AVIATION WEEK

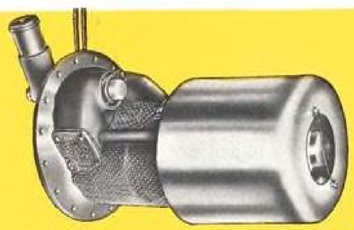
A McGRAW-HILL PUBLICATION

FEBRUARY 21, 1949

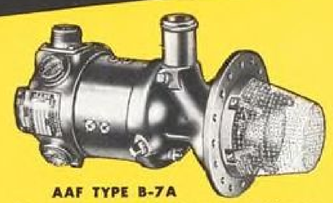
Another

MAJOR PRODUCT of our AIRCRAFT ACCESSORIES DIVISION

FUEL BOOSTER PUMPS



AAF TYPE B-17
"Submerged"—Army approved for jet aircraft; rating at 27V D. C. is 1400 gph at 29 psi.



AAF TYPE B-7A
"External" mounted—for reciprocating engine aircraft; capacity 19 psi at 500 gph (high speed)—10 psi at 500 gph (low speed).

AAF TYPE B-19
"Submerged"—2-speed unit for jet aircraft, Army approved; rating at 27V D. C. is 20 psi at 500 gph (high speed) — 10 psi at 500 gph (low speed).

AAF TYPE B-25
"Submerged"—Army approved, for jet and reciprocating type engines; rating at 27V D.C. is 28 psi at 500 gph (high speed) 12 psi at 500 gph (low speed).

AAF TYPE B-22
"Submerged"— newly developed for military aircraft; uses 400 cycle 3-phase single speed 208 volt A.C. motor; rating 16 psi at 1000 gph.

AAF TYPE B-18A
"Submerged"— for jet military planes; approved by Air Materiel Command; rating at 27V D.C. is 1000 gph at 16 psi.

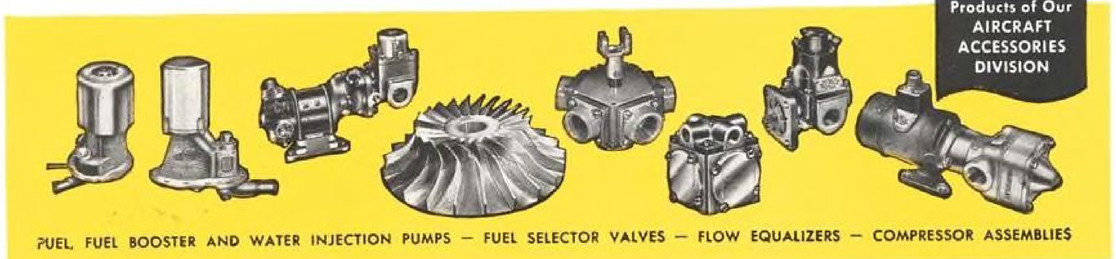
Thompson Products

"Tapco" Plant—Cleveland 17, Ohio—U. S. A.
Other factories in Detroit • Los Angeles • St. Catharines, Ont.

THE PRECISION UNITS illustrated at the right are typical of Thompson fuel booster pumps that meet all new installation, safety and performance requirements in military, commercial and personal aircraft.

Our Aircraft Accessories Division was the largest producer of fuel booster pumps during the war, and continues to develop improved postwar types for all aircraft applications. Light weight and compact, they are designed to handle all kinds of fuels at temperatures from −65° to +135° F. Radio noise filters are provided when specified.

Our extensive engineering and high altitude testing facilities are always available to customers who are interested in aircraft fuel systems and other products of our Aircraft Accessories Division.



FUEL, FUEL BOOSTER AND WATER INJECTION PUMPS — FUEL SELECTOR VALVES — FLOW EQUALIZERS — COMPRESSOR ASSEMBLIES

Why she's laughing over spilt milk

SPILLS used to mean big cleaning bills for airlines. Removing and dry-cleaning a wool carpet runs into heavy labor and material costs. But this problem has now been answered by B. F. Goodrich engineers—with the Avtrim Flight Rug, shown in the Capital Airlines' picture above.

Things spilled on an Avtrim Flight Rug can be easily wiped up. Thorough cleaning can be done with soap and water or a solvent, without removing the rug. What's more, Avtrim Flight Rugs last far longer than ordinary carpets. They're easy to install. The flame-resisting sponge rubber backing provides cushiony comfort, reduces vibration. And the glorious colors add new beauty to any cabin.

