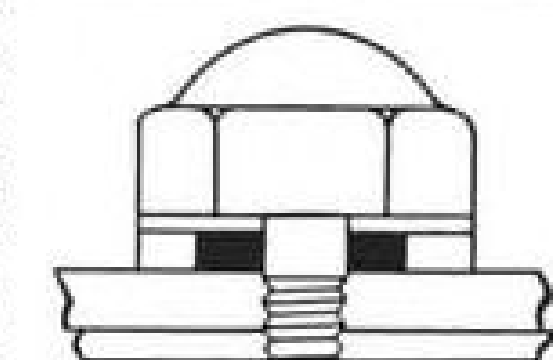


Lock O Seals are approved for use on military aircraft using Class I and IV fuels under specifications USAF 45007 as superseded by MIL-P-5315.

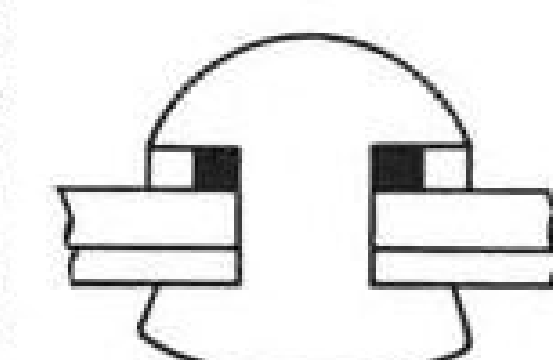
Lock O Seals are available with three types of synthetic rubber seals that will fill all your sealing requirements. Lock O Seals are impervious to oily solvents, ordinary gasoline, special aircraft fuels, water, air, and gases. Temperature range from minus 100° F. to plus 500° F.

Lock O Seals provide a permanent positive seal for bolts, nuts, rivets, studs, tubing, electrical connections, flush rivets, and other round rods and tubes.

* PATENT 2,396,005 TRADE MARK



STUD
APPLICATION



BRAZIER
HEAD RIVET

Write for Brochure and Engineering Data

THE FRANKLIN C. WOLFE CO., INC.

407 COMMERCIAL CENTER STREET • BEVERLY HILLS • CALIFORNIA

SEARCHLIGHT SECTION

ENGINEERS

Expanding Engineering Department of Convair needs experienced
AERODYNAMICISTS AIRCRAFT DRAFTSMEN
AIRCRAFT DESIGNERS AIRCRAFT STRUCTURAL ENGINEERS
And specialists in all phases of aircraft engineering for work on the B-36 and other military projects. Please include summary of experience in reply.

Engineering Personnel Office
CONSOLIDATED VULTEE AIRCRAFT CORPORATION
Fort Worth, Texas

LUXURY

AIR FRANCE

French National Airline, 683 Fifth Ave., N. Y.
offers for sale two

CATALINA — PB-5A

Private compartments accommodate 20 luxurious seats
Deluxe Galley — Full long-range radio equipment

CAA CERTIFICATED — READY FOR OPERATIONS

One with 1491 SM 1092 since conversion 335 SO
R1830-92 zero time SO, 335 SM

Converted By

CONSOLIDATED VULTEE AIRCRAFT CORPORATION

SAFETY

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 528 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

FIRST CLASS radio man for permanent work in Pacific Northwest. Must have minimum 1 year experience on overhaul and service scheduled airline type equipment. No others need apply. Better than average pay, working conditions, and future. Reply P-6363, Aviation Week.

EXPERIENCED AIRCRAFT Industrial Engineer for maintenance shop layout and equipment specification. Overseas Position. Two year contract. P-6524, Aviation Week.

DESIGN ENGINEERS with 3 to 10 years of Aircraft design experience needed to assist in design of high performance military aircraft. Salary commensurate with training and experience. P-6694, Aviation Week.

POSITIONS WANTED

DISPATCHER. EXPERIENCED in major airlines operations; over 2½ yrs. dispatching for scheduled helicopter operation. Commercial, instrument, instructor, and dispatch certificates, with ground instruction experience. Particularly useful for copr. contemplating helicopter services. College graduate, age 35, married. PW-6676, Aviation Week.

FLIGHT ENGINEER—Mechanic—Operations—Ten years experience Cubs to CV-240, B-377 and DC-6 engines and air craft. Extensive overseas service with one of the major airlines as mechanical and operational supervisor. A&E, Flight Engineer and Radio License. Want any job with some security and future. Prefer foreign assignment. Single, Age 29, Veteran. PW-6716, Aviation Week.

POSITIONS WANTED

POSITION WANTED—Manager or Assistant, Municipal, or Commercial Airport, or fixed base operation. Seven years airport management experience, engineering background, supervisor of non aviation concessions, training programs, aircraft repair stations, aircraft and parts distributor sales and service. Commercial pilot with all distributor sales and service. Commercial pilot with all ratings, including Ground Instructor ratings. Detailed brief of qualifications and references mailed on request. PW-6705, Aviation Week.

EX-NAVY PILOT, commercial license with multi-engine land and sea ratings, current navy instrument card, engineering experience seeks flying or engineering work in South America. PW-6705, Aviation Week.

ENGINEERING MANAGER—Eleven years experience in aircraft structures, aerodynamics, aircraft instruments, reaction power plants, automatic fuel metering and starting systems and recent experience in engineering management. B.S. Degree Mechanical Engineering. Aeronautical recognized technical university. Married. PW-6707, Aviation Week.

