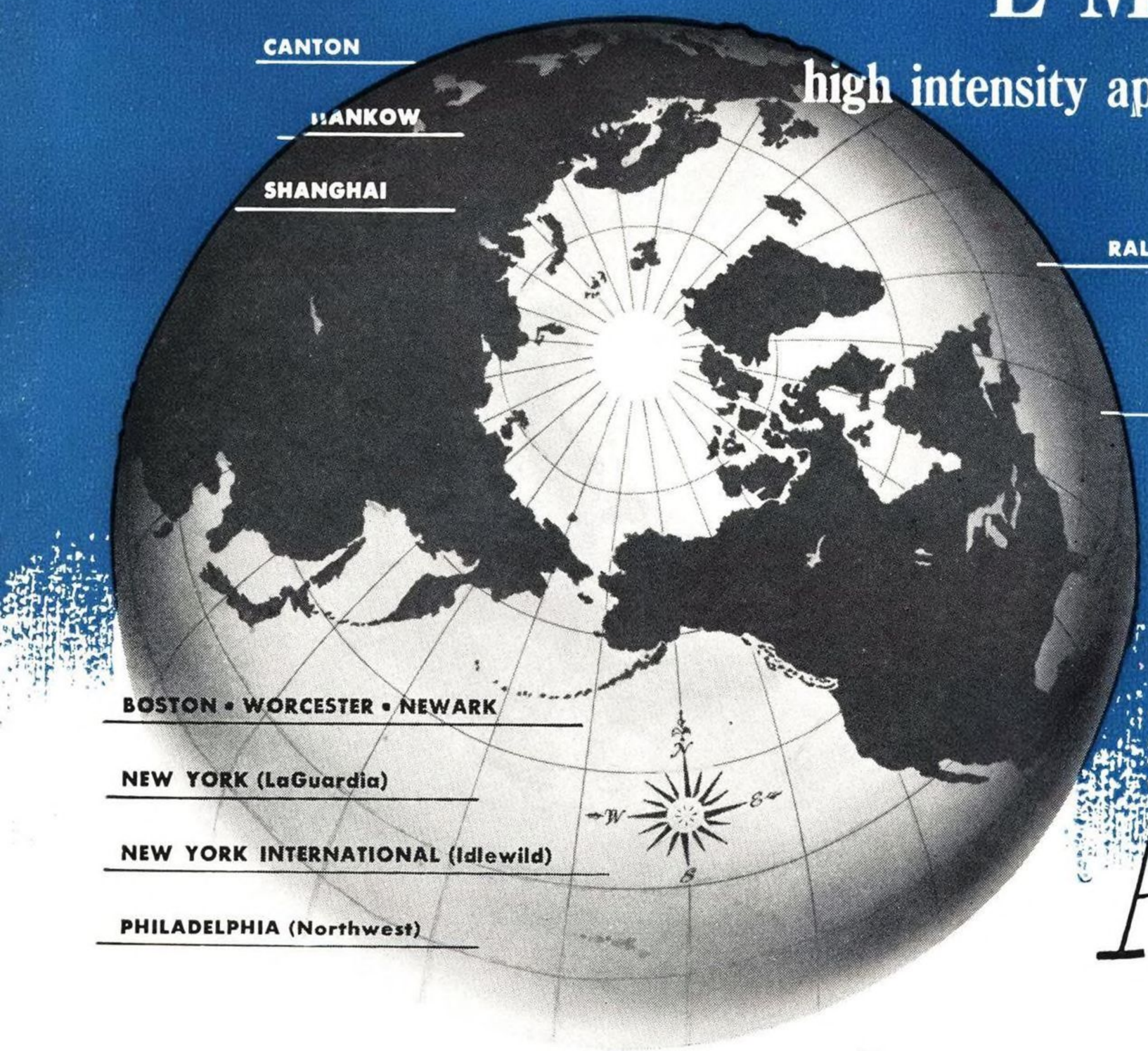
AVIATION WEEK

A McGRAW-HILL PUBLICATION

JAN. 17, 1949

L-M–Bartow

high intensity approach and runway lights



All over the world!

L-M—Bartow pioneered high intensity lighting, and is today's leader both in quality and number of installations. The list shows some recent users of L-M—Bartow high intensity systems. Only the fully controllable beam permits the very high controlled intensities, up to 180,000 beam candlepower. This gives maximum penetration, *without glare*, reaching out further to "bring 'em in alive" when every foot of distance counts. For information on this and other engineered lighting for all sizes of airports **wire or write Airport Lighting Division, Line Material Co., East Stroudsburg, Pennsylvania.**

LM

LINE MATERIAL Airport Lighting

ELECTRICAL EQUIPMENT • INSTRUMENTS • MICARTA PULLEYS, STRUCTURAL PARTS • FANS, HEATERS, COOLERS • JET PROPULSION

AIRBORNE

WESTINGHOUSE

Aircraft

GENERATORS

. . . strong hearts for high flyers!

Constant-Frequency Alternator, type QA-11, 40 kva, 120/208 volts, .75 P.F., 400 cycles, 6,000 rpm. Weight 74 lbs.

Variable-Speed, D-C Generator, type DB-30, 9 kw, 30 volts, d-c, 300 amps., 3,000/-9,000 rpm. Weight 59 lbs.

Constant-Speed, D-C Generator, type G-80, 24 kw, 30 volts, d-c, 800 amps., 6,000 rpm. Weight 85 lbs.

. . . plus numerous other types for a variety of applications.

The heart of the vital electrical system on modern aircraft . . . the generator . . . above all, must be dependable.

Small or large, d-c or a-c, low voltage or high voltage, Westinghouse generators have extra dependability. It is the result of more than 15 years' experience in building engine-mounted generators . . . wartime schedules that topped 6,000 generators a month . . . engineering and research that produced this unchallengeable record of generator "firsts" . . .

First to braze commutator connections on a production basis—greatest contribution ever made to generator dependability.

First halide-treated, high-altitude brushes—still the only answer for long brush life.

First quick-disconnect, precision-cast steel mounting flange with high critical frequency and with fatigue strength greater than that of any engine pad.

First to use chrome-silver-copper alloy commutator bars—twelve times the endurance of copper at 300° C.

First readily replaceable coupling combining a resilient synthetic member and a friction damper—amplification less than 3:1 at all frequencies.

First ventilated bearings, mounted in nitralloy bushings, and lubricated with extreme-temperature-range silicone grease.

First generator available with load-sensitive temperature indicator.

First true "wide speed range" . . . 3,000 to 9,000 rpm . . . 300-ampere generator below 60 pounds.

Generators are but a small part of the complete Westinghouse line of aviation products. For more information, ask for B-3775. Call your local Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94767

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Leader in Aviation Equipment

ON THE GROUND

ENGINE STARTERS, BATTERY CHARGERS • AIRPORT LIGHTING • TEST EQUIPMENT • RADIO AND MICROWAVE APPARATUS • LAMPS

"She's all warmed up—set her on fire!"

Those are familiar words at the Kidde proving grounds, where we *deliberately* start engine fires by the hundred. What's more, we start them in a roaring wind that doubles for a high-speed slipstream.

How do we do it?

With a pair of B-26 power plants set up in tandem. The propeller of the front engine sends the "slipstream" back through the rear nacelle, where we start the fires. The cockpit is placed to give the man at the controls a clear view of the flames.

Why do we do it?

Because only by simulating, as closely as possible, the actual conditions of high-speed flight can we determine the true efficiency of all the many fire-extinguishing agents. It's under conditions like these that we've blasted out engine fires with CO_2, CB, MB, DL, the Freons.

These "in-the-air" studies have provided us with a wealth of data on aviation fire-fighting—data which we are ready to pass on, at any time, to government agencies, aircraft manufacturers and airline operators.

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Kidde

Walter Kidde & Company, Inc. • 118 Main Street, Belleville 9, N. J.

MORE UNIFORM CONTROL

FEWER TAKE-UPS

with

LOCK-CLAD

aircord

LOAD APPLICATION causes almost no stretch in Roebling Lock-Clad Aircord . . . the swaged duralumin tubing compresses the steel cord and boosts its AE value. More than that, this combination of metals virtually synchronizes the thermal expansion and contraction of control cords to the dural airframe. Lock-Clad Aircord thus gives more uniform control, fewer take-up adjustments.

Roebling Lock-Clad Aircord is also ideal on pressurized-cabin planes where control sections pass through pressure seals. The cable's round, smooth surface means a snug, secure fit at all times.

Write for your copy of Catalog A-902 describing the full line of Roebling aircraft products.

AIRCORD DIVISION

JOHN A. ROEBLING'S SONS COMPANY

TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

ROEBLING

ROEBLING

A CENTURY OF CONFIDENCE

AVIATION WEEK

Vol. 50, No. 3 — January 17, 1949

Robert H. Wood
EDITOR

Merlin H. Mickel
MANAGING EDITOR

Robert B. Hotz.....News Editor
Irving Stone.....Technical Editor
William Kroger.....Manufacturing
Alexander McSurely.....Sales & Service
Charles L. Adams.....Transport Editor
Robert McLarren.....Engineering
Katherine Johnsen.....Congress
Stanley L. Colbert.....Production Editor
Marie Adams.....Editorial Assistant
Scott H. Reiniger.....Editorial Assistant
Victoria Giaculli.....Editorial Makeup
Scholer Bangs...Los Angeles Correspondent

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

Domestic News Bureaus: Atlanta 3, Rhodes-Haverty Bldg.; Chicago 11, 520 N. Michigan Ave.; Cleveland 15, Hanna Bldg.; Detroit 26, Penobscot Bldg.; Los Angeles 14, 621 S. Hope St.; San Francisco 4, 68 Post St.; Houston, 514 South St. *Correspondents:* Boston, Buffalo, Dallas, Dayton, Denver, Indianapolis, Jacksonville, Kansas City, Knoxville, Lansing, Louisville, Memphis, Miami, Milwaukee, New Orleans, Oklahoma City, Ogden, Philadelphia, Phoenix, Pittsburgh, Portland (Ore.), St. Louis, Salt Lake City, Seattle, Wichita and 43 other cities.

Foreign News Bureaus: London, Paris, Frankfurt, Moscow, Tokyo, Bombay, Melbourne, Rio de Janeiro, Buenos Aires. Correspondents in Athens, Caracas, Santiago, Shanghai, Zurich, Rome, Johannesburg and over 40 other cities.

ECONOMIC STAFF

Dexter M. Keezer, Sanford S. Parker, William F. Butler, Robert P. Ulin.

Robert F. Boger
PUBLISHER

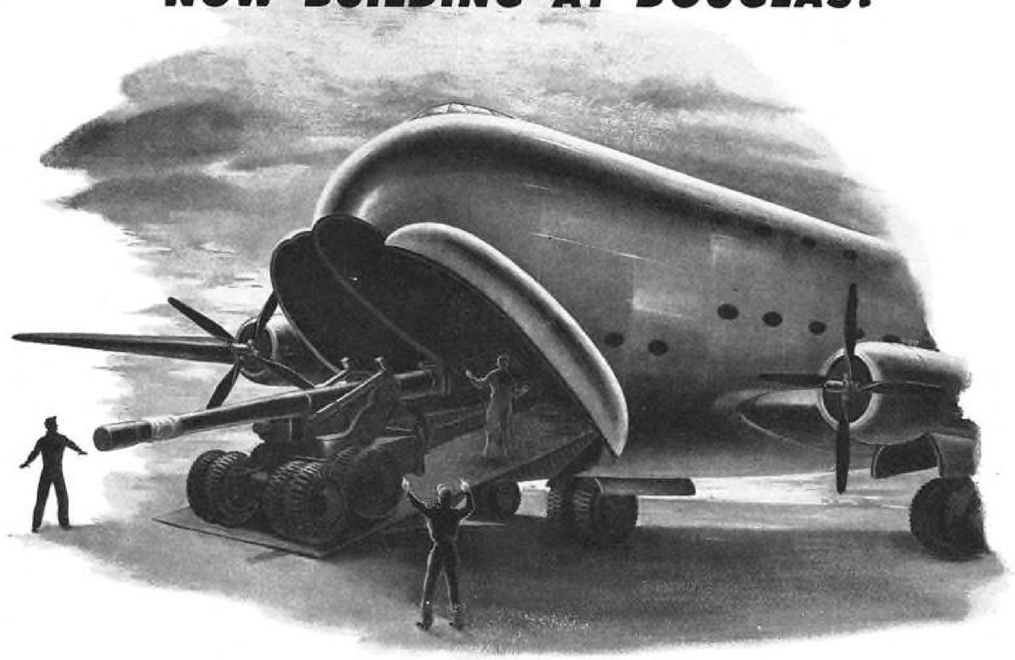
J. G. Johnson, *Business Manager;* R. W. Martin, Jr., *Sales Manager:* Sales Representatives: J. C. Anthony, New York; M. J. Storz, Philadelphia; V. K. Dissette, Cleveland; L. J. Biel, Chicago; W. F. Donnell, St. Louis; J. H. Allen, Dallas; W. G. Ashmore, Atlanta; J. W. Otterson, San Francisco; C. F.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

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

McGRAW-HILL PUBLISHING CO., Inc., James H. McGraw (1860-1949), Founder. Publishing Office, 99-129 N. Broadway, Albany, N. Y. Editorial and Executive offices: 330 W. 42nd St., New York 18; 520 N. Michigan Ave., Chicago 11; 68 Post St., San Francisco 4; Aldwych House, London, W.C. 2; National Press Bldg., Washington 4, D. C.; Architects Bldg., 17th & Sansome Sts., Philadelphia 3; Hanna Bldg., Cleveland 15; 2080 Penobscot Bldg., Detroit 26; Continental Bldg., St. Louis 8; 1427 Statler Bldg., Boston 16; Rhodes-Haverty Bldg., Atlanta 3; 621 South Hope St., Los Angeles 14; 738-39 Oliver Bldg., Pittsburgh 22. JAMES H. McGRAW, Jr., President; CURTIS W. McGRAW, Vice-President and Treasurer; EUGENE DUFFIELD, Executive Assistant for Publications; NELSON BOND, Director of Advertising; JOSEPH A. GERARDI, Secretary; J. F. BLACKBURN, Jr., Director of Circulation . . . Aviation Week, 330 W. 42nd St., New York 18. Published weekly, price 50¢ a copy, 50¢ in Canada. Allow at least ten days for change of address. Address all communications about subscriptions to Director of Circulation, 330 W. 42nd St., New York 18, N. Y. Subscription rates—United States and possessions, $6 a year, $9 for 2 yr., $12 for 3 yr. Canada, $7 for 1 yr., $11 for 2 yr., $14 for 3 yr., payable in Canadian currency at par. Pan American countries, $10 for one yr., $16 for 2 yr., $20 for 3 yr. All other countries, $20 for 1 yr., $30 for 2 yr., $40 for 3 yr. Please indicate position and company connection on all subscription orders. Entered as second class matter July 16, 1947, at Post Office, Albany, N. Y., under Act of March 3, 1879. Volume 50, Number 3. Printed in U.S.A. Cable address "McGraw-Hill New York." Member A.B.C. Copyright, 1949, McGraw-Hill Publishing Co. Aviation Week is indexed in "Reader's Guide to Periodical Literature", "Engineering Index" and "Industrial Arts Index". 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.

FLYING LST! GIANT NEW AIR TRANSPORT

NOW BUILDING AT DOUGLAS!



Vividly the Berlin Air Lift reveals the need for high-speed, large capacity transport aircraft. And to meet this need skilled engineers and craftsmen at Douglas are now producing 28 giant, all-purpose C-124A transports for the U. S. Air Force.

Two and one-half times the size (by weight) of the famed Douglas C-54, this huge plane will carry a 50,000-pound load, and can transport military cargo 1,200 miles and return to base without refueling. Novel built-in nose ramp, similar to the famous sea-going LSTs, facilitates handling of heavy ground force equipment such as tanks, field guns, bulldozers and fully loaded vehicles.

It is expected that the C-124A will enhance in every respect the quarter-century reputation of Douglas for leadership in the design and construction of the world's finest, fastest and most dependable air transports.

DOUGLAS AIRCRAFT COMPANY, INC., SANTA MONICA, CALIFORNIA

DOUGLAS

Trans-Texas Airways, largest certificated feeder carrier in the country operating within one state, connects over thirty (30) Texas communities and six (6) Mexican border points with the nation's major domestic and international carriers. Passengers, mail, parcel post and freight are being flown in steadily increasing volume. Hitherto isolated regions of vast Texas are now only hours away from the country's great markets. *From its very first run, Trans-Texas Airways has used Texaco Aviation lubricants and fuels exclusively.*

Reduced maintenance cost is one reason why...

TEXACO's simplified lubrication plan — used by airlines everywhere — can help reduce your maintenance costs . . . simplify maintenance procedure . . . assure maximum efficiency in aircraft operation. The plan is flexible, but most airlines using it find they can take care of all their lubrication jobs with *only seven* Texaco lubricants.

Naturally, this greatly simplifies lubricant storage and handling. Then, in addition, there is Texaco Lubrication Engineering Service with plenty of aviation know-how to help you organize your maintenance facilities properly . . . and set up sound, safe, speedy service practices.

Get the whole story of how you can increase efficiency and reduce costs with Texaco Aviation Products and Lubrication Engineering Service. Telephone the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, *Aviation Division,* 135 East 42nd Street, New York 17, N. Y.

TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

Tune in . . . TEXACO STAR THEATRE presents MILTON BERLE every Wednesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

The Canadian Problem

U. S. aircraft manufacturers can look forward to considerable dealings with the newly revived Canadian aircraft manufacturing industry. Regardless of whether the North Atlantic defense pact is formalized, the U. S. Air Force and the Royal Canadian Air Force will work more closely than ever before on joint defense of the Polar frontier against potential enemy air attack.

Already the USAF and RCAF have agreed that it is desirable to have interchangeable equipment, standardized training and a common tactical doctrine. This has enormous significance for U. S. aircraft manufacturers. First evidences of this are the current negotiations between Fairchild Engine & Airplane Corp. and North American Aviation Inc., with Canadian manufacturers regarding the production of their products in Canada under a licensing agreement. These negotiations are forerunners of similar problems that are likely to arise for other U. S. manufacturers.

Canadian Approach

The Fairchild negotiations began with an approach by Canadair Ltd. of Montreal for a licensing agreement covering the Packet (C-82), no longer in production by Fairchild. Later Canadair expanded its interest to include everything now under manufacture by Fairchild including the C-119, improved versions of the Packet; the C-120 detachable fuselage transport with considerable commercial promise; the tractor landing gear; and guided missiles. State Department, Munitions Board and Air Force offered no objections to this proposed deal and negotiations are still in progress.

The North American case was slightly different. The subject of Canadian manufacture of the F-86A, holder of the world speed record and fastest USAF operational fighter, was first broached to USAF top brass by Air Vice Marshal Curtis of the RCAF and Canadian Supply Minister Clarence D. Howe, who has a reputation as a go-getter. Lieut. Gen. Howard Craig presented the matter to North American indicating the USAF had no objection. North American too, is still negotiating with the Canadians, who have indicated de Havilland of Toronto will handle the deal if it is completed.

Seek U. S. Sales

In both cases the Canadians hope to sell their American-designed products in the British commonwealth market which is already virtually closed to American products because of the dollar shortage. However the Canadians have also indicated that they hope to sell to the U. S. military services and at that point U. S. manufacturers have begun to take a second and longer look at proposed Canadian deals.

On this score there is another case history that may shed some light on the future. Canadair has been building a hybrid version of the Douglas DC-4 and DC-6 known as the Canadair Four and powered by British engines. The Montreal firm has been successful in selling the Canadair Four to Canadian and British airlines, markets Douglas normally could not tap. However Canadair has also tried to sell the Canadair Four to the USAF as a military transport and has actually sold DC-4 and DC-3 spare parts to the USAF at a cost considerably below what Douglas can offer. Labor rate differential accounts for almost all the price difference. Canadian aircraft plant wages are almost 40 percent lower than those paid in U. S. plants despite the fact that the International Assn. of Machinists is the dominant union in this field on both sides of the border.

Canadian Price Cheaper

The Canadians, by their own calculations, can sell the planes they build under U. S. license back to U. S. military services at approximately 25 percent less than U. S. manufacturers can and still maintain a comparable rate of profit. If this comes to pass it will represent serious competition for a U. S. aircraft industry still struggling to get a firm footing on the minimum peacetime volume required for survival. The Canadians are also interested in selling some of their own products to the U. S. military services. The C-100, twin jet all-weather fighter made by A. V. Roe of Toronto, is the best they have to offer currently and it is competing in a field that has as yet produced no outstanding U. S. entry. Obviously if interchangeable equipment is desired some Canadian planes will have to be accepted for the USAF if the RCAF is to buy and use USAF equipment.

One can hardly blame the Canadians for attempting to revive their aircraft industry since it has become obvious the world over that a healthy and efficient aircraft industry is one of the vital ingredients in national survival. A realistic view of the strategic situation in Western Europe gives further stimulus to Canadian desires to grow independent of English aircraft production. A trend toward moving much of English aircraft productive capacity to Canada is already discernible, particularly in the heavier types of planes, leaving Britain to concentrate on jet fighter types.

Changed Economics

Preliminary negotiations for Canadian production of first line USAF tactical aircraft were begun in an economic climate that saw the U. S. aircraft manufacturing industry suddenly presented with about all the production it could immediately handle by virtue of the expanded aircraft program voted by 80th Congress. Now with procurement cutbacks in the wind and rugged competition for the business available, U. S. manufacturers may be more inclined to the view that they should make the planes RCAF wants in their own plants and sell them to Canada as a straight export deal.

If the Canadians run against this impasse they have several trumps to play. The USAF now operates strategic Arctic bases jointly with the RCAF on Canadian soil. The USAF needs the full cooperation of the RCAF on common training and tactics. The Canadians will have excellent bargaining power with the USAF and the USAF is the U. S. aircraft industry's largest customer. The USAF's wish is likely to be the industry's command. USAF procurement officers will be faced with the dilemma of competition from cheaper Canadian-built models of U. S. planes in the face of maintaining the U. S. aircraft industry at a healthy level.

These problems may never arise. If the U. S. industry gets another shot in the arm from a Congressional boosting of the Truman air power budget and has its own factories full of production lines the Canadian picture will be another source of welcome revenue. If the Truman budget sticks and U. S. aircraft assembly lines slow to a walk the Canadian problem may well become acute. It is something for all U. S. manufacturers to think about.

RADIO NOISE SILENCED!

AIRBORNE

ACTUATORS MEET RADIO NOISE REQUIREMENT of AN-M-10a

AIRBORNE ACTUATORS incorporate filtering means within the equipment. No accessory filter or shielding is necessary. Each unit is *production-tested* to insure that no perceptible noise is transmitted to the aircraft receiver.

Trim Tpol
ROTORAC
Lineator

Write today for complete information

AIRBORNE
ACCESSORIES CORPORATION
25 MONTGOMERY STREET • HILLSIDE 5, NEW JERSEY

Western Representative
JAMES L. ADAMS & CO. • LOS ANGELES 6

AVIATION CALENDAR

Jan. 18—January meeting, New York section, Institute of the Aeronautical Sciences, McGraw-Hill Building Auditorium, 330 W. 42nd St., New York.

Jan. 18-Feb. 11—Third Air Transportation Institute, American University, Washington, D. C.

Jan. 20-22—"Minute Plant" conference, Society for Advancement of Management (panel discussions on procurement program and industrial preparedness), Chicago.

Jan. 24—Honors Night dinner, Institute of the Aeronautical Sciences, Hotel Astor, New York City.

Jan. 24-27—IAS seventeenth annual meeting, Hotel Astor, New York City.

Jan. 27—Society of Automotive Engineers, metropolitan section, fuels and lubricants meeting, Engineering Societies Bldg., New York City.

Jan. 31-Feb. 4—American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York.

Feb. 8—ICAO Operations division, Montreal.

Feb. 19-27—National Sportsmen's Show, Grand Central Palace, New York.

Feb. 22—ICAO Airworthiness division, Montreal.

Mar. 3—Society of Automotive Engineers, metropolitan section, air transport meeting, Engineering Societies Bldg., New York City.

Mar. 10-12—Annual meeting of American Society of Tool Engineers, Hotel William Penn, Pittsburgh.

Mar. 18—Annual national aircraft propulsion meeting, Hotel Carter, Cleveland, sponsored by IAS.

Mar. 22-24—Air Transport Assn., annual airline engineering and maintenance conference, Continental Hotel, Kansas City.

Apr. 3-6—American Association of Airport Executives, Oklahoma City.

Apr. 11-13—Society of Automotive Engineers national aeronautic and air transport meeting, Hotel New Yorker, New York.

Apr. 11-16—Western Metal Congress and Exposition, sponsored by American Society for Metals, Shrine Civic Auditorium, Los Angeles, Calif.

Apr. 19-21—AIEE, southwest district meeting, Baker Hotel, Dallas, Tex.

Apr. 22-24—Second Annual Oklahoma City Air Show, sponsored by Oklahoma City Chamber of Commerce.

May 2-4—2nd annual meeting of the Airport Operators Council, Denver.

May 19-21—Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Mich.

May 23-24—Annual meeting of the Magnesium Assn., Edgewater Beach Hotel, Chicago.

June 20-24—AIEE, summer general meeting, New Ocean House, Swampscott, Mass.

July 3-4—First Annual Southern California International Air Race, Long Beach.

July 13—ICAO North Pacific regional air navigation meeting, Seattle.

Sept. 3-5—National Air Races, Cleveland.

Sept. 26-28—National Electronics Conference, Edgewater Beach Hotel, Chicago.

PICTURE CREDITS

13, 15, 18—AF; 16, 17—McGraw-Hill World News; 34, 35, 37—Convair; 56, 57—EAL, AA, PAA and MPO Productions.

BENDIX-SKINNER FILTERS
DO VITAL JOBS BETTER!

Delivering 600 Gallons of Perfectly Filtered Fuel to an Air Force F-80 in 1 Minute, 54 Seconds!

The picture above was taken during the single refueling stop made by three Air Force F-80 jets on a record breaking cross-country speed flight. There is more to refueling these planes than just filling the tanks. Every drop of fuel must be thoroughly filtered between the fuel truck and the plane. It must be as free from water and other impurities as the finest filters can make it. That's why the U. S. Air Force specifies Bendix-Skinner KG-66 filters, eight of which are indicated by arrows in the picture.

These filters were chosen for two reasons: they assure exceptionally fine filtration and extremely high flow rate. As a result, 600 gallons of fuel were delivered absolutely free of harmful water and impurities—in 1 minute, 54 seconds! The advantages of such efficient, economical filtering are obvious and applicable to all aircraft. Bendix-Skinner makes a complete line of fine filters for *every* aircraft purpose, so specify Bendix-Skinner filters for your ground and air-borne operations. Write the factory direct.

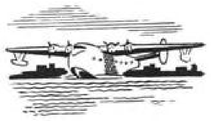
SPECIFY BENDIX-SKINNER FILTERS FOR EVERY AIRCRAFT!

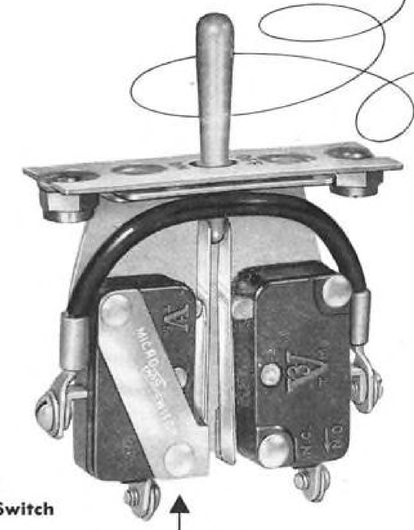
SKINNER PURIFIERS DIVISION OF
1500 Trombley Avenue, Detroit 11, Michigan
Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

Bendix
AVIATION CORPORATION

AT 45,000 FOOT ALTITUDE

OR AT SEA LEVEL...





These MICRO Precision Switches offer greatest capacity with small size

New! MICRO 1AT1 Toggle Switch

This momentary action toggle switch is a small, high capacity snap-action switch. It has been found valuable for such an application as jet motor control. The switch conforms with AN Drawings No. 3235-1 and 3235-2.

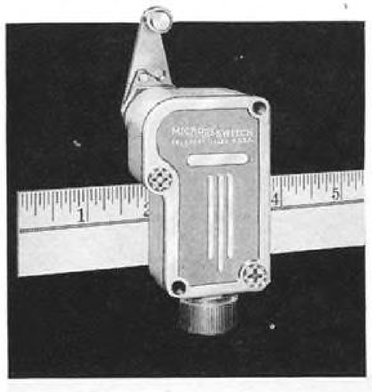
MICRO...first name in precision switches

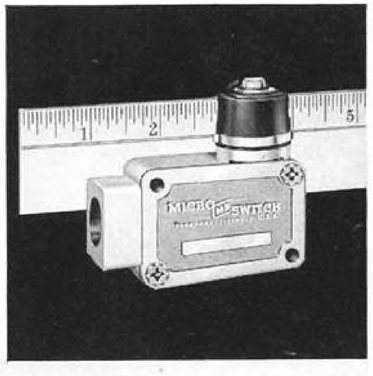
For more than a decade, the aviation industry has looked to MICRO SWITCH design engineers to supply the small precision switches, housings and actuators to meet their exacting needs.

This close cooperation has resulted in a continuing development of high capacity, precise-acting switch components which have made a major contribution to aircraft dependability.

On this page are shown a number of such MICRO SWITCH units, developed to meet specific needs, which have proved valuable in solving a number of design problems.

Aviation engineers are invited to make use of MICRO SWITCH "know-how" gained through long experience. We may have solved your problem for somebody else. Call a MICRO SWITCH engineer at one of the offices listed below . . . or write to us.





New! MICRO V3-1 Switch Housings

Rotary lever arm actuator adjustable through 360 degrees . . . total travel 90 degrees in either direction. This cast aluminum housing for the small V3-1 Switch has two mounting holes for mounting on either face.

Either one or two V3-1 switches may be enclosed in this aluminum die-cast housing. The sealed rubber protective boot is laboratory tested for aircraft purposes.

V3-1 MICRO Precision Switch—AN-3234

This small switch has d-c rating of 6 amperes, 28.5 volts at 45,000 feet, and 10 amperes, 28.5 volts, at sea level.

© 1949 First Industrial Corp.

MICRO MS SWITCH
A DIVISION OF FIRST INDUSTRIAL CORPORATION
FREEPORT, ILLINOIS, U.S.A.

BRANCH OFFICES: Chicago • New York • Boston • Cleveland • Los Angeles

SALES REPRESENTATIVES: Portland • St. Louis • Dallas • Toronto

NEWS DIGEST

DOMESTIC

William A. M. Burden, former assistant Secretary of Commerce for Air, has been elected president of the Institute of the Aeronautical Sciences, succeeding John K. Northrop. He will take office next week at the annual Honors Night.

Society of Automotive Engineers elected Stanwood W. Sparrow president at the annual meeting in Detroit. He is vice president—engineering, Studebaker Corp.

Theodore P. Wright, former Administrator of Civil Aeronautics, now vice president—research, Cornell University, has been elected to the board of directors of Robinson Airlines.

Two Lockheed F-80C jet fighters flew from Chicago Municipal Airport to LaGuardia Field, New York, in 1 hr., 21 min., 8 sec. Pilots were Lt. Col. William Haviland and First Lt. Harry Howell, both of the Florida National Guard. Previous best time between the two points was 1 hr., 51 min., 53 sec., made Apr. 27, 1947 by an American Airlines DC-6.

Boeing Airplane Co. delivered to the Pacific division of Military Air Transport Service the YC-97B, which is nearly identical to the commercial Stratocruiser. It is the last of the original order of ten C-97s, the others being freight planes.

Lt. Gen. John E. Hull USA, was appointed director of the Weapons Systems Evaluation Group by Defense Secretary Forrestal. The new organization is charged with studying and evaluating for Forrestal's office weapons and tactical and strategic methods, such as the Navy-USAF dispute over carriers vs. long-range bombers. A civilian research director will be appointed. Hull commanded the joint task force at the Bikini atom bomb tests.

Clarence F. Lea, former chairman of the House Interstate and Foreign Commerce Committee, and sponsor of a great deal of aviation legislation, was appointed director of governmental relations for the Transportation Assn. of America, organization which has urged integration of air and surface transportation. Lea's office will be in Washington.

FOREIGN

British Government announced that its airlines will be permitted to choose and order their own planes, confirming an AVIATION WEEK forecast of Dec. 13, 1948. In the future the Ministry of Supply, which had been ordering planes without being obliged to consult the airlines, will be responsible only for encouraging development work.

INDUSTRY OBSERVER

► North American Aviation, Inc. has delivered 15 F-86A jet fighters to the Air Force for a special service testing program that will include cold weather operations in Alaska and tactical evaluation at Eglin Field, Fla. in addition to the usual flight testing at Muroc. Production of the F-86A at Inglewood, Calif. has been slowed by a shortage of General Electric TG-190 jet engines. Meanwhile, Solar Aircraft Corp. and Ryan Aeronautical Corp. have been given subcontracts for parts for the engines.

► Civil Aeronautics Administration warns pilots that Polaroid sun glasses and safety windshields may cause spots and streaks before their eyes resulting in reduced visibility and hazardous distractions. Strain patterns in the original material used for glasses and windshields are made visible when the light is polarized, according to CAA.

► U. S. Air Force is planning to use the Chase YC-123 (version of the CG-20 all metal glider powered by two Pratt & Whitney R-2800 engines) as standard equipment in its medium assault units in troop carrier squadrons. The YC-123 will carry 67 fully-equipped troops. Chase has not yet finished construction of the YC-123 prototype. It will have a hydraulically operated ramp and loading door; maximum speed of 220 mph. and a payload of 18,000 lb. Competition for standard plane in light assault units is still between the Chase YC-122 and the Northrop C-125, trimotor transport.

► USAF will send a Convair B-36B to Alaska for several months of cold-weather testing prior to basing a tactical unit of B-36Bs in Alaska. Initial B-36 will be based at Ladd Field, near Fairbanks until spring.

► McDonnell Aircraft Corp. of St. Louis has a new experimental contract for a supersonic Navy jet fighter. McDonnell got the nod in a recent Navy supersonic fighter competition that involved eight other aircraft manufacturers.