Avtrim is an ideal material, too, for arm rests, baggage racks, wall paneling and many other uses. For complete information, write to *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

AVIATION WEEK

Vol. 50, No. 8 — February 21, 1949

McGRAW-HILL PUBLISHING CO., Inc., James H. McGraw (1860-1948), 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; 2980 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 8. 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.

NEWS SIDELIGHTS

Skycoach Row

Expansion of skycoach services by certificated carriers has resulted in the creation of strange bedfellows. Standard Air Lines, transcontinental nonscheduled operator, and United Air Lines both vigorously protested against TWA's new, low-cost Kansas City-Los Angeles flights with 24-passenger DC-3s.

Standard, which has been flying coast-to-coast for $99, agreed with United that TWA's coach fares were "unreasonably low, unjust and discriminatory." CAB threw out both complaints, and TWA inaugurated its new service early this month.

Navy Drive

The financially-lush Navy League has quietly approved a five-year $500,000 publicity program to build up public and congressional support for a bigger and better naval arm. The program is expected to concentrate on promoting Naval Aviation, now being overshadowed by the Air Force.

The publicity program, contemplating a $100,000 expenditure a year, will be directed by Col. E. Courtlandt Parker, Washington attorney, formerly a wartime Marine Corps officer.

Among Navy League's long list of millionaire vice presidents are Winthrop Aldrich, president of the Chase National Bank of New York, and Ferdinand Eberstadt, who directed the Hoover Commission's "task force" on reorganization of the military establishment.

Eberstadt also spearheaded the Navy's lusty fight against armed services unification, prior to the passage of the 1946 act.

Lights Dimmed?

Air Line Pilots Assn. has tossed a monkey wrench into Civil Aeronautics Administration's plans to steamroller a joint military-civil standardization on its own slope line system of high intensity approach lights.

ALPA submitted a minority report to the Air Force-Navy-Civil subcommittee on visual aids to navigation bluntly stating that airline pilots will not accept the slope line system or any other than has more than a single row of lights for directional guidance. ALPA point is that more than one row causes confusion in bad visibility.

Meanwhile CAA has gone ahead with bidding on some $10 million worth of business on new slope line systems. ALPA was critical of the manner in which CAA conducted its lighting tests at Arcata and felt the single row system was unduly handicapped by CAA use of low power red-filtered lights in contrast to the 2500 watts of clear light on slope line bars.

ALPA President Dave Behncke told the ANC subcommittee that since the 7000 airline pilots will be the principal users of an approach light system it is logical that they should have a system that meets their requirements.

B-36 Defense

U. S. Air Force is swinging into high gear on its public defense of the Convair B-36, six-engine bomber, as the "best long range bomber now available."

Air Secretary Symington and Chief of Staff Gen. Hoyt Vandenberg both made public speeches last week in defense of the big bomber. Air Force still has nothing to say about its plans to sling four jet engines under the B-36 wings to provide additional speed for short periods.

Meanwhile Convair is smarting under industry reaction to a company press release that made invidious comparisons between the B-36 and Northrop's B-49 jet Flying Wing.

Sea-Air

The Sea-Air Committee of the National Federation of American Shipping is still going –but in low gear.

The "committee" now consists of Robert Kline, Jr., Washington attorney. The steamship organization will continue to push for separation of "subsidy" and "service" mail payments to airlines. It is not expected to be aggressive on Capitol Hill, in promoting its original objective: legislation authorizing shipping companies to enter the airline field. Several bills to accomplish this have been introduced, but there is no indication they will be acted on.

Hill Jobs

Leading applicants to direct staff work on the Senate Interstate and Foreign Commerce Committee's coming airline financial investigation are Parker Van Zandt, well-known aviation consultant, and Ed Sweeney, a member of the faculty of Northwestern University School of Law, specializing in aviation matters.

Hal Davis, a $10,330-a-year clerk of the committee on aviation matters, appointed by Sen. Owen Brewster (R., Me.), is expected to continue service under the new chairmanship of Sen. Edwin Johnson (D., Colo.).

CAA Smokescreen

Industry observers are highly amused over Civil Aeronautics Administration reaction to the first scientifically conducted tests made on the CAA-sponsored omni-range airways system. Made for the newly organized Air Navigation Development Board the omni-range tests were flown by W. E. "Dusty" Rhoades in the Air Transport Assn.'s research DC-3 "Beta".