BUSINESS OPPORTUNITIES

To Highest Bidder:
Successful government licensed seaplane base, established 1934. Vacation country, 40 hotels and camps, immediate vicinity. A-1 equipment, 3 planes, large ramp, parts inventory, attractive surroundings, knotty pine office, rest room. All charter. New England, Middle Atlantic states. Ideal, profitable, with excellent clientele. Unusual opportunity for pilots desiring own business. Reason for selling: wish to devote time to managing hotel and camps, recently purchased. Bud Russell, Rangeley Seaplane Base, Rangeley, Maine. Tel. 159, ring 3.

Douglas DC-3 21
Passenger Scheduled Airline. Certificated. \$25,000.00 including complete extra power section. Airframe 4700 SOH, Engines NT50. Howell Aircraft Supply, Hangar 27, Oakland Airport, California.

REAL ESTATE

Plants-Properties.

Offices for rent or lease. Most suitable for manufacturing representatives. Location in Glendale, Calif. CI-4-1524. Philip Lombardo, 1241 Graynold Ave., Glendale, Calif.

AERONAUTICAL ENGINEER

to perform stress analysis, design of aircraft components and flight test data analysis for flight research organization. Minimum 5 years experience required. Submit resume to

Box AW 290, 221 W. 41 St. N. Y. 18

PRATT & WHITNEY PARTS

for R-2000-7-9-11-13

Prompt Service

Send inquiries

GENERAL OVERSEAS AIRLINES

Area 7 Newark Airport Newark, N. J. Market 2-0964

LOCKHEED LODESTAR

P & W 1830—SIC 3G ENGINES

Originally modified by Lockheed factory. Just re-licensed. Beautiful appearance and condition. Low airplane and engine time. Trade-in's considered. Call or wire.

We Own this Airplane

LEEWARD AERONAUTICAL

P. O. Box 210, Fort Wayne, Ind., H-2145

MALLARD OWNERS

New Wheels and Flaps Position Indicator Instruments G. E. Manufacturer's Part No. 8DJ26AAA-Sub 1 \$20 per instrument. Payment upon inspection.

C. K. FAY, MIDWEST AIRWAYS, INC.
Mitchell Field Milwaukee, Wisconsin

Aircraft Maintenance Equipment

for Douglas

DC-4, C-54, DC-3, C-47

Immediate Delivery

GENERAL OVERSEAS AIRLINES

Area 7 Newark Airport Newark, N. J. Market 2-0964

Rising Sun SCHOOL OF

ESTABLISHED 1930 AERONAUTICS

"Built Upon the Success of Its Graduates"

GOVT. C. A. A. and VETERANS APPROVED

ENROLL NOW FOR NEXT CLASS

Write for Illustrated Catalog.

2206-16 E. HUNTINGTON ST., PHILA., PA.

SEARCHLIGHT SECTION

AIRCRAFT & ELECTRONIC EQUIPMENT

As a leading supplier we offer a complete line of

BRAND NEW INSTRUMENTS

- FLIGHT & NAVIGATION INSTRUMENTS
- ENGINE INSTRUMENTS
- AUTOMATIC PILOTS
- INVERTERS
- AUTOSYNS
- PRECISION AUTOSYNS
- RATE GENERATORS
- SYNCHROS
- ALNICO FIELD MOTORS
- GYROS
- A.C. MOTORS
- D.C. MOTORS
- SERVO MOTORS
- TORQUE UNITS
- TORQUE AMPLIFIERS
- FREQUENCY METERS
- BLOWER ASSEMBLIES

Write for complete listings

All Instruments May Be Purchased

C.A.A. Certified

U. S. Export License-2140

WUX Great Neck, N. Y.

INSTRUMENT ASSOCIATES

37 E. Bayview Ave., Great Neck, N.Y.

Tele: IM perial 7-1147

Douglas DC-4

Demountable power plants

for R-2000-7-11-9-13

with fire prevention completed

Immediate Delivery

GENERAL OVERSEAS AIRLINES

Area 7 Newark Airport Newark, N. J. Market 2-0964

NEW AIRFRAME PARTS

C-47

C-54

C-46

AT-36

P-38

P-51

B-25

Your inquiries will receive prompt attention

MORCO TRADING CORPORATION

354 South Spring Street

Los Angeles 13, California U.S.A.

Exporters of Aircraft Parts

CABLES: MORCO LOSANGELES

DOUGLAS AIRFRAME

Parts for DC-4,

C-54, C-47, DC-3

Send inquiries

GENERAL OVERSEAS AIRLINES

Area 7 Newark Airport Newark, N. J. Market 2-0964

NO EXCUSE NOW! STOCK UP!

DOUGLAS PARTS

Demountable Power Plants
Ring Cows — Collector Rings

DOUGLAS PARTS

Main Gear — Nose Gear
Wheels — Struts — Braces

DOUGLAS PARTS

Wings — Rudders — Elevators
Tips — Flaps — Ailerons

DOUGLAS PARTS

Starters — Generators
Pumps — Valves — Relays

DOUGLAS PARTS

High-Density Seats — Sleeper
Seats — Rugs — Windows — Berths

DOUGLAS PARTS

Nose Sections — Fuselage
Sections — Door Frames

DOUGLAS PARTS

Cargo Doors — Passenger
Doors — Cargo Tie-Down Kits

DOUGLAS PARTS

Heaters — Ducts — Vents
Hatracks — Bulkheads

DOUGLAS PARTS

E Fuel Systems — Detectors
Dump Chutes — Cables

DOUGLAS PARTS

Priced to induce your
IMMEDIATE PURCHASE!