► Beech Aircraft has suspended production of Bonanzas until Feb. 14 because of the expected season reduction in orders for deliveries. The company announced that with a total gross business monthly production approximating $2 million, the temporary discontinuance of the Bonanza line will affect revenues by less than 10 percent for the period. The company laid off 150 of its 2500 employes as the result of the curtailment. Production continues on Model 18s and reconversion of Navy transports. Experimental work is continuing on the Model 45 Mentor military trainer and the Model 34 Twin-Quad transport.

► Fairchild has removed the bottom portion of the vertical surfaces on the C-119B, resulting in a production saving and no loss in directional stability or control. The booms have been lengthened thereby increasing the tail volume.

► British have withdrawn their Sunderland and Hythe flying boats from the Berlin airlift for the winter due to the danger of ice on Havel Lake. The four-engined boats made 1365 flights between July 5 and Dec. 14, 1948, during the course of which they evacuated 1200 undernourished Berlin children.

► Initial versions of the Douglas AD-3 (Skyraider) and the Lockheed P2V-4 (Neptune) will be powered by the standard Curtiss-Wright R-3350 engine rather than the Turbo Cyclone-18, a compounded version of the R-3350. The standard versions will be replaced by compound engines when they become available.

► Siebel Helicopter Co. of Wichita has flight tested its S-4, two-place helicopter. Production of a commercial version awaits CAA approval. The S-4 is powered by a Lycoming O-225-CI engine with no modifications. Gross weight is 1400 lb. with a disposable load of from 500 to 600 lb. Rotor is 29 ft. in diameter. Length of the helicopter is 33 ft.

Vol. 50, No. 3

AVIATION WEEK

January 17, 1949

What the Budget Means to Procurement

Congress is expected to fight Truman's request for a cut in air funds.

By Robert Hotz

President Truman's fiscal 1950 air power budget will face a stiff fight on Capitol Hill this spring.

The Truman budget called for a sharp slash in military aircraft production from fiscal 1949 figures for both Air Force and Navy aircraft procurement. Air Force was cut from its present 60 combat groups to 48 groups and 10 squadrons.

► **Even Split**—The fiscal 1950 budget split the national defense total of $15.7 billion in new obligational authority into three almost equal segments:

Air Force...$4.6 billion
Navy .....$4.6 billion
Army .....$4.5 billion

Also included in the defense budget were $16 million for the Secretary of Defense offices; $800 million for the beginning of Universal Military Training (a program that the President said would soon cost $2 billion a year); and $525 million for stockpiling strategic materials.

For the aircraft industry this budget means the allocation of $2.3 billion in new aircraft procurement during fiscal 1950. This compares with $2.8 billion in new obligation authorization for fiscal 1949.

The $2.3 billion will buy 2669 planes with an airframe weight of 34 million lb. This compares with 3865 planes with airframe weight of 43 million lb. contracted for during fiscal 1949. The second step in the U. S. Air Force 70-Group and Navy 14,500 plane expansion programs would have required new contract authority of $3.3 billion for fiscal 1950 (2.6 for USAF and .7 for the Navy).

► **Cash Increases**—The USAF is scheduled to contract for 1669 new planes with an airframe weight of 25 million lb. in fiscal 1950. The Navy will buy an estimated 1000 planes with airframe weight of 9 million lb.

The new contract authorizations are for production that will extend over the next two calendar years. Actual cash appropriations to pay manufacturers for work completed and liquidate the contract authority will appear largely in subsequent budgets. Actual cash payments to the aircraft industry for fiscal 1949 are estimated at $1.2 billion with payments of $1.7 billion scheduled for fiscal 1950.

► **Five Billion Available**—In his budget message President Truman pointed out that there is an estimated $3.2 billion in unliquidated contract authorizations being carried forward from fiscal 1949 and previous years. Added to the $2.3 billion of new obligations in fiscal 1950 this means that a total of $5.5 billion in aircraft and related equipment will be delivered by the industry and paid for in 1950 and the following years.

Deliveries of 37 million airframe lb. are expected during fiscal 1950 compared with about 25 million airframe lb. to be delivered before the end of fiscal 1949 next July.

President Truman also indicated that increased aircraft procurement would be necessary in fiscal 1951 after war surplus plane storage pools are exhausted.

Pending passage of legislation authorizing a long term aircraft procurement program, all funds appropriated for both Air Force and Navy aircraft procurement in fiscal 1950 will be "available until expended" to avoid the two-year statutory limit on military expenditures. Similar procedure was followed for fiscal 1949 procurement funds.

► **Fight Begins**—Fight to boost the fiscal 1950 air power appropriations began almost before the echoes of Truman's budget message faded. Rep. Carl Vinson (D., Ga.) leader of the air power bloc on Capitol Hill indicated that his strategy would be aimed at adding about $1.2 billion to USAF procurement funds to insure the second step in the build-up to a 70-Group Regular Air Force with supporting reserves begun last year as a result of an overwhelming bi-partisan vote to boost the President's air power budget for fiscal 1949.

Vinson conferred with Air Secretary W. Stuart Symington last week at the Pentagon shortly after the President's budget message was delivered. Symington's only comment to date has been his deftly timed annual report plumping for the full four-year USAF expansion program. Sources close to the Secretary indicated that the Air Force will make a determined fight to maintain its four-year expansion program.

► **GOP Rule**—With Vinson setting the tempo for the House Armed Services Committee there will be plenty of opportunity for Symington and other USAF leaders to publicly state their case during Congressional hearings in response to direct questions by friendly committee members without violating the gag rules imposed by the executive branch of the government. Defense Secretary Forrestal's office issued an immediate warning to the Air Force and Navy to refrain from providing any additional information on aircraft procurement as outlined in the fiscal 1950 budget although the budget did not give all the information required for adequate comparison of USAF and Navy aircraft programs.

Highlights of the USAF budget:

- **New Aircraft**—$1,630,000,000 for new aircraft, tooling and production facility expansion.
- **Guided Missiles**—$15 million.
- **Electronics**—$115 million.
- **Industrial Mobilization**—$16,912,000.
- **Research and Development**—$215 million is scheduled, including $21,651,000 for research; $138,345,490 for development; $12.5 million for operational engineering; and $40,979,900 for management and operation studies.
- **Air Reserve**—$82 million for an increase to 67,512 officers and men with each pilot getting 120 hours a year flying time.
- **Air National Guard**—$115 million for an increase to 49,500 officers and men with each pilot getting 125 hours of flying time.
- **Air ROTC**—$11,700,000.
- **Air Secretary**—$14,467,000 for a contingency fund.

Naval Aviation budget highlights:

- **Piloted Aircraft**—$662,782,500.
- **Pilotless Aircraft**—$13,000,000.
- **Industrial Mobilization**—$3,900,000.
- **Aeronautical Instruments**—$2,960,000.
- **Electronics**—$15,940,000.
- **Aircraft Overhaul**—$182,402,718.
- **Research and Development**—$79,448,000.

Budget Highlights

Total Obligational Authority for Aircraft Procurement

(Including missiles, industrial mobilization, electronics, as well as airplanes)

In Millions of Dollars

	1949	1950
U. S. Air Force	2,045	1,640
Navy	753	693
Total	2,798	2,333

Number of Aircraft to be Purchased

U. S. Air Force	2,632 (33 million lb.)	1,669 (25 million lb.)
Navy	1,233 (12 million lb.)	1,000 (9 million lb.)
Total	3,865 planes	2,669 planes

Airframe Weight Estimates

	1949	1950
Aircraft contracted for	45 million lb. (estimated)	34 million lb.
Aircraft deliveries	25 million lb. (estimated)	37 million lb.

Air Power Yardstick

(Recommendations for minimum annual military aircraft procurement and amount recommended by the budget for 1950)

Air Coordinating Committee 1945	
Annual minimum "after" world peace is well assured	30,000,000 lb.
Annual minimum to "cooperate in maintenance of world peace"	60,000,000 lb.
President's Air Policy Commission 1948	
Recommended for 1948 (calendar year)	34,000,000 lb.
Recommended for 1949 (calendar year)	56,000,000 lb.
Congressional Aviation Policy Board 1948	
"Initial strength to mount promptly a . . . successful air offensive" requires annually	111,000,000 lb.
"Strength necessary to prevent the loss of a war" requires annually	63,000,000 lb.
Stanford University Survey (1948)	
Annual minimum to provide base for expansion	80,000,000 lb.
Amount provided by 1950 budget	34,000,000 lb.
Estimated actual deliveries fiscal 1950	37,000,000 lb.
Estimated actual deliveries in 1948 calendar year	22,000,000–25,000,000 lb.

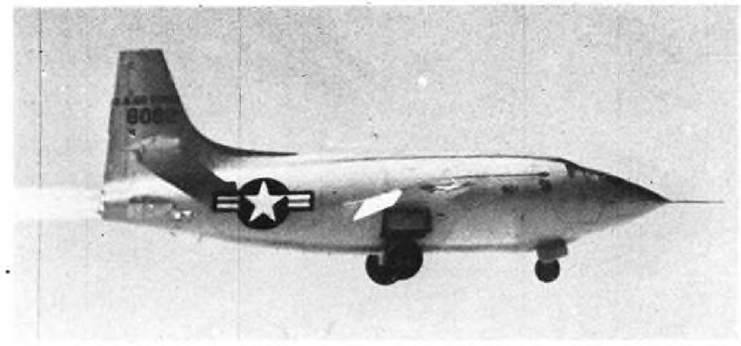
Budget Boosts

President seeks record amounts for support of civil aviation agencies.

The President's 1950 fiscal year budget underwrites a program of government-subsidized promotion of commercial aviation and recommends record-high appropriations for the Civil Aeronautics Administration and the Civil Aeronautics Board, as well as the National Advisory Committee for Aeronautics.

Declaring that "commercial aviation, the newest of our transportation industries, is still in a stage of development that requires subsidy assistance," the President disclosed that:

► **Fiscal 1950 Program**—His proposed 1950 fiscal year program would mean a $256 million government expenditure, by CAA and NACA, directly for "promotion of aviation" transportation, through new plane development, airport



Bell X-1 rocket powered research plane is shown shortly after it made its first take-off under its own power at Muroc. Blast from the four rocket tubes is clearly visible. Pilot Charles Yeager still has the X-1 flaps and gear down.

X-1 Makes Own Power Take-off

The Bell X-1, rocket-powered research plane, has taken off under its own power and set a new unofficial rate of climb record of more than 13,000 ft. per minute.

Originally designed to take-off under its own power, the Bell X-1 had previously been air-launched at around 30,000 ft. from the belly of a specially modified B-29. No modifications were required for the take-off at Muroc Air Force Base.

► **Yeager Is Pilot**—The X-1 was flown by Capt. Charles Yeager, USAF pilot who made the first piloted supersonic flight in the X-1. He used up 2300 ft. of runway to become airborne. All four rocket motors, producing a total thrust of 6000 lb. were employed on the take-off and climb to 23,000 ft. After take-off the X-1 reached 23,000 ft. in one minute and 40 seconds.

It climbed at speeds up to 380 mph. and remained in the air for eight minutes of which two minutes were powered flight. Maximum endurance of the X-1 in powered flight is two and a half minutes with all four rocket tubes firing or 10 minutes using the tubes singly.

► **No Record Claim**—The Air Force will not seek to make official the X-1's record of a 13,000 ft. per minute rate of climb during the Muroc tests. Present rate of climb record is held by the Grumman F8F which reached 10,000 ft. in 100 seconds. The X-1 has also set a new altitude record of 63,000 ft. (AVIATION WEEK, Dec. 27)—some 3000 ft. higher than the present record held by a British jet powered Vampire.

construction, airways facilities, etc.

This would compare with a $194 million commercial aviation promotional expenditure by CAA and NACA for the current fiscal year, and a $136 million expenditure for the 1948 fiscal year.

▶ **Budget Breakdown**—The budget proposes these record allocations for civil aviation agencies for the coming year:

CAA, $218,008,500—$151,008,500 cash and $67 million contract authorization. This tops by $59,538,500 CAA's current year budget of $158,470,000 $100,470,000 cash and $58 million contract authorization. (The President indicated he would seek a $6,625,000 supplemental, boosting CAA's current year funds to $107,095,000).

CAB, $3,980,000—An increase of $530,000 over the $3,450,000 provided for this year. Of the increase, $100,000 is earmarked for stepping up mail rate work, and another $100,000 for airline cost standards development. (The President indicated he would seek a $187,500 supplemental, boosting CAB's current-year funds to $3,637,500).

NACA, $85,205,000—$63,705,000 cash and $21.5 million contract authorization. This is $19,095,000 over NACA's current year budget of $66,110,000—$47,910,000 cash and $18.2 million contract authorization.

▶ **CAA Increases**—Major CAA increases are proposed for operating new airways facilities, for expanding the electronics aid installation program, and for moving forward with the long-range airways facilities program looking to all-weather flying in about 15 years.

Totals of CAA programs recommended in the 1950 budget:

Salaries and Expenses, $97,437,000. This compares with $82,451,000 for the current year. It includes $69,820,984 for operation of the federal airways system (8,573,187 more than this year's $61,247,797); $11,002,825 for air safety enforcement (slightly more than this year's $10,860,083); $2,535,700 for operation of aircraft (slightly above this year's $2,180,508); $748,563 for airport planning (compared with this year's $569,881).

Establishment of Air Navigation Facilities, $50,150,000 — $23,650,000 cash and $26.5 million contract authorization. This is more than double the $22,099,000—$10,099,000 cash and $12 million contract authorization—provided for the current year. Of the proposed $50,150,000 allocation, $42,150,000—$15,650,000 cash and $26.5 million contract authorization—is for equipping the federal airways system with electronics aids for all-weather flying. Earmarked for liquidation of previous contracts is $8 million of the proposed cash appropriation.

Development of Air Navigation Facilities, $10 million—$6 million cash and $4 million contract authorization. This is for moving ahead with research required by the 15-year all-weather facilities program proposed by the Radio Technical Commission on Aeronautics. Expenditures will be supervised by the new Air Navigation Development Board (AVIATION WEEK, Nov. 29).

Airport Program, $51.5 million—$15 million cash and $36.5 million contract authorization. Of this amount, $11.5 million will be used to liquidate contracts, leaving $40 million available with which to move forward with the program. This will keep airport construction at the current-year level. CAA had $40 million for this year—$3 million cash and $37 million contract authorization.

Alaska Airports, $5.8 million. CAA was given $9 million in contract authorization this year to start construction of new commercial airports at Anchorage and Fairbanks.

Washington National Airport Operation, $1.3 million. This is a slight increase over the $1,185,000 for this year. An additional $21,500 for construction was included. This year CAA had $1,835,000 allocated for construction.

Technical Development, $1.8 million. This is the same amount available this year.

▶ **NACA Increase**—The $85,205,000 recommended for NACA provides for a big increase in personnel and a major expansion of its construction program. The allocation includes:

Salaries and Expenses, $48,705,000—or $10,890,000 over this year's allocation of $37,815,000.

Construction and Equipment, $36.5 million—$15 million cash and 21.5 million contract authorization. This compares with this year's $28.2 million allocation—$18.2 million cash and $10 million contract authorization. Under the 1950 budget, NACA would enter contracts for a $12,535,800 construction program at Langley Field; an $11,332,000 program at the Ames Laboratory; and a $10,855,000 program at the Cleveland Laboratory.

For the current year, NACA estimates obligations for new construction at the Langley Laboratory at $13,257,000; at the Ames Laboratory, $700,000; and at the Cleveland Laboratory, $6.6 million.

Symington Says:

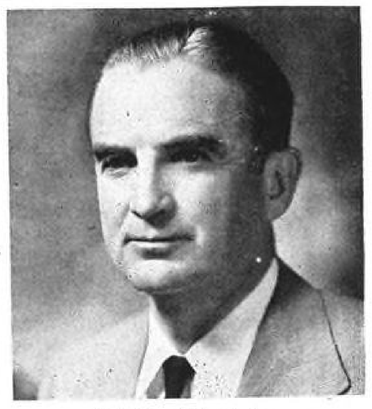
"None too much time" to provide 70-Group Air Force as planned.

Stern warning to build up a 70-Group regular Air Force plus supporting reserves before it is too late was sounded by Air Secretary W. Stuart Symington in his first annual report published last week. This program requires 12,441 combat planes.

Symington's plea was written last summer at the end of fiscal 1948 but released the day before President Truman submitted his fiscal 1950 budget to Congress calling for a slash in the USAF to 48 regular groups and 9200 planes. Symington warned that it is essential to continue with the second step in the 70-Group program begun last year if the United States is to attain air supremacy by 1952.

▶ **Warns of Waste**—"This country has none too much time to provide itself with the means of its own protection," Symington cautioned. "It cannot afford the waste of its time and resources that are inherent in vacillation and stop-and-start planning."

When quizzed on his slash of the Air Force, President Truman said that the number of groups was a misleading measure of air power and that the number of planes and men was a better yardstick. Symington emphasized that 70 combat groups are essential to the four year expansion program which had



W. Stuart Symington

been contemplated for the Air Force.

▶ **USAF Plan**—Symington listed the four principal objectives of the USAF expansion program:

- Replacement of obsolescent World War II type planes with the latest technically advanced types capable of meeting new combat needs and a new potential adversary.
- A research and development program that will constantly provide the best possible operational equipment.
- Organization of a long range striking force that can choke off hostile attacks at their source and operate as a tangible deterrent to potential aggressors.
- Nourish and develop "the sustaining resources of air power—a healthy military aircraft industry—by carefully regulated flow of orders which will permit the modernization of production plants and the assembly and training of skilled manpower necessary for the quick expansion required in event of war."

▶ **Expansion Schedule**—Symington pointed out that the USAF expansion program activated 55 combat groups by last January. It now has 60 groups and was scheduled to be at 66 groups by June 1949, and 70 groups by the following September. He said that by the time the full 70 groups were activated 60 of them would be at full combat readiness.

Symington also voiced confidence that the aircraft industry would bring its lagging production rate up to schedule by next July, the end of fiscal 1949.

▶ **Priority Goals**—Among the top priority goals of the USAF during the present fiscal year Symington listed:

Long Range Procurement—USAF wants legislative authority to expend its appropriations over a five year period rather than the present two years.

Engineering Center—USAF will ask for legislative authority to begin establishment of a huge air engineering and development center for supersonic aircraft and missiles.

Radar Warning Net—Research and procurement funds will be sought to establish a radar warning and fighter control network to protect the American continent against surprise air attack.

Transport Prototype Development—USAF will support a federal program to develop prototypes of cargo and transport aircraft that are suitable for peacetime commercial aviation needs and can be utilized for military airlift.

Surplus Property—USAF will seek to avoid taking over War Asset Administration responsibility for disposing of war surplus aircraft and parts after Feb. 28, 1949.

Speed Gains Seen At Miami Air Races

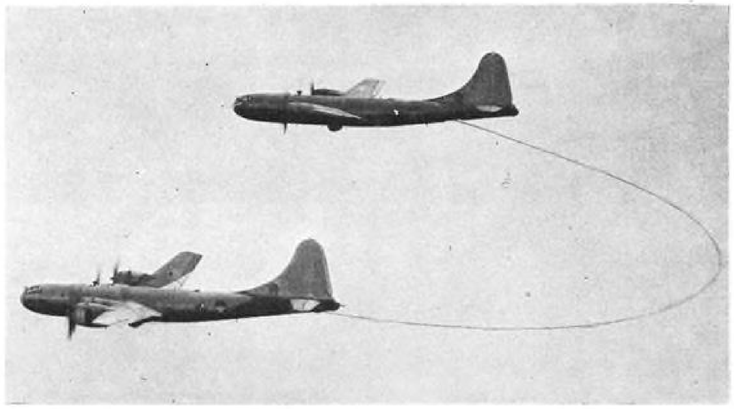
Average speed of midget plane racers moved up a sizeable notch last week in the 1949 Continental Motors Trophy Race at Miami, when Steve Wittman, Oshkosh, Wis., veteran race pilot and designer won the final event with 176.867 mph. average. This is nearly seven mph. faster than the 169.608 mph. winning time of Herman (Fish) Salmon in the 1948 Goodyear midget final at Cleveland.

Wittman's racing partner, 24-year-old Bill Brennand, who won the Continental race last year, finished second with 174.193 mph. and both were far ahead of other competition in the 24-mile race around a two-mile course. Wittman was flying his "Bonzo" midget in which he took second in the 1948 Goodyear, and Brennand piloted the Wittman-designed "Buster" plane.

▶ **Long-Chester Battle**—Hottest competition was the unsuccessful effort of Art Chester, veteran Los Angeles race pilot, to catch Dave Long, Lock Haven, in fourth place. Despite Chester's skillful "on the deck" flying and sharp racing turns, his "Swee' Pea" racer was unable to beat out Long's "Midget Mustang." Both were well behind third placer T. B. Heisel, Gainesville, Fla., in a Pitts Special. Heisel averaged 170.011 mph., Long, 166.763 mph. and Chester 166.730 mph.

Beverly Howard, Charleston, S. C., fixed base operator, regained the aerobatic championship which he lost last year to Woody Edmondson, Lynchburg, Va., operator. Howard won the Al Williams Gulf Aerobatic Trophy.

Betty Skelton, diminutive Tampa, Fla., pilot won the woman's division aerobatic title for the second successive year. Caro Bailey, Springfield, Ohio, was second.



Air Refueling: Key to Long Range

Strategic air power of the U.S. Air Force will be dependent on aerial refueling for its extremely long range operations in the foreseeable future.

Admission of the Air Force's inability to develop planes capable of mounting strategic air attacks from American bases without aerial refueling came in the first annual report of Gen. Hoyt S. Vandenberg, USAF chief of staff. Vandenberg's report was published as part of Air Secretary W. Stuart Symington's report to the Secretary of National Defense.

▶ **Committee Report**—Vandenberg's report stated:

"To meet the Air Force requirements for a strategic bomber capable of delivering a bombing attack against targets at extreme range, a committee was established to consider the problem and to present appropriate recommendations to the USAF aircraft and weapons board. This committee, composed of representatives of headquarters, USAF; The Air University; Strategic Air Command; and Air Materiel Command, made an exhaustive study utilizing technical advice from aircraft manufacturers are other sources.

"The final report of this committee concluded that an aircraft of acceptable size could not be built to perform its mission at the desired range unless air to air in flight refueling were employed. New military characteristics were written on this basis and approved by the aircraft and weapons board. The Air Force is therefore aggressively developing the air to air refueling program potentialities and extensive modification program is under way that will provide tankers and receivers for tactical units in the near future."

▶ **Controversy Stirred**—Although this report was written last summer at the close of the 1948 fiscal year, its release now when the fight for aircraft procurement funds is reaching a new peak of intensity on Capitol Hill will again revive the bitter controversy between the Air Force and the Navy over the range potentialities of land-based versus carrier-based aircraft.

Technical experts of the USAF said that the conclusions reached by the special committee on range limitations would tie down the USAF to advanced foreign bases for any sustained air operations against a European or Asiatic enemy. Only relatively small and specialized long range striking forces could be used if aerial refueling is necessary.

▶ **Money Needed**—USAF spokesmen indicated that an intercontinental strategic bomber could be developed within 8 to 10 years provided sufficient funds were available for the required research and development. They admitted prospect of obtaining those funds is dim.

Significance of the USAF policy shift away from developing an intercontinental bomber is that design competitions for some time will be aimed at producing aircraft smaller than the Convair B-36 with performance in the sonic speed range.

Airlift boss Tunner and McGraw-Hill World Newsman Christie at Weisbaden.

Searchlights at Fassberg, British zone, act as navigational aids in addition to illuminating parking ramp. Dotted lines at right are blinking wingtip lights of taxiing C-54.

Tunner Outlines 'Ideal' Cargo Plane

After six months of operations, commander describes requirements; makes suggestions to manufacturers.

By John Christie
(McGraw-Hill World News)

WEISBADEN, Germany – Airlift task force commander Maj. Gen. William H. Tunner outlined the cargo plane of the future as he evaluated the first six months of "Operation Vittles" in an exclusive interview with AVIATION WEEK.

Tunner considers proof of the economy of larger type aircraft one of the prime lessons derived from the airlift.

▶ **C-54 vs. C-47**—From figures gathered during the good weather months of August and September, the Air Force compared the merits of the C-54 and the C-47. Says Tunner:

"In every respect the C-54 proved more economical. We also had a C-74 which made 25 trips to Berlin. Based on this more limited experience, we applied the same factors and found that this plane, which is designed to carry 25 tons, was much more economical in all respects than the 10-ton plane, in about the same ratio as the 10-ton plane was cheaper than the 3.5-ton plane.

"We feel that the type aircraft needed is the one primarily designed for carrying freight," declares Tunner, who also directed the "Hump" operation during the war. "It must be economical to operate, have maximum ease of maintenance and be capable of loading without use of mechanical devices. All aspects of its design should be subordinate to this test: Will it reduce costs?"

▶ **Cargo Plane Requirements**—Tunner and his staff won't commit themselves publicly to any one type plane. They do, however, have definite basic requirements:

• **Design**—A conventional four-engine transport type, with 5000-mi. gas load, able to lay down 25 tons after a 3000-mi. flight. Cockpit designed to permit operation with a crew of not more than three when navigator is not required.

• **Performance**—Speed of 225-250 mph., ability to climb 20,000 ft. with full load and sustain operations at that altitude for 10 hr., to permit overflying normal fronts found in trans-Atlantic crossings. Adequate power and flight characteristics to assure safe landings and takeoffs on the 6000 ft. runways commonly found at existing airports.

• **Loading**—Fuselage designed for loading to an average density of 10 lb./cu. ft. up to a 25-ton load. Inside fuselage width of at least 164 in. Loading and unloading without aid of equipment such as fork lifts, etc. Several cargo doors large enough to receive a 6x6 truck with its canopy. Monorails for cargo movement within the plane.

While Tunner declines comment on airlift plane shifts, it is generally conceded that a change to such aircraft as the C-74, C-97, C-124, etc., would be too drastic in terms of training for operations and maintenance, and in establishing necessary servicing facilities.

An interim aircraft—such as the DC-6A (cargo version of the DC-6) has been mentioned to bridge the gap between a C-54 operation and use of larger planes. The DC-6A can carry 2½ tons more than the C-54.

▶ **Traffic Control Advances**—A visiting CAA official recently observed: "The airlift has advanced the art of traffic control about 10 years." Two outstanding and complementary reasons: the unprecedented use of GCA, and straight-in approach methods.

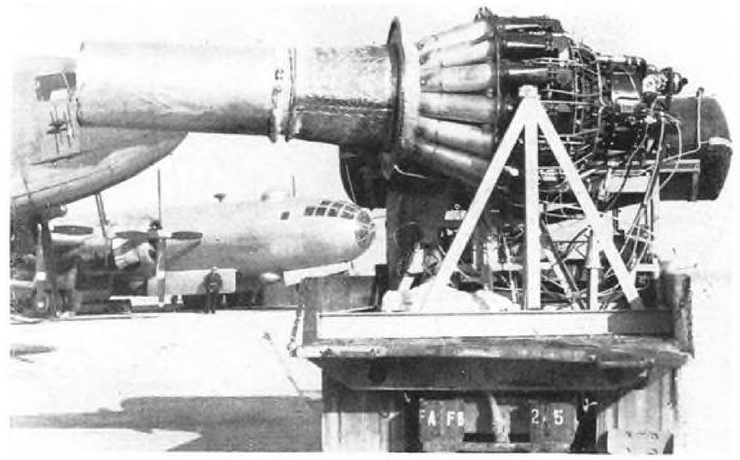
In its new role as a primary let-down method for handling saturation traffic, GCA "has proved itself . . . beyond doubt," says Tunner. "Without GCA our operation could not have been near so successful. Indeed, we couldn't have flown at all some days."

▶ **Two At Once**—Landing at four-minute intervals with GCA have become standard procedure. With simple straight-in approach patterns at each field, GCA can have four planes in its scope at one time, and direct two let-downs at the same time.

Straight-in approach patterns have expedited traffic flow to the point where three-minute intervals or less are commonplace in the operation. Safety factor has been enhanced by the elimination of stacking and holding.

▶ **Overhaul Expensive**—While maintenance control has helped keep aircraft utilization high and accident rates low, overhaul of the C-54s is proving expensive.

Tunner's maintenance men have devised a number of recommendations for development of accessories aimed at cutting maintenance time. To aircraft manufacturers they make these proposals:



Mobile ice remover made from jet engine was idea of M/Sgt. Paul G. LeBeau. Now used to clean ice from wings of airlift planes, it's being adapted to clean runways.

• An auxiliary powerplant capable of operating the aircraft electrical system on the ground and providing sufficient power to permit use of extension cords at nacelles. Electrical outlets should be provided in the landing gear walls and on firewalls.

• An air compressor of sufficient capacity to permit inflation of struts, tires, accumulators, etc. A unit of this type could be used to power pneumatic tools.

• Built-in provisions for use of a lightweight engine and propeller change hoist in each nacelle.

• A system on each engine that would eliminate the necessity of changing oil every 100 hr. as presently required. Use of cartridge filters that could be replaced easily and quickly might be a solution.

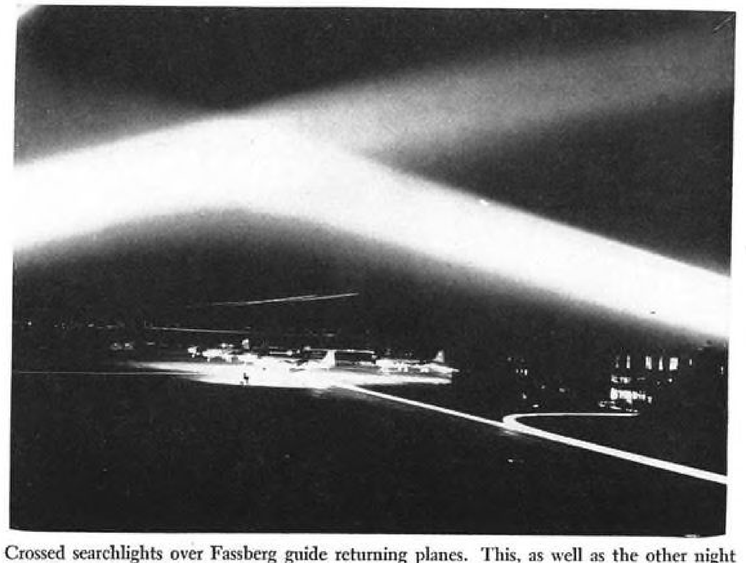
• An electrically operated hydraulic pump that would permit operation of the aircraft hydraulic system without use of external hydraulic units or operating engines.

• Landing gear strut jacks. The ability to change tires and repair brakes without necessity of carrying cumbersome jacks is of real importance. A unit of this type could be built or attached to each strut and operated by means of a hydraulic hand pump located in the plane.

While these accessories would not be necessary in normal commercial operations, they would find considerable application in military aviation and perhaps in commercial service in territories where ground facilities are undeveloped.

BY NIGHT—The landing and navigation lights of an incoming C-54 trace the letdown between the approach lights.

BY DAY—The poles of the high intensity approach lights at Templehof stand out above the trees of a cemetery.



Crossed searchlights over Fassberg guide returning planes. This, as well as the other night photos, is time exposure. White lines are headlights of moving trucks.

PRODUCTION

Cutbacks Make Way For New B-36 Orders

U. S. Air Force cancelled $300 million worth of scheduled jet bomber, fighter and helicopter production to buy a substantial new quantity of Convair B-36 bombers. Previous order was for 96 of which 50 have been completed.

The new Convair order will include the RB-36, a 10-engine photo-reconnaissance version of the B-36 featuring six Pratt & Whitney Wasp Major engines and four jet engines slung in pairs under each wing tip. The jets will be operated only as emergency power to evade enemy action on long missions.

▶ **Modifications**—Included in the $300 million to be reallocated will be modifications to B-36s and Boeing B-50s now in production.

The following 1949 production schedules were cancelled by the Air Force to provide the $300 million:

• **Northrop**—30 RB-49 jet flying wings to have been built at Convair's Ft. Worth plant.

30 C-125 Raider trimotor assault transports and arctic rescue planes.

• **North American**—51 B-45As, four-jet light bombers. These were the last of an original order for 190 B-45s now in production at North American's Long Beach plant.

118 F-93A sweptwing jet fighters. These fighters were originally designated the F-86C and were scheduled for production during 1949.

• **Kellett**—10 H-10 twin rotor transport helicopters. These helicopters were designed by Kellett but were to be produced by some other company to have been designated by the USAF.

Increase of the B-36 order and modification of B-50s are aimed at putting a long range striking force into combat readiness as soon as possible. USAF said they were "in line with" President Truman's budget message cutting the Air Force to 48 combat groups. Action was taken by a special board (AVIATION WEEK, Jan. 10) composed of Gens. Fairchild, Norstad, Craig, and McNarney.

Small Business Work Totals $28 Million

DAYTON—More than 1900 Air Force procurement contracts totalling $28 million have been let with small businesses—establishments using fewer than 500 employes—in a six months period ending Nov. 30, 1948.

Maj. Gen. K. B. Wolfe, director of procurement and industrial planning for Air Materiel Command, announced Jan. 17 that 1969 contracts, or nearly half of the total number let in that period had gone to manufacturers in the less-than-500-employe category.

▶ **Subcontracts High**—In addition, he estimated, subcontracts let to small businesses by other Air Force prime contractors will total many more millions of dollars, primarily for components going into USAF planes.

When other small manufacturers take advantage of the opportunities now available to become Air Force suppliers, the percentage of small business in the total volume of contracts is expected to mount even higher this year.

Small business in some respects has an edge over the big companies in bidding competition, AMC procurement analysts report.

Research costs which vary and bulk large for big industry in arriving at contract bids, are often part of a fixed overhead for the small firm. And the small manufacturer can profitably accept a contract which will keep his plant at capacity operation, but which would be negligible for the huge factory of his big competitor.