Radar, automatic flight recorders and other accurate measuring instruments were used to get the data presented in the ANDB report. Data revealed that errors in the omni-range system were greater than CAA had indicated previously and that further tests of the equipment were necessary.

Apparently stung by the first attempts at scientific analysis of the equipment in which it has already invested millions of the taxpayers dollars, CAA's peripatetic press agent Ben Stern put his mimeograph machines to grinding out a press release trumpeting that "omni-range tests reveal high reliability and increasing accuracy." Stern's press release offers no detailed data in support of CAA's claims and is apparently based on routine CAA flight checks on omni-range installations without the precise instrumentation and scientific analysis used in the ANDB survey.

Housing Chill

Aircraft manufacturers are not enthused over Walter Reuther's plan to have them make 20 million prefabricated houses during the next 10 years.

The United Automobile Workers president presented his plan to a Senate Banking subcommittee in Washington last week. Airframe manufacturers thought of the idea two years ago when wartime plant production halted abruptly. Intensive surveys of the possibilities of using aircraft plants for mass production of prefab houses indicated the project was not feasible and even companies most interested dropped the idea.

Plane and house making required radically different tooling and different labor skills.

AVIATION CALENDAR

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

Feb. 22—ICAO Airworthiness division, Montreal.

Feb. 23-24—Aerial agricultural spraying conference, Community Bldg., Manhattan, Kansas.

Feb. 24-25—4th annual aviation conference, Washington-Youree Hotel, Shreveport, La.

Feb. 26-27—Third annual Pacific Coast Midwinter Soaring Championships, Torrey Pines, San Diego, Calif.

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

Mar. 7-10—Institute of Radio Engineers Convention, Hotel Commodore, New York City.

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

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

Mar. 14-16—Symposium on engineering research, Center for Continuation Study, University of Minnesota, Minneapolis.

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

Mar. 22—ICAO African-Indian ocean air navigation meeting, Algiers.

Mar. 22-24—Air Transport Assn., annual airline engineering and maintenance conference Continental Hotel, Kansas 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. 19-20—Magnesium Assn., annual spring meeting, Edgewater Beach Hotel, Chicago.

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.

Apr. 24-27—American Assn. of Airport Executives convention, Oklahoma City.

Apr. 28-29—Sixth IAS personal aircraft meeting, Hotel Allis, Wichita.

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

May 18—National Fire Protection Assn. committee on aviation and airport fire protection, Fairmont Hotel, San Francisco.

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

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

May 24-27—Second joint conference of IAS, Royal Aeronautical Society, New York City.

June 3-12—Sixth annual Michigan Aviation week.

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

PICTURE CREDITS

11—Douglas; 12—Curtiss-Wright; 13—Sikorsky; 15—McGraw-Hill World News; 24—General Electric; 33—Civil Aeronautics Administration; 34—McGraw-Hill World News; 35—American Airlines.

NEWS DIGEST

DOMESTIC

Northwest Airlines last week announced plans for a transcontinental skycoach service starting Mar. 24 between New York and Seattle, with fares averaging about four cents a mile. Newly-converted 56-passenger DC-4s would make the coach flights Monday through Friday with New York departures about 11 p.m. Stops would include Detroit, Milwaukee, Minneapolis, St. Paul, Billings and Spokane. If CAB approves, the new coach fare will be $96.80 compared to the regular rate of $157.85.

U. S. civil aircraft number 97,025 according to a Civil Aeronautics Administration state-by-state tabulation as of Oct. 1, 1948. Tabulation shows 95,987 civil craft are in the continental limits, 663 in Alaska, 233 in Hawaii and 73 in Puerto Rico, and a few in other countries.

Conviction of Bennett E. Meyers, former Air Forces major general, has been upheld by the U. S. Supreme Court, which refused to hear Meyers' appeal from a U. S. Circuit Court of Appeals decision last November affirming his conviction.

A North American F-86, piloted by Maj. Frank K. Everest, flew the 390-mile distance from Dayton to Washington in 33 min. 3 sec. at an average speed of 710 mph.

National Aeronautics Assn. elected Col. Roscoe Turner, Ben O. Howard and Arthur C. Chester to honorary life membership in recognition of their outstanding contribution to sporting aviation in the United States.