GENERAL OVERSEAS AIRLINES

AREA 7 NEWARK AIRPORT

NEWARK, N. J. MARKET 2-0964

and as such has an overhaul time of 150 hours. At the 150-hour inspection, special Air Materiel Command approval may be obtained, and the overhaul life extended in increments of 50 hours, with inspections at the end of each period, to a total of 250 hours. The erroneous figure of 92-hour overhaul should be corrected.

W. L. LEMON

Service Engineering Division
General Electric Co.

West Lynn 3, Mass.

(The AVIATION WEEK figure was taken from the printed testimony of Col. Kaufman, USAF, before the House Armed Services Committee. Col. Kaufman was introduced as an Air Materiel Command Supply & Maintenance officer and spokesman.—Ed.)

Praise for a Tower

Recently I was in an unfortunate position just out of Washington National Airport in a lightplane which developed engine trouble of such a nature that I desired immediate landing and, therefore, felt that I should declare an emergency and return to Washington National Airport at once.

I did this approximately five minutes out and advised them of my ETA as soon as I set my base leg, advised my present position and was given a clear field. At my first call declaring an emergency, I gave my position but the tower was not able to get me in sight due to restricted visibility. At that time they immediately ordered all aircraft on the approach or in the pattern to pull up and hold out.

In my varied flying experience I have never seen a more efficient and completely under-control service than was displayed by the personnel at Washington National Airport at that time. I feel that this tower should definitely be commended on the way in which they handled this incident. It is indeed comforting to know that the private pilots in light airplanes can receive this type of efficient service.

R. M. HOLDEMAN, Vice-President
Jamieson Aircraft Co., Inc.
DeLand, Florida

Kollsman Comments

In your excellent editorial comment on the proposed Kollsman Cabin Pressurization System, Apr. 17 there appears the statement, "... The DC-6 equipment, also a Kollsman development, is much more complicated and requires more pilot control."

This reference is incorrect, in so far as the principle of operation of the Douglas system was wholly designed by the Douglas Aircraft Co., and our work consisted only of mechanizing the instruments. Moreover, at this stage we are not yet prepared to make comparisons as to the relative complexity of the two systems.

Obviously, in some way I must have conveyed the wrong impression to one of your editors.

JACK ANDRESEN
Chief Electro-Mechanical Engineer
Kollsman Instrument division of
Square D Co.
Elmhurst, New York

Orders now being received for July Delivery "AN" STANDARD PARTS BOOKS

Offset Printed • 1081 pages • 2 volumes • Bound in Fibre Covers.

"AN", "NAF" Utility Items: "AN" Special Items and "AND" Design Sheets

List Price: Set of Two Volumes \$30.00. Write for quantity discounts.

Money back if not satisfied

CORYDON M. JOHNSON CO., INC., Bethpage, L. I., N. Y.

STRICTLY PERSONAL

NICKEL, TRICKLE, TILT—The Associated Press tells about Carl Hixon of Northwest Airlines who inserted a nickel in an automatic coffee vendor at the Minneapolis airport the other day. He pushed a button labeled cream and sugar. Nothing happened. So he hammered on the machine with fists. Presto! The machine clanked. Red lights flashed. A charge of hot coffee squirted on Hixon's suit and a sign over the nickel slot flashed "SOLD OUT."

* * *

PHOENIX WAS A HIGH POINT—Charlie Adams, our Transport Editor, was one of about 60 newsmen who visited Arizona on American Airlines' recent pre-inaugural flight of the DC-6 coach service. He says the Arizona Gazette did some fine descriptive reporting in few words. The Gazette capitalizes the first few words of important paragraphs. So the savvy reporter's fourth paragraph started off like this:

"ALL WERE HIGH in their praise . . . of the air coach flight," etc.

* * *

DR. VON FLUGEN'S GLOSSARY

AIR CARRIER: Any container or vehicle used primarily for the purpose of carrying air.

AIRCRAFT DOPE: See AIRPLANE DOPE.

AIRCRAFT FLIGHT REPORT: A loud noise accompanying the termination of an aircraft flight; usually preceded by a rapid descent.

AIRFRAME: Ambiguous terminology. May mean either a frame constructed around a body of air or a body of air surrounding something.

AIR HOSTESS: Same as ground hostess only before grinding.

AIR MINDED: A deprecatory invective, similar to "addle-brained."

AIRPLANE DOPE: See AIRSHIP DOPE.

AIRSCREW: Censored.

AIRSHIP DOPE: Dope, schmope, what's the difference?

AIRSHIP HULL: A whole airship.

AIRSPACE RESERVATION: Any geographical location set aside by the U.S. government for the exclusive occupancy of airspace.

ALCLAD: Entirely clothed.

ALCOA: A mineral base shortening frequently used as a substitute for butter.

AMYL ACETATE: See aircraft, dope.

ANGLE OF ZERO LIFT: The angle immediately preceding an aircraft flight report.

ARCTIC FRONT: An attitude assumed by an uncooperative stewardess.

ARRESTING GEAR: A police officer's equipment.

ARTIFICIAL AGING: A phenomenon which occurs after approximately seven hours' association with the aircraft industry.