Tabulation of small business contracts and their value against the total number of contracts let and their value:

	Small Contracts	Value	Total Contracts	Value
November	545	$5,217,851	929	$98,947,345
October	485	3,384,858	842	60,173,630
September	115	1,324,219	290	26,633,677
August	109	1,171,853	263	30,644,687
July	259	2,885,429	491	57,425,393
May 19-June 30	456	14,031,223	1,201	1,117,295,143
Totals	1,969	$28,015,433	4,016	$1,391,119,875

Brig. Gen. H. A. Shepard, procurement division chief, points out that many small businesses which are responsible and qualified to bid for the contracts, have not yet registered to become qualified Air Force suppliers.

Application should be addressed by the firm to Commanding General AMC, Wright-Patterson AFB, Dayton, Ohio, Attention MCPPXS72, Source & Price Records. The firm will receive a form to record its products and available facilities.

New Altimeter

A new sensitive altimeter with a simplified dial that cuts to a minimum the possibility of misreading was disclosed last week by Kollsman Instrument division of the Square D Co.

In place of the three pointers registering 100, 1000 and 10,000 ft., gradations on present Kollsman altimeters, the face of the new instrument has only one dial that registers in 100-ft. units and makes one revolution per each thousand feet. A two-digit counter record altitude in terms of thousands of feet.

Aircraft Manufacturer Mergers?

The recent shifting of aircraft orders among key builders is being viewed by informed observers as strong impetus for further merger discussions within the industry.

By favoring Convair with increased orders for the B-36 while withdrawing some awards from Northrop, the AF could be expressing displeasure with Northrop in not coming to terms with Convair in a previously discussed consolidation, it is pointed out.

Recently, reliable reports have indicated that active negotiations have been resumed for a three-way deal involving Convair, Northrop and Curtiss-Wright. This combine finds considerable justification in that Convair would supply the physical plant facilities, Northrop the engineering know-how, and Curtiss-Wright the cash.

It is known that a Chicago industrialist has been making overtures to Curtiss-Wright in behalf of this projected consolidation but was meeting with resistance.

Nevertheless, the recent election of Paul Shields, senior partner of a major New York stock exchange firm, to the post of chairman of the executive committee of Curtiss-Wright, has supported the view that efforts for this proposed three-way deal are continuing. It is known that this financial firm has had very close business association with the Atlas Corp., which controls Convair.

Top Air Force people for some time have contended that there are too many aircraft companies for the amount of business that is likely to be forthcoming, and that mergers would improve the economic health of the industry.

There is also the feeling in Washington that any new merger proposals would receive more sympathetic response from the Anti-Trust division of the Justice Department than the plan for a Lockheed-Convair merger months ago. This merger was unofficially vetoed by the department.

KEEP LIGHT PLANE engines in *clean condition* for fine performance—*with Esso Aviation Oil!*

IT'S MADE FROM high quality base stock . . . and it's a detergent-dispersant type aviation lubricant that performs a remarkable *cleaning action* as it lubricates. When oil is changed, suspended carbon and sludge *drains out of the engine!*

TRIPLE-PROVED by tests run in America's largest and most complete aviation petroleum laboratories. By tests run by a leading manufacturer of light plane engines. By 10 years' actual operation in exhaustive flight-tests!

NEXT TIME you change oil, change to the oil that helps improve the operating condition of light plane engines—ESSO AVIATION OIL! It's available in grades HD 55, HD 65, HD 80 at airports from Maine to Texas . . . wherever you see the famous Esso Winged Oval.

YOU CAN DEPEND ON

ENGINEERING

How Much Force Can Body Withstand?

Tolerance to acceleration is prime factor in fast-craft operation.

By Charles F. Lombard*

With the development of high-speed airplanes designed to withstand large aerodynamic stresses, the problem of human tolerance to forces associated with acceleration has become of major importance.

Particularly in high-speed craft, various maneuvers, meteorologic conditions, buffeting, accidental impacts, and the like, impose upon the human body stresses often far beyond ordinary experience.

Results range from impairment of vision and judgment to unconsciousness and varying degrees of damage to the body's structure.

►**Velocity, Force Factors**—It is important to realize that velocity, as such, does not affect the body. Man could safely travel at any imaginable velocity if he were moving at constant speed in a straight line, and if he were not exposed directly to the dynamic effects of motion relative to a fluid medium.

If one refers to the laws of motion, equations for uniform, rectilinear motion will be found to contain no term for force. Therefore, no force associated with the velocity itself could be applied to the body in consequence of uniform motion in a straight line at any velocity.

On the other hand, if motion involves a change in velocity, or if it departs from a straight line, a term for force appears in the applicable equations.

When velocity changes, in straight-line motion, the rate of change is termed the acceleration. Since mass is always involved, the applicable equation is $F = m\,a$, or in other words, a force is brought into action which is proportional to the mass affected and to the linear acceleration imparted to it.

If a mass moving at uniform velocity in a straight line is caused to depart from that line and to move in a curve, or circular path having a given radius from the axis of rotation, it exerts an outward force expressed by the equation

$$F = m\,\frac{v^2}{r}$$

Otherwise stated, the force exerted

* Associate Professor, Dept. of Aviation Medicine, University of Southern California.

Acknowledgment is given by the author to A. M. Mayo for general guidance, to E. W. Cornwall and R. M. Francis for assistance in the preparation of the chart, and to H. P. Roth, engineering consultant of the Dept. of Aviation Medicine, USC.

Explanation of Chart

Plotted on log log graph layout is the equation for velocity $V = gt$, where g is acceleration in multiples of the earth's gravity, t time in seconds, and velocity is miles per hour. Also plotted is the equation for distance.

$$S = \tfrac{1}{2}\,gt^2 \text{ or } S = Vt/2$$

where S is stopping distance in feet, V is velocity in miles per hour, and t is again time in seconds.

The X axis is time in seconds, the Y axis is either force in multiples of G (gravity) or stopping distance in feet. The diagonal velocity lines labeled velocity vs. acceleration vs. time are used for acceleration in G, while the velocity vs. stopping distance vs. time lines are used for stopping distance in feet.

Sample use of the chart: An airplane makes an emergency landing in a corn field. Velocity on contact was 100 mph., and stopping distance was 100 ft. Following the 100-mph. line in the velocity vs. stopping distance vs. time group, we find that it intersects the 100-ft. line at 1.4 sec. Also the 1.4-sec. line intersects the 100-mph. line of the velocity vs. acceleration vs. time group at 3.25 G, assuming uniform deceleration.

Since the pilot was seated upright, we know that the force was transverse to his long axis and well below his limits of tolerance as shown in Line A.

Line A shows the approximate time limits of normal tolerance to transverse G, (prone).

Line B shows the approximate tolerance to positive G (head to foot) seated.

Line C shows the approximate tolerance to negative G (foot to head) seated. (There are indications that line C should parallel line B.)

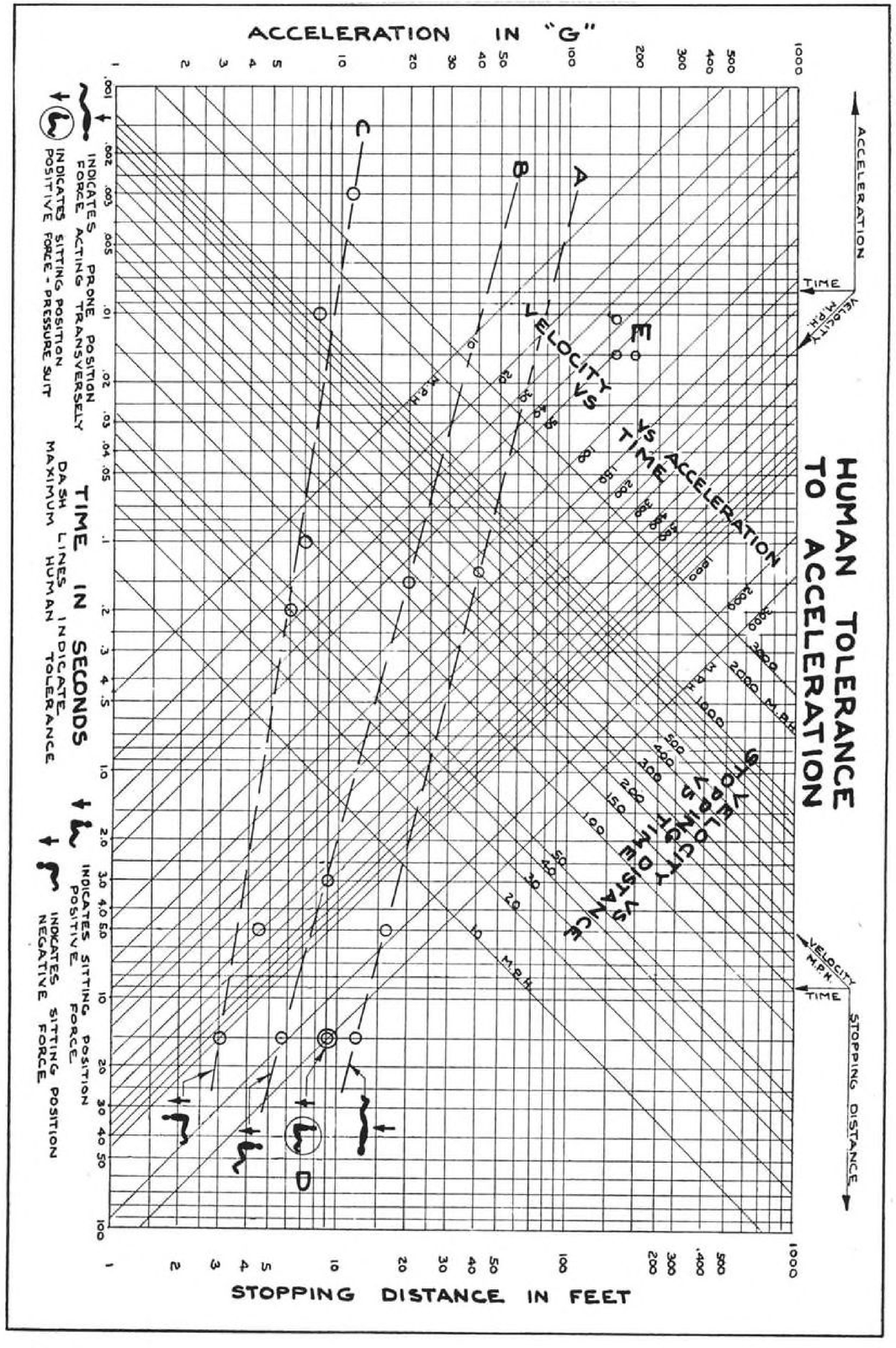
Point D shows the increased tolerance provided by G-suit plus straining by the individual.

The three points at E are cases of survival from falls from high places. In each case the individual landed nearly flat on some yielding substance such as earth and, although bruised considerably and in some cases suffering broken bones, did survive. In each of these cases the severity of exposure and subsequent damage was much more intense than charted as the human tolerance.

The chart can be used to determine the stopping distance, the G, or the time if one of these plus the velocity upon contact is known. It can also be used for acceleration-velocity determinations.

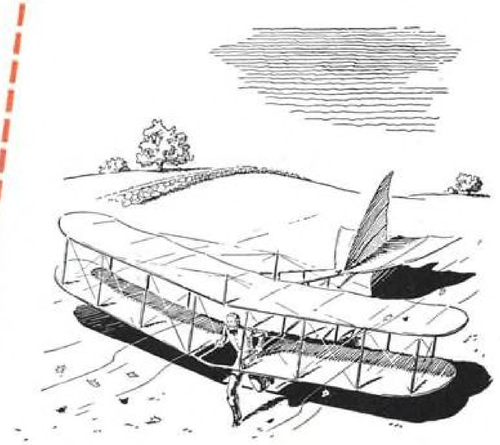
Human Tolerance to Acceleration

Position	Acceleration Tolerated	Time Tolerated	Source of Information
Seated + G	+ 5.5 G	15 sec.	Ref. 12
	+ 9.0 G	3 sec.	Ref. 7
	+ 9.0 G (protected)	15 sec.	Unpublished (USC)
	+20.0 G	.10 to .20 sec.	Ref. 6 (Navy)
Seated − G	− 3 G	15 sec.	Unpublished (USC)
	− 6 G	0.2 sec.	Ref. 7 (Air Corps)
	− 7 G	0.1 sec.	Ref. 7 (Air Corps)
	− 8 G	0.01 sec.	Ref. 7 (Air Corps)
	−11 G	0.003 sec.	Ref. 7 (Air Corps)
Transverse G	12 G prone	15 sec.	Unpublished (USC)
	17 G prone	5 sec.	Ref. 9 (German)
	40 G prone	.14 sec.	Unpublished (Navy)

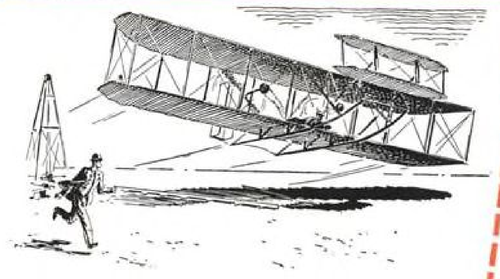


Who was First?

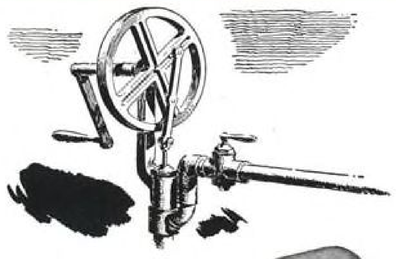
WHO WAS FIRST to apply the principles of the parachute conceived and sketched by Leonardo da Vinci in 1514? *Answer: In 1783 Lenormond jumped from the tower of the Montpellier Observatory holding in each hand an umbrella of 5 ft. diameter.*



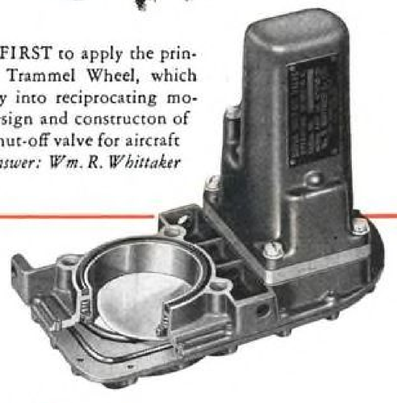
WHO WAS FIRST to apply the principle of lift derived by driving an inclined surface horizontally through the air? *Answer: Sir George Cayley built the first successful man-carrying glider in England during the 19th century.*



WHO WAS FIRST to apply the principles of air pressure to lateral control of powered aircraft? *Answer: The Wright Brothers developed the idea of lateral control through flexing wings and rudder manipulation in 1903.*



WHO WAS FIRST to apply the principles of the Trammel Wheel, which converts rotary into reciprocating motion, to the design and constructon of a sliding gate shut-off valve for aircraft application? *Answer: Wm. R. Whittaker Co., in 1942.*



Whittaker pioneered and perfected the first sliding gate shut-off valve for the aircraft industry. Constantly pioneering new developments in aircraft valve applications, Whittaker has many "firsts" to its credit. Whittaker's versatile engineering staff stands ready to link the economies of proven designs to your specific requirements. WM. R. WHITTAKER CO., LTD., 915 N. Citrus Ave., Los Angeles 38, Calif.

Whittaker

First IN DESIGN

First IN PERFORMANCE

First WITH VALVES THAT ARE FIRST CHOICE IN INDUSTRY

outwardly (centrifugal force) is proportional to the mass and to the square of the velocity along the curve, and inversely proportional to the radius of the curve.

► **Accelerations**—The equation for centrifugal force does not at first glance seem to contain a term for acceleration. However, the term $\frac{v^2}{r}$ is actually a measure of the rate of change of velocity away from a straight-line path and therefore, by definition, an acceleration although a difficult one to visualize. We therefore speak of the associated force as being due to radial acceleration.

To the two accelerations, linear and radial, we may add a third—angular acceleration, which is a measure of the rate of change in rotation or angular velocity.

The equation applying to this type of acceleration is $F\ L = a_a\ I$, in which F is force; L is distance from the center of rotation, at which the force is tangentially applied; a_a is rate of change in angular velocity; and I is the moment of inertia of the mass involved.

In the case of linear and angular motion, it is common for convenience to speak of increase in velocity as acceleration and decrease in velocity as deceleration.

Physiological Considerations

In aviation medicine it is common practice to speak of the forces due to acceleration in terms of "G" in the amounts equivalent to gravitational acceleration having the symbol "g".

The weight of an individual as we commonly use the term, is the force in pounds created by gravity or "1 G" acting on the mass of the body.

In aircraft and in special testing machines, it is possible to subject the human as well as equipment to accelerations of higher magnitude for appreciable periods of time, say one second or more.

Since $F = m\ a = \frac{w}{g}\ a$, an increase in acceleration to twice that due to gravity would double the force. Or $F = \frac{w}{g}\ 2a$ and since $a = g$ then $F = \frac{w2g}{g} = 2w$. Thus, at 2 G the force or apparent weight is doubled.

Similarly, we would say that at 10 G the force or weight is tenfold. This means that a pilot executing a 7 G maneuver, as in a pull-up from a dive, exerts a force against the seat of the plane of seven times his normal weight, caused, of course, by radial acceleration acting on the mass of his body.

We likewise speak of G forces in linear acceleration and deceleration. If we speak of a 20 G deceleration during a crash we mean that the rate of change

If THESE *are your work clothes...*

We're offering you a complete, compact line of highest quality Aircraft Finishes that will make your job easier, quicker and give you outstanding results! There are 19 carefully selected colors—plus black and white—in the complete Sherwin-Williams Aircraft Color Line. Every single one chosen for its cleanness, brilliance, purity, richness—and unbeatable *durability!* All of these colors are available in *four* types of finish: Opex Pigmented Nitrate Dope, Opex Pigmented Butyrate Dope, Opex High Gloss Lacquer, Kem Synthetic High Gloss Enamel.

In addition to this comprehensive *color* line, Sherwin-Williams offers selected finishes for *every aircraft and airport need* from ramp equipment to offices and hangars. The Sherwin-Williams Co., Aircraft Division, Cleveland 1, Ohio. (Export Division, Newark, New Jersey).

Products of SHERWIN-WILLIAMS Industrial Research

SHERWIN-WILLIAMS
AIRCRAFT FINISHES

"push-button" purchasing

OF
ENGINE PARTS,
OVERHAUL TOOLS
AND AERONAUTICAL
EQUIPMENT

AE&P provides a technical and specialized service to solve problems of procurement. Just what does this mean to you?

1. Assures you of *availability*. AE&P maintains the largest *Pratt & Whitney* and *Wright* engine parts and special tools inventory of its kind in the world.
2. You gain the benefits provided by a staff of purchasing personnel with years of technical aeronautical experience, *plus* personal contacts with all the various sources of supply outside our own inventories.
3. Saves you time and costly paper work by eliminating extra correspondence . . . simplifies your receiving department functions . . . provides one invoice in place of many.

These triple advantages are coupled with AE&P's standard efficiency:—inspection to factory standards . . . "new and perfect" guarantee . . . accurate marking to your requirements . . . preserving and packaging to highest export standards . . . delivery *on time—every time.*

We call this service "push-button" purchasing because it makes *your* purchasing procedure easier. For full details and catalog, write or wire today.

U. S. EXPORT REGISTRATION NO. 2422
Authorized Agent War Assets Administration

AIRCRAFT ENGINE AND PARTS
CORPORATION
345 MADISON AVE., NEW YORK 17, N. Y. • CABLE ADDRESS: AIRPARTS, NEW YORK

P.S. AE&P is currently purchasing for several airlines abroad *all* of their material requirements.

of velocity has been twenty times that which would be caused by gravitational forces.

► **Action on Body**—The magnitude of these forces to the human becomes important when we consider the area over which they act. As the area becomes smaller, the pressure becomes larger, and as localized pressure increases a level is reached which is destructive.

Degree of destruction as well as the extent depends upon the physical characteristics of the tissues involved, and amount and duration of the pressure.

Compare, for example, the effects of a 200-lb. force on 4 sq. in. of forehead and the effects of the same force on ¼ sq. in. In the first case, the pressure is 50 psi., in the second, 1000 psi. The latter would be destructive.

Effect of force upon the body depends on the duration of application in relation to the magnitude of the force, as well as on the site and area of application.

If the force is large, but acts for only a very short time (from a fraction of, to a few milliseconds) the predominant effect will be due to locally-applied pressure.

If this acts upon soft tissues, pressure waves may be generated whose nature will depend, in turn, on the velocity of the agent imparting the force, the kinetic energy of the agent, and the area of contact.

These pressure waves will travel through the semi-fluid mass of the body and will produce various effects dependent upon the structure and function of the tissues traversed. If the force acts upon the skeletal structure, local destruction may be caused.

► **Large Force, Brief Application**—As the magnitude of the force increases while the duration of application decreases there is a transition into the field of wounding by missiles.

Missiles produce a high degree of local tissue destruction depending upon many factors beyond the scope of this discussion.

However, rate of transmission and magnitude of shock waves into the abdomen of animals from a missile in the thigh has been determined, and shows a velocity of propagation of pressure waves to be approximately 4,800 ft./sec.[3]

If we consider the effects of a very brief application of a large force to the head we are confronted by two experimental observations: (a) Accelerations of 100 to 200 G cause concussion,[2] (b) absorption of 200 in.-lb. of energy in a brief period of time causes fatal damage to the brain.[3]

These observations are only approximate since in (a) the force acted for approximately 0.25 in., yet may have caused the acceleration in 0.01 in. while in (b) the absorption of 200 in.-lb. of energy may have occurred in either a fraction or a multiple of a millisecond.

► **Body Positions**—When forces are applied for a longer time we must consider the manner and direction of application relative to the body.[4]

When the force is directed from the head to the feet the acceleration is said to be positive; from the feet to the head, the acceleration is negative.

When the force is directed transversely through the body, acceleration is said to be transverse and is further classified by the position of the individual. If the force is directed from the back toward the stomach, the individual is said to be in a prone position. If directed from the stomach toward the back, the individual is said to be in a supine position. If the force acts from side to side, he is in a lateral position.

Obviously there is a possibility of a combination of the various positions such as semi-prone, in which the individual is between the vertical and a prone position, as well as a semi-supine position in which the person lying on his back is somewhere between a supine and a vertical position.

There is also a crouched position in which he is more or less doubled up with his knees close to his chin, with the direction of forces due to acceleration usually from head to feet.

► **Action of Blood**—All of these positions are important in considering the effect of application of positive (head to feet) forces due to acceleration since the height of the column of blood between the heart and the brain, measured in the direction of force, determines the amount of acceleration which can be tolerated for relatively long periods of time—say three seconds or more.[5, 6]

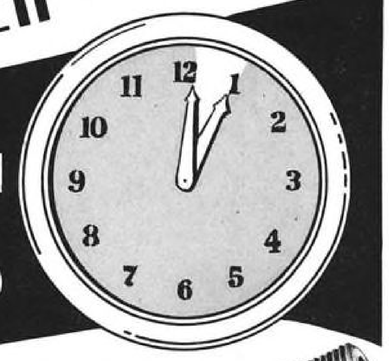
If the hydrostatic pressure exerted by this column of blood is greater than the blood pressure (at heart level) generated by the heart, the circulation through the brain will be arrested. When the oxygen in the blood contained in the capillaries of the brain is used up by the nervous tissue the brain will cease to function. The individual will exhibit changes in performance of his nervous system, progressing rapidly from poor judgment to complete unconsciousness.

Regardless of the magnitude of acceleration, up to 9 G (head to foot), which deprives the brain of circulation, there appears to be a period of time of approximately three seconds during which the brain will function.[7] The average individual will have the circulation through the brain arrested at approximately 4.5 to 5.5 G unless there is an additional force assisting the heart in maintaining a sufficient head of pressure.[5]

Straining of the muscles of the legs and abdomen, as well as the use of protective pressure suits, assists the heart in

with HANSEN couplings

minutes Saved
are
HOURS GAINED



CONNECTION
TAKES ONLY A SECOND

If you have fluid lines in your plant you can increase efficiency and save precious minutes with Hansen Couplings. Any line can be quickly and easily connected or disconnected without loss of liquid or gas in the line.

When you want to connect a Hansen Coupling, it is merely necessary to push the plug into place, where it locks securely. The valve opens, and flow starts instantly. The same operation disconnects—move the sleeve, and the plug pops out. Flow is shut off automatically.

From a wide range of available sizes and types you can select one suitable for any application. Air, oil, and gas, oxygen and acetylene, gasoline, hydraulic oil, and steam . . . each type of service has a Hansen Coupling engineered to meet its specific requirements.

Write for Industrial Catalog No. 47 today.

QUICK-CONNECTIVE COUPLINGS
for AIR • ACETYLENE • OIL • GASES
GREASES • STEAM • OXYGEN • HYDRAULIC

REPRESENTATIVES
New England States: Pearse-Pearson Co., West Hartford, Connecticut, Boston, Massachusetts
Atlantic, Gulf States: B-R Engineering Co., Baltimore, Md.
Northern Ohio: F. & W. Ursem Company, Cleveland, Ohio
Southern Ohio, W. Va., Northeastern Ky.: Steinhagen Airline Products, Dayton, Ohio
Tennessee, Arkansas, Kentucky: Ralph A. Biller Co., Nashville, Tennessee
Michigan: William H. Nash Company, Detroit, Michigan
Indiana, Wisconsin: Neil Engineering Company, Ft. Wayne, Indiana, Milwaukee, Wisconsin
Northern Illinois, Eastern Iowa: Walter Norris Engineering Company, Chicago, Ill.
Central Midwestern States: Sturgis Equipment Co., St. Louis, Mo.
North Midwestern States: Hanscome-Rogness Company, Minneapolis, Minnesota
Texas, Oklahoma: C. C. Brownfield Dallas, Texas
Colorado, New Mexico, Utah, Wyoming: E. C. Wild Co., Denver, Colorado
Northern Cal., Nevada: R. J. Gentles, San Francisco, California
Arizona, S. California: Chester Paul Co., Glendale, California
Idaho, Oregon, Washington: Jack J. Kolberg Company, Seattle, Wash.
IN CANADA
Province of Ontario: John Best Associates, Toronto, Ontario
Quebec & Maritime Provinces: Cowper Company Ltd., Montreal, Que.

THE HANSEN MANUFACTURING COMPANY
4031 WEST 150th STREET • CLEVELAND 11, OHIO

The
FLYING WING*
is "unconventional"

but not in its use
of
STAINLESS STEEL

RADICAL in its departure from the usual, this giant XB-35 bomber represents an important step in Northrop Aircraft's program of seeking maximum efficiency in flight in an all-wing plane which eliminates all drag-producing appendages.

Though revolutionary in appearance, the FLYING WING conforms strictly to long-established procedure by using Stainless Steel wherever requirements are unusually severe.

Thus in the roll-type bomb-bay doors, U·S·S 18-8 Stainless and U·S·S Stainless-W insure smooth, positive functioning despite vibration and high or low temperatures.

Used for many years by the leading makers of military and commercial aircraft of all types, U·S·S Stainless Steel admirably meets the stringent requirements for engine and airframe parts that must have not only high resistance to corrosion, oxidation and cavitation but must maintain these properties at extremely high temperatures for many hours at a stretch. It provides superior resistance to wear and fatigue. It lends itself to intricate forming, to gas, arc and resistance welding and other fabricating processes.

To insure optimum results both in its fabrication and its performance we offer you the practical cooperation of our Stainless engineers who are experts in its use.

*T.M. Reg. U.S. Pat. Off. by Northrop.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO · NATIONAL TUBE COMPANY, PITTSBURGH
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK
8-1049

USS
U·S·S STAINLESS STEEL
SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS
UNITED STATES STEEL

maintaining sufficient pressure to keep circulation through the brain at positive G levels above ordinary tolerance.[6]

►**G Tolerance**—If the individual is seated in a reclining position, the G tolerance level is increased corresponding to the decrease in the heart-to-head distance in the direction of acceleration.[5]

In the prone position (face down) man can tolerate 12 G for 10 to 30 sec. In the supine position (on his back) he can tolerate 14 G for 10 sec. or longer.[8]

At higher G levels in prone and supine positions, breathing is more difficult and may be painful.[9] In a supine position man has been known to survive 200 G of 0.015 sec. duration.[10]

Man's tolerance to negative acceleration is less than that to positive acceleration, due to pooling of the blood in the soft tissues of the head, face and neck as well as those in the chest cavity. Minus 11 G has been tolerated for .003 sec. with only slight discomfort in abdominal viscera.[11] Minus 3 G has been tolerated for 15 sec. with only a dull aching congestion of head and neck. At minus 4.5 G head and neck congestion is quite painful.[5]

The skeletal system becomes important in plus G only when duration of application is so short that the circulatory system is not involved and when the magnitude of acceleration is sufficiently large to produce forces of destructive magnitude.

At approximately 25 G, while seated, there is the possibility of fracture of the vertebrae. Humans have tolerated 20 G developed during seat ejection experiments in .21 sec., lasting however, only several thousandths of a second.[6] Nothing is known concerning the effects of accelerations of this magnitude on humans if continued for longer periods of time.

The elasticity of the various structural components of the body undoubtedly enables toleration of accelerations of large magnitude for fractions of a second, which would not be tolerated for longer periods.

►**Grey-Out, Black-Out, Red-Out**—Grey-out and black-out are colloquial terms referring, respectively, to the narrowing of the visual fields and to the temporary total blindness occurring during pull-outs.

The fluids within the eye are under an elevated pressure of approximately 28 mm.Hg. This pressure correspondingly lowers the effective pressure causing blood to circulate through the retina of the eye.

As the amount of positive G is increased a value is reached in which the increased hydrostatic pressure of the blood between the eye and the heart equals or exceeds the effective circulating blood pressure.

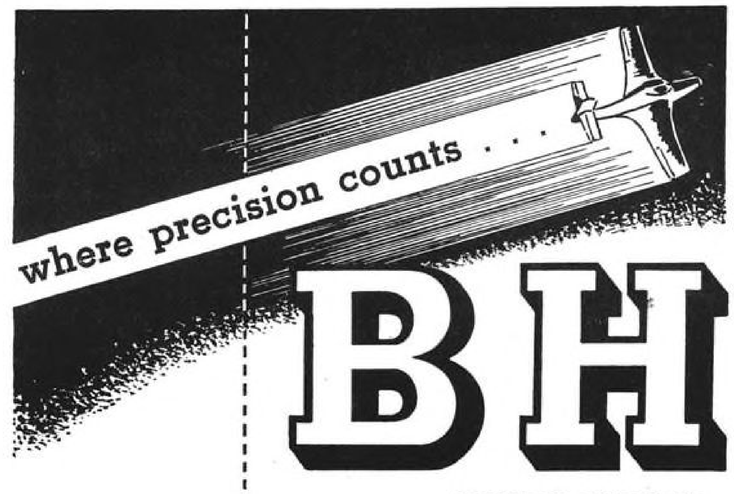
If the blood pressure is 140 mm.Hg. at heart level, effective circulating pressure for the eye is 140 minus 28 or 112 mm.Hg when the eye is at the same level as the heart (as when lying down with the head slightly back).

If the individual sits up, effective pressure to the eye is further decreased by the hydrostatic pressure of the blood column which is directly dependent upon acceleration or G and increases with G. When the hydrostatic pressure equals 112 mm.Hg no circulation through the eye is possible.

Circulation through the brain is still possible at this point since the pressure of the cerebro-spinal fluid, or the pressure inside the head, is negative when one is sitting up. Thus with the brain supplied with oxygen by circulating blood, but not the retina, a person remains conscious but sees nothing—total blackness.

Grey-out occurs when the circulation through the eye becomes so feeble that an inadequate supply of oxygen reaches the less resistant light sensitive cells of peripheral vision. Central vision is the last to fail.

Normally, in relaxed individuals, grey-out occurs at 3.5 to 4.5 G. Pressure suits and straining or even a state of excitement will elevate these levels. Hot days, sickness, fatigue, and other events and conditions which normally make one

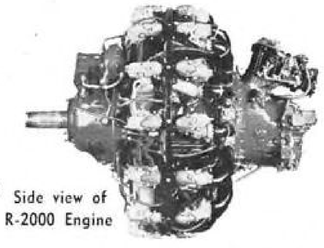


BH

CYLINDER DEFLECTOR
for PRATT & WHITNEY
R-2000 TWIN WASP ENGINE

- Gas Turbine Components
- Intake Pipes
- Propeller Cuffs
- Cowls
- Collector Rings
- Engine Mounts
- Aluminum Tanks
- Sheet Metal Fabrication
- Sheet Metal Stampings

Precision-made by B. H.



Side view of R-2000 Engine

LET US KNOW YOUR REQUIREMENTS
Suppliers to manufacturers only

QUALITY FIRST B·H AIRCRAFT CO. INC.

B. H. AIRCRAFT COMPANY, Inc.
Metal Fabrication to Aircraft Precision Standards
FARMINGDALE 3, NEW YORK

feel poorly will lower these levels. A state of well-being under comfortable conditions is essential for maximum resistance.

Red-out or seeing red has been associated with exposure to minus G and apparently has been experienced by some pilots in outside loops and push-overs.

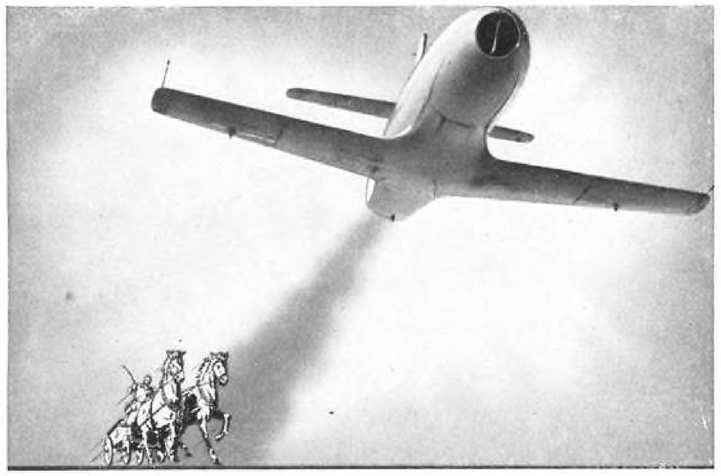
The basis for red-out is obscure unless, as suggested by one investigator, it is caused by the lower eyelid coming up over the eye. Strong light shows red through the eyelids and would be more noticeable during minus G since the lower lid has no muscle to retract it from over the eye.