FINANCIAL

North American Aviation, Inc., reported profit of $6,779,561 for fiscal year ended Sept. 30, 1948, on sales of $94,129,710. In the preceding year, company showed loss of $28,258 on sales of $19,855,320.

Pan American Airways is negotiating with a group of banks for a $20 million line of credit, fulfilling part of the terms of the agreement under which it seeks to purchase American Overseas Airlines. One section of the agreement provides that PAA shall obtain additional credit amounting to $10 million.

FOREIGN

Israeli Air Force numbers more than 50 fighter planes, including British Spitfires and German Messerschmitt 109s, European diplomats report. Among transport types, the force has a C-54 and a Constellation, in addition to DC-3s and a number of Noorduyn Norseman.

INDUSTRY OBSERVER

► **Douglas and Chance Vought will figure in the next world speed record attempts. Navy plans to use the Douglas Skyrocket to break the 670 mph. record now held by the North American F-86A. If current plans are approved the Chance Vought Cutlass (XF7U-1) will then crack the Skyrocket's mark. Skyrocket is a research plane but the Cutlass will make its runs as a fully armed fighter to match the USAF standards set with a tactically-equipped F-86A. Navy plans to keep planes well under their maximum speed using just enough power to comfortably crack the old records. If successful these performances will boost the official record to around 700 mph.**

► Republic Aviation has completed its XF-91, the supersonic interceptor with an inversely-tapered wing and a combination of turbojet and rocket power. Initial test flight of the XF-91 will be made soon at Muroc.

► **Although Curtiss-Wright Corp. denied Aviation Week's report of last Sept. 13 that it was building a rocket engine to power the Bell X-2 supersonic research plane a Curtiss-Wright press release dated Feb. 11 announces that among the exhibits at "the Span of Flight" will be one that "illustrates the top-secret Curtiss-Wright engineered rocket engine which will power the Air Forces spectacular X-2".**

► Convair has a subcontract to make nose assemblies for the Boeing B-54A VDT engine powered bomber and the RB-54, a photo-recon-version of the same type. Convair will spend about $2 million for planning and tooling on the project with first deliveries scheduled to be made to Boeing next fall.

► **McDonnell Aircraft reports its Banshee production met the Navy's schedule at the end of 1948. Completion of the Navy order for 235 Banshees is scheduled for June 30, 1950.**

► U. S. Air Force has activated its first jet bomber unit—the 47th Bomb Wing of the 12th Air Force at Barksdale Field. The wing will be equipped with North American B-45A four-jet bombers now rolling off the production line at Long Beach, Calif. First USAF group to be equipped with North American F-86A swept-wing jet fighters will be announced shortly.

► **Australia plans to use four Douglas DC-6 transports on its trans-Pacific service. The four planes were originally ordered by Scandinavian Air Lines but were diverted to Australia for payment in sterling. Australian branch of de Havilland has orders for six of its tri-motor Drover feederliners from British nonscheduled operators.**

► Westinghouse has been negotiating with FIAT of Italy for Italian production of Westinghouse jets under a licensing agreement. British are also in the Italian picture with similar negotiations by de Havilland.

► **British Boulton-Paul Balliol, an advanced type trainer designed for Royal Air Force use, crashed killing two test pilots. The Balliol, powered by a Rolls Royce Merlin, was in competition with a Merlin powered Avro Athena for the RAF contract. Versions of both planes powered by the Armstrong Siddeley Mamba turboprop engine have been postponed pending further engine development.**

► Convair's XC-99 on its eighth flight was moved from San Diego, Calif., to the company's B-36 plant at Ft. Worth, Tex., where test flights will be completed. Two more company test flights are scheduled, to be followed by three Air Force flights prior to Air Force acceptance of the transport.

► **Air Force has ordered five additional Ryan Navian liaison aircraft for delivery to Greece under U. S. aid program. The planes will be added on to the 158 already under order for National Guard and Army Field Forces. The order also includes spare parts, special tools and ground handling equipment.**

Vol. 50, No. 8 AVIATION WEEK February 21, 1949

AF, Congress Act Fast on Radar Net Plan

Steps taken to start $160,750,000 warning system on approaches to U.S. and Canada.

Air Force plans to build $160,750,000 air warning network project over the continent to preclude an aerial attack disaster were laid before Congress last week.