ASSEMBLY DRAWING: A gathering at which a prize or prizes are awarded by means of pulling names or numbers from a hat or other container.

ASTRONOMICAL: The boss' salary.

(To be continued)

* * *

CREEPING BUREAUCRACY—Hy Sheridan writes from the roomy control chamber of his AA DC-6 that Sadie the Stewardess read the headlines awfully fast the other morning and then was heard telling one of her passengers she sure was surprised to see that the government was even getting into burlesque these days. The passenger was a little startled at this latest spread in bureaucracy and asked for some more dope. "Well," Sadie said, "they are arguing about a big guided muscle program now."

* * *

PREVENTING PREMATURE TAKEOFFS—Jerry Lederer of Flight Safety Foundation passes along an effective system to prevent premature takeoff by catapult. It originally was publicized by Naval Aviation News. The pilot to be catapulted holds in his hand a rope, the other end of which is tied in a noose and placed around the neck of the officer responsible for giving the signal that sets off the catapult. Jerry says it is too soon to obtain statistical confirmation of the efficiency of this idea.

* * *

BITS ABOUT PEOPLE

Earl D. Osborn, Edo's president, took delivery the other day on the 11th plane he has owned in 27 years—a new 4-place Cessna 170 seaplane. Earl bought his first ship, an Aero-marine 40 flying boat, in 1923. . . Mac Bannell, formerly PAA press man in Washington, has resigned from Waterman Steamships and is in Guatemala dealing in cosmetics.

John Creedy, who dispenses all kinds of publicity from Pan American's news bureau in New York, was tearing the town upside-down trying to get hordes of people out to the May 10 Wings Club luncheon. He's chairman of the meetings committee for the club, or something. He really did a job too; attendance was terrific. (The guest speaker was Ralph Damon, TWA president.)

Del and Marjorie Rentzel welcomed their third son the other day: Christopher Horton Rentzel. His predecessors are Del, Jr., 12, and Lance, 6.

Tom Wolfe, who has been in the airline business nigh onto 25 years, has given birth too—his new 700-page book, *Air Transportation—Traffic and Management* is being published by McGraw-Hill Book Co. Tom is now living in Pasadena, Calif. (873 Linda Vista Ave.), and is eyeing aviation again. He resigned as vice president of PAA over a year ago to form Wolf Enterprises, Inc., which has now been sold. —R.H.W.

WHAT'S NEW

Telling the Market

How to Speed Up Soldered Assemblies with Solder Pre-Forms gives manufacturers the when, what and how of using pre-formed solder shapes. Write to Soldering Specialties, Summit, N. J. . . . Airline purchasing agents and maintenance men should find publication **A-1, Compounded Chemicals Reference Guide to Aviation Maintenance Operations and Overhaul**, a valuable reference for describing products of Aviation Chemicals division of Fine Organics, Inc. Write the company at Lodi, N. J. . . . **1950 Catalog of McGraw-Hill Books**, including those of Whittlesey House, describes company's technical and general volumes. Write to McGraw-Hill Book Co., Inc., 330 W. 42 St., New York 18, N. Y. . . . **Metal Stock List of Pacific Coast Aircraft Companies and Warehouses** is aimed for materials engineers and purchasing agents, listing by specification, grade and size of most-used aircraft materials. Contact Northrop Aircraft, Inc., Hawthorne, Calif., attention of G. M. Aron, standards engineer . . . **Civil Aeronautics Manual 3 Supplement** provides users of Part 3 with compilation of rules, policies, and some interpretations which CAA has issued in other forms as well as some new material for Part 3, effective Dec. 15, 1946 as amended. Write Civil Aeronautics Administration, U. S. Department of Commerce, Washington 25, D. C. . . . **Aviation in Virginia** is a profusely illustrated report giving that state's existing facilities and recommending future development, prepared by Airways Engineering Corp., 1212 18 St., N.W., Washington 6, D. C.

New Books

Elements of Practical Aerodynamics (4th ed.) by Bradley Jones is a general survey of the practical aspects of the subject. It is simplified to the point where only an elementary calculus background is necessary to understand the text. Many problems have been added, others revised.

The book discusses in detail the behavior of ideal fluids, vortex motion, circulation, boundary layer, speed of sound, Bernoulli's equation and stagnation pressure for compressible fluid, V-g diagrams, and longitudinal stability.

The author has been professor of aeronautical engineering at the University of Cincinnati since 1929.

Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 444 pages including index, price \$5.