Man's limits of toleration to acceleration have been summarized in the accompanying tabulation and graph. The data, in general, came from experiments on young healthy male adults, and should be interpreted as the tolerance of an average individual of that group who is actively trying to resist the effects of the applied forces where possible.

This is particularly true in considering the effects of plus G for 15 sec. since a relaxed individual might collapse at plus 4.5 G, yet be alert at plus 7 G while resisting the force by straining both leg and abdominal muscles. These limits are *physiological limits* and must not be confused with *psychological limits*.

References

1. Harvey, E. N., Whiteley, A. H., Grundfest, H., and McMillen, J. H.: Piezoelectric Crystal Measurements of Pressure Changes in the Abdomen of Deeply Anaesthetized Animals During Passage of a High Velocity Missile. The Military Surgeon, 98(6):509-528, 1946.
2. Denny-Brown, D., and Russell, W. R.: Experimental Cerebral Concussion 64:93, Brain, 1941.
3. Gurdjian, E. S. and Webster, J. E.: Experimental and Clinical Studies of the Mechanism of Head Injury—Trauma of the Central Nervous System, Chapt. II. The Williams and Wilkins Co., Baltimore, Md., 1945.
4. Physiology of Flight. Human Factors in the Operation of Military Aircraft. AAF Manual 25-2, Hq. AAF, Washington, D. C. Mar. 15, 1945.
5. Armstrong, H. G.: Principles and Practice of Aviation Medicine. 2d ed., 1943. The Williams and Wilkins Co., Baltimore, Md.
6. Human Tolerance to Accelerations Applied from Seat to Head During Ejection Seat Tests. Navy Dept. BuAer Report Ted. No. NAM 256006, Jan. 31, 1947.
7. Human Tolerances to Negative g of Short Duration. M. R. No. TSEAA 695-74; May 19, 1947, Hq. AMC, Eng. Div.
8. Ham, G. C.: Effects of Centrifugal Acceleration on Living Organisms. War. Med., 3(1):30-56, 1943.
9. Ruff, S., and Strughold, H.: Grundriss der Luftfahrtmedizin. Leipzig, J. A. Barth, 1939, English Translation: National Research Council, Wash., D. C., 1942.
10. DeHaven, Hugh: Mechanical Analysis of Survival in Falls from Heights of Fifty to One Hundred and Fifty Feet. War Med., 2(4):586-596, 1942.
11. Studies on Acceleration During Flight in an Instrumented Aircraft. M. R. No. TSEAA 695-69a, May 1, 1947 Hq. AMC, Eng. Div.
12. McFarland, Ross A.: Human Factors in Air Transport Design. McGraw-Hill Book Company, Inc., New York and London, 1946.



From Horseshoe Iron to Aircraft Alloys

Reckoned in terms of transportation, Ryerson steel stocks and steel experience span the gap between plodding percheron and flashing jet plane.

On the hoofs of thousands of horses, Ryerson iron clattered along the cobbled streets of yesterday. Now, Ryerson aircraft alloys streak through the sub-stratosphere in the high speed planes of the Air Age.

This century of service to transportation and allied industries illustrates how Ryerson has kept pace with progress. Ryerson stocks of carbon, alloy and stainless steel—continually changing with the times—always meet the specialized requirements of every major industrial field.

In these days of heavy demand, the particular steel you need may be temporarily out of stock. But from long experience we can usually suggest a practical alternate. So, whatever your requirements, we urge you to call our nearest plant.

Principal Products

BARS—Carbon and alloy, hot rolled and cold fin., reinforcing

STRUCTURALS—Channels, angles, beams, etc.

PLATES—Sheared and U.M., Inland 4-Way Floor Plate

SHEETS—Hot and cold rolled, many types and coatings

TUBING—Seamless and welded, mechanical and boiler tubes

STAINLESS—Allegheny sheets, plates, tubes, etc.

MACHINERY & TOOLS—for metal working

RYERSON STEEL

Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco.

Future of Engineers In Industry Surveyed

A recent survey aimed at evaluating the future position of engineering specialists in American industry should prove of interest to the various aeronautical activities, which draw their personnel from a wide range of technical classifications for broadly diversified phases of research, design and production.

Engineering colleges, too, should find in this study opinions that may prove valuable for future planning.

Conducted by Rensselaer Polytechnic Institute, Troy, N. Y., the analysis expresses the views of 550 representative industrialists.

▶**Demand to Increase**—Although industrial production is at the highest peacetime level in the nation's history, 76 percent of the executives think the demand for engineering specialists will continue to increase during the next ten years. The remainder see no slackening in the need.

And 90 percent believe that there is a growing demand in industry for executives and managers with engineering

50 YEARS OF PROGRESS WITH KESTER SOLDER

The present type of cored solder used by industry was first made by J. F. Kester in 1899. From the simple beginning of its first application . . . a few soldered connections in the old hand-crank telephone . . . it has continued to grow by keeping pace with new techniques as demanded by industry. Today's modern production would not be possible without cored solder.

Standard for Industry and Home Since 1899

RADIO-TELEVISION—The early commercial, amateur, and professional builders of radios accepted Kester Rosin-Core Solder as standard. Then as now, Kester still leads in this field.

AUTOMOTIVE—Ever since its inception Kester Acid-Core Solder has been and still is the standard in the automotive field and for the trade. Mechanics and repairmen insist upon it.

ELECTRICAL-ELECTRONIC—Kester makes a great variety of "specialized" core solders and solder preforms—even those suitable for the fine touch required in electronic work.

AGRICULTURAL—For a half century Kester Cored Solder has been the farmer's standard for maintenance and repair. He uses Kester because his soldering must be fast and reliable.

HOMECRAFT—In hobbycraft as well as home repair, good solder bonds are essential. Kester Metal Mender and Radio Solder are the standards for all homecraft workers.

INDUSTRIAL—Kester Cored Solders have met every requirement for the past half century. They have earned the reputation for and are recognized as standard for industry.

Over 100,000 Types and Sizes

of KESTER Flux-Cored SOLDER

Free—Technical Manual. Send for Kester's new 28-page manual, "Solder and Soldering Technique." A complete analysis of the application and properties of soft solder alloys and soldering fluxes.

1899 50th Anniversary 1949

KESTER SOLDER

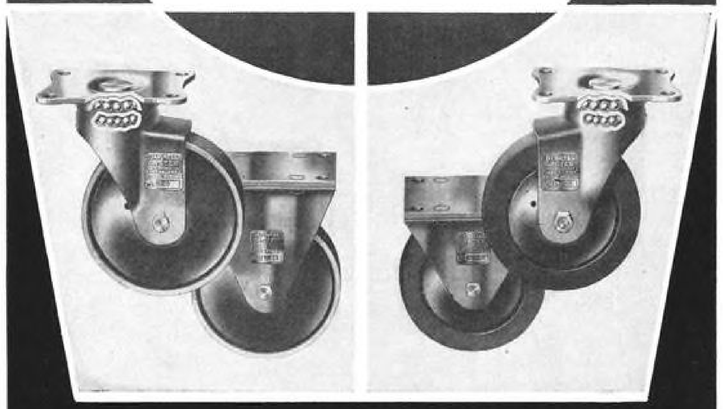
KESTER SOLDER COMPANY
4201 Wrightwood Avenue, Chicago 39, Illinois
FACTORIES ALSO AT NEWARK, NEW JERSEY • BRANTFORD, CANADA

For Greater Economy Choose

DARNELL

CASTERS & WHEELS

SAVE EQUIPMENT
SAVE FLOORS
SAVE MONEY
and TIME



- Wearing parts carbonized and hardened
- *Patented* Double Ball-Bearing *Swivel*
- Maximum floor protection means savings
- Will increase efficiency of employees
- Made in any size for any type of use

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

background. It is revealed that approximately 38 percent of the executive and managerial positions in the 550 organizations represented are now held by engineering graduates.

Ninety-nine percent say that college laboratories should continue to stress thorough grounding in basic principles as their major function, that equipment should be kept up-to-date and modern production methods be shown in the labs or taught in cooperation with industry.

▶ **Help from Industry**—Sixty-five percent think that industry should help meet increased costs which progressive education entails.

In outlining ways in which support can best be accorded, 180 respondents said that grants should be given to colleges either directly or through associations of industries. Another 235 believe that an industry properly can underwrite the cost of special projects or departments doing work related to its field.

Some advocated broad programs of cooperative work and study, while others believe that industry should greatly increase its awards of scholarships and fellowships in the colleges. A recent example of such assistance is that of the fellowships established by Howard Hughes in creative aeronautics at California Institute of Technology (AVIATION WEEK, Jan. 3).

The 78 percent who believe teachers are underpaid say that the colleges will have to offer salaries more nearly comparable to those paid in industry if they are to obtain top-flight personnel.

One of those queried, James H. McGraw, Jr., president of McGraw-Hill Publishing Co., New York City, said that educational support by industry and business "is a matter of self-interest on the highest plane, as an adequate supply of well-trained men will be necessary if we are to maintain and improve our position as an industrial nation."

Radar Beam Hazard

Radar beams can set fire to aircraft fuel, according to the results of a test program conducted by the fire department of the North American Co.

Standard SCR-720 and APG-28 radar units were beamed at ANF-33 grade gasoline, and the fuel was ignited at distances of less than 25 ft. when metal objects were in the vicinity.

The pulse energy is picked up by any good conducting material, such as a steel tool, lead pencil, etc. and the potential arcs to the ground, setting fire to the gasoline.

The tests also indicated the possibility of light metals being heated by radar beams to temperatures high enough to ignite fuel vapors.

for **SAFER, FASTER**
Aluminum Surface
BRIGHTENING

use **CEE-BEE** *"Improved A-3"*

- **Tests and repeated use show effect on Alclad is infinitesimal.**
- **Will not attack zinc chromate primer on trapped or open surfaces.**
- **Safe on faying surfaces. No attack! No resulting corrosion!**
- **Much lower acid content; chromic acid may be added.**
- **Brings out true Alclad color.**
- **Free rinsing! No white residue! No streaking!—even when used with hard water.**

Cee-Bee anounces the "Improved A-3" aluminum surface brightener. It is much safer than any other similar material ever developed; does a finer job of oxide removal; of cleaning and brightening.

ABSOLUTELY SAFE Northrop Aircraft Research Laboratories have made comprehensive tests on Cee-Bee A-3. Results prove complete safety on 24ST and 75ST aluminum; no effect whatsoever on primer in faying surfaces—even under extreme conditions. Write for complete data on this test.

Aircraft manufacturers state that the damage caused by corrosion and oxidation is many times more costly than proper cleaning. The use of the Cee-Bee A-3 Bright-Cleaning methods eliminates heavy oxide and corrosion from under surfaces of wings, fuselage and stabilizers at surprisingly low cost. Find out about these Cee-Bee savings.

CHECK AND MAIL THE COUPON TODAY!

case story 63

Here's what this airline did—

1 **Submitted the "Improved A-3" to laboratory tests for corrosion and effect on primer.**
Lab. recommendation for actual service test

2 **Service test performed on one DC-3 for undersurfaces of fuselage and wings.**
Recommended for regular use for this purpose

3 **Due to satisfaction of above operation, A-3 is now used on complete DC-3's and Boeing Stratoliners.**

Estimated Savings **of $38.82 and 34 man hours on each DC-3; $55.50 and 50 man hours on each Boeing Stratoliner are reported by this operator.**

Cee-Bee Chemical Co., Inc.
655 E. Gage Avenue, Los Angeles 1, Calif.

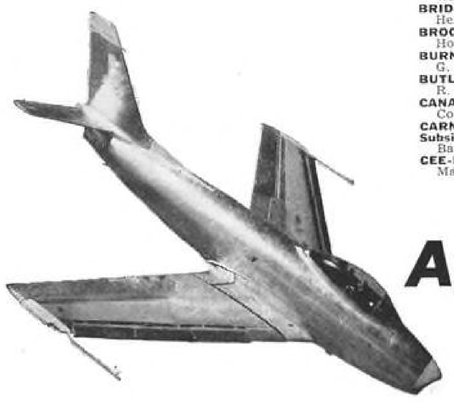
Gentlemen:
Please send me the checked information.

☐ Condensed Northrop LAB Report
☐ Cee-Bee's Engineered Cleaning Procedure using A-3
☐ Results and savings of other users.

NAME_____
COMPANY_____
ADDRESS_____

CEE BEE

CEE-BEE CHEMICAL CO., INC., AVIATION DIV.
655 E. GAGE AVE. • LOS ANGELES 1, CALIF.



Again more companies *Aviation Week* than

AC SPARK PLUG DIV., GENERAL MOTORS CORP.
D. P. Brother & Co., Inc.
ACRO ELECTRIC CO.
White Advertising Co.
ADAMS RITE MFG. CO.
The Shaw Co.
ADEL PRECISION PRODUCTS CORP.
The McCarty Co.
AEROPRODUCTS DIV., GENERAL MOTORS CORP.
Kircher, Helton & Collett, Inc.
AEROQUIP CORP.
Hopcraft-Keller-Scheifle, Inc.
AEROTEC CORP., THE
The Harry P. Bridge Co.
AIRBORNE ACCESSORIES CORP.
Weber Thomson Assoc.
AIRCRAFT BOOKS, INC.
The Kotula Co.
AIRCRAFT COMPONENTS CORP.
Henry J. Kaufman & Assoc.
AIRCRAFT HARDWARE MFG. CO., INC.
Batten, Barton, Durstine & Osborn, Inc.
AIRCRAFT RADIO CORP.
Burke, Dowling, Adams, Adv.
AIRCRAFT TOOLS, INC.
Edward S. Kellogg Co.
AIRITE PRODUCTS CO.
O. K. Fagan Adv. Agency
AIR-MAZE CORP.
Batten, Barton, Durstine & Osborn, Inc.
AIRWORK CORP.
Direct
ALBERTSON & CO., INC.
E. W. Sann & Assoc.
ALUMINUM CO. OF AMERICA
Fuller & Smith & Ross, Inc.
ALUMINUM INDUSTRIES, INC.
The Keeler & Stites Co.
AMBROID CO.
Arthur W. Sampson Co.
AMBROSE AVIATION CO., INC., FRANK
Steedle, Rankin & Boyle, Inc.
AMERICAN PHENOLIC CORP.
Burton Browne Advertising
AMERICAN STEEL & WIRE CO.,
Subsidiary of U. S. Steel Corp.
Batten, Barton, Durstine & Osborn, Inc.
AMES CO., B. C.
Henry A. Loudon Adv., Inc.
ANGIER & ASSOC., OTIS
Ad-Sales, Inc.
ANSUL CHEMICAL CO.
J. A. Cormack Adv.
ARENS CONTROLS, INC.
Frank C. Nahser, Inc.
ARMSTRONG SIDDELEY MOTORS, LTD.
Godbolds, Ltd.
ATLANTIC AVIATION CORP.
Strohmeier Assoc.
AUBURN SPARK PLUG CO., INC.
Spitz & Webb Adv.
AVIATION BUSINESS COUNSEL
Direct
AVIATION DISTRIBUTORS & MFGRS.
Belden & Hickox Adv.
AXELSON MFG. CO.
Heintz & Co., Inc.
BG CORP., THE
Albert Frank-Guenther Law, Inc.
B. H. AIRCRAFT CO., INC.
Harold Marshall Adv. Co.
BARBER-COLMAN CO.
Cummings, Brand & McPherson Adv.
BEECH AIRCRAFT CORP.
Erwin, Wasey & Co., Inc.
BENDIX AVIATION CORP. (Eclipse-Pioneer Div.)
MacManus, John & Adams, Inc.
BENDIX AVIATION CORP. (Pacific Div.)
The Shaw Co.
BENDIX AVIATION CORP. (Products Div.)
MacManus, John & Adams, Inc.
BENDIX AVIATION CORP.
(Scintilla Magneto Div.)
MacManus, John & Adams, Inc.
BENDIX AVIATION CORP.
(Friez Instrument Div.)
MacManus, John & Adams, Inc.
BENDIX AVIATION CORP. (Mobile Radio Div.)
MacManus, John & Adams, Inc.
BENDIX AVIATION CORP. (Red Bank Div.)
MacManus, John & Adams, Inc.
BENDIX AVIATION CORP.
(Scintilla—Electrical Connectors)
MacManus, John & Adams, Inc.
BENDIX AVIATION CORP.
(Skinner Purifier Div.)
MacManus, John & Adams, Inc.
BEVERLY SHEAR MFG. CO.
Direct
BOEING AIRPLANE CO.
N. W. Ayer & Son, Inc.
BOWSER, INC.
Willis S. Martin Co., Adv.
BRIDGEPORT FABRICS, INC.
Henry A. Loudon Adv., Inc.
BROOKS & PERKINS, INC.
Holden, Clifford, Flint, Inc.
BURNDY ENGRG. CO., INC.
G. M. Basford Co.
BUTLER MANUFACTURING CO.
R. J. Potts-Calkins & Holden Adv.
CANADAIR, LTD.
Cockfield, Brown & Co., Ltd.
CARNEGIE-ILLINOIS STEEL CORP.,
Subsidiary of U. S. Steel Corp.
Batten, Barton, Durstine & Osborn, Inc.
CEE-BEE CHEMICAL CO., INC.
Mann Advertising Co.
CHAMPION SPARK PLUG CO.
MacManus, John & Adams, Inc.
CHANCE VOUGHT AIRCRAFT DIV.,
UNITED AIRCRAFT CORP.
Platt-Forbes, Inc.
CHASE AIRCRAFT CO., THE
Direct
CHERRY RIVET CO.
Dana Jones Co.
CHEVROLET MOTOR DIV.,
GENERAL MOTORS CORP.
Campbell-Ewald Co., of New York, Inc.
CHICAGO METAL HOSE CORP.
Russell T. Gray, Inc.
CHICAGO PNEUMATIC TOOL CO.
G. M. Basford Co.
CITIES SERVICE CO.
Ellington & Co., Inc.
CLEVELAND NATIONAL AIR RACES
Humphrey, Prentke & Assoc.
CLIFFORD MANUFACTURING CO.
James Thomas Chirurg Co., Inc.
COLUMBIA STEEL CO.,
Subsidiary of U. S. Steel Corp.
Batten, Barton, Durstine & Osborn, Inc.
CONSOLIDATED VULTEE AIRCRAFT CORP.
Young & Rubicam, Inc.
CONTINENTAL MOTORS CORP.
Wallace-Lindeman, Inc.
CRANE & CO., JOE
Direct
CUNNINGHAM SON & CO., JAMES
Campbell-Sanford Adv. Co.
CURTISS-WRIGHT CORP.
Charles Dallas Reach Co., Inc.
CURTISS-WRIGHT CORP. (Airplane Div.)
Charles Dallas Reach Co., Inc.
CURTISS-WRIGHT CORP. (Propeller Div.)
Charles Dallas Reach Co., Inc.
DANLY MACHINE SPECIALTIES, INC.
The Cramer-Krasselt Co.
DARNELL CORPORATION, LTD.
Henry L. Rhea Adv. Service
DEEMAR CO.
George M. Hakin Co.
DILL MFG. CO., THE
McDaniel-Fisher & Spelman Co.
DOUGLAS AIRCRAFT CO., INC.
J. Walter Thompson Co., Inc.
DUMONT AVIATION & SUPPLY CO.
Jordan & LoBuono
DU PONT DE NEMOURS, E. I., & CO., INC.
(Plastics Dept.)
Batten, Barton, Durstine & Osborn, Inc.
EBERHARD FABER PENCIL CO.
Hicks & Greist, Inc.
EDISON, INC., THOMAS A.
The Schuyler Hopper Co.
EDO CORP.
Strohmeier Associates
ELASTIC STOP NUT CORP. OF AMERICA
G. M. Basford Co.
ELECTRIC AUTO-LITE CO., THE
Ruthrauff & Ryan, Inc.
ELECTRIC STORAGE BATTERY CO., THE
Geare-Marston, Inc.
ELECTROL, INC.
G. B. Woodin Co.
ERIE METER SYSTEMS, INC.
Davies & McKinney Industrial Adv. Agency
ESSO EXPORT CORP.
McCann-Erickson Corp.
ESSO STANDARD OIL CO.
McCann-Erickson Corp.
FAFNIR BEARING CO., THE
Horton-Noyes Co.
FAIRCHILD ENGINE & AIRPLANE CORP.
Cecil & Presbrey, Inc.
FEDERAL AIRCRAFT WORKS
Dwyer & Devoy Adv.
FEDERAL TELEPHONE & RADIO CORP.
J. M. Mathes, Inc.
FIRESTONE TIRE & RUBBER CO., THE
Sweeney & James Co.
FLADER, INC., FREDRIC
Direct
FLOTTORP MFG. CO.
Wallace-Lindeman, Inc.
FOOTE BROS. GEAR & MACHINE CORP.
The Buchen Co.
GARRETT CORP., THE (AiResearch Mfg. Co.)
J. Walter Thompson Co.
GENERAL CONTROLS CO.
The McCarty Co.
GENERAL ELECTRIC CO. (Apparatus Div.)
G. M. Basford Co.
GENERAL ELECTRIC CO. (Const. Materials Div.)
G. M. Basford Co.
GENERAL MILLS, INC.
Batten, Barton, Durstine & Osborn, Inc.
GENERAL MOTORS CORP.
Campbell-Ewald Co., of New York, Inc.
GILFILLAN BROS.
Davis & Company
GIANNINI & CO., INC., G. M.
Western Adv. Agency, Inc.
GLADDEN PRODUCTS CORP.
Davison-Dibble Co.
GOODRICH CO., THE B. F.
Batten, Barton, Durstine & Osborn, Inc.
GOODYEAR TIRE & RUBBER CO., INC.
Kudner Agency, Inc.
GORDONAY PRODUCTS CO.
Seeman & Peters, Inc.
GRANBERG CORP.
Avery & Bruguiere Adv.
GREER HYDRAULICS, INC.
S. Vogel
GRUMMAN AIRCRAFT ENGRG. CORP.
Charles W. Hoyt Co., Inc.
GULF OIL CORPORATION
Young & Rubicam, Inc.
HANSEN MFG. CO.
Richard T. Brandt, Inc.
HARDMAN MFG. CO.
John H. Riordan Co.
HARRISON RADIATOR DIV.,
GENERAL MOTORS CORP.
Campbell-Ewald Co., of New York, Inc.
HEBARD & CO., W. F.
Burton Browne Adv.
HINDUSTAN AIRCRAFT LTD.
Direct
HOBART BROTHERS CO.
Ralph Dalton & Assoc.
HOLLINGSHEAD CORP., R. M.
The Aitken-Kynett Co.
HONTI ENGINEERING AND MANUFACTURING CO.
Direct
HOTEL LEXINGTON, INC.
Elmo Ecker Adv.
HYDRO-AIRE, INC.
John H. Riordan Co.
INDIANA GEAR WORKS
A. L. Perkins & Co.
INTERNATIONAL NICKEL CO., INC., THE
Marschalk & Pratt Co.
JACK & HEINTZ PRECISION INDUSTRIES, INC.
The Griswold-Eshleman Co.
JAROS AIRCRAFTERS, WALTER K.
Direct
JOHNS-MANVILLE CORP.
J. Walter Thompson Co.
KELLER PRODUCTS, INC.
Direct
KIDDE & CO., INC., WALTER
Newell-Emmet Co.
KILGORE MFG. CO.
Byer & Bowman Adv. Agency
KNOPF, INC., ALFRED A.
Denhard, Pfeiffer & Wells, Inc.
KOHLER CO., THE
Roche, Williams & Cleary, Inc.
KOLLSMAN INSTRUMENT DIV.,
SQUARE D COMPANY
Erwin, Wasey & Co., Inc.
KOPPERS CO., INC. (Aeromatic Propeller Dept.)
Vansant, Dugdale & Co., Inc.
LAMINATED SHIM CO., INC.
Wilson, Haight & Welch, Inc.
LAVELLE AIRCRAFT CORP.
Broomfield-Podmore Adv.
LEAR, INC.
John B. Van Domelen Agency
LEBANON STEEL FOUNDRY
Foltz-Wessinger, Inc.
LINE MATERIAL CO.
Hamilton Adv. Agency, Inc.
LINK AVIATION, INC.
Byrne, Harrington & Roberts, Inc.
LOCKHEED AIRCRAFT CORP.
Foote, Cone & Belding Adv.
LONG CO., INC., THE S. A.
The McCormick-Armstrong Co.
LORD MANUFACTURING CO.
W. S. Hill Co., Inc.
LUCAS LTD., JOSEPH
Elliott Adv. Ltd.
LUNDY MFG. CO.
American Adv. Assoc.
LURIA ENGINEERING CORP.
Rickard & Co., Inc.
LUSCOMBE AIRPLANE CORP.
Tracy-Locke Co., Inc.
LYON CO., THOBURN
Direct
MACMILLAN CO., THE
Atherton & Currier, Inc.
MACWHYTE CO.
Needham, Louis & Brorby, Inc.
MARMAN PRODUCTS CO.
West-Marquis, Inc.
MARQUETTE METAL PRODUCTS CO., THE
Belden & Hickox Adv.
MARTIN CO., THE GLENN L.
Vansant, Dugdale & Co., Inc.
McCAULEY CORP.
Hugo Wagenseil & Assoc.
MERCER-ROBINSON, INC.
Walter J. Gallagher Adv.
MICRO SWITCH CORP.
Hamilton Adv. Agency, Inc.
MINNEAPOLIS-HONEYWELL REGULATOR CO.
Liddison Lewis & Associates
MOTOR GENERATOR CORP.
Ralph Dalton & Assoc.
MOULTON CO., INC., THE
Jaycraft Co.
NATIONAL PLASTICS EXPOSITION
James R. Flanagan Adv. Agency
NATIONAL TUBE CO., Sub. of U. S. Steel Corp.
Batten, Barton, Durstine & Osborn, Inc.
NELSON CORP., THE HERMAN
The L. W. Ramsey Adv. Agency
NEWARK ELECTRIC CO.
The Chernow Co., Inc.
NEW DEPARTURE DIV.,
GENERAL MOTORS CORP.
J. M. Hickerson, Inc.
NICKERSON & CO., INC., JOHN
Wiley, Frazee & Davenport, Inc.
NUKRAFT MFG. CO., INC.
William Hoffman & Assoc.
OHIO SEAMLESS TUBE CO., THE
Howard Swink Adv. Agency, Inc.
PLOMB TOOL CO.
Willard G. Gregory & Co.
PRATT & WHITNEY AIRCRAFT DIV.,
UNITED AIRCRAFT CORP.
Platt-Forbes, Inc.
PRINCETON UNIVERSITY PRESS
Sussman & Sugar, Inc.
PYRENE, LTD.
Nelson Advertising Service, Ltd.
RADIO CORP. OF AMERICA
J. Walter Thompson Co.
REED COMPANY, INC., J. D.
Wallace Davis & Co.
REEVES BROTHERS, INC.
Goold & Tierney, Inc.
REPUBLIC AVIATION CORP.
The Albert Woodley Co.
ROEBLING'S SONS CO., JOHN A.
Beatty & Oliver, Inc.
ROHM & HAAS CO.
John Falkner Arndt & Co.
ROMEC PUMP CO.
White Adv. Co.
ROTOL, LTD.
Crane Publicity, Ltd.
ROADCAP, ROY R.
Direct
RUSSELL MFG. CO.
Chas. W. Hoyt Co., Inc.
RYAN AERONAUTICAL CO.
Batten, Barton, Durstine & Osborn, Inc.
RYERSON & SON, INC., JOSEPH T.
Aubrey, Moore & Wallace, Inc.
SAAB AIRCRAFT CO., THE
Allamanna Annonsbyran A. B.
SAFE-FLIGHT INSTRUMENT CO.
Strohmeier Assoc.
SLICK AIRWAYS, INC.
Thomas F. Conroy, Inc.
SNAP-ON TOOLS CORP.
Scott, Inc.
SOCONY VACUUM OIL CO.
Compton Advertising Co.
SOLAR AIRCRAFT CO.
Dan B. Miner Co., Inc.
SOUTHWEST AIRMOTIVE CO.
Wilhelm-Laughlin-Wilson & Assoc.
SPARTAN AERO REPAIR DIV.,
SPARTAN AIRCRAFT CO.
Brooks-Keefe Adv. Agency
SPERRY GYROSCOPE CO., INC.
Charles Dallas Reach Co., Inc.
STANDARD OIL CO. OF INDIANA
McCann-Erickson, Inc.
STANDARD PRESSED STEEL CO.
R. E. Lovekin Corp.
STERN WATCH AGENCY, INC., THE HENRI
Kelly, Nason, Inc.
STEWART-WARNER CORP. (South Wind Div.)
MacFarland, Aveyard & Co.
SURFACE COMBUSTION CORP.
Bramble & Odiorne Adv.
TEXAS COMPANY, THE
Buchanan & Co., Inc.
TEXAS ENGINEERING & MFG. CO.
Albert Evans Advertising
THERMO-ELECTRIC CO.
Fred Lange Associates, Inc.
THOMAS ASSOCIATES
O. K. Fagan Adv. Agency
THOMPSON CO., THE H. I.
Hixson & Jorgensen, Inc.
THOMPSON PRODUCTS, INC.
The Griswold-Eshleman Co.

place *more* advertising in in any other aviation magazine

WHILE THE AVIATION INDUSTRY supports many publications, all with some merit and readership . . . today it has one overwhelming preference, one dominant medium . . . *Aviation Week*.

The fact that more people spend more advertising dollars in *Aviation Week* by a great margin (2 to 1 in 1948*) is based on solid advertising values. This ever-widening preference is the result of proved readership . . . substantiated by continuing Starch studies . . . reaffirmed again and again by independent reader-preference surveys.

All this information is yours for the asking—proves beyond doubt what more and more aviation advertisers and their agencies have learned . . . why their 1949 advertising schedules in *Aviation Week* are consistently larger.

Today you can reach *everybody* who is *anybody* in the aviation business through the one publication that reports everything of aeronautical significance. Write or wire your nearest *Aviation Week* office.

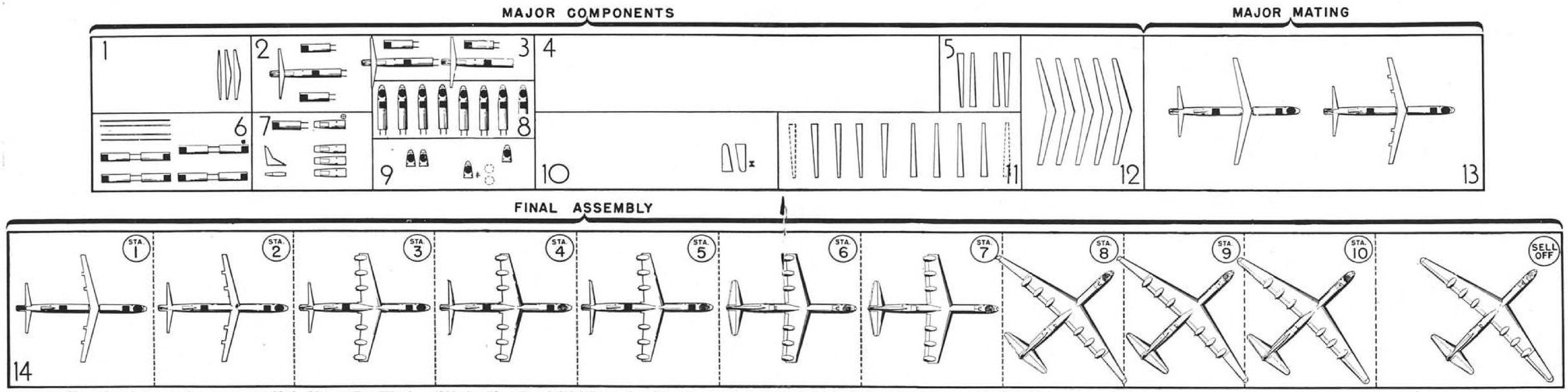
** Based upon figures as published in Industrial Marketing.*

PACIFIC AIRMOTIVE CORP.
West-Marquis, Inc.
PACIFIC SCIENTIFIC CO.
Robert F. Dennis, Inc.
PACKARD ELECTRIC DIV., GENERAL MOTORS CORP.—Campbell-Ewald Co., of New York, Inc.
PAPER MFG. CO.
Charles A. White Jr., & Co.
PERMANENTE PRODUCTS CO.
Young & Rubicam, Inc.
PESCO PRODUCTS DIV., BORG-WARNER CORP.
Fuller & Smith & Ross, Inc.
PHILLIPS PETROLEUM CO.
Lambert & Feasley, Inc.
PHILLIPS SCREW MANUFACTURERS
Horton-Noyes Co.
PIONEER PARACHUTE CO., INC.
Julian Gross Adv. Agency
PITTSBURGH PLATE GLASS CO. (Safety Glass)
Batten, Barton, Durstine & Osborn, Inc.
SANFORD CO., THE
Bruce L. Altman Adv.
SAVAL INC.
O. K. Fagan Adv. Agency
SCOTT AVIATION CORP.
Warman & Co., Inc.
SENSENICH BROS.
Foltz-Wessinger, Inc.
SHERWIN-WILLIAMS CO.
Newell-Emmett Co.
SHORT BROTHERS, LTD.
J. Walter Thompson Co., Ltd.
SIKORSKY AIRCRAFT DIV., UNITED AIRCRAFT CORP.—Platt-Forbes, Inc.
SILENT HOIST & CRANE CO.
Harry Hurst Adv.
SIMMONDS AEROCESSORIES, INC.
Jones & Brakeley Inc.
SINCLAIR REFINING CO.
Hixson-O'Donnell Advertising, Inc.
THURSTON, INC., W. HARRIS
Goold & Tierney, Inc.
TINNERMAN PRODUCTS, INC.
Meldrum & Fewsmith Advertising
TITANINE, INC.
Robert Hilton Co.
TITEFLEX, INC.
Sykes Adv., Inc.
TOPFLIGHT TAPE CO.
Yorktown Adv. Agency, Inc.
TORNGREN CO.
Tippett, Jackson & Nolan Adv.
TURCO PRODUCTS, INC.
The Mayers Co., Inc.
UNITED AIRCRAFT CORP.
Platt-Forbes, Inc.
UNITED-CARR FASTENER CORP.
Alley & Richards, Inc.
UNITED SERVICES FOR AIR, INC.
Gaskill-Oertel Adv.
UNITED STATES PLYWOOD CORP.
Marschalk & Pratt Co.
UNITED STATES RUBBER CO. (Aircraft Tires, Footwear Koylon, Mech. Goods Wire)
Fletcher D. Richards, Inc.
UNITED STATES STEEL CORP.
Batten, Barton, Durstine & Osborn, Inc.
UTICA DROP FORGE & TOOL CORP.
Devereux & Co., Inc.
VICKERS, INC.
Witte & Burden Advertising
VICKERS-ARMSTRONG LTD.
Intam, Ltd.
VICTOR CHEMICAL CO. OF CALIF., INC.
Charles N. Stahl Adv. Agency
WALDES KOH-I-NOOR, INC.
Grey Advertising Agency, Inc.
WALTER MOTOR TRUCK CO.
Thoma & Gill Adv.
WEBER SHOWCASE & FIXTURE CO., INC.
Harrington, Whitney & Hurst Adv.
WESTERN GEAR WORKS
West-Marquis, Inc.
WESTINGHOUSE ELECTRIC CORP.
Fuller & Smith & Ross, Inc.
WESTON ELECTRICAL INSTRUMENT CORP.
G. M. Basford Co.
WHITTAKER CO., LTD., WM. R.
The McCarty Co.
WILCOX ELECTRIC CO., INC.
Arthur G. Rippey & Co.
WILLARD STORAGE BATTERY CO.
Meldrum & Fewsmith Adv.
WILSON CO., THE H. A.
Charles Dallas Reach Co., Inc.
WOLF'S HEAD OIL REFINING CO.
The Aitkin-Kynett Co.
WRIGHT AERONAUTICAL CORP.
Charles Dallas Reach Co., Inc.
WYMAN-GORDON CO.
John W. Odlin Co., Inc.