ADVERTISERS INDEX

AVIATION WEEK

MAY 29, 1950

Adams-Rite Mfg. Company	4
Agency—The Shaw Company	
Air Associates, Inc.	35
Agency—J. Branch Briggs Adv.	
Aircraft Radio Corp.	9
Agency—Burke Dowling Adams Adv.	
Allison Division, G.M.C.	4th Cover
Agency—Kudner Agency, Inc.	
Avica Corporation	10
Beech Aircraft Corp.	33
Agency—Erwin, Wasey & Co., Inc.	
Bendix Products Div. of Bendix Aviation Corp.	3rd Cover
Agency—MacManus, John & Adams, Inc.	
Clifford Manufacturing Company	22
Agency—James Thomas Chirurg Co.	
Control Products, Inc.	49
Agency—George Homer Martin Associates	
Darnell Corporation, Ltd.	46
Agency—Rhea Advertising Service	
Eaton Manufacturing Co.	21
Agency—Clark & Rickerd, Inc.	
Electric Auto-Lite Co., The	36
Agency—Ruthrauff & Ryan, Inc.	
Garrett Corporation, The, Airesearch Mfg. Co.	5
Agency—J. Walter Thompson Co.	
Glidden Co., The	32
Agency—Meldrum & Fewsmith, Inc.	
Goodyear Tire & Rubber Co., Inc.	Front Cover
Agency—Kudner Agency, Inc.	
Kollsman Instrument Corp.	48
Agency—Erwin, Wasey & Co., Inc.	
Koppers Company, Inc.	46
Agency—Vansant, Dugdale & Co., Inc.	
Lavelle Aircraft Corp.	8
Agency—Broomfield-Podmore Adv.	
Minneapolis-Honeywell Regulator Co.	2nd Cover
Agency—Addison, Lewis & Associates	
New Departure Div., G.M.C.	3
Agency—J. M. Hickerson, Inc.	
Pesco Products Company	38
Agency—Fuller & Smith & Ross, Inc.	
Rohr Aircraft Corp.	42
Agency—Barnes Chase Co.	
Searchlight Section	50-51
Snap-On Tools Corp.	47
Agency—Scott, Incorporated	
Sperry Gyroscope Company	6
Agency—Charles Dallas Reach Co., Inc.	
Standard Pressed Steel Co.	53
Agency—R. E. Lovekin Corp.	
Tinnerman Products, Inc.	26
Agency—Meldrum & Fewsmith, Inc.	
United Aircraft Corp.	28-29
Agency—Platt-Forbes, Inc.	
United Helicopter, Inc.	25
Agency—Elliott, Goetze & Boone Adv.	
Western Gear Works	24
Agency—West-Marquis, Inc.	
Wilcox Electric Company	31
Agency—Arthur G. Rippey & Co.	
Wittek Manufacturing Company	8
Agency—The Advertising Corp.	
Wolfe Co., Inc., The, Franklin Co.	49
Agency—Aylesworth-Jameson Co.	

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT	
Positions Vacant	50
Positions Wanted	50
EDUCATIONAL	
Books	50
Schools	50
BUSINESS OPPORTUNITIES	
Offered	50
EQUIPMENT	
(Used or Surplus New)	
For Sale	50, 51

SPS AIRCRAFT FASTENERS

UNBRAKO



NAS INTERNAL WRENCHING LOCK NUT

... a superior safety nut. Sizes from #8 to 1".



NAS INTERNAL WRENCHING AIRCRAFT BOLTS

... are made to latest NAS Specifications. Threads are fully formed by rolling after heat treatment, an important UNBRAKO feature. Full range of standard sizes.

FLEXLOC

EXTERNAL WRENCHING NUTS

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

Other outstanding advantages include:

Maximum tensile with minimum weight

Approved under latest NAS Specifications

Large bearing surface

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

Temperature range to +550° F.

No special tools needed—use standard 12-point socket or box wrenches. Designed for use in cramped quarters

Sizes from 1/4" to 3/4" NF Thread Series

Send for samples and information.



FLEXLOC

ONE-PIECE SELF-LOCKING NUTS

The one-piece FLEXLOC is both a stop and a lock nut, due to its resilient segments which lock positively, even under extreme vibration. Torque is unusually uniform—within a few inch pounds. "Thin" and "regular" types; NC and NF threads. Officially approved by many U. S. depts., bureaus, etc., and CAA for aircraft use.



Write for further information on these UNBRAKO and FLEXLOC Products.

-SPS- STANDARD PRESSED STEEL CO.
JENKINTOWN 26, PENNSYLVANIA

EDITORIAL

The Johnson-Lee Subsidy Proposals

A double-barreled program to strengthen the domestic airline route pattern and remove the stigma of subsidy is gaining strong support both in Congress and the Civil Aeronautics Board. Industry leaders are still eyeing the new plans warily. They recognize that the proposals may go far toward dispelling the widespread impression that the airlines are fattening themselves at taxpayers' expense. But at the same time they recoil instinctively from the prospect of extensive surgery performed on their route systems by bureaucrats and the possibility that future mail pay will depend on congressional whim.

Early this month (AVIATION WEEK May 15), Sen. Edwin Johnson (D., Colo.), chairman of the Senate Commerce Committee, recommended legislation separating compensatory mail pay from subsidy and earmarking the latter on a community-by-community basis. He said the airlines' "need" mail pay is largely a subsidy to small towns and not a handout to the carriers themselves.

Airline executives, who have long supported that thesis, applauded Johnson's recognition of who really benefits from the subsidy. But they point out that breaking down subsidy on a community-by-community basis is a monumental—if not impossible—task for a Civil Aeronautics Board which is already far behind in its work.

Last week, CAB member Josh Lee, speaking before a feeder airline seminar at the University of Oklahoma, offered a program that ties in closely with Sen. Johnson's ideas. Lee said it is time for CAB to announce a blueprint for overall improvement of the domestic route pattern. While the Board would continue to work on many individual cases, the master plan would give direction to its efforts.

Lee put in another good word for mergers as a means of eliminating uneconomic competition, permitting better equipment utilization, affording greater convenience to the travelling public, and improving the competitive balance between carriers. These advantages, he said, would result in substantial savings to the government. "Unless CAB leads the way in recommending the merging of certain carriers, there are likely to be either no proposals at all for merging, or else the wrong proposals," the CAB member declared.