AVIATION WEEK

Member of the ABC and ABP.

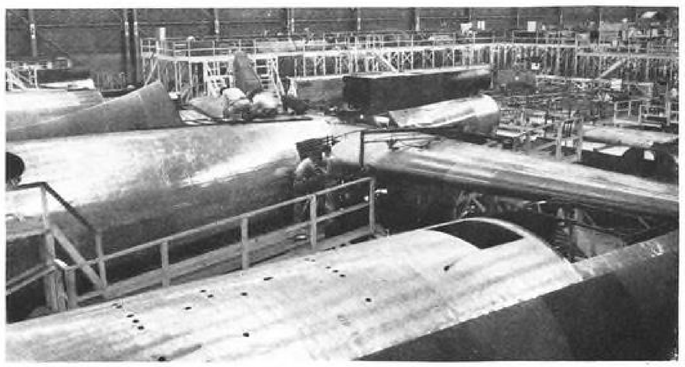
McGRAW-HILL PUBLISHING CO., *330 West 42nd St., New York 18*
Offices in Boston, Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, St. Louis, Atlanta, San Francisco and Los Angeles



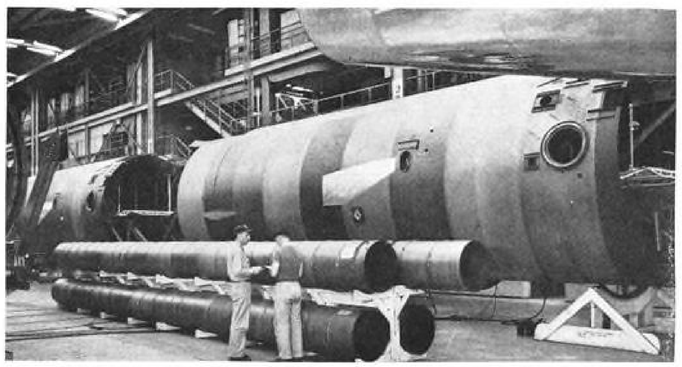
Shown here in two sections, main assembly building at Fort Worth division—where B-36 is produced—is 200-ft.-wide bay stretching 4000 ft. Plant has 8,600,000 sq. ft. of paved working space. Area designations are: 1, horizontal stabilizer; 2, tail mating; 3, tail primary; 4, production stores; 5, wing clean-up; 6, bomb bay; 7, tail; 8, nose primary; 9, nose; 10, wing center section spars; 11, wing center sections; 12, wing mating; 13, major mating; and 14, final assembly. Craft at end of line are turned sidewise.

How Convair Produces B-36, World's Largest Bomber

"Line" gets the accent in Fort Worth production scheme featuring straight 5/6-mi.-run for mating of huge assemblies.

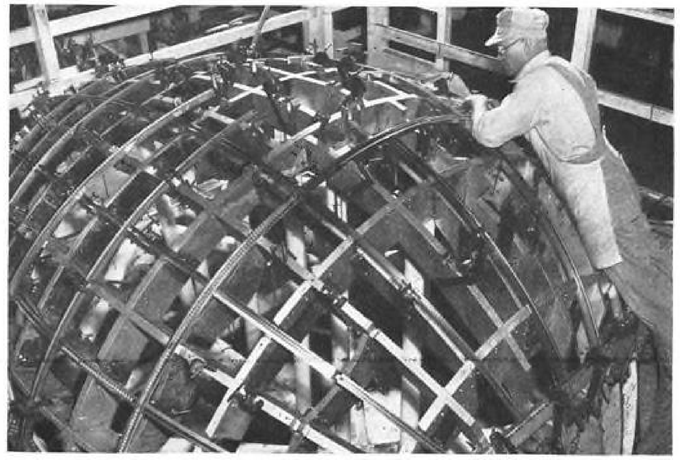


Mating horizontal stabilizer with tailcone and tail section. At this station (left, out of picture), aft bomb bay section is mated simultaneously to tail.

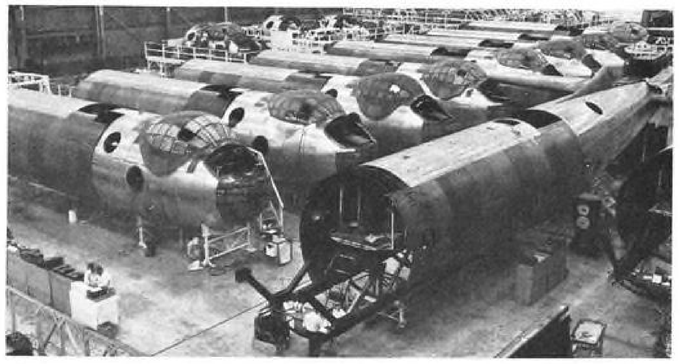


After 85-ft. communication tube is installed in bomb bay sections, they are mated, one to nose section, other to tail section, and placed in primary line.

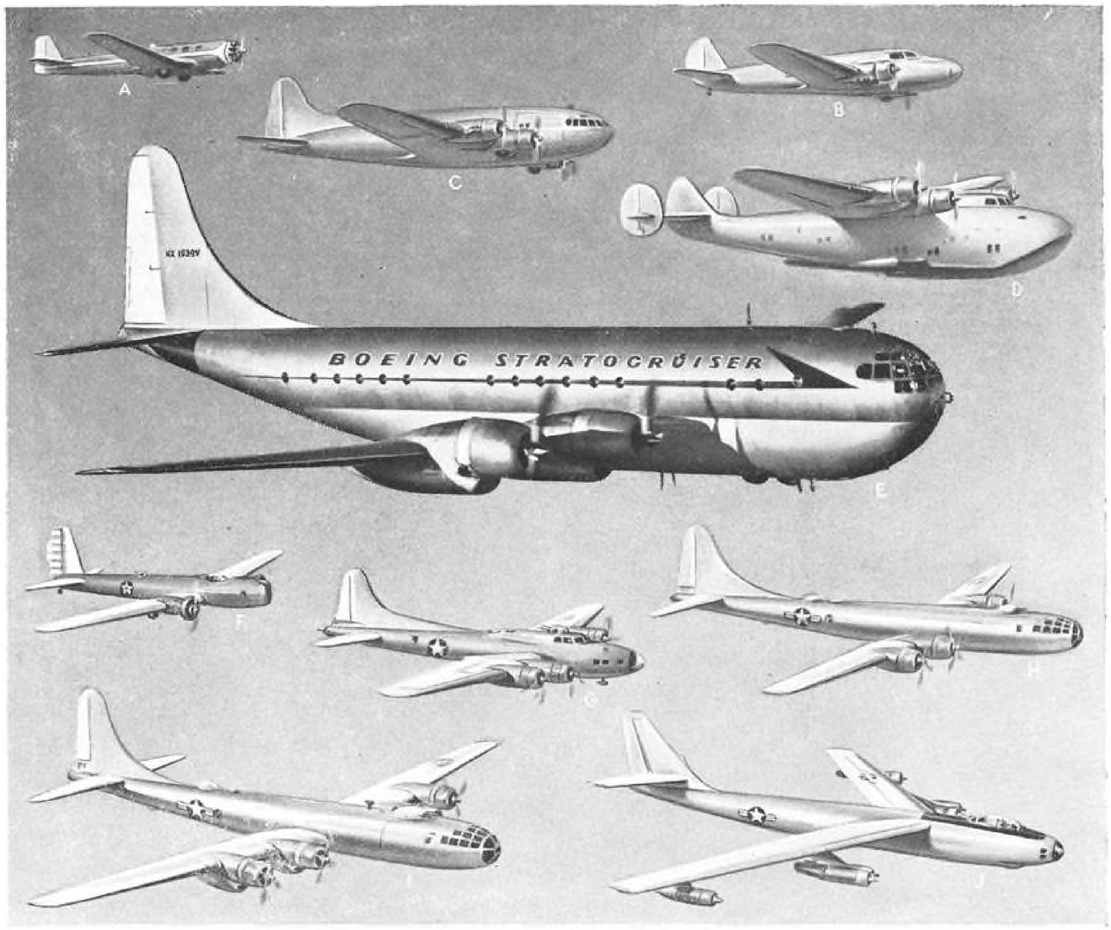
Tremendous stretch of plant's 200-ft. width is strikingly revealed in view from site of bomb bay fabrication. At upper right are seen major assembly fixtures for bomb bay truss structure. Area in foreground and at left is for subassembly.



Pilot enclosure, with hat-sections clamped for spotwelding. Structure, entirely of stainless steel, is closely controlled cross-hatch for proper glass fit.



Nose-forward bomb bay primary line. In background, pilot enclosure is being installed. In foreground is aft bomb bay mated to tail. (Continued on page 37)



Blazers of the trail

Everyone who has ever flown has his eyes on Boeing's great new Stratocruiser as it moves up toward the commercial flight lines.

The reason is easy to see. For the twin-deck Stratocruiser culminates 32 years of trail blazing in aircraft design and production. Into its building has gone all of Boeing's vast wealth of knowledge, skill and experience.

Among its predecessors was the Boeing Monomail, introducing a design formula that's been followed ever since. From it evolved the Boeing 247, America's first three-mile-a-minute transport. Then came the ocean-spanning 314 Clippers, and the Boeing Stratoliner, first pressurized-cabin transport.

In the military field, Boeing leadership has been just as pronounced. The early B-9 bomber established the modern trend in bombardment aircraft. From it developed Boeing's great warrior team, the B-17 and B-29, the new B-50 Superfortress and the radical new 600-mile-an-hour B-47 Stratojet.

Now, the Stratocruiser inherits the design knowledge gained from development of the whole proud Boeing line. Already proved in exhaustive flight tests, this fastest, most powerful, most comfortable of all commercial transports will soon go into service on the airlines of the world.

A. Monomail
B. 247 Transport
C. Stratoliner
D. 314 Clipper
E. Stratocruiser
F. B-9 Bomber
G. B-17 Flying Fortress
H. B-29 Superfortress
I. B-50 Superfortress
J. B-47 Stratojet

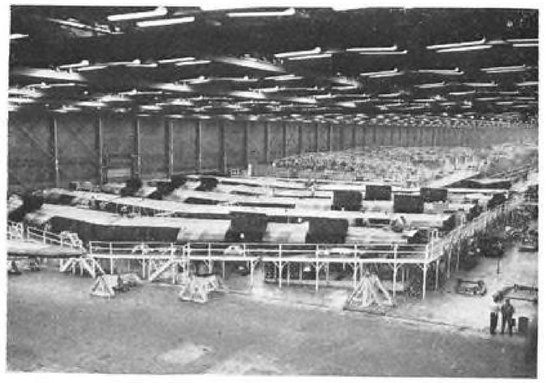
Boeing is building fleets of Stratocruisers for these forward-looking airlines:

PAN AMERICAN WORLD AIRWAYS • SCANDINAVIAN AIRLINES SYSTEM • NORTHWEST AIRLINES
AMERICAN OVERSEAS AIRLINES • UNITED AIR LINES • BRITISH OVERSEAS AIRWAYS CORPORATION

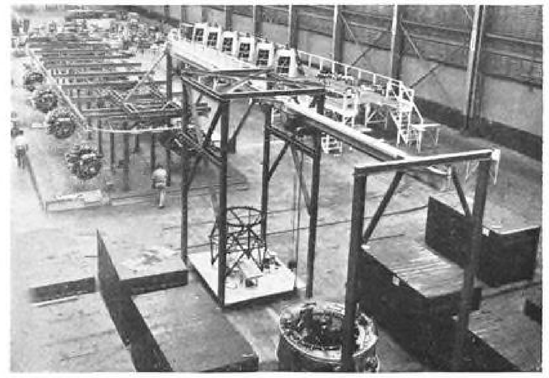
For the Air Force, the B-50 Superfortress, B-47 Stratojet and C-97 Stratofreighter; for the Army, the L-15 Scout liaison plane.

BOEING

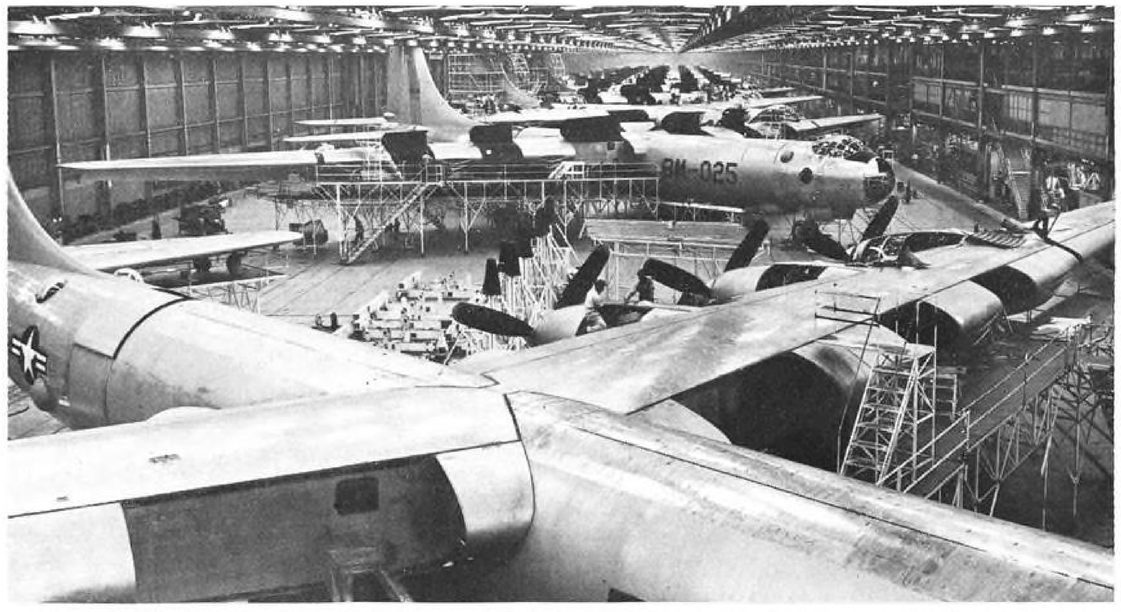
As B-36 Approaches End of Line . . .



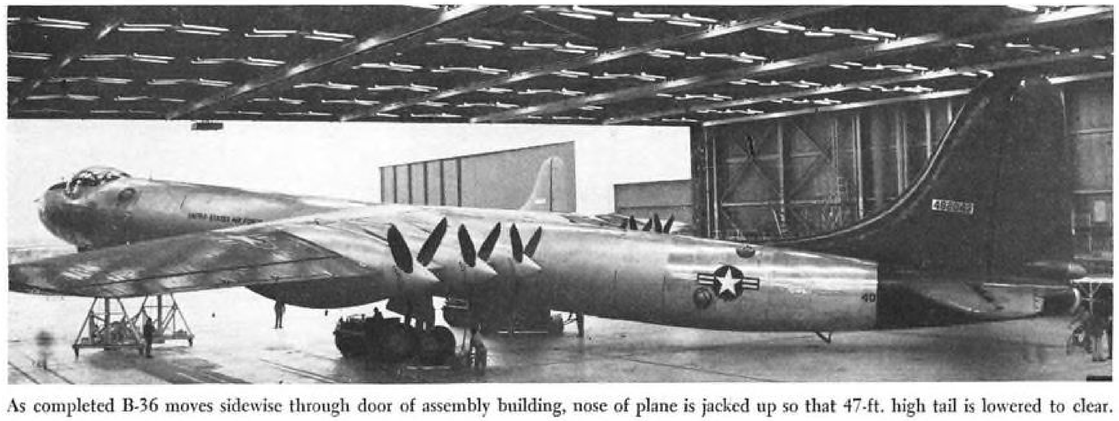
Wing flat line, for primary installations. Air inlet openings have been provided and removable leading edges coordinated with wings.



Powerplant assembly, covering engine dress-up, build-up. Each engine is on tracks, goes through single turn for build-up cycle.



At end of line, craft are turned to afford room for full wing span, 230 ft. Vertical tail extends up into roof truss area for clearance.



As completed B-36 moves sidewise through door of assembly building, nose of plane is jacked up so that 47-ft. high tail is lowered to clear.

when it all depends on a clamp

you can depend on MARMAN

When it comes to holding things together — under stress and strain, heat, pressure, vibration —you can really rely on Marman Clamps and couplings...V-bands for high temperature ducts, Channel-bands for air conditioning systems, straps for supporting fuel tanks, accessories and fixtures—to name just a few. Somewhere in this varied line is the answer to every fastening problem.

There is no more need for you to spend design time on a clamp than on a standard nut or bolt. Marman's standard types will fill every need and can be specified as easily as standard nuts and bolts.

This versatile group of products is the result of years spent in the design of standardized units for every specialized application. Now manufacturers can have these clamps and couplings designed right into their products saving design time and production money on jobs which once required individualized parts.

FOR INFORMATION WRITE DEPT. A-1

MARMAN PRODUCTS CO. INC.
940 WEST FLORENCE AVENUE
INGLEWOOD, CALIFORNIA

Dynamotor "Canned" For Altitude Efficiency

A unique and compact dynamotor assembly has been devised by Bendix Aviation Corp., Red Bank (N.J.) division to solve economically the difficult problem of obtaining efficient operation of this airborne, rotating electrical equipment at extremely high altitudes.

The dynamotor is housed in an ordinary No. 2 can—the type commonly used for vegetables—hermetically sealed in sea level air. Result is that the unit functions at sea level conditions and efficiency even though it is operating at great heights. Because the dynamotor is, normally, an unventilated device, no undue heating problems are created by confining it in a can.

A special yoke is installed in the assembly to save weight and space, and sponge rubber bumpers cope with end play. Terminals are provided in one end of the can and sealing is done with a standard machine having a modified chuck to accommodate them.

If repairs are necessitated, the dynamotor may be freed with use of an ordinary can opener, then resealed in a similar housing.

Supplier of the housing, the American Can Co., estimates that it will withstand altitudes up to 200,000 ft. before rupturing from the pressure of the contained sea level air.

Metric-Size Wrenches

Open end wrenches with metric-size jaws have been produced by Plomb Tool Co., Los Angeles, for mechanics who maintain foreign-made equipment. Opening size combinations, in millimeters, are 6 × 7, 8 × 9, 10 × 11, 12 × 13, 14 × 15, 16 × 17, 18 ×19, 20 × 22, 21 × 23 and 23 × 26.

The New Firestone SKY CHAMPION LEAKPROOF TUBE

HOLDS AIR 4 TIMES LONGER

Greater Safety • Added Economy • More Landings
Less Servicing • Fewer Tire Changes
More Retreadable Tires

THE NEW Firestone Sky Champion Leakproof Tube brings you all these advantages at no increase in price or weight. The tube is made of natural rubber, chemically treated on the inside to greatly improve its air-holding qualities. This means greater protection to the tire because it operates through a greater part of its life at proper air pressure, providing greater safety on landings and takeoffs. This also means reduced maintenance cost due to less frequent inflating and fewer tire changes. Because the tire body is protected against the hazards of underinflation, it may be retreaded for additional service.

Write Firestone, Aircraft Products Division, Akron, Ohio, for more complete information on this outstanding new product.

Listen to the Voice of Firestone every Monday evening over NBC

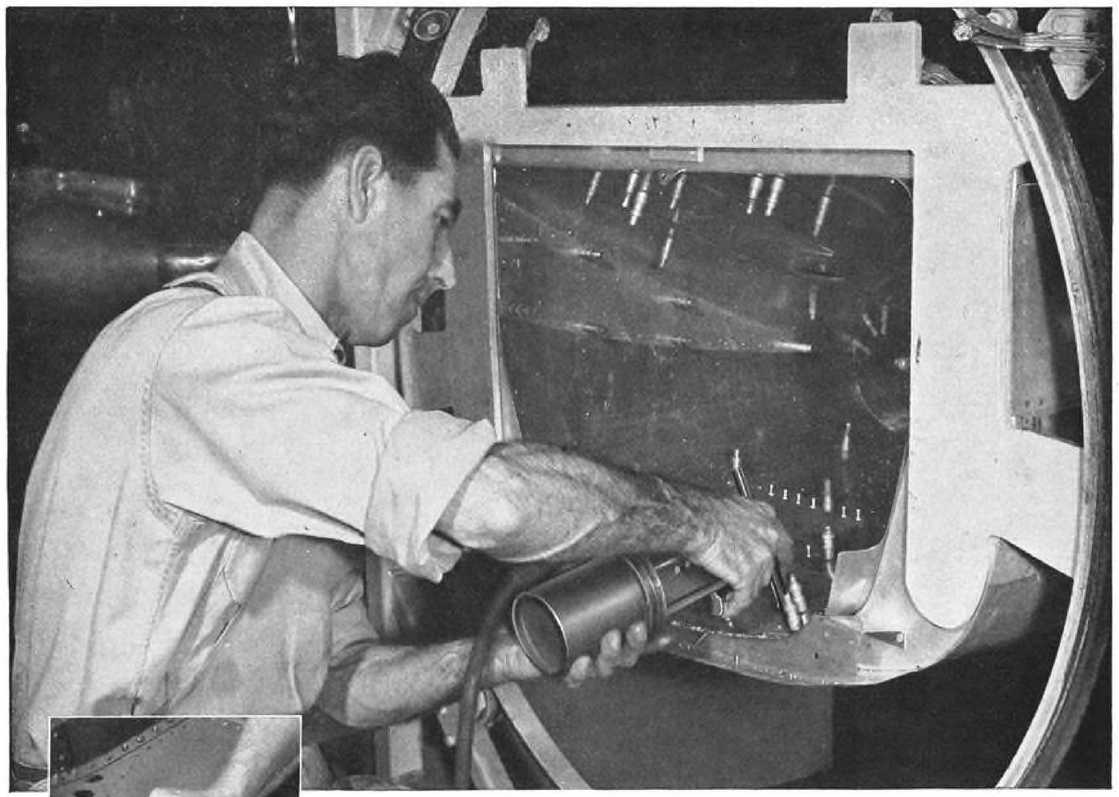
Copyright, 1948, The Firestone Tire & Rubber Co.

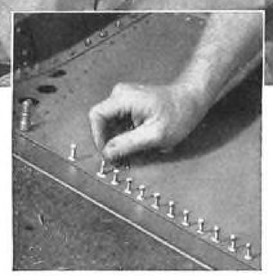
NOT THIS

BUT THIS

Firestone
SKY CHAMPION
TIRES and TUBES
Mean
GREATER SAFETY

No Increase in Price

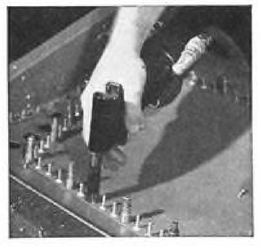




Insert the rivet in the drilled hole. With the gun, pull through the rivet stem and expand the rivet in the materials to be fastened.

Here a Cherry riveter pulls aluminum rivets in a typical hard-to-reach, airplane assembly job.

Cherry Blind Rivets
MAKE THE HARD JOBS EASY



FREES PRODUCTION PLANNING Fuselage, wing, tail group, and other aircraft assemblies are finished faster with Cherry Rivets. There's no bucking . . . Only one man is needed. Riveting from one side of the work does away with those "blind spot" production problems.

COMPARABLE TO SOLID RIVETS Cherry Rivets have shear values comparable to solid rivets . . . But they are much easier to use any time, anywhere. They combine the strength of solid rivets with a very simple fastening technique.

VIBRATION-RESISTANT Cherry Rivets have excellent hole-filling qualities and high clinching action between the shank of the rivets and the materials fastened. This gives Cherry riveted joints exceptional resistance to vibrational stresses.

UNEQUALED FOR MAINTENANCE WORK In maintenance work, they stand alone . . . unequaled. Easy to install, easy to remove. Easy to replace. They enhance the appearance of any job. Try Cherry Rivets today and gain years of less expensive assembly work.

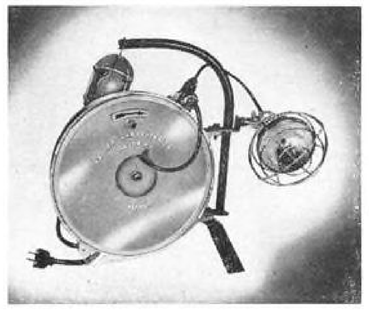
Cherry Rivets are made from aluminum, steel, or Monel. Standard rivets are available in five diameters and two head styles. There is a wide range of grip lengths. Special heads, diameters, grip lengths, and alloys can be made to order. Write us today for further information. Address Department **A-110**, Cherry Rivet Company, 231 Winston Street, Los Angeles 13, California.

CHERRY RIVETS. THEIR MANUFACTURE & APPLICATION ARE COVERED BY U. S. PATENTS ISSUED & PENDING

Cherry Rivet Company
LOS ANGELES 13, CALIFORNIA

CHERRY RIVETS ARE APPROVED BY CIVIL AERONAUTICS AUTHORITY AND UNDERWRITERS' LABORATORIES, INC.

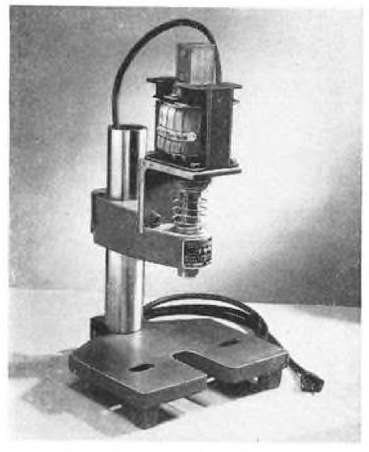
NEW AVIATION PRODUCTS



automatic or manual operation, Model BS-1 punch, made by **Black & Webster, Inc.**, 30 Pleasant St., Needham 92, Mass., is suitable for staking, riveting, marking, wire cutting, blanking, forming and drawing of metals, plastics, fabrics, leather, etc. Unit incorporates high temperature silicone-insulated coil in rugged solenoid which permits continuous operation at better than 150 blows per min., delivering impact of more than one ton. Device weighs 45 lb. and needs less than 1 sq. ft. of space.

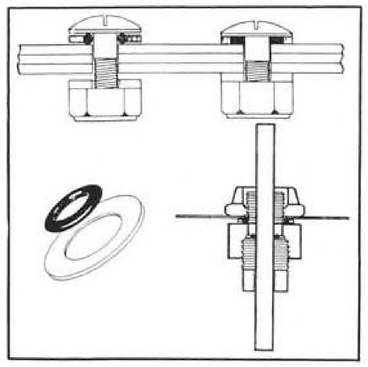
For Illumination Problems

"Light King", practical aid in difficult lighting locations in hangars, ramps and factories, is portable combination of flood lamp and extendible trouble or utility light made by **Keller Laboratories**, Oneida, N. Y. Each light has 26-ft. cable, giving working radius of 52 ft. from nearest outlet. Twin reels are cast aluminum alloy, stand and handle rod are black enameled steel. Single turn retracts cable 2-3 ft. Low center of gravity and balanced 3-point standard give secure support. Unit may be removed from standard and mounted on wall or other location. Spotlight uses 150w. flood lamp, trouble light holder takes bulbs up to 100w. Double outlet permits use of electric drill or other tool by disconnecting flood lamp or trouble light. Wire is covered with special grease- and water-resistant material. Weight is 24 lb.



Versatile Impact Hammer

Designed for multitude of uses where speed and high production rates are important in field of automatic, semi-



Sealing-Action Washer

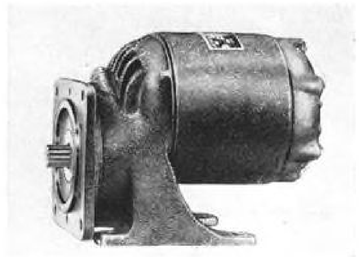
Washer giving effective positive seal around screws, bolts, rivets, tubing, electrical wires and in hydraulic applications, is announced by **Franklin C. Wolfe Co.**, 407 Commercial Center St., Beverly Hills, Calif. Known as Lock O-Seal, device is small rubber-like sealant ring encircled by washer-like retainer serving to prevent compression of ring beyond elastic limit. It's claimed that seal will not deteriorate, has locking as well as sealing action, may be re-used, and provides same full metal-to-metal bearing surface as standard washers.

Dry Chemical Fire-Fighter

Portable fire extinguisher announced by **American-LaFrance-Foamite Corp.**, Elmira, N. Y., is designed to afford long range and duration of operation, and more complete discharge of chemical contents. Unit has all-internal expelling gas connections, built-in safety disk, and is light in weight. Chemical is non-toxic, non-corrosive, nonconductor of electricity, and will not freeze. It is recommended for liquid and electrical fires.

Comfortable Headset

Twin receiver headset, developed by **Telex, Inc.**, 1633 Eustis St., St. Paul, Minn., is reported to weigh only 1.6 oz. Each receiver is positioned just above ear and is connected to easily adjusted, nickel sound-arm by locking ball-and-socket joint so that only small plastic tips enter ear openings, thus eliminating pressure and chafing. Sound arms can be removed from ears without removing receiver from head. Single cord connection can be plugged into either receiver, or both. Headband, made of Z-nickel sheet encased in Tenite plastic, can be bent or twisted for slipping into pocket or small compartment.



Motors For Aircraft

Line of high frequency induction type aircraft motors, offered by **U. S. Electrical Motors, Inc.**, 200 E. Slauson Ave., Los Angeles 54, Calif., operate on a.c. and with synchronous speeds of 6000, 8000 and 12,000 rpm. Available in sizes from ⅛ to 16 hp., they are 3-phase, high frequency, 400c. for intermittent or continuous duty. Lightweight alloy housings are used, ball bearings are pre-packed. Units are offered with or without built-in gears. One type can be equipped with a built-in brake for instant stopping. Thermo devices afford overload protection to safeguard motors upon failure of actuators or other parts.

FINANCIAL

What New Taxes Will Mean

President's proposal reflects administration thinking for business levies, but Congress has the last word.

The aviation industry will be vitally affected by the tax legislation enacted in Washington this year. While the President may propose various levies, it is Congress, in the final analysis which will write the conclusive tax bills.

The outlook for all industries, particularly the aviation groups, will be reappraised in the light of the President's recommendations. Such projections will unquestionably submit to revisions as the separate Congressional committees proceed to write their tax bills.

With this background, it may be well to remember that despite the initial hysteria likely to greet the Presidential tax recommendations, Congress will make the final determinations in this respect. Further, the process promises to be time-consuming.

▶ **What to Expect**—Under such circumstances, it is virtually impossible to predict the ultimate form of tax legislation emanating from the 81st Congress. It is possible, however, to conjecture on the general tenor of taxation surrounding the aviation industry, premised largely on government policies in effect during the last war and in recent periods.

The aircraft builders may be subject to the same profit limitations due to high corporate and excess profits taxes as may be imposed on all enterprises. An important qualification, however, is present in the special status the aircraft industry holds in its relationship to the government.

While the official policy has been to erect special safeguards to limit profits on aircraft contracts, at the same time the government is interested in fostering a healthy and financially solvent industry. This was inherent in the recommendations advanced by both the President's Air Policy Commission and the Congressional Aviation Policy Board.

Thus there is strong reason to believe that even if excess profits taxes should be imposed on the aircraft industry along with all other industrial enterprises, consideration of this factor as a drain on resources will be handled in the renegotiation processes.

In other words, it is probable that renegotiation of profits for the aircraft builders will be done with full consideration toward the final results, after taxes of all types.

▶ **Profits Circumscribed**—Currently, the aircraft manufacturers are circumscribed as to the extent of profits they may retain on military contracts. The Vinson-Trammel Act confines profits on military aircraft and components to 12 percent of sales. There is no guarantee that this limit must be attained. In fact, it is rarely reached. The Renegotiation Act of 1948, which applies to contracts let under 1949 fiscal awards, contains the promise of strict restrictions in accepting reasonable and necessary costs on military contracts.

The agencies responsible for procurement of aircraft also have their own ideas on profit margins and allowable costs. It is believed in informed quarters that aircraft builders may be permitted to earn at least 4 percent on sales on all military contracts, after taxes, under conditions of economical management. There is no assurance that such minimum return will be realized but the opportunity at least may be available.

In a number of instances, aircraft companies will obtain special relief during 1949 and 1950 under the carry forward provisions of the tax laws under which losses of the past two years may be applied against profits in the following two years.

▶ **Airline Position**—The airlines may be expected to occupy a favorite position in the federal tax structure. The carry forward provision of the tax laws applies with even greater force to a number of key airlines. Under this measure, substantial tax credits as a result of heavy losses during 1948 will ease the tax imposts on available earnings for this year or 1950.

During the last war, airlines were exempted from the excess profits tax to the extent of their mail pay and normal exemption. With the single exception of Eastern Airlines, this provision removed the industry from the payment of any excess profits taxes.

With federal policy directed toward the financial strengthening of the airlines, there is strong support for a similar exemption to be incorporated in any excess profits tax law that may be enacted.

Certainly the government would be working at cross-purposes with itself if on one hand it should usurp all airline earnings through heavy taxation and on the other support the industry through increased mail payments.

▶ **Eastern Cited**—As a matter of interest, it is significant that Eastern paid a total of more than $15 million in excess profits taxes during the war years. Some industry observers were critical of the Eastern management in not spending more money in various pursuits so as to reduce its tax liability. An informed view, however, holds that if this policy were followed, the close control of operating costs might have been impossible in the postwar period that followed.

A major contradiction in government policy exists in the form of the continuing excise taxes on transportation. When originally imposed, one of the main objectives of the transportation tax on persons was to discourage unnecessary travel. A collateral purpose, of course, was to provide a new source of federal revenues.

The history of excise taxes on transportation is quite clear in the intention to maintain them only as a temporary measure. For instance, during the first world war, an excise transportation tax was imposed effective Oct. 3, 1917, and was finally repealed as of Jan. 1, 1922.

Effective Oct. 10, 1941, an initial 5 percent tax was imposed on all transportation of persons. This was increased to 10 percent on Nov. 1, 1942, and to 15 percent on April 1, 1944, at which level it now remains. A 3 percent tax on the transportation of property was enacted effective Dec. 1, 1942, and continues to this day.

▶ **Airlines Hardest Hit**—The reasons for the original imposition of these transportation taxes no longer exist.

While all forms of transportation are affected, the airlines are hit the hardest by this impost. In attempting to broaden their markets, the air carriers must press for lower rates to make their service more attractive to a wider circle of the public.

The removal of the 15 percent tax would afford the air carriers with greater flexibility in their passenger tariffs. The government, in the long run, stands to gain by this repeal. This would stem from the fact that the more profitable the airlines are in their passenger service, the less the drain on federal funds through mail subsidies. This is to say nothing of strengthening the air carriers in the interest of national defense.

It is doubtful if a better candidate in tax elimination can be found than the transportation excise levy. The beneficial effects flowing from this repeal promise to more than offset the relatively limited revenues from this source.

—Selig Altschul

PERFECTLY MATCHED-

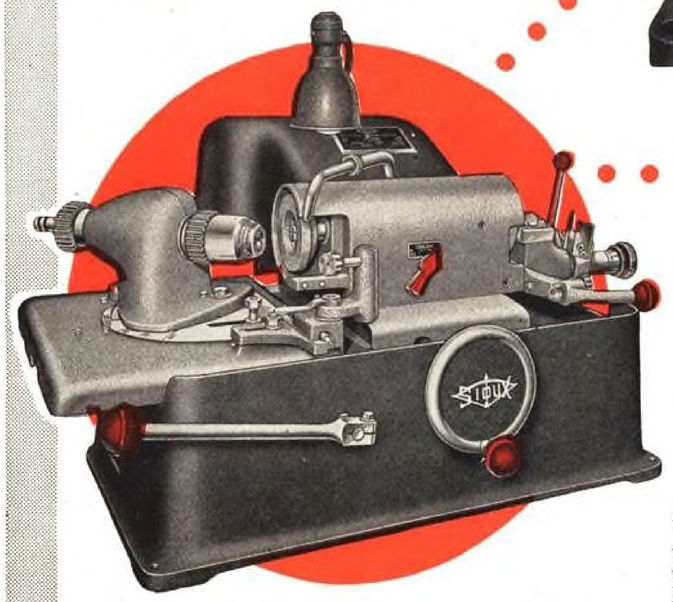
for *Fast-Factory Finish Grinding* on Valves and Seats

SIOUX

PERFECTED DUAL ACTION

Valve Seat Grinder with Ball Bearing Holder

Precision work in fast time is made possible by the almost unbelievable speed of this valve seat grinder. Perfected dual action provides a controlled fine vibration for grinding accuracy and dispersion of cuttings—wheel mounted for full valve seat contact. Uniform finish all the way round is assured.



the New SIOUX

WET VALVE FACE GRINDING MACHINE

More Dollar Value Than Ever Before

Wet Grinding eliminates heat and distortion, producing finest finish and factory precision. Wet Grinds Valves, Valve Ends, Tappets and Rocker Arms.

Sold only through authorized SIOUX Distributors

STANDARD THE WORLD OVER

ALBERTSON & CO., INC. SIOUX CITY, IOWA, U. S. A.

"MOST COMFORTABLE, ROOMY PLANE"...say Navion Owners

"A REALLY FULL-SIZED 4-PLACE CABIN"—"Most comfortable"—"Restful and relaxing"—"Superb visibility"—are typical answers several hundred *Navion* owners gave when asked what they thought of their planes. Every day more executives and professional men are discovering that the *Ryan Navion* is the ideal personal and business plane. There are good reasons. Front seats are individually adjustable, ventilation is draft-free. Improved sound insulation and smooth-as-silk stability—even in rough air—give quiet relaxation. The exclusive roll-back canopy gives easiest exit and entrance for rear-seat passengers. And there's loads of space for luggage or cargo. See how you can profitably use a *Ryan Navion* in your business or profession. Write us today on your letterhead for a free, fully-illustrated brochure, and ask about a free demonstration flight. There's no obligation.

"SAFE"—"EASY-TO-FLY" was No. 1 on the long, favorable list of comments about the 150-mph *Navion*. Almost every owner stressed *Navion's* effortless flying and the patented inter-connected aileron and rudder control that permits steering with wheel alone, but gives you rudder when you need it. That's why owners agree the safe, dependable *Navion* virtually flies itself!

"RUGGED"—"DON'T HAVE TO BABY IT"—"Can really take it"—these were high on the list of *Navion*-owner comments. The ability of the thick-skinned, all-metal *Navion* to withstand heavy-duty punishment, in all kinds of weather, on rough or improvised fields, is one big reason why *Navion* owners fly anywhere they want to go...and do it as cheaply as driving a car.

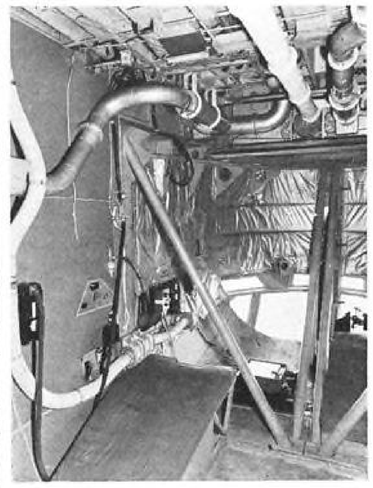
"SHORT FIELD PERFORMANCE—THE BEST" was an almost unanimous chorus from *Navion* owners. *Navion* delivers the slowest, shortest landings of any plane in its class. High-lift, full-deflection flaps, husky tricycle gear with wide wheel tread and oversize tires, *steerable* nose-wheel, and high ground clearance make for smooth, solid landings even in cross winds.

The Thoroughly Proven Post-War Plane *Ryan Navion*

Rely on Ryan RYAN AERONAUTICAL COMPANY • 41 LINDBERGH FIELD • SAN DIEGO 12, CALIFORNIA

AVIATION WORLD NEWS

Bristol Freighter must refuel at isolated, primitive airstrips such as this.



Photographer lies prone in this station to shoot through panels in modified nose.

Searching for Oil in Iran by Air

New survey flights, using specially-equipped Bristol Freighter, will map 10,000 sq. mi. of Middle East.

LONDON—Prospecting for oil from the air again will get under way shortly in the Middle East. A specially-modified Bristol Freighter of Hunting Aerosurveys Ltd. already has left England to undertake the job for the Anglo-Iranian Oil Co.

The operation is expected to last over a period of two or three years, with the plane carrying out its camera-studies for six months out of each year. It is the sixth such aerial exploration Anglo-Iranian has conducted, the first three having been in 1936, 1937 and 1938 and the last two in 1946 and 1947.

▶ **New Maps**—Large areas of the Middle East never before accurately charted have been photographed from the air during these surveys. Detailed maps and photographic mosaics made up from these shots enable geologists to spot the likeliest oil-yielding locations. The result is to narrow down the areas to be studied on the ground and will give an increasingly clear picture of the probable oil and mineral resources of this part of the world.

The present survey is expected to add 10,000 square miles to the area already mapped.

The Hunting Aerosurveys' "Freighter," used for a similar survey that began late in 1947, has had its nose-observation panels modified still further to give better visibility.

Additional Perspex panels enable the photographer to see a little more "round the corner" and also increase his forward field of view. The camera station has been moved forward slightly so that the photographer, who lies prone like a bombardier, can take photographs and observe through the panels at the same time.

Another change is the installation of a partition separating the nose from the aircraft's hold, easing the problem of maintaining comfortable temperatures in the camera compartment at high altitudes.

▶ **From 22,000 Ft.**—The "Freighter" is fitted with oxygen apparatus for operation at altitudes of 22,000 ft. By flying at this height, the survey party will conserve film by widening the range covered by the camera.

The plane will carry out to Iran more than a ton of photographic equipment and other survey gear, as well as a crew of seven.

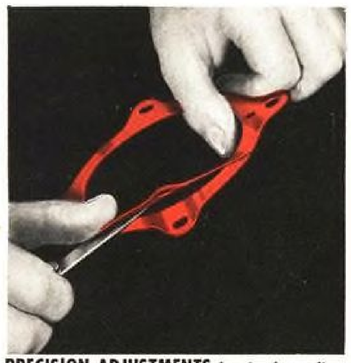
Throughout the operation, the plane and its crew will be based at Abadan, but overnight stops at remote airfields may occasionally be necessitated by bad weather. This is unusual, however, for the six months during which the expedition will operate normally are quite good for air survey.

Refueling away from base calls for a little organization. In 1947 the "Freighter" refueled occasionally at points where fuel arrived from Abadan in consignments of 600 to 700 gallons at a time in 4½ gallon cans, after a long journey by barge and lorry.

▶ **Hot Work**—At first the expedition will work in ground temperatures of 75 to 80 deg., falling to 50 deg. at night. By the end of March, conditions become more uncomfortable, and at the end of May daytime temperatures have risen to 115 to 120 deg.

Under these conditions, it is definitely a relief to fly to 8000 ft. to cool off. Unfortunately, by the time the aircraft has climbed to 20,000 feet or more, conditions have changed completely and after prolonged periods of high flying crews find themselves wish-

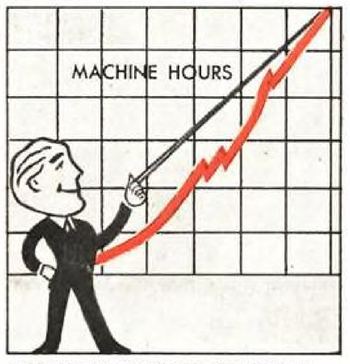
LAMINUM* SHIMS GIVE THE FULL SAVINGS OF SHIM DESIGN!



PRECISION ADJUSTMENTS by simply peeling laminations. No grinding, miking, filing. Machining tolerances are greatly increased because the shim provides for exact fit and takeup.

AT-THE-JOB ADJUSTMENTS. No need for standby lathe or operator. The only tool required is a jackknife to peel off a .002" or .003" lamination.

PREVENTION OF OIL AND PRESSURE LOSS. Fitted with babbitted lugs, LAMINUM shims will also seal oil in the bearings of high speed pressure-lubricated equipment.



LESS "DOWN TIME" FOR THE USER. The use of LAMINUM provides a permanent adjustment feature to allow for wear and preserve critical accuracy.

Send today for chart illustrating 46 money-saving, time-saving applications, detailed specifications, sample of LAMINUM.

PRECISION STAMPINGS in any quantity

Let us quote on your *difficult* stamping jobs. Our experience, tools and presses are geared for *close tolerance* production.

*LAMINUM (Reg. U. S. Pat. Off.) shims are solidly bonded laminations of .002 or .003 inch precision gauge brass or steel with a microscopic layer of metallic binder. Cut to your exact specifications.

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

LAMINATED SHIM COMPANY, Inc.
5101 Union Street Glenbrook, Conn.

SHIMS SHIM STOCK STAMPINGS AN-COR-LOX NUTS

ing they were back on the ground.

The aircraft normally carries five people on each flight—pilot and copilot, photographer, radio engineer, and a captain of the Iranian Air Force, who flies as observer and—since the Persian Government is informed of all areas which are to be photographed—has the job of seeing that the aircraft does not fly outside the agreed limits.

Weather forecasts come from two sources—the R.A.F. station at Shaibah and personnel in the drilling areas who contact Abadan by 'phone every morning, giving details of visibility and cloud formations and also, during January, February and March, advising on the possibility of occasional thunderstorms. After March, there is a two months' spell of fine weather, followed by a period in which heavy snowstorms are not infrequent.

► **Experience**—Last year's expedition was in the air for 450 hours and covered roughly 70,000 miles. After six months at Abadan they flew to Kuwait to survey three areas totaling about 160 square miles for the Kuwait Oil Company. This comparatively small job lasted only three weeks and photographs were taken from altitudes of about 3000 ft. On the return journey to England they undertook survey work for the Cyprus Mines Corporation and the Hellenic Mining Company.

The previous expedition's experience proved the Bristol "Freighter" ideal for aerial survey work, operating reliably at high altitudes and giving the photographer plenty of room in which to do his job. Another attractive feature for an expedition on such a scale was its ability to transport the entire party and all the aircraft spares, photographic and survey equipment required for six months operation overseas.

From Planes to Trains

BANGALORE, India—India's only aircraft factory, which has handled a great diversity of projects since the U. S. Air Force stopped using it as a maintenance base at the end of the last war, has been given a major role in supplying the country's pressing need for railway rolling stock.

Still titled Hindustan Aircraft Ltd. although its aircraft work is confined to airline overhaul and assembly of British training planes for the RIAF, it has been assigned a contract for 100 all-steel streamlined lightweight railway carriages built on "stressed-skin" aviation principles.

The carriages were developed when the factory, which is owned by the Indian government, was still being operated largely under American contract management.

Greater Blades for Bigger Jobs

Now—A New Blade Construction Principle Opens New Horizons for the Aeroprop

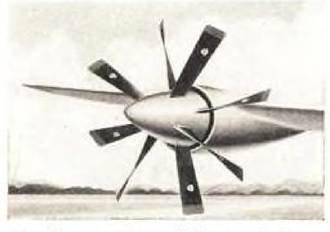
With the successful development of the tubular blade principle, Aeroproducts announces another great stride forward—Aeroprops with tubular blades engineered for engines up to 10,000 horsepower.

There are two salient advantages offered by the Aeroprop with tubular blades. It gives high power-absorption at high efficiency. It gives strength-weight ratios comparable to or better than those of ordinary hollow blade construction, yet it is available in larger sizes. Thus engines of greater horsepower may be used within diameter limitations of present propeller installations while larger blades for more powerful engines become feasible.

Tubular Blade Cross Section. **(A)** Main structural member—seamless tapered tube flattened and formed. **(B)** Air-foil contour—one-piece die-formed sheet of steel silver-brazed to tube; trail edge roll-welded. **(C)** Aeroproducts' light, cellular blade-filler material bonded to steel stabilizes secondary vibratory stresses.

Tubular bladed Aeroprops have passed all required military tests. Like all Aeroprops, they are produced with selected features—reverse pitch, instant-feathering, de-icing, etc. Models with application up to 10,000 horsepower are in production or design.

Like all Aeroprops these propellers demonstrate again that Aeroproducts—backed by the vast research facilities of General Motors—can help today with your planning for tomorrow.

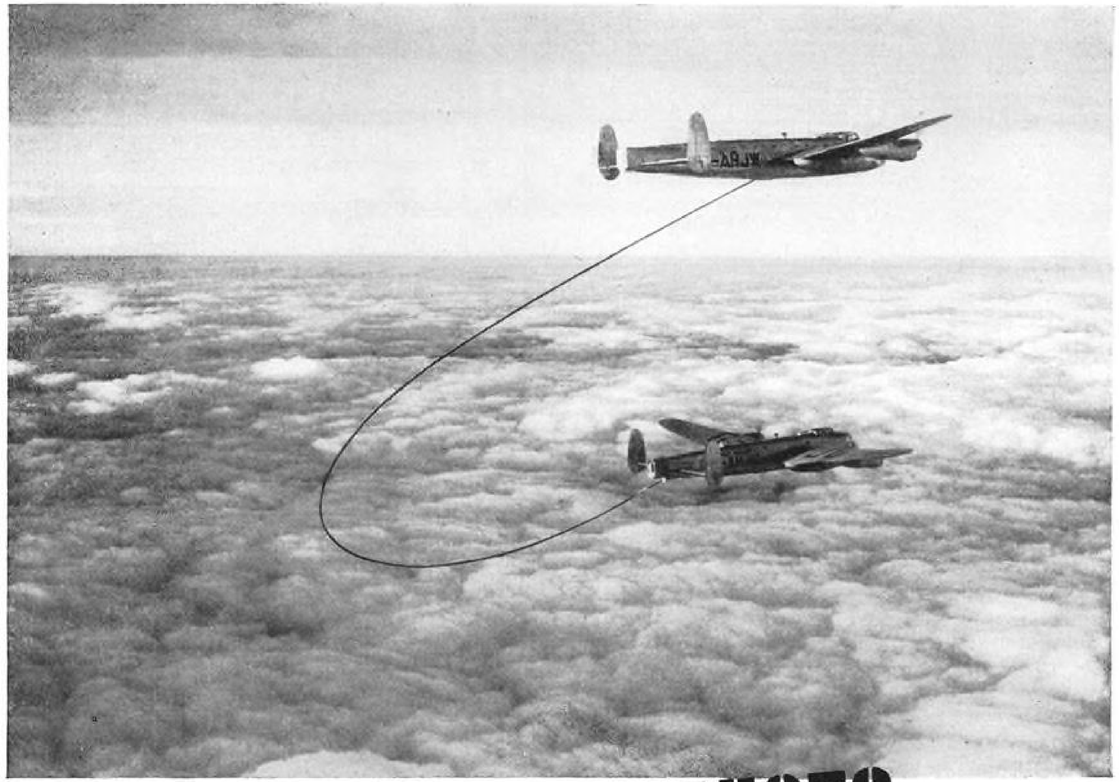


The Aeroprop is available in single or dual-rotation with instant-feathering, reverse pitch, electric de-icing, and all other features required for any installation. Regulator, hub and blade assemblies are designed for unit installation or replacement. It is strong, light and simple.

Aeroprop

BUILDING PROPELLERS FOR AIRCRAFT TODAY
DESIGNING PROPELLERS TO MEET TOMORROW'S NEEDS

AEROPRODUCTS DIVISION • GENERAL MOTORS CORPORATION • DAYTON, OHIO



*SUCCESSFUL TESTS

PROVE REFUELLING IN FLIGHT

Greatly Increases

- RANGE
- PAY LOAD
- BLOCK TO BLOCK SPEEDS
- SAFETY

WORLD-WIDE AIR TANKER SERVICE — SUPPLIERS OF COMPLETE FLIGHT REFUELLING EQUIPMENT

*During December 8th and 9th, U.S. B-50 bomber flew 9,400 miles non-stop, with the aid of three mid-air refuellings.

FLIGHT REFUELLING INC.

1915 News Building
220 East 42nd Street
New York City

Emergency Facilities

MELBOURNE—Emergency landing facilities at places all over Australia are being organized by the National Safety Council.

In 1939, the Council evolved a plan to assist aircraft in distress in making emergency landings. The project was held in abeyance during the war and was replaced by the Volunteer Air Observation Corps of the Royal Australian Air Force.

The duty of this volunteer organization was to keep track of Allied and enemy aircraft and to assist distressed planes.

The Council is now continuing with its original program of organizing air safety committees in country districts. These committees will be trained to give expert assistance to pilots forced to make emergency landings at night in their districts.

They select from their members an emergency night-landing team and arrange for the use of a suitable landing field.

The ultimate objective is to have committees operating at distances of 50-100 miles at points throughout the Commonwealth, and 752 municipalities have been approached with requests to organize such committees by the National Safety Council.

Where it is not practicable to provide local landing facilities, the nearest committee will assume additional signaling duties to direct distressed aircraft to suitable landing fields.

Manila's New Runway

MANILA—Construction of a modern runway at Manila International Airport, south of the Philippine capital, within 300 days from Oct. 12, 1948, is called for in a contract between the Philippine and United States governments and Marscon, Inc.

Marscon is a Philippine corporation formed by Morrison-Knudsen, Inc., of Boise, Idaho, and Marsman and Co., a Manila construction firm.

In addition to the new runway, the existing NW-SE runway will be extended.

The Manila International Airport was formerly Nichols Field, a U. S. Army fighter base from 1921 to the outbreak of World War II.

Runway construction is part of the Civil Aeronautics Administration program for airport rehabilitation.

The field, which reverted to Philippine control in 1947, has had increased difficulty in accommodating heavy planes, which are proving too much of a burden for the present light concrete runway.

KENYON CONTINUES TO SERVE THE MAJOR AIRCRAFT MANUFACTURERS

HYDRAULIC... Check, Relief, Restrictor, Multiple Selector, Thermal Expansion Valves, Line Filters.

PNEUMATIC... Pressure Regulators, Solenoid Actuated Valves.

FUEL AND OIL VENT SYSTEM... Vacuum Check, Vent Check, Check-Relief Valves.

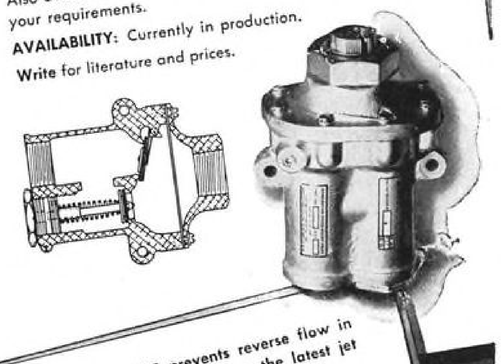
CONTROLS... Flexible Shafts, Gear Boxes, Tab Actuators, Torque Tube Drives.

GAGES... Accumulator Charging, Differential Pressure, Hydraulic.

MINIATURE PRECISION PRINTED CIRCUITS... Electrical, Electronic and Optical Parts.

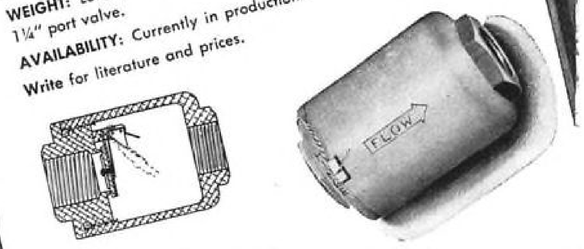
KENYON COMBINATION CHECK-RELIEF VALVE for fuel and oil vent systems currently used on latest jet aircraft.

Combines two units, eliminates weight in extra tubing and fittings.
Non-metallic parts impervious to oils or aromatic fuels.
WEIGHT: 15 oz., aluminum.
Also available with 90° elbow and mounting flange or to your requirements.
AVAILABILITY: Currently in production.
Write for literature and prices.



KENYON LOW-PRESSURE CHECK VALVE prevents reverse flow in vacuum and low pressure air lines. Also used on the latest jet aircraft.

AN APPROVED. Conforming to drawing AN5830-1 to -10.
High efficiencies permit a large flow with a small pressure drop which betters AN requirements.
Has yellow dot approval.
Non-metallic parts impervious to oils and aromatic fuels.
WEIGHT: Less than 0.3 lbs. for ¼" port valve to less than 0.7 for 1¼" port valve.
AVAILABILITY: Currently in production.
Write for literature and prices.



KENYON CONTINUES TO LOOK AHEAD WITH DEVELOPMENT AND RESEARCH...

We have the facilities to produce or develop special equipment to meet your requirements

Write to Kenyon Instrument Co., Inc. 1336 New York Avenue, Huntington Station, L. I., N. Y.

KENYON
INSTRUMENT CO., INC.
HUNTINGTON STATION, L. I., N. Y.

Wire and Cable for Aircraft

by...

AUTO-LITE

● The quality of Auto-Lite Aircraft Wire and Cable is the result of 37 years of experience, research and advanced laboratory tests. Again and again these products have proven their dependability . . . where dependability is a "must." The specifying of Auto-Lite Wire and Cable is fast becoming standard practice among leading aircraft manufacturers. Here is ample proof of the Auto-Lite statement that "Money cannot buy better wire and cable."

THE ELECTRIC AUTO-LITE COMPANY
Wire and Cable Division
Sarnia, Ontario — Port Huron, Michigan

LOW TENSION

Aircraft cable with copper conductor
Specification AN-JC-48a

Aircraft cable with aluminum conductor
Specification ANC-161

Shielded aircraft cable
Specification ANC-168

HIGH TENSION

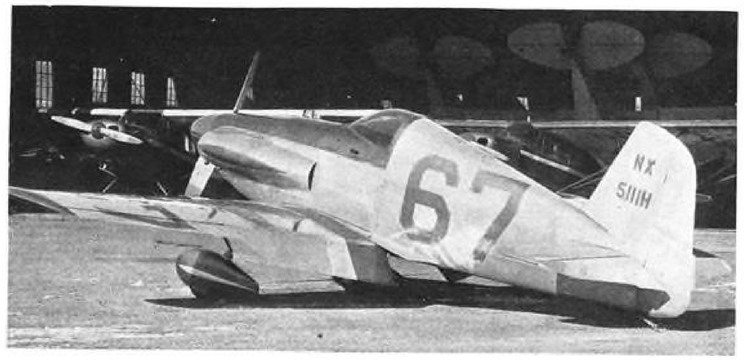
Aircraft ignition cable with stainless steel conductor and neoprene sheath
Specification ANC-130a, 5mm, 7mm and 9mm sizes

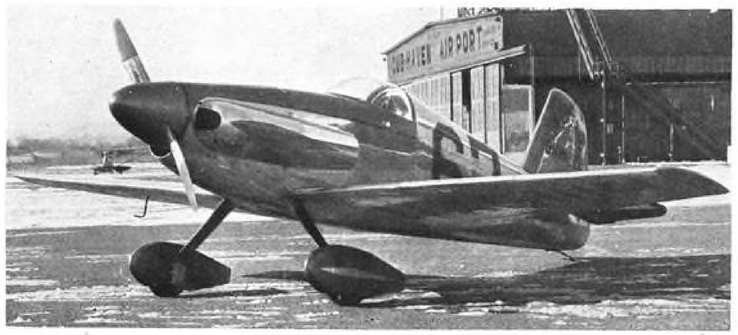
Aircraft ignition cable with copper conductor and neoprene sheath to commercial specification

Aircraft ignition cable—Auto-Lite Steelductor—with stainless steel conductor and braid and lacquer finish
Specification AN-JC-56

Aircraft ignition cable with copper conductor and braid and lacquer finish
Specification AMS-3390 and AMS-3392

Aircraft ignition cable with copper conductor and braid and lacquer finish to commercial specification





Two views of the Midget Mustang, now going into production at Schweizer Aircraft, Elmira, N. Y., as a personal and sport plane, show the high performance design of the small one-placer which took it to the finals of 1948 Goodyear Trophy races. Designed and flown by Dave Long, Piper engineer, the all-metal 85 hp. plane displays in these pictures its flap installation, short (18 ft. 6 in.) wingspan, spring-type landing gear with streamlined wheelpants and unique engine cooling vents.

Sportplane Priced Under $5,000

Modified single-seat racer boasts high cross country performance at extremely low operating cost.

By Alexander McSurely

How many buyers are there for a new high-performance all-metal single-seat sportplane priced at under $5000?

Schweizer Aircraft Corp., Elmira, N. Y., and Dave Long, Piper engineer, are seeking an answer to this question. Schweizer has started production of five such planes, slightly modified versions of Long's "P-Shooter" which he raced in the 1948 Goodyear Trophy Race at Cleveland and in the 1949 Continental Trophy Race at Miami.

First region CAA office at New York says it has not yet received request for commercial certification of the midget but expects it. As a racing plane the prototype carried an experimental license. Analysis of the plane's characteristics and construction as reported, shows no obvious reason why it would be denied a commercial license.

► **Craft Re-christened**—Last week Long flew his prototype P-Shooter now re-christened "Midget Mustang", to Miami from Lock Haven for the dual purpose of demonstrating its cross-country characteristics, and to compete in the Continental Trophy Race. He flew the 1150 miles in 7 hr. 20 min. averaging 160 mph. with heavy headwinds, he reported. From Lock Haven to Richmond he averaged 186 mph. The plane is capable of high speeds over 200 mph.

In the Continental final, Long finished fourth with a speed of 166.763 mph. (for additional details on Miami Races see Headline News section.) Last fall at Cleveland, Long pulled his plane out of the final Goodyear race at the ninth lap because of a fuel vapor lock.

Long's performance figures for the Midget Mustang show it capable of high speed exceeding 200 mph., normal cruising of 170 mph., landing speed of 53 mph. with flaps and rate of climb at 1300 ft./min. At cruising rpm. the plane burns 6.8 gal./hr. and tank holds 15 gal. Production version will carry a 35-lb. capacity baggage compartment behind pilot's seat.

Powerplant is a Continental C85-8FJ engine (with fuel injection.) which turns a fixed pitch Sensenich wood propeller, with choice of propellers for best rate of climb or high speed on the level.

Plane has 18 ft. 6 in. wingspan, is 16 ft. long and 4 ft. 6 in. high. It is designed to Professional Racing Pilots Assn. specifications for 190 cu. in. displacement engine racers.

► **Two Markets**—Long and Schweizer see two markets for the Midget Mustang—as a standardized show and racing plane and as a high performance cross-country plane which operates at extremely low direct cost.

On arrival at Miami, Long sold his prototype plane to a California buyer, subject to delivery after the race.

Wing is a late type laminar flow airfoil section with maximum thickness at 40 percent of chord. A 2 to 1 taper ratio is used. Two degrees of washout incorporated in wing plus differential aileron travel combine to provide positive aileron control throughout the stall, the designer states. Wing area totals 69 sq. ft., three ft. more than minimum PRPA requirement, and presumably plane weighs not much more than the 500 lb. minimum Goodyear weight empty requirement.

One of the modifications on the production planes is a new attachment arrangement for the spring steel landing gear. Gear strut attaches to a torsion tube suspension which passes through a support bearing in the main spar and extends aft to a rigid attachment at the rear spar. New arrangement takes all the gear outside the propeller slip stream, reduces the length of exposed strut, and increases wheel tread, improving brake control and lessening ground looping tendency.

► **Tail Skid**—Goodyear 5.00 x 5 tires and wheels and single disk brakes are used. Instead of a tailwheel, the Midget Mustang, like the prototype and like most of the Goodyear racers, will have a tail skid. It is a spring leaf and replaceable shoe type skid attached at the two rear fuselage bulkheads.

Conventional stick control and rudder pedals with toe-operated hydraulic brakes are provided. A three-position flap control lever at lower left side of cockpit operates pushrods actuating flap movement.

Fuselage is monocoque structure with seven bulkheads wrapped in seven skin-

sheets, flush-riveted. One-piece molded plastic canopy is attached to sheet-metal covered steel tubular frame hinged so that pilot may enter or exit from either side, and so that he may remove the canopy or jettison it in flight by operating both latches simultaneously. Reinforced bulkhead behind pilot's seat provides turnover protection. Quick release safety belt and shoulder harness is provided.

Main wingspar carry-through structure is a heavily reinforced bulkhead which is located at instrument panel station.

Wing panels are attached to fuselage by two shear bolts at front spar and a single hinge bolt at the rear spar. Channel section front and rear spars are reinforced by laminated capstrips, nose ribs and center ribs. Wing is reinforced at each root to form a walkway. Flush-riveted skin covers each panel. Wingtips are removable. All control surfaces are all metal construction. Rudder and elevators are cable operated. A double acting spring bungee system, controllable from cockpit provides longitudinal trim.

Ground adjustable tabs are provided on rudder and ailerons.

Engine is attached to steel tubular mount by four bolts through rubber shock mountings which are attached to firewall bulkhead by four bolts. A simple baffle cooling system provides adequate cooling even under racing conditions.

► **Ex-ATC Pilot**—Long served in Air Transport Command as a pilot during the war, on leave of absence for three years from Piper, where he has been a design engineer since 1937. The P-Shooter was a sparetime hobby development of his own, modified to meet the special Professional Racing Pilots Assn. specifications when they were announced.

Schweizer has had considerable experience building complete aircraft and assemblies in small lots. In addition to the well-known all-metal Schweizer model 1-21 sailplane which won the 1947 national soaring championship, and many earlier gliders, the company is currently subcontracting to build surfaces for Chase Aircraft, Inc., for its Air Force glider and cargo plane, and has previously built subassemblies and assemblies for Republic, Curtiss-Wright, Fairchild, Boeing and others. The company also makes various non-aircraft products utilizing aircraft materials and skills.

Presumably the initial production order of five Midget Mustangs will be followed by a larger order as soon as commitments are received for the first planes.

The aircraft, flown from Lock Haven to Miami, placed among the winners at the Midget races.

BRIEFING FOR DEALERS & DISTRIBUTORS

GI CADET TRAINING—Posters sent out by Lt. Gen. Idwal H. Edwards, USAF deputy chief of staff for personnel, urging GI flight training students to win their wings in the Air Force, are being displayed at a number of airports at the request of Gen. Edwards.

AVIATION WEEK asked the Washington Veterans Administration headquarters whether a trainee's intent to seek USAF cadet training would be considered a bonafide proof of his intent to make aviation his vocation. Sam Coile, head of registration and research service, replied that Air Force cadet training was much different from GI flight training, that there was no need of an applicant for cadet training to take the other training first, declined to give a definite "yes" or "no" on the question.

He stated that "as far as he knew" the new USAF posters did not indicate any coordinated desire by VA to stimulate additional GI flight training.

NEW AUTO PILOT—A lightweight automatic pilot for small airplanes, designed by Bert Carlson, is going into production at Aero Industries, Inc., Cleveland, Ohio. Cessna and Beech engineers are investigating the possibilities of adapting the pilot to their four-placers, and are checking experimental prototype articles.

Carlson believes there is a potential market for at least 10,000 of the auto-pilots on light planes now in use, and Aero Industries is planning an initial production quantity of 2500.