Because of its objective position, Lee explained, the Board could recommend mergers that would be in the public interest and could assist in providing referees and arbitrators to effectuate agreements between the carriers.

Conceding that the objectives may be laudable, industry observers suggest that the approach is of the shotgun wedding variety. They figure that if CAB gets into the habit of pointing a weapon, it may also be inclined to shoot.

Most important aspect of Lee's speech was his sugges-

tion that the domestic route pattern be improved through separation of air service into two distinct categories by transferring most of the small feeder-type communities now on trunklines to the feeder systems.

This, he indicated, would remove a number of trunklines from the subsidized category. Small towns, instead of receiving infrequent, off-hour trunk service would have convenient local schedules provided by feeders. The trunks would not have to maintain small twin-engine aircraft but could concentrate on fast, long-haul transports, including jets. Through-passengers on trunklines would not be inconvenienced by frequent, time-consuming stops. Small points that might prove unprofitable on trunklines might pay off on feeders because of more intensive cultivation of the available traffic potential by short-haul operators whose lives depended on it.

With complete separation of trunk and feeder service, the public would know where the subsidies are going. And who—certainly not Congress—would oppose the expenditure of money earmarked specifically for bringing airline service to the grass roots? The airline subsidy would then be in much the same category as the \$152 million spent last year for rural free delivery.

Without addition of some trunkline towns to make their systems more complete, a number of feeders may not be able to justify their continued existence, Lee believes. Thus many towns would be dropped from the airline map.

So runs the argument for complete separation of feeder from trunkline service. But there's also the other side.

If the majority of trunkline towns now requiring subsidy were transferred to the feeders, it would constitute a major revolution in the industry. Out of the best 365 stations on the airline map, 182—or nearly half—do not generate enough revenue to meet expenses.

Despite this situation, the trunklines are in no hurry to turn over their weak points to the feeders, which are already operating 17,000 route miles. The trunks are suspicious of feeder ambitions to become trunks themselves, notwithstanding CAB assurances to the contrary.

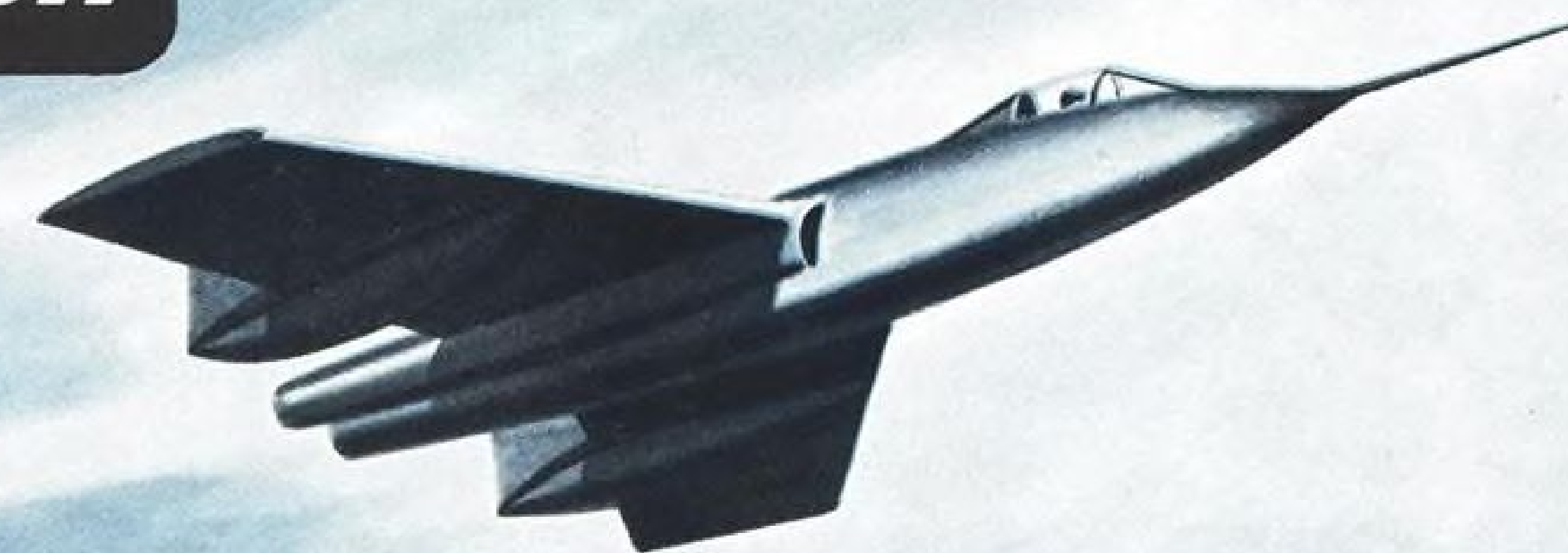
Pending CAB orders already propose transferring a half-dozen UAL stops on the West Coast and in the Rocky Mountain area to feeders. American, Braniff and Continental are affected to a lesser degree. On the other hand, American, Northwest, TWA and Chicago & Southern have voluntarily asked permission to suspend or abandon service at a number of small towns to which they are now certificated. The towns themselves squawk loudly at the prospect of losing caste by transfer from trunk to feeder routes.

While far from a panacea, the Lee-Johnson proposals have strong political backing and considerable popular appeal to the weary taxpayer. With railroads and other interests stirring public opposition to airline subsidies, the suggestions must be studied seriously.