BOWMAN BUYS PATHFINDER—Purchase of Pathfinder Flying Service, Inc., of Stockton, Calif., by R. P. Bowman Co., Oakland, Calif., has consolidated two of the biggest west coast personal aircraft distributing companies.

R. P. Bowman, head of the company bearing his name, said that headquarters for the Cessna distributorship purchased in the transaction would be moved from Stockton to Oakland. In addition to the eight Cessna dealers in various California and Nevada cities now operating, other dealers are expected to be appointed soon.

The two companies will continue to operate with separate identities, with Bowman, a veteran of 31 years in aviation and with more than $2,500,000 in personal plane sales on his record, in charge of the combined organization. Bowman's announcement did not indicate future plans of Henry Von Berg, former head of the Pathfinder organization.

EXPANDING SPRAY PROJECT—Success of the aerial spraying project for blackfly control in an Adirondack resort area last year, using sovacide F, a DDT-laden aerial spray administered by a Bell helicopter, has led to doubling the acreage to be treated next year.

In the original operation, in Herkimer County, N. Y., a 4000 acre tract was sprayed, according to Socony Vacuum Oil Co., manufacturer of the spray. The area received three applications at intervals of approximately 10 days in June, totalling six-tenths of a gallon of sovacide and three-quarters of a pound of DDT to each acre, and result was extermination of from 90 to 95 percent of the blackfly population at a cost of about $2.25 per acre.

Resort owners in the area treated said they experienced capacity registrations in June as compared with 40 percent of capacity in the preceding June. Plans this year call for treatment of 8000 to 10,000 acres.

EDO CONTINUES IN FLOAT BUSINESS—Earl D. Osborn, founder and president of Edo Corp., and one time owner of AVIATION WEEK's predecessor, Aviation Magazine, has flatly denied rumors that Edo is out of the float business.

While the College Point, L. I., Edo plant has been concentrating recently on Air Force, Navy and Army contracts, it has an "adequate inventory of standard floats on hand" and has resumed production on Model 2000 floats for the Aeronca Sedan and Model 3430 floats for the Cessna 195.

Sales division for floats has been consolidated into the Edo general sales department. "We have been in the float business 23 years and intend to remain it," Osborn stated.

—ALEXANDER McSURELY

LETTERS

Footnote to a Footnote

W. A. Mankey's letter in AVIATION WEEK for Dec. 27, headed "Historical Footnote," perhaps calls for this footnote to a footnote.

Since the "Propulsion Grab Bag" article to which Mankey referred was written by your editorial staff, it is obvious that no one here in any way inspired the editors' reference to T. Claude Ryan as the designer of Lindbergh's "Spirit of St. Louis."

Art Mankey belabors his point unnecessarily. Unfortunately its effect is to reflect upon and discredit Claude Ryan by implying that he perhaps claims credit for *personally* designing Lindbergh's plane. No such thing.

AVIATION WEEK's editors obviously used the word "designed" in the broad sense. There is usually one guiding hand behind any project or company—as Claude Ryan has been behind the Ryan organization for 26 years—and it was to that person in the larger sense you undoubtedly referred. . . .

Furthermore, no one person "designs" an airplane. It takes a lot of people to do the job, and a lot of people deserve the credit. But it was a "Ryan" plane which first flew to Paris (look at the name on the fin of the Spirit of St. Louis some time) a point which Mankey overlooks. . . .

To paraphrase Mr. Mankey, "knowing your desire for 'fair play', am quite sure you will appreciate this letter." I think everyone will agree that Claude Ryan's been a pretty effective airplane *builder* for more than a quarter century.

WILLIAM WAGNER, Public Relations Manager
Ryan Aeronautical Company
San Diego 12, Calif.

Change of Pace

Two items in particular drew my attention in your issue of Dec. 27. One was the story of the work being done by Fred Weick and Otto Koppen on slow flying airplanes. The other on the 1949 Cleveland Air Races indicated that primary emphasis would be on jet flying.

It seems to me that here is a golden opportunity to get progress in safer and more utilitarian personal aircraft and a more interesting Race through the old principle of "change of pace."

Why not set up a sizable prize and trophy for the winner of a contest which includes short takeoff and landing, slow flying with good control, efficiency, and finally a short full throttle race? Landing, takeoff and slow flying tests could be run directly in front of the stands in the lulls between "hot" races. The results of all these figures could be ground out into a handicap starting time for the race, so that the first ship across the finish line takes the prize and the spectators would know the winner immediately . . .

Here is a chance for a good show, a real practical boost to better personal aircraft and some swell advertising. Has anbody got the $50,000?

HAROLD HOEKSTRA
Arlington, Virginia

(Mr. Hoekstra is chief engineer of CAA's Aircraft Service, but has written the letter as a personal opinion of a private citizen—Ed.)

Refueling With Martini Glasses?

Generally "Good-Natured" Brown doesn't heckle editors—especially when they are friends of his. However, part of the story at the bottom of page 30 of the Oct. 11 issue of your excellent magazine reads, "With present installations it requires six men eight hours to fuel an airplane with 7,000 gal."

According to my mathematics, this figures out to 875 gal. an hour or 14.5 plus gal. per minute. The last figure is just something under par for a good hand pump operation by one man. If all six men are working, it figures out to 2.4 plus gal. per minute per man. At that rate I wonder if they are fast workers using martini glasses or reasonably slow workers using beer seidels.

H. F. BROWN
Shell Union Oil Corp.
50 W. 50 St., New York 20, N. Y.

(Figures were given AVIATION WEEK by the Air Force—Ed.)

We have quite a following too~

a following that is growing steadily. Our customers, over the past 43 years, have continued to send us their toughest gear problems. They have known that IGW's skilled craftsmen can meet their most rigid specifications.

The Main Drive Shaft for the Sikorsky S-52 Helicopter

Indiana GEARS
GEARS • CAMS • INTRICATE AND PRECISE MACHINE PARTS
INDIANA GEAR WORKS • INDIANAPOLIS 7, IND.

AIR TRANSPORT

Scheduled Lines Top Safety Record

1948 mark is best in air transport history; international operators take highest honors.

By Charles Adams

The U. S. scheduled air transport industry chalked up the best safety record in its history in 1948, and for the second consecutive year international operators took top honors.

Certificated domestic trunklines, international flag carriers and feeder operators flew an estimated 7,768,786,000 revenue passenger miles in 1948 with only 103 passenger deaths. The passenger fatality rate per 100 million passenger miles flown during the year was approximately 1.3—considerably lower than the previous mark of 1.6 set in 1946 and 1943.

▶**Long-Range Progress Shown**—Last year's record discloses amazing progress in airline safety if compared with the figure of more than 23 deaths per 100 million passenger miles flown in 1930, when complete statistics first became available. In 1947, the overall industry passenger fatality rate was about 2.7 per 100 million passenger miles flown.

During 1948 the domestic trunklines had four fatal accidents and 83 passenger deaths, compared with five fatal accidents and 199 passenger deaths in 1947. U. S. flag carriers operating internationally completed last year with only one fatal accident and 20 passenger deaths, against two fatal accidents and 20 passenger deaths in 1947. (Accidents involving crew deaths only are not included.)

Domestic passenger fatality rate last year was 1.4 per 100 million passenger miles flown, against 3.2 in 1947. Internationally the rate in 1948 was 1.06 against 1.08 in 1947.

▶**Clean Slate For Feeders**—The feeder-lines kept their safety record immaculate. Since the first certificated short-haul operator began service in August, 1945, there never has been a passenger fatality on a feeder flight.

Last year's domestic accidents involving passenger fatalities: Jan. 13, Oxon Hill, Md., Eastern Air Lines DC-3, two crew and three passenger deaths; Mar. 10, Chicago, Ill., Delta Air Lines DC-4, four crew and eight passenger deaths; June 17, Mt. Carmel, Pa., United Air Lines DC-6, four crew and 39 passenger deaths; and Aug. 29, Winona, Minn., Northwest Airlines Martin 2-0-2, four crew and 33 passenger deaths.

Internationally, the lone fatal accident involving passenger fatalities was the crash of a Pan American Airways Constellation at Shannon, Eire, Apr. 15 with ten crew and 20 passenger deaths. Not counted in the scheduled airline safety statistics is the mishap involving a chartered Northwest Airlines DC-4 at Mt. Sanford, Alaska, Mar. 12, when six crewmen and 26 passengers were killed.

▶**Nonsked Record**—Safety record of the uncertificated operators continued to lag behind that of the scheduled airlines last year. On Jan. 7, 1948, a Coastal Air Lines DC-3 crashed near Savannah, Ga., resulting in one crew and 17 passenger fatalities, and on Jan. 28 a chartered DC-3 operated by Airline Transport Carriers, Inc., fell near Coalinga, Calif., with three crew and 29 passenger fatalities.

In addition, a DC-3 leased to Airborne Transport, Inc., New York, has been missing on a Puerto Rico-Miami flight since Dec. 28 and is presumed lost with three crewmen and 27 passengers. This accident, together with the charter plane crash early this month at Seattle which killed eleven Yale University students and three crewmen, is causing considerable concern in industry and Civil Aeronautics Board quarters and may hasten the crackdown on non-scheduled flying activities.

▶**American Airlines Achievement**—Highlighting the safety achievements at the end of 1948 was American Airlines' record of completing 3,933,000,000 safe passenger miles since Mar. 3, 1946. In building up the total, AA carried 7,785,000 passengers and flew 166,000,000 consecutive safe plane miles—a figure equivalent to about three years' operation of the Berlin airlift at its present scale.

Carriers which boasted long safety records on Jan. 1, 1949 (date of last passenger fatality in parentheses): Braniff (Mar. 26, 1939), Caribbean-Atlantic (no fatal accidents since records were established with CAB in 1942), Chicago & Southern (Aug. 5, 1936), Colonial (Apr. 18, 1930), Continental (May 1, 1935), Hawaiian (no fatal accidents since establishment in 1929), Mid-Continent (Nov. 15, 1934), Northeast (no fatal accidents since establishment in 1933), Panagra (Jan. 22, 1943) and Uraba, Medellin & Central Airways (no fatal accidents since records were established in 1940).

Airline Safety Record*

Year	Pass. Deaths	Fatality Rate**
1930	24	23.0
1931	26	21.4
1932	25	16.8
1933	8	4.0
1934	21	9.2
1935	15	4.1
1936	46	9.5
1937	51	9.5
1938	32	5.1
1939	19	2.2
1940	35	2.7
1941	37	2.2
1942	55	3.1
1943	32	1.6
1944	65	2.4
1945	93	2.3
1946	115	1.6
1947	219	2.7
1948	103	1.3

*Includes domestic trunklines, feeders and international flag lines.

**Passenger fatalities per 100 million passenger miles flown.

CAB Won't Call Off NAL Investigation

The Civil Aeronautics Board has refused to dismiss its investigation to determine whether National Airlines' routes should be transferred to other carriers. But the federal agency is trying to calm the worst fears of NAL and the industry arising from the probe.

In a unanimous decision, CAB this month rejected National's contention that the Board is without legal authority to conduct the investigation because it lacks power to order the action contemplated in the probe. The opinion also denied that continuation of the investigation is contrary to the public interest and will seriously impair NAL's efforts to improve its financial position.

▶**"Not a Dismemberment Case"**—At the same time, the Board asserted that the proceeding instituted last fall (AVIATION WEEK, Oct. 4) "is in no sense a dismemberment case." Rather, CAB declared, it is a survey to determine how a particular portion of the domestic route pattern would best fit into the overall structure.

"A finding that transfer of one or more segments of National's system to other carriers would be in the public interest is only one of several findings that could be made as a result of the investigation," CAB observed.

"The Board might also conclude that no transfer of any part of NAL's system is in the public interest, or that through service by equipment interchange, as publicly suggested by National, (AVIATION WEEK, Dec. 27) is the best plan for integration of the carrier's routes into the domestic pattern. Desirability of merging National and another carrier presents an additional alternative finding."

▶**Powers Discussed**—CAB said it did not have to decide now whether it has authority to order the transfer of a carrier's routes against the company's will. The Board declared its order instituting the investigation did not assert this power, and it therefore is not yet an issue. CAB contends the current probe—in which a hearing is now scheduled for Feb. 14—is merely exploratory, and a new proceeding will be initiated to force NAL's dismemberment if the move is found to be in the public interest.

As to National's argument that its credit position is being hurt by the investigation, CAB noted that one of the main sources of difficulty faced by the whole air transport industry may lie in the existing route pattern.

"Unless we can take steps to revise and improve that pattern, the industry's troubles may increase. We are convinced that in the long run the move is for the good of the industry."

▶**"Politics" Charge Ignored**—CAB did not discuss National's charge that it, among all the domestic carriers, apparently was singled out for an investigation as a result of "political influences" growing out of the 10-month pilots strike settled in November. Intimations that the Air Line Pilots Assn. worked through American Federation of Labor President William Green to have the White House "pressure" CAB into ordering the NAL probe last September were widely circulated.

National claims that at the time the probe was instituted it had a record of unparalleled economy in operations and a financial structure superior to that of many other carriers. Thus, NAL contends, "the existence of this investigation places every carrier in apparent jeopardy of revocation of its certificate, regardless of its success or failure, and irrespective of its compliance with the terms of the Civil Aeronautics Act."

The Board's action has retarded National's progress in regaining its competitive position since settlement of the pilot strike, the carrier's officials have stated.

They add that the probe also has seriously hampered consummation of a proposed merger between National and Delta Air Lines.

Two Carriers Would Take Inactive Feeder Routes

More pressure is building up on the Civil Aeronautics Board to withdraw route authorizations made to feeders which have not activated their systems.

Massachusetts Airlines, which makes scheduled daily flights between Boston, New Bedford, Martha's Vineyard and Nantucket, Mass., has asked CAB for permission to operate over route segments presently covered by the certificate issued to E. W. Wiggins Airways. Specifically, Massachusetts Airlines requested short-haul links between New York and Boston and between Boston and Albany, N. Y., via numerous intermediate points.

▶**Certificate Expires This Year**—Wiggins received its certificate for Boston-Albany routes in CAB's New England area case in June, 1946, but has not begun service. The certificate expires next December.

Meanwhile, the chamber of commerce of Gadsden, Ala., one of the cities on Southern Airways' still inactive feeder system, has asked CAB to order the company to show cause why its authorization should not be transferred to some other existing airline serving the area. The move followed shortly after Florida Airways, an active feeder line, made a bid to CAB to take over Southern's routes.

Gadsden chamber of commerce noted that almost 21 months have passed since Southern was designated for feeder service. The chamber supported Florida Airways' contention that Southern lacks the organization and financial backing to start operations. Southern hopes to activate its routes this spring.

Permit to Avianca

Aerovias Nacionales de Colombia (Avianca) has received a three-year foreign air carrier permit to operate from Bogota and Barranquilla, Colombia, to Miami and New York via Jamaica, British West Indies. The temporary authorization was made by the Civil Aeronautics Board and approved by President Truman.

In its decision, CAB rejected the contention of National Airlines and Eastern Air Lines that Avianca is controlled by Pan American Airways and that its application therefore should be denied. The Board said the Colombian government and nationals of that country can outvote PAA. CAB said also it did not believe Avianca would divert a substantial amount of traffic from U. S. carriers.

Avianca has been operating from Colombia as far as Miami since January, 1947. The carrier will use 55-passenger DC-4s on the Bogota-Barranquilla-Miami-New York run.

Continental Power ... Fliers' First Choice

It's a tribute to a superior product, backed by superior service — this steadily-growing preference for planes with Continental power. It's based on proven performance, economy and long life, as well as on the knowledge that parts and service, when needed, are at hand wherever you may fly. Nine oustanding models, starting with the A65, are providing ***dependable*** power for today's finest personal, family and executive type planes.

Continental Motors Corporation
MUSKEGON, MICHIGAN

Did You See Collier's?

Its issue for December 25 carried a message addressed by Continental Motors to the thousands of potential plane owners among Collier's readers. The "Start Flying Now" series, of which this ad is a part, mirrors Continental Motors' faith in the future of this modern mode of travel. In business and industry, as well as on ranch and farm, safe, fast, dependable aircraft are more than paying their way.

CONTINENTAL

Powerful as the Nation — Continental Motors — America's Standard

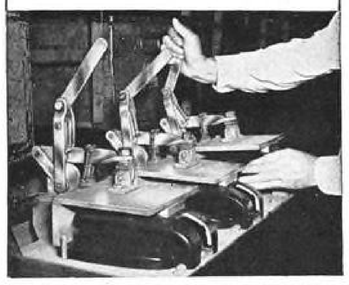
Red Seal

ENGINES

Cut Costs with DANLY KWIK-KLAMPS

PROFITABLE USES!

- Holding work during assembly.
- Applying pressure on plastic parts.
- Holding parts for light machining.
- Positioning work for inspection and testing operations.



SAVE TIME ON PRODUCTION WORK

Progressive manufacturers are cutting production handling time by using Danly Kwik-Klamp Toggle Clamps. These multi-purpose devices save valuable man hours by simplifying work setups. It is unnecessary to employ time-consuming bolting methods to accurately position work for processing. Kwik-Klamps are conveniently placed in any position on machines, hold down plates, layout fixtures and assembly tables to clamp and hold work.

QUICK POSITIVE CLAMPING ACTION

Rapid clamping and unclamping is made possible through Kwik-Klamp link motion. This toggle arrangement in different sizes provides ample tension up to 750 lbs. A simple movement of the handle quickly engages the toggle link to apply holding pressure on the clamp bar.

Convenient Catalog and Wall Chart

FREE—information on Danly Kwik-Klamp Toggle Clamps and uses. Inquire now how these helpful holding devices will cut your production costs. Write Div. 1283.

YOU CAN DEPEND ON **DANLY** QUALITY AND SERVICE FOR ALL TOOL AND DIE SUPPLIES.

DANLY MACHINE SPECIALTIES, INC.

2240 So. 52nd Ave. Chicago 50, Ill.

DANLY

MECHANICAL PRESSES • DIE SETS • DIE MAKERS' SUPPLIES

A Clipper sleeperette used as movie set for a Pan American sales promotion film. After film is completed it will be distributed to all Pan American district sales offices.

Films Used to Promote Air Travel

First shown by PAA in 1929, airline travelogues are now reaching countless millions through television.

Television is becoming an unexpected bonus for a proven airline promotion device—the travel film.

At least 50 different airline-produced color films are in circulation, with reproductions running into the hundreds. The video audience which saw these movies last year numbers in the millions; in addition, millions of people saw the films in clubs, schools, church groups, and other organizations throughout the country.

► **PAA Is Leader**—Undisputed leader in airline film production is Pan American World Airways, which was the first carrier to use this medium for sales promotion (PAA started making pictures in 1929) and maintains a permanent Motion and Still Picture division.

Pan Am emphasis on film sales promotion—it has produced close to 30—is due partly to the fact that the carrier depends more on tourist trade than other airlines, and is in close competition with steamships. PAA claims that last year 8¼ million saw its films, exclusive of television.

Hollywood producers, with an eye toward the budget, find strips of PAA film useful for travel scenes and foreign location shots, since the only payment required for this service is that Pan Am credit be given in the film head and that its planes be shown if possible.

Currently, PAA is distributing 16mm sound color film on Ireland, Alaska, Latin America, Bermuda, Hawaii, Cuba and the Caribbean, Mexico and Guatamala. In Latin America, about 90 Portuguese and Spanish versions of these pictures are in circulation. Films are also distributed in Europe and the Far East.

► **Effect on Sales Volume**—Overall effect of pictures on sales volume is hard to estimate, but Frank Howe, head of PAA's Motion and Still Picture division, points out that a particular film's selling power has often been revealed by an isolated incident. For example, following a screening of "Wings to Cuba and the Caribbean" in Miami, a large number of people in the audience were booked for passage.

Another important part of the airline's visual sales program is the use of color slides, supplied complete with explanatory scripts to travel agents who use the slides to supplement direct sales talks.

► **Eastern Stars Rickenbacker**—Eastern Air Lines, another of the air carriers which has recognized the promotional value of films, has sponsored what it feels is one of the most important airline pictures to date—"Air Power Is Peace Power," a 16mm color film which runs for 35 min. and stars Eastern's president, Eddie Rickenbacker. While Eastern emphasizes what it believes is the superiority of its Constellations, the picture aims at selling air travel generally, and all airlines are represented.

American Airlines began using films for promotion in 1935 and produced its first color picture, "Flagships on Parade," in 1940. The carrier's 30 min. color production "Wings to Viking Land," a travelogue on Scandinavian countries has been televised over two networks.

► **American Slide Library**—Currently, American is building up its library of Kodachrome slides and plans to distribute these to travel agents. When queried on the sales value of slides, an official at American cited this example:

"We gave a luncheon some time ago for a group of travel agents and had a showing of our slide film "What's It Like to Fly to Europe?"

"After the show, the bus-boy and the headwaiter signed up for a trip to Greece."

► **TWA Europe Film**—TWA released its first film last year. A second production was completed last month, and finishing touches are being put on still another film, a travelogue on Europe.

United Air Lines became a film pro-

Introductory slide to one of American Airlines' color slidefilm travelogues. Kodachrome slides require only a small projector, are inexpensive and can be shown almost anywhere.

Travel agent uses PAA's visual sales kits to sell couple on trip abroad. Color slides shows Ann Hathaway's cottage in England.

Eddie Rickenbacker faces camera for a scene in Eastern Air Lines movie "Air Power Is Peace Power." Film was released last year.

Cameraman prepares to shoot native scenes for PAA film "Wings to Hawaii."

DC-4 cockpit gets its picture taken for one of Pan American's sales films.

Cameraman can hardly be distinguished from his equipment. He's lost under hood.

We modestly celebrate our third anniversary this month, so you know we are still young, aggressive, and willing to give extreme effort to help supply you with aircraft parts, supplies and equipment.

However, our staff totals some 137 years of experience in the aircraft business. We've worked with these items...we're old enough to understand your problems and requirements.

We have a large stock of Elastic Stop Nuts ...AN bolts, nuts, screws, bearings, rivets, washers, and all types of aircraft hardware. Check us *first for AN & AC Hydraulic Fittings.*

We'll manufacture for you to the latest specifications. *Special fittings* made to order.

Phone: ORegon 8-3441 Cable: Sanfordcal
Teletype: TWX Ingl 7575 • WUX YAL Inglewood Calif

Department AW-1
SANFORD AIRCRAFT, INC.
1015 W. Manchester • Inglewood, California

A SMART MOVE TO MAKE!

PUT YOUR AIRCRAFT NEEDS ON ONE PURCHASE ORDER and SAVE!

It takes only a moment of thought to see the advantages of putting all your parts and equipment needs on one P.O. . . . just in time and money saved on paper work alone!

MAKE YOUR SELECTION FROM: Vibration Mounts, Packing Rings, Tapes, Hoses and "V" Belts, Cherry Rivets, Hi-Shear Rivets, Hardware, Douglas Parts, Pratt & Whitney and Wright Parts, Instrument repair Parts, Accessories.

manufactured TO YOUR SPECIFICATIONS: Stainless Steel AN Nuts and Bolts, Slotted Head Sheet Metal Screws, Spacers, Bush ings, MOULTON ECONOMY KITS for DC-3, C-47, C-53 Airplanes. Write for Catalog.
CHarleston 0-2171 • TWX BRB 7078 • Cable: MOULTAIR

the **MOULTON COMPANY, Inc.,** AIRCRAFT PARTS • MANUFACTURERS • DISTRIBUTORS
3210 WINONA AVENUE • BURBANK • CALIFORNIA

ducer in 1945 when it made the documentary "Of Men and Wings," which gives a brief history of 25 years of coast-to-coast flying. Since then it has produced two 28 min. color films.

▶ **First for NWA**—Northwest Airlines held a preview Jan. 3 in Copenhagen, of its first travelogue, "Northwest to the Orient."

PAA-AOA Merger

The proposal by which Pan American Airways would acquire American Overseas Airlines' routes and property through a stock transfer (AVIATION WEEK, Dec. 20) has started moving through the Civil Aeronautics Board's legal machinery.

Prehearing conference was scheduled for Washington, D. C., late last week. Thomas L. Wrenn, assistant chief examiner, has been assigned to the case, which the carriers hope will be decided by next fall, at the latest.

PAA's arguments for approval of the merger agreement are expected to center around these points.

- Three American-flag carriers on the North Atlantic run are at least one too many if excessive subsidies are to be avoided.
- Pan American now operates under a competitive disadvantage over the North Atlantic since, unlike AOA and TWA, it lacks affiliated transcontinental routes to feed traffic into its overseas operation.
- The added financial strength resulting from the AOA-PAA merger will enable U. S. flag carriers to present a better front against the growing competition of foreign operators.

NEW TERM FOR RYAN

Congratulations were in order from CAB Chairman Joseph J. O'Connell, Jr., (right) when Oswald Ryan, Board vice chairman, was nominated this month by President Truman for a new six-year term. Ryan has been on the Board since 1938.

Irregular Suspends

Air America, one of the leading transcontinental "$99" airlines, has suspended for two months its Los Angeles-New York operation.

It is a case of leaning over backward to keep in good graces of CAB by providing a "prolonged break" in its already irregular service. The company is applicant for a Class II certificate.

Unless CAB frowns upon the move, Air America during the two months period may utilize time of its rented DC-4s by inaugurating a fare-slashing Los Angeles-San Francisco service.

Air America contemplates creation of a subsidiary company which would fly two daily DC-4 round trips between Lockheed Air Terminal and Oakland Airport (both non-terminal points on interstate routes) for a one-way fare of $15 and round trip fare of $22.50. An intrastate operation, it would not be subject to CAB tariff regulation. One airline, Airline Transport Carriers, already is maintaining a coach type service between the two points with DC-3 equipment, and charging a one-way fare of $9.99. Scheduled certificated airline fares between the two points are $21.05 one way and $40 round trip.

NWA Faces Strike

A system-wide strike of Northwest Airlines mechanics and food service workers for higher wages is in the making.

Union spokesmen say only intervention by President Truman with a fact-finding commission or an unexpected wage offer from the carrier can prevent a walkout. About 1500 employes from New York to Shanghai are involved in the dispute, simmering since last June. They are represented by the International Assn. of Machinists, an independent union that demands 16 cents an hour pay hike.

Northwest contends it is unable to grant the wage increase requested. It pointed to large deficits suffered by the company during the past year.

ATA Conference

The Air Transport Assn.'s 1949 engineering and maintenance conference will be held in the Continental Hotel, Kansas City, Mar. 22-24, with the various sessions open to manufacturers' and suppliers' representatives. Subjects on the agenda: powerplants and propellers; ground service equipment; instruments; ignition, hydraulic and vacuum systems; engine accessories; structures and controls, including internal furnishings and equipment; electrical systems; fuel, oil systems and heating; ventilation and pressurization.

NO FAST DEALS HERE!

In business more than a decade, Van Dusen Aircraft Supplies is solidly established, puts a greater value on its reputation for integrity than the profit of a "fast deal"

Van Dusen's honest, sincere, speedy service has done much to change the buying habits of those seeking the best aero supply service.

AIRLINES. 14 major airlines regularly buy from Van Dusen a wide variety of supplies from engine parts to cleaning materials — at the best possible prices with the fastest possible service.

EXPORT. Van Dusen's strategic location for fast shipment has resulted in mounting export business. Teterboro warehouse is convenient to air freight terminals and steamship docks. New York office, (51 Madison Ave.) expedites orders.

DEALERS. Over 700 airport service operators have found Van Dusen a good outfit to deal with for all their supply needs. VDAS field sales and service personnel assure maximum satisfaction.

For all the right products at the right prices try Van Dusen and see the difference.

Van Dusen AIRCRAFT SUPPLIES
MINNEAPOLIS
TETERBORO, N. J. NO. GRAFTON, MASS.
Cable Address: VANDUSAIR, N.Y.

Rusco Aero Rings for Smooth Landings

SPECIFY RUSCO AERO SHOCK RINGS for use on landing gears, steerable tail wheels, nose wheels, retractable gears and as "bungees" and "beckets." Unlike ordinary "shock cord," these rings have no joints or vulcanized splices!

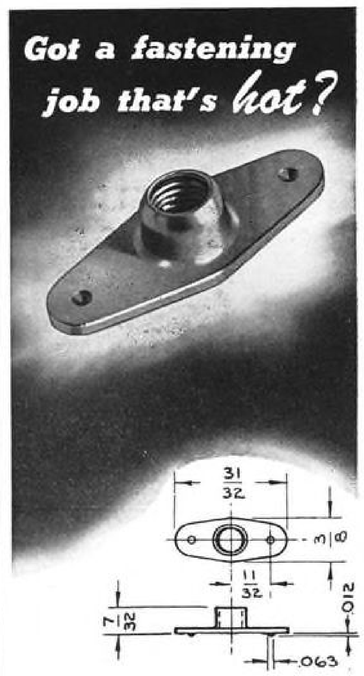
Because the internal core is composed of multitudes of high quality rubber strands fabricated to exacting tolerances, RUSCO RINGS store over 1100 foot pounds of energy per pound of weight . . . more than ten times that of metal springs.

RUSCO AERO RINGS are "tailor made" to meet specific requirements. Advise us of yours.

RUSCO AERO PRODUCTS

THE RUSSELL MANUFACTURING COMPANY
Middletown, Conn.
New York • Chicago • Detroit • San Francisco

Got a fastening job that's *hot*?



Let SOL-A-NUT take over!

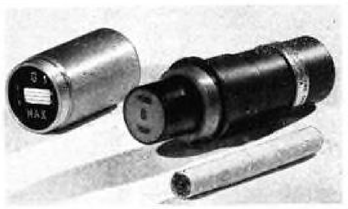
When you're looking for a self-locking nut built to resist high temperatures and corrosion, don't overlook SOL-A-NUT. This reliable fastener has already proved its stamina in many hot spots — on exhaust systems, pre-heaters, turbojet superchargers, jet engines and the like.

Sturdy, one-piece stainless-steel construction means long life — it will not corrode if damaged. Reasonable in cost . . . quick and easy to spot-weld, SOL-A-NUT meets U. S. Government standards.

Monadnock also manufactures SNAP-IT-TRIM and FABRI-LOC fabric and insulation retainers, Adams-Rite WEDJITS, AIRLOCS . . . has a wealth of experience in the fastening field. We welcome inquiries from manufacturers seeking reliable development and production facilities.

MONADNOCK MILLS San Leandro California

subsidiary of UNITED-CARR FASTENER CORP.



G- WARNING
MAX

FLIGHT RESEARCH presents two revolutionary new instruments which make possible for the first time a means of indicating and recording g-loads under all flight conditions. Their functional operation is made possible by the use of precise damping control.

The G-WARNING* Indicator flashes a warning light when the aircraft approaches the design load limit to enable the pilot to take preventive action before hazardous acceleration loading is reached.

The G-MAX* Indicator provides a *record* of maximum acceleration which has been encountered.

These units can be installed readily in any type of airplane.

G-WARNING* $28.00 G-MAX* $26.00

* Trademark FLIGHT RESEARCH

ENGINEERING CORPORATION
Box 1-F Richmond, Virginia
Aeronautical Instrumentation
Research *Production*

ATLANTIC SERVES

Atlantic Aviation
Finest Service in the East
MASTER AIRCRAFT AND RADIO SERVICE
NEXT TIME—STOP AT ATLANTIC

Stratocruisers Figure In Port Authority Feud

Three airlines have asked a temporary injunction to force the Port of New York Authority to open up Idlewild immediately for their Boeing Stratocruisers.

Notice of the injunction was served on the port agency last week by Pan American Airways, American Overseas Airlines, and Northwest Airlines.

The motion will be argued in New York Supreme Court on Jan. 20th. It is a new development in a suit filed last month by eight airlines to compel the Authority to honor leases at Idlewild.

The move was considered necessary because delivery of the 75-passenger Stratocruiser is expected within a matter of days and Idlewild is the only airport in the New York area which has runways strong enough to carry the 142,500 lb. weight of these craft.

Airlines are trying to obtain use of the field pending final decision.

George W. Whiteside, attorney for the airlines, said that continued denial of operational facilities at Idlewild for the Stratocruisers would cause "incalculable and irreparable damage" to the airlines. The motion includes an offer by the airlines to pay into the custody of the Court or to furnish appropriate security for the payment of any differences in charges between those agreed to in the contracts and the charges the Port Authority is now seeking to substitute for the contract rates."

Braniff Extension

Braniff Airways hopes to extend its Latin American operations to La Paz, Bolivia, and Rio de Janeiro within the next 30 days.

Despite opposition from Pan American Airways and Panagra, Braniff opened its overseas routes as far south as Lima, Peru, last June. Since then, the carrier has been readying auxiliary fields and completing a $200,000 radio navigation facility project from Lima to Rio. Braniff was unable to negotiate agreements for use of communications facilities operated by its American flag competitors.

NAL Wage Pact

National Airlines has signed an agreement with the International Assn. of Machinists providing 10 cents an hour wage increases for all classifications of maintenance workers. Under the one-year pact, pay will range from $1.03 an hour for starting apprentice mechanics to $1.99 an hour for lead mechanics and inspectors. Overtime and other special pay features of the previous contract remain the same.

SEARCHLIGHT SECTION

WANTED
STAINLESS STEEL FABRICATOR

Aeronautical consulting firm wishes to expand scope of business by becoming engineering and sales representatives for a reputable stainless and high temperature alloy steel fabricator.

A qualified engineer, familiar with latest developments in turbo-jet and rocket installation, will be assigned exclusively to this account serving all aircraft manufacturers East of the Mississippi. Our sales office includes design, research and drafting facilities.

P-7609, Aviation Week,
330 West 42nd Street, New York 18, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT
Additional positions vacant advertising on page 62

MAINTENANCE FOREMAN DC-3 airline maintenance experience required. Write stating qualifications to personnel director at Robinson Airlines, Ithaca, New York.

POSITIONS WANTED

SALES REPRESENTATIVE experienced in flight, manufacturing, promotion in aviation and machinery fields. Civil, Navy, Airline, trained hold airline transport rating instrument and instructor, commercial land, sea, experimental flight experience over ten years in aviation. Prefer job in which experience in industry is used. Will fly as company pilot. Married, best of references, age 29. PW-7710, Aviation Week.

SALES OR Contracts:—Graduate aeronautical engineer, ten years experience in technical and administrative engineering with major aircraft corporations seeking new connections. Desires sales or contracts position with company in aviation or allied field where broad engineering background is essential. PW-7708, Aviation Week.

AERONAUTICAL ENGINEER—5 years experience; 1½ years as Navy aircraft engineering officer; 3¼ years in research flight test and wind tunnel work. Age 27, married. Desires responsible position in project staff, flight test, research, or aerodynamic groups. PW-7669, Aviation Week.

COMMERCIAL PILOT with over 6000 accident free hours, single, multi-engine, instrument, and instructor rates, private and commercial examiner desires position as company or personal pilot, extensive experience as Charter Pilot over most of the U. S., day, night, IFR, VFR, age 29, married. Veteran, 2 years college. Qualified for A&E. PW-7714, Aviation Week.

SPECIAL SERVICE

Hangar light craft
@ $10 mo. Navion Bonanza, PT @ $20. Rooms at port. Fairview, Williamton, Mass. Tel. 276-W. Active skis all winter.

FOR SALE

Aeroquip Flexible Hose
Installations. Kits Including AN Fittings For C-48 and C-47, available for immediate delivery. Aero Hardware & Supply Co., 4301 N.W. 36th St., Miami Springs, Fla.

ATTENTION
CORPORATION AIRCRAFT OWNERS

Airline Captain desires position as Executive Pilot with collateral sales engineering duties.
Age 29, married, 2½ years aeronautical engineering, 7 years domestic and overseas airline flying. Ex-plane Commander—Naval Air Transport Service. ATR with all ratings.
Will go anywhere for position with future.
***Write:*—Room 158, Hotel Gramatan, Bronxville 8, New York**

SHORTLINES

► **All American**—Colin H. McIntosh, formerly with American Airlines and more recently with Charles A. Rheinstrom, Inc., aviation consultants, has been appointed director of operations for the new passenger services AAA plans to inaugurate shortly. Jere V. Chain, formerly with American Overseas Airlines, has become superintendent of stations.

► **Arizona Airways**—Organizational plans have been stepped up with election of T. B. Wilson, former TWA board chairman, as chairman of Arizona's board. Wilson reportedly has invested in the feeder, which was designated for a certificate in February, 1948, contingent on a showing of adequate corporate financial structure and availability of satisfactory airports.

► **Continental**—Has asked CAB to extend its Route 29 beyond San Angelo, Tex., to Tulsa, Okla., via Abilene and Wichita Falls, Tex., and Lawton-Fort Sill and Oklahoma City, Okla.

► **Mid-Continent**—Has asked CAB approval of a $19.95 roundtrip excursion fare between Kansas City and St. Louis. The tickets, representing a 26 percent reduction from present rates, would have 15 day return limits but would be good on all MCA flights between Kansas City and St Louis on any day of the week starting Jan. 25. Filing of the new roundtrip excursion tariff followed an earlier and unsuccessful request by Mid-Continent to lower one-way fares between the same two points to $9.95, with no time limit.

► **Northern Consolidated**—Has accepted a CAB show cause order granting the Anchorage, Alaska, carrier $262,000 in temporary mail pay for the period Dec. 1, 1947, to Oct. 31, 1948. Rate from Nov. 1, 1948, to Mar. 31, 1949, will be $1.75 a plane mile; and after Apr. 1, 1949, $1.25 a plane mile.

► **Northwest**—Has accepted a CAB mail rate proposal which boosts its domestic revenues by about $764,000 in 1948 and takes it out of the same mail pay class as American, Eastern, TWA and United Air Lines. . . . J. A. Butcher has been named supervisor of flight engineering.

► **Pan American**—Recently placed the last of its 20 new Convair-Liners in service between Miami and Caracas, Venezuela. . . . Company has inaugurated regular service to Basra, Iraq.

► **Philippine Air Lines**—Has opened a Seattle district sales office.

► **Southwest**—Carried 8959 passengers on its feeder system in November, up 2622 over the same 1947 month.

► **Trans-Australia**—Reports demand for seats on its new Convair-Liners exceeds bookings for any other type of aircraft.

TWA Traffic Record

TWA's passenger and cargo traffic hit record levels on both domestic and overseas routes last year.

Warren Lee Pierson, board chairman, estimates his company flew 852,562,000 revenue passenger miles domestically in 1948, against about 820 million in 1947. Overseas revenue passenger mileage rose from about 220 million in 1947 to 255,118,000 in 1948.

Cargo ton miles—including mail, express and freight traffic—soared from a systemwide total of 25,248,237 in 1947 to 33,015,832 last year. During 1948, TWA inaugurated service to eight new cities domestically, bringing its total U. S. stops to 56. Addition of Zurich, Switzerland, and Milan, Italy, to its routes this year will increase TWA's international stops to 18.

During 1949, TWA plans to extend its Constellation service to India. At present, carrier's 12 overseas Constellations operate as far as Cairo, with DC-4s flying on to Bombay.

CAB SCHEDULE

Jan. 17—Oral argument on application of Servicos Aereos Cruzeiro do Sul for Brazil-U. S. foreign air carrier permit. (Docket 3336.)

Jan. 24—Hearing in Milwaukee-Chicago-New York service case. (Docket 1789 et al.)

Jan. 24—Hearing on TWA's complaint against Pan American Airways' Saudi Arabian service. Postponed from Jan. 10. (Docket 3264.)

Jan. 25—Hearing on Western Air Lines-Arizona Airways San Diego-Yuma route transfer. (Docket 3440.)

Jan. 31—Hearing on additional service to Puerto Rico. (Docket 2123 et al.)

Jan. 31—Hearing on TWA's complaint against Seaboard & Western Airlines. (Docket 3346.)

Feb. 2—Hearing on Board's enforcement proceeding against Transocean Air Lines. (Docket 3244.)

Feb. 8—Hearing on Florida trunkline service. (Docket 2215 et al.)

Feb. 9—Hearing on Board's investigation of through service and interchange requirements at St. Louis and Memphis. (Docket 3426.)

Feb. 14—Hearing on Board's investigation of National Airlines route transfer. Postponed from Jan. 24. (Docket 3500.)

Feb. 14—Hearing on Board's enforcement proceeding against Nats Air Transportation Service. (Docket 3456.)

Feb. 16—Hearing in reopened Mississippi Valley and southeastern states cases. (Dockets 548 and 501 et al.)

Apr. 11—Hearing in reopened Hawaiian case. (Docket 851 et al.)

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • PLANES • EQUIPMENT—USED or RESALE

NEEDED IN TEXAS!

ENGINEERING DRAFTSMEN
ENGINEERING DESIGNERS
AERODYNAMICISTS

The nation's fastest expanding industrial area has immediate openings and excellent opportunities in world's finest aircraft plant. Personnel will be used for research and development work on B-36, world's largest bomber, and other advanced Air Force designs. Positions are also available for tooling personnel.

Write for application blank to

Engineering Personnel Office

CONSOLIDATED VULTEE AIRCRAFT CORPORATION

FORT WORTH DIVISION

Makes Your Plane EASIER TO SEE In The Night Sky

FLASH-AIRE

(LIGHTBODY TYPE WH-100)

Private Plane Position Light Flasher

FLASH-AIRE* gives you the added safety of flashing position lights for your plane. Ask your aircraft accessory dealer for FLASH-AIRE*, or write for information.

- C.A.A. Approved for All Private Planes. (P. & P. 21-3)
- Light Weight, only 13 ounces.
- Diameter 3" Height 4"
- Easily Installed.

TEMCO is also producing approved type flashers for commercial and military aircraft and marine uses.

Patent Applied for

*Trademark

$19.75

TEXAS ENGINEERING & MFG. CO., INC.

P.O. Box 6191 Dallas 2, Texas Dept. F-4

SIKORSKY S-51 HELICOPTER

4-Place 650 Lb. Payload—Total Time 250 hrs.
Licensed To August 1949
Excellent Condition

PRICED CURRENT MARKET

John L. Senior, Jr. 331 Madison Ave. N. Y. C.

---

new and used DC-3 and DC-4 parts, equipment and accessories at below cost!

For DC-3, DC-4, and P. & W. R-1830 and P. & W. R-2000 parts, accessories and components, contact:

Surplus Sales Representative,
Store Dept.
United Air Lines Maintenance Base,
Bayshore Highway,
South San Francisco, Calif.
Telephone JUno 8-2424

Items are available for your inspection at the above address. Prompt delivery. Guaranteed to be as represented.

UNITED AIR LINES

FOLEY AND COMPANY

are pleased to announce their appointment as Eastern Distributors for

CHAPIN

- Fuel Strainers
- Oil Dilution and Priming Solenoid Valves
- Voltage Regulator Base Assemblies
- Quick-Action Drain Valves

(Meeting Army and Navy specs.)

Manufactured by the
CHARLES E. CHAPIN CO.
East Rutherford, N. J.

We are also Eastern Representatives for:

OWATONNA TOOL CO.
Owatonna, Minn.

KROPP FORGE CO.
Chicago, Ill.

FOLEY & COMPANY
Chuck Foley, Pres.
15 PARK ROW
NEW YORK 7, N. Y. WOrth 2-1149

BENDIX OLEO STRUTS

for B-23—Part #54181
BRAND NEW
IMMEDIATE DELIVERY
$245.00

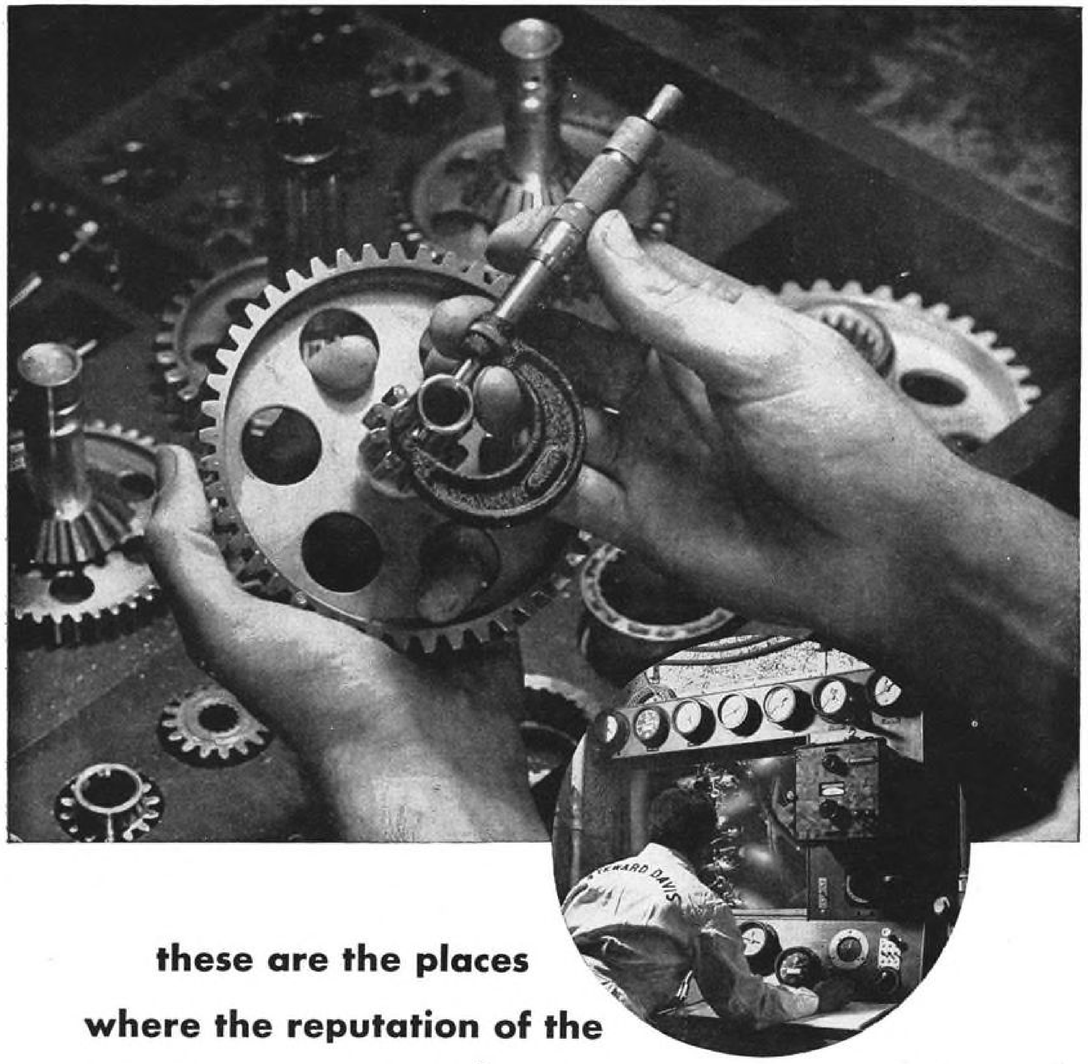
Priced for Quick Sale
Telephone Portsmouth 7-4008
AVIATION SUPPLY CO.
6207 So. Cicero Ave. Chicago 38, Illinois
Suppliers of Aircraft Accessories

SCHOOLS

Rising Sun SCHOOL OF AERONAUTICS

ESTABLISHED 1930
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. HUNTINGDON ST., PHILA., PA.

UNUSUAL OPPORTUNITIES
Can be found each week in the
SEARCHLIGHT SECTION
of
AVIATION WEEK



these are the places where the reputation of the steward-davis conversion is made . . .

As tough as the modern aircraft engine is, it needs only the slightest relaxation of overhaul standards to transform it long before its time from a perfectly synchronizing power-plant into a malfunctioning engine that can no longer deliver a cargo or meet a schedule. In the Steward-Davis shops the Steward-Davis conversion is inspected to Pratt & Whitney overhaul specifications; at the Steward-Davis test cell it is tested to Pratt & Whitney performance specifications. By the application of these world-famous standards these are the places where the reputation of the Steward-Davis R-1830-92 Conversion is being made.

The Steward-Davis R-1830-92 Conversion, warranted for 100-hours, test-run, prepared for long-time storage, (packaged for expert shipment and complete with carburetor, ignition harnesses and magnetos—$1695 plus your run-out R-1830-92 engine. (Return freight to Steward-Davis of run-out engine will be paid by Steward-Davis.)

steward-davis

13501 SOUTH WESTERN • GARDENA, CALIFORNIA

STRICTLY PERSONAL

WHO PULLED THE PLUG ON CANADA'S SECRET FIGHTER?—We have just made a last-minute check with the McGraw-Hill doorman before writing this bulletin. Up to a few minutes ago the Canadian Mounted Police had not yet galloped up to our West 42nd St. door to quiz us about a story that had Canadian aviation authorities on their ear some weeks ago.

You may remember the story. It described the XC-100. A sketch accompanied it. The Associated Press flashed the illustration and story from coast to coast and front pages were sprinkled with them.

"Amazingly Complete"—An official of A. V. Roe Co. first said AVIATION WEEK's story was "amazingly complete." Later the press was told our story involved "guess work." The Canadian air chief of staff promised prosecution for any Canadian who "leaded" the information. He ordered the Mounties to investigate. Then a U. S. aviation newsletter headlined that AVIATION WEEK was "in trouble" with Canada. That is not correct. It forgot to quote this sentence from the AP story appearing in the New York Times and other papers: "Officials are concerned not so much with any actual information disclosed in the magazine but with the manner in which the data were obtained."

Where's The Leak?—In other words, as one paper wrote, "The Canadian Mounties are out to get the man or men who pulled the plug out of the Canadian top-secret bucket." But it is purely a Canadian domestic matter, finding their own security weaknesses, and we must disappoint all the stenographers on the 28th floor who have been watching for a troop of redcoats to march in. AVIATION WEEK obtained its information in strictly professional journalistic manner, with no midnight raids or purchasing or borrowing of blueprints or by any other movie-thriller device. Any smart newspaperman could have obtained the same results by asking enough of the right questions.

Several Canadian papers got dramatic, put the finger on Charles Cain, a British aviation writer who was in the U. S. last summer free lancing for us and British publications. Cain was editor of the Aeroplane Spotter before it folded last year. So, after his return to London, imagine Mr. Cain's amazement at being interviewed by Scotland Yard!

One super-duper story from the Toronto Globe & Mail wins the prize. You'll enjoy it. It is abstracted below, under its original three column, front page headline:

REVEAL BRITISH AIR EXPERT TOLD CANADIAN JET SECRETS

The only man who seems to know, isn't in any position to reveal how a mysterious leak released a flood of information about Canada's new top-secret, very confidential, hush-hush fighter. It was no bearded spy that wormed through the iron security curtain surrounding the Malton plant of the A. V. Roe. It was a scholarly, soft-spoken Britisher who is now enjoying a peaceful ocean cruise back to the land of his forefathers. (Ed. Note—Mr. Cain flew back on Pan American).

Charles W. Cain, one of the world's top-ranking experts on aircraft identification, recently visited the Roe plant and was conducted on a tour which furnished him with sufficient information to write for AVIATION WEEK a 2000-word article on another new Avro development, the new jet transport plane. . . .

Little does Mr. Cain realize the furore his side trip created. The RCMP has promised a full-dress investigation of his second assignment for the publication, a detailed description of the twin-jet XC-100, so complete that the chief of Canada's air staff is in a tizzy.

AVIATION WEEK, meanwhile, is saying little. The writer himself is on his way home and unable to contribute anything to enlighten either RCMP or RCAF.

Officials at Avro are convinced the information came from outside sources. They neither confirm nor deny that the Briton visited their plant and brush aside inquiries about Mr. Cain with a brusque "No comment."

Murray Willer, assistant sales manager at the Malton plant, says no visitors have been permitted into the fighter plane division for a year. . . . A Toronto aviation editor, however, says a trip to the fighter division would be unnecessary for an expert of Mr. Cain's qualifications. "All he'd have to do would be to look at a blueprint or assemble stray bits of gossip to duplicate on paper a fairly accurate replica of the machine." Little guesswork was involved, he added, in writing an article so packed with detail.

Where Mr. Cain picked up the detail, as far as the air force is concerned, is still one of the greatest peacetime mysteries in the annals of Canadian aviation.

So, if AVIATION WEEK has helped Canada tighten its security net—which once was so loose that a big Russian spy ring was able to function for many months—perhaps the story was as constructive as it was informative.

Meanwhile, AVIATION WEEK is also being read avidly by British aviation circles, who are seeing here stories the British aviation magazine do not print. More on that later.

R. H. W.

WHAT'S NEW

New Name

"Air Traffic and Service Corp," is the new name of the former Fay Traffic and Service Corp. It publishes the daily Air Traffic Digest, which abstracts and digests CAB filings and actions. Edward A. J. Fay, who assisted in the organization of the corporation last summer, resigned, as has Eugene S. Ostheimer. Max Tendler, publisher, who served as general manager from the start, has been elected president. William V. Henzey, who has been serving as an assistant editor, will continue in that capacity.

Trade Literature

"As the Twig Is Bent," a promotional booklet distributed to college engineering students. Available from Boeing Airplane Co., Seattle, Wash.

"Airport Financial Statements," a new CAA manual designed as a guide for airport accountants and those dealing with airport finances. Copies may be obtained from the U. S. Govt. Printing Office, Washington, D. C. Price is 15 cents per copy.

"Bulletin 18," a second revision which sets forth recommendations for aircraft rescue and fire fighting equipment for airports. Available upon request to National Fire Protection Assn., Committee on Aviation and Airport Fire Protection, 60 Batterymarch St., Boston, Mass.

"Ace Drill Catalog No. 48" containing 2165 different items and technical data. Available upon request to Ace Drill Corp., Detroit, Mich.

"Steel Shelving," a booklet describing steel parts bins, shelving and storage equipment. Available upon request to Superior Manufacturing Co., P. O. Box 2917, Winston-Salem, N. C.

"New Design Features," a folder illustrating new improvements in broaching machines. Available upon request to Lapointe Machine Tool Co., Hudson, Mass.

"Catalog 100-G," containing illustrations and specifications of its major items, is available upon request to South Bend Lathe Works, South Bend 22, Ind.

"Forming of Austenitic Chromium-Nickel Stainless Steels," assembled and edited by Vsevolod N. Krivobok, Sc. D., International Nickel Co., Inc., and George Sachs, D. Eng., Case Institute of Technology. Published by the International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. Price $4.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—JANUARY 17, 1949

■

PROFESSIONAL SERVICES—
See First Issue of Month

SEARCHLIGHT SECTION

(Classified Advertising)

CHECK LIST
of recent and standard
AVIATION BOOKS

1—AIRCRAFT INSTRUMENT MAINTENANCE
By E. F. WERNER. Shows you how to install, inspect and maintain all types of aircraft instruments—anerold, Bourdon tube, diaphragm, electrical, and gyroscopic—and how to locate and repair specific troubles. **$7.50**

2—FLUID DYNAMICS
By V. L. STREETER. Explains in detail the ideal fluid theory for both two and three dimensional flow plus the theory for viscous flow. Practical problems illustrate every-day uses and show how theory works. **$5.00**

3—FLUID MECHANICS OF TURBO-MACHINERY
By G. F. WISLICENUS. A full analysis of flow problems met in design of water, gas, or steam turbines, centrifugal or axial-flow pumps and compressors, propellers, and hydraulic torque converters and couplings. **$7.50**

4—SUPERCHARGING THE INTERNAL COMBUSTION ENGINE
By E. T. VINCENT. Tells how to supercharge and turbosupercharge aircraft and diesel engines—with emphasis on engine cycles, power outputs, and thermal efficiencies. Brings you specific design and testing procedure. **$5.00**

5—TECHNICAL AERODYNAMICS
By K. D. WOOD. Enables you to make performance, stability, and design calculations on airplanes. Second edition contains recent material on jet propulsion and the basic elements of supersonic aerodynamics plus entirely new illustrative examples and problems. **$5.50**

6—EXPLOSION AND COMBUSTION PROCESSES IN GASES
By WILHELM JOST. Here are the experimental and theoretical facts underlying explosion and combustion processes in gases. Covers initial stages, spark ignition, detonation, etc., and explosion of various gases in Otto and Diesel engines. **$7.50**

7—AIRPORTS: DESIGN, CONSTRUCTION AND MANAGEMENT
By GLIDDEN, LAW, AND COWLES. Accurately describes each of the component parts of an airport, the factors involved in location and design, and basic principles of operation and management. Includes specifications and test procedures. **$7.50**

SEE THEM 10 DAYS FREE

McGraw-Hill Book Co., Inc.,
330 West 42nd St., New York 18, N. Y.
Send me the book(s) circled below for 10 days' examination on approval. In 10 days I will send remittance for the book(s) I keep, plus a few cents postage, and return the unwanted book(s) postpaid.*

1 2 3 4 5 6 7

Name .....
Address .....
City ..... Zone..... State.....
Company .....
Position AW-1-17-49

* SAVE! We pay mailing costs if you send cash with this coupon. Same return privilege.

LETTERS

Comments on Helicopter Editorial

Following are letters commenting on AVIATION WEEK's *editorial Jan. 3, "Lift the Ceiling on Mercy Copters."*

Your editorial . . . is excellent. I find solid encouragement for all worthwhile effort in your fearless willingness to champion causes in which you believe. The fortunes of fate are so unpredictable as to make a man who steers his course on a "fear compass" unworthy of her great prizes and unlikely to be directed safely in any event. I would rather take my chances on the firm ground of right. I think you have done that in this editorial.

The military blinders obscuring the helicopter from their vision are not new equipment. We need to become bolder in new conceptions. We were apparently satisfied to have a little air progress when Hitler's Germany was thinking in bigger terms.

The result was their leadership in a big way in both jet and rocket propulsion. Radar may be another example.

Now comes the helicopter, our very own development, with enormous utility for military purposes, as well as commercial, and we are ignoring its military application almost as much as we did jets.

Thus in life saving, in atomic bomb evacuation where in many cases no other vehicle will be of any value (because of radiation and disrupted streets), in dispatch work, in low flying spotting and observation work, in river crossings, and in field mobility generally, there is nothing which can remotely compare with the helicopter.

And yet it waits patiently while what is "safe," i.e., free from pioneering, absorbs almost all of the available money and attention. It took the Lufthansa boys to show us the use of the transport in military strategy; but let us hope that we can conceive for ourselves so far as the fascinating prospects of the helicopter are concerned.

I think that fear of ridicule of a new idea by Congressional committees is at the root of the matter. I smile when I think of what would have been said at the outset of the atomic energy project had the facts been known publicly when it was first started. It took courage to be willing to face the very possible failure of that one.

You can do a great service by showing that all exploration into the new involves risk of ridicule. But when a project is as sure as the helicopter now is, the risk is that the ridicule will be directed the other way—for not using it.

May your fortunes keep pace with your progressiveness and courage.

L. WELCH POGUE
Pogue & Neal
Southern Building
Washington, D. C.

(Mr. Pogue, former chairman of CAB, is legal counsel for the Helicopter Council of the Aircraft Industries Assn.—Ed. Note).

It is heartening to know that those who have struggled to keep the helicopter industry alive have found in you an honest voice that can clearly state the case in such simple, straight-forward and cogent language. You have rendered them, and the public at large, an inestimable service in this and on many other occasions.

It is to be regretted that the thoughts you expressed will have the rather limited distribution of an aviation trade publication to those people who do or should understand the impact of your story. I feel sure that if this message could reach a wider facet of our reading public they would in their innate good sense demand the proper action by our law-makers and those charged with national defense. . . .

The public are entitled to know that adequate attention is being given to matters of evacuation and safety so long as their funds are being expended in implements of incalculable destruction. This same public justifies these vast expenditures only on grounds of fear of attack. In this implicit acknowledgment of the possibility of attack, the public is entitled to an appropriate expenditure along its home front for evacuation.

The helicopter offers a means if its development is kept apace.

AGNEW E. LARSEN, Chairman
Helicopter Council
Aircraft Industries Assn.

(Mr. Larsen heads the Rotawings division of the Glenn L. Martin Co., North Wales, Pa. —Ed. Note).

Ordinarily I take my AVIATION WEEK home and, when fully relaxed, read and reread it. Today, I first glanced at the editorial, and that is why you are getting this bouquet so quickly.

Everyone in the Los Angeles Airways followed with keen interest the newspaper items relating to the airmen who were marooned on Greenland. We kept wondering why they did not introduce helicopters from the beginning, and when the news finally came out that the Saipan was going up there, wondered why it had taken so long to getting around to doing it the right way. . . . I personally feel this rescue would have been routine for the helicopter, resulting in some long overdue credit in high official circles where it seems to be needed and as you so well stated in your editorial [in the issue of Jan. 3].

In discussing this incident with out pilots, they all concluded that doing the job would have been duck soup for any of them and that with the exception of the extreme cold weather, the job we are doing here every day, long into the night, is very much more difficult.

We of course would not like to have that rubbed in on anyone in the service circles because we feel they too are doing a fine job. But I am disappointed that some means of exchanging all the experience and problems concerning the helicopter does not exist.

Over the past 15 months we have amassed an enormous amount of valuable experience which is available to anyone, under proper circumstances, and . . . the record itself is not too bad.

The facts of life are becoming starkly apparent to me that AM-84 will within the very preceivable future outgrow the capacity of its equipment as well as the limitations of the present CAVU operating technique. As a sidelight to this, you may be interested to know that in December we turned down somewhere between 100,000 and 150,000 lb. of parcel post and airmail and roughly 250,000 to 300,000 lb. of express. Just how many passengers we could have dispatched to and from the airport at 25 cents per "taxicab" mile is unknown, but considering that 82,358 passengers moved in and out of Los Angeles Airport during November, it would not take an Einstein to figure the potential on that score.

The economic self-sufficiency of the helicopter so far as we are concerned is contingent only upon the availability of the proper-size machine. We have stipulated that our needs would be met in 1951 by a machine of 16,000 to 20,000 lb. gross weight, having a capacity of from 10 to 12 passengers in addition to 2000 to 3000 lb. of cargo.

The manufacturer of our present equipment (Sikorsky) claims that such a machine is practical and feasible and moreover that some of the services indicate a need for substantially the same product. But they are afraid to go ahead because of a lack of high level crystal clear decision and, of course, our own company could not underwrite a primary engineering development project of this scope.

In order to meet this situation, I have tentatively proposed that a board be formed consisting of Los Angeles Airways representing the "scheduled" commercial element of the industry, and the Aircraft Industries Association representing production, and I would like, at this juncture, to include an element on staff level of the armed services. Moreover, this board could be broadened to include at least as observers the CAB, CAA, etc.

I expect to be in the East shortly to push this project harder than ever. In the meantime, I want you to know that your timely and constructive editorial may be the necessary spark to set off the forces capable of doing the job.

C. M. BELINN, President
Los Angeles Airways, Inc.
5901 West Imperial Highway
Los Angeles 45, Calif.

I have just read your editorial. . . . I think it was most timely and should be effective . . .

LAWRENCE D. BELL, President
Bell Aircraft Corp.
Buffalo, N. Y.

FAMOUS FIRSTS IN AVIATION

OSTUCO has grown up with the aircraft industry. The list of manufacturers who have depended on OSTUCO Aircraft Tubing for continued development and improvement reads like the blue-book of American plane manufacturers:

Aeronca Aircraft Corp.
Beech Aircraft Corporation
Bell Aircraft Corp.
Bellanca Aircraft Corp.
Boeing Airplane Co.
Cessna Aircraft Co.
Chance Vought Aircraft Div.
Consolidated Vultee Aircraft Corp.
Curtiss-Wright Corp.
Douglas Aircraft Co., Inc.
Fairchild Aircraft Div.
Goodyear Aircraft Corp.
Grumman Aircraft Engr. Corp.
Lockheed Aircraft Corp.
Luscombe Airplane Corp.
McDonnell Aircraft Corp.
The Glenn L. Martin Co.
North American Aviation, Inc.
Northrop Aircraft, Inc.
Piasecki Helicopter Corp.
Piper Aircraft Corp.
Republic Aviation Corp.
Sikorsky Aircraft Div.
Spartan Aircraft Co.
Texas Engineering & Mfg. Co., Inc.
The Waco Aircraft Co.

OSTUCO

First Flight Over the North Pole

was made in 1926 by Lieutenant-Commander Richard E. Byrd and Floyd G. Bennett. Take-off and landing base was Spitsbergen, an island east of Greenland.

First "Chrome-Moly" Steel Tubing for Aircraft

was developed and produced in 1921-22 by The Ohio Seamless Tube Company. "Chrome-Moly" is a name now familiar to every aircraft manufacturer.

Through continuous research, sound design, and precision manufacture, OSTUCO has maintained undisputed leadership in this highly specialized field of aircraft tubing and has contributed greatly to the progress of American aviation.

Favorable strength-without-weight characteristics make OSTUCO Aircraft Tubing tops for fuel lines, engine mounts, landing gears and many other uses. OSTUCO Tubing is built to U. S. Army and U. S. Navy specifications. Percentage of rejects is amazingly low. And OSTUCO has an enviable reputation for prompt deliveries. Today, the first maker of aircraft tubing is still first with the makers of aircraft.

THE OHIO SEAMLESS TUBE COMPANY

Plant and General Offices: SHELBY 1, OHIO

Sales Offices: CHICAGO, Civic Opera Bldg., 20 North Wacker Dr. CLEVELAND, 1328 Citizens Bldg. • DAYTON, 1517 E. Third Street DETROIT, 2857 E. Grand Blvd. • HOUSTON, 927 A M&M Bldg. LOS ANGELES, Suite 300-170 So. Beverly Drive, Beverly Hills • MOLINE, 617 15th St. • NEW YORK, 70 East 45th St. • PHILADELPHIA, 1413 Packard Bldg., 15th & Chestnut • ST. LOUIS, 1230 North Main St. • SEATTLE, 3205 Smith Tower • SYRACUSE, 501 Roberts Ave. CANADIAN REPRESENTATIVE: Railway & Power Corp., Ltd., HAMILTON, MONTREAL, NORANDA, NORTH BAY, TORONTO, VANCOUVER and WINNIPEG.

SEND FOR FREE BOOK

Write today, without obligation, for your copy of booklet; A-2, containing helpful, factual information on OSTUCO Aircraft Tubing. Address the nearest OSTUCO Sales Office, or write direct to General Office, Shelby, Ohio.

ON AMERICA'S AIR FLEET

Foote Bros. Power Units and Actuators

Modern aircraft operation demands a high degree of automatic control to free pilots from tasks that mechanical units can perform better.

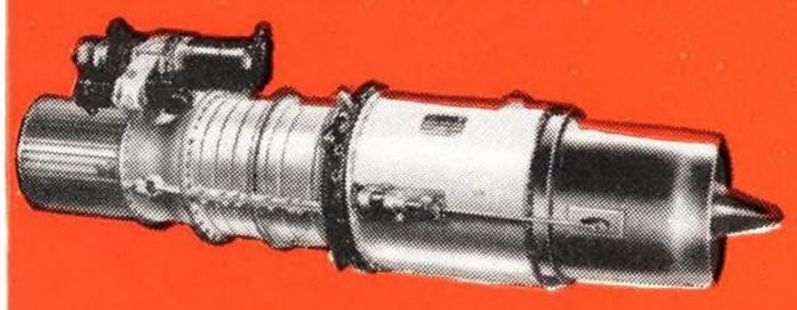
Because of the pioneering done by Foote Bros. in the production of aircraft devices—because of the ability of Foote Bros. engineers to solve problems faced in designing gear units of minimum weight to fit in a confined space—because of the complete facilities, modern techniques, and wide experience found in Foote Bros. large plants—actuators and power units produced by Foote Bros. are serving on many of the leading airplanes that form America's air fleet.

A-Q (aircraft quality) Gears that contribute so much to the efficiency of these units are also employed on turbo-jet engines and on such reciprocating engines as the Wasp Major.

The ability of Foote Bros. to serve the highly specialized demands of the aircraft industry is a good testimonial to the ability of Foote Bros. engineers to provide you with better gears, power units, and enclosed gear drives to meet even the most exacting specifications.

Whatever your requirements, call Foote Bros.

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. AVW, 4545 S. Western Blvd., Chicago 9, Illinois



Accessory Drive on Turbo Jet Engine

Precision Gears on Pratt and Whitney Wasp Major

FOOTE BROS.

Better Power Transmission Through Better Gears