Bendix Products Division

FIRST IN

FUEL METERING



Setting the Pace in America's Most Progressive Industry!

Tomorrow's aircraft—jets of unbelievable speeds, transports of gigantic size—are now on the drawing boards. And the task of creating new fuel metering systems and landing gear for many of these planes-in-the-making has been entrusted to the Bendix Products Division of Bendix Aviation Corporation.

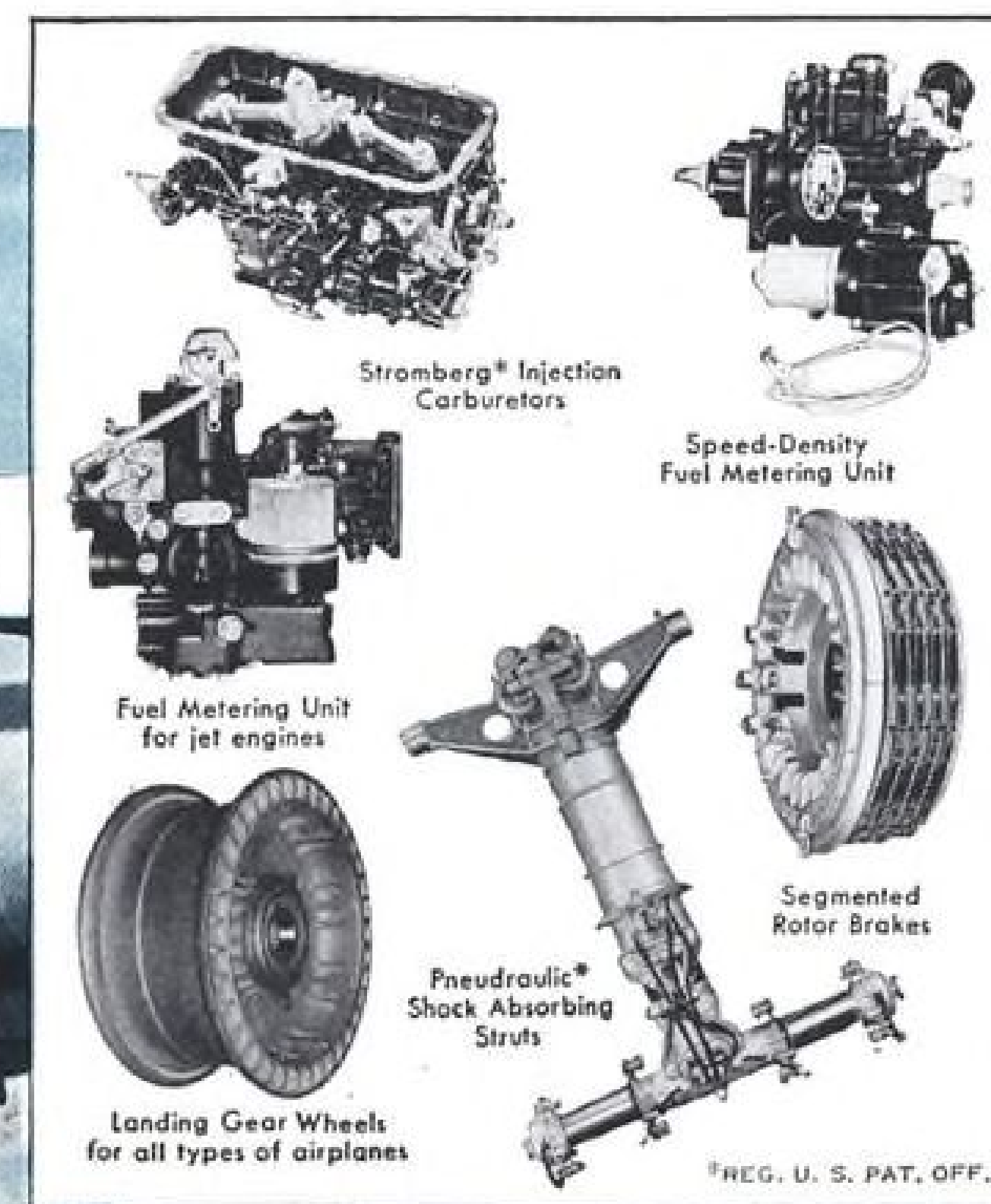
Here, at Bendix Products, is a proved combination of creative engineering and quality production in these highly specialized fields. Let this Bendix skill and experience in the development of carburetion, fuel metering, shock-absorbing struts, wheels and brakes help you keep America's aviation the leader of the world.

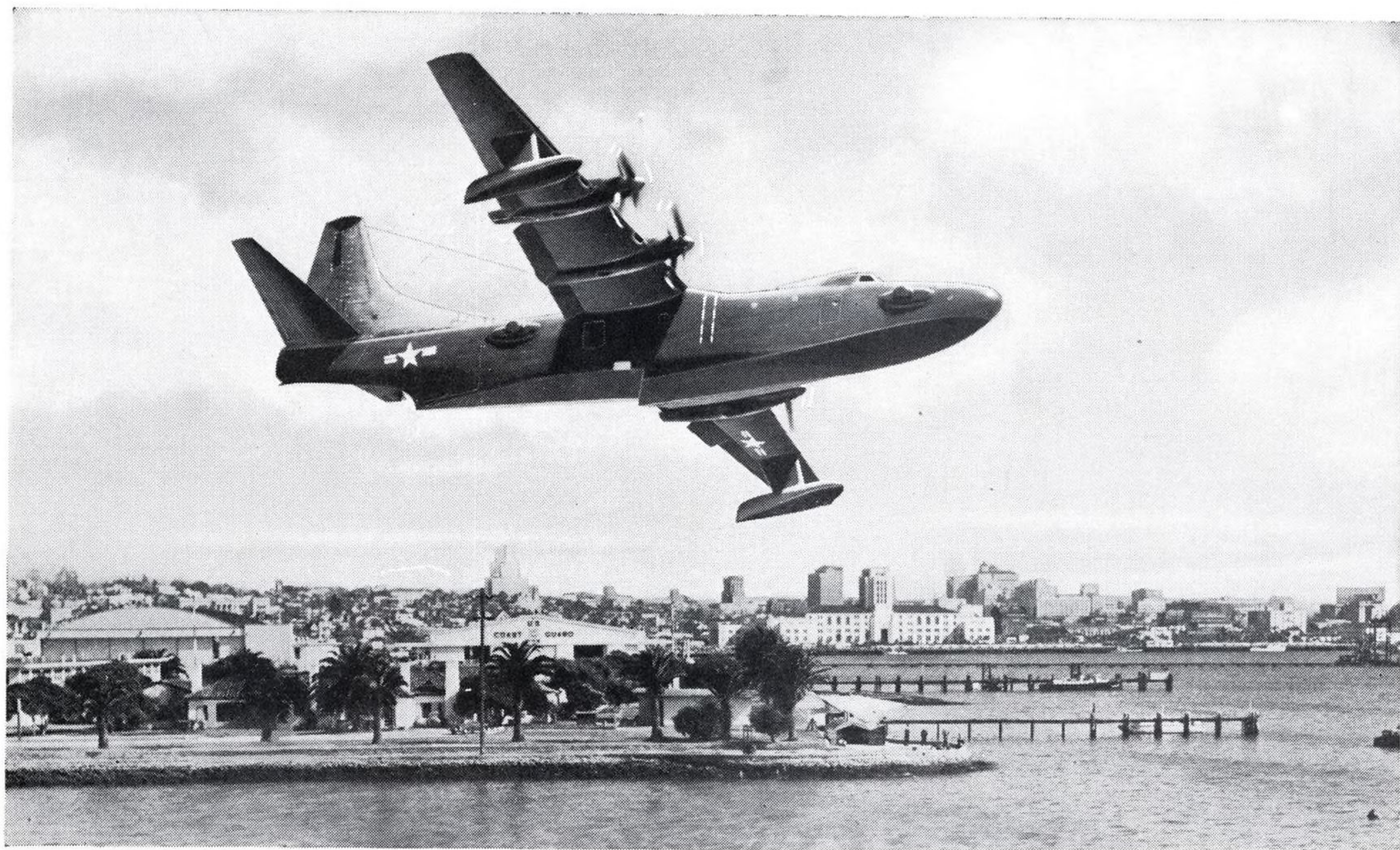
BENDIX PRODUCTS DIVISION • SOUTH BEND, INDIANA



Export Sales: Bendix International Division, 72 Fifth Ave., New York 11, N. Y.

LEADER IN LANDING GEAR





ALLISON TURBO-PROP ENGINES POWER NAVY'S GIANT PATROL BOAT TO AN AMERICAN "FIRST"

EQUIPPED with four new Allison T40 Turbo-Prop engines, the Navy's 60-ton XP5Y Convair flying boat chalked up an American *first* in its maiden flight from the harbor base of the Consolidated Vultee Aircraft Corporation at San Diego, California.

This long-range anti-submarine patrol seaplane is the first American aircraft to fly solely with Turbo-Prop power.

With a total weight of only 10,000 pounds and developing a spectacular 22,000 horsepower, the four Allison twin-turbine engines establish a world's

record in a horsepower-to-engine-weight ratio — 2.2 horsepower for each pound of engine.

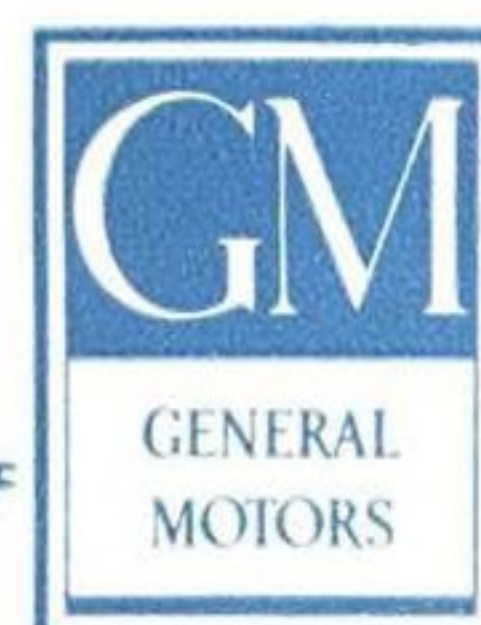
The power from one of these T40 Turbo-Props is greater than the total power of all four reciprocating-type engines in a B-17 Flying Fortress, with only a fraction of the piston-type engine weight.

This first flight of the Convair clearly demonstrates revolutionary design advantages, through the use of Allison Turbo-Prop engines, now applicable to all military transport, cargo and commercial aircraft in the high-power field.

Allison

Builder of Axial and Centrifugal Flow Turbine Engines

DIVISION OF



INDIANAPOLIS, INDIANA