The project, described by USAF officers as the "irreducible minimum" for national defense, will involve establishment of 20 control centers serving as the basic warning installations for 20 defense areas. Each center will be under the command of an area air defense commander. The system of centers will be supplemented by radar stations strategically dispersed, radar-equipped picket ships for off-shore warning service, and a system of intercommunication.

▶ **Dollar Breakdown**—The $160,750,000 needed for the project would be divided as follows:

- **For land construction,** $85,500,000.
- **For electronics equipment,** $68,250,000 (USAF has equipment valued at $42,250,000 on hand, leaving $26 million needed for new equipment).
- **For naval radar picket ships** (four), $7 million.

After hearing Maj. Gen. Gordon P. Saville, commanding general for air defense, warn that the continent is now "almost a blank" on the score of an attack warning system, a House Armed Services subcommittee quickly approved legislation authorizing the project. Similar legislation was introduced in the Senate by Sen. Millard Tydings (D., Md.), chairman of the Senate Armed Services Committee. Early House and Senate passage of the authorization is expected.

▶ **Seek Supplemental**—USAF will seek a supplemental appropriation so that the project can be immediately started. Portions of the $115 million provided for electronics equipment and the $21 million provided for real estate and construction in the 1950 fiscal year budget, now under consideration by the House Appropriations subcommittee on the Armed Services, are earmarked for the project, USAF disclosed. The Budget Bureau turned down the Navy request for $7 million for picket ships in the 1950 fiscal year budget.

Meanwhile, visiting Canadian Prime Minister Louis St. Laurent told reporters that the joint chiefs of staff of Canada and the U. S. have held preliminary discussions on a far more extensive continental warning network than the $160,750,000 project. But this, St. Laurent said, "would call for expenditures so great that little would be left us for anything else."

Basic difference between the two proposed radar nets is that the one now sought by the Air Force would attempt to cover only the most vulnerable routes of approach to the United States and Canada while the more extensive net would erect a radar "picket fence" around the North American continent and its northern approaches.

▶ **Technical Problems**—Biggest technical problems facing radar producers is the development of satisfactory airborne radar for use by fighters at extremely high altitudes; development of airborne radar equipment for large transport type aircraft to be used as aerial radar pickets and ferrets for counter-radar measures; and the constant race between radar and counter-radar measures; and the constant race between radar and counter-radar devices.

Since the proper operation of an air raid warning system requires positive identification of all friendly aircraft the military warning system will have to be integrated with the new electronic all weather airways and traffic control system now being developed as a joint military-civil effort under direction of the Air Coordinating Committee, Research and Development Board and the Air Navigation Development Board.

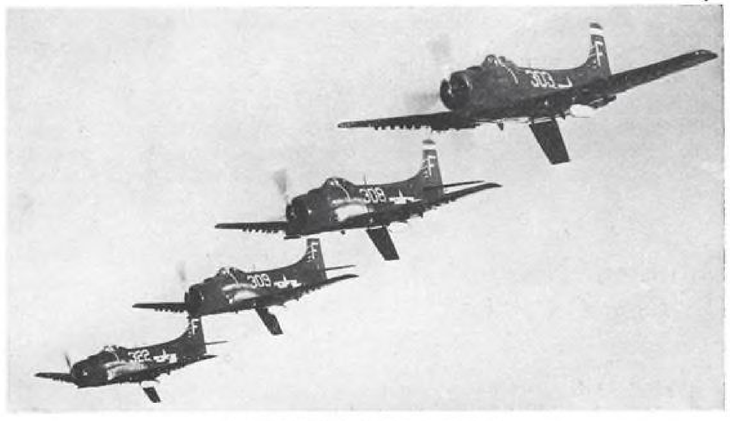
Defense Chiefs Ask Guided Missile Site

Defense chiefs last week urged congress to approve a $200 million guided missile proving ground with a base area of "several hundred miles" and a range of "over 3000 miles".

Legislation authorizing the project has been recommended by a House Armed Services subcommittee, and introduced in the Senate by Sen. Millard Tydings (D., Md.), chairman of the Senate Armed Services Committee.

Highlights of testimony:

- **Guided Missiles** of a 500-mile range will be ready for testing before the end



LEISURELY SKYRAIDERS

Unusual action shot shows a formation of Douglas Skyraiders (AD-1) slowed down with their dive brakes fully extended. Main dive brake is located below the fuselage with other brakes on each side of the fuselage near the insignia. White radomes are located under the left wing. Douglas is pushing the Skyraider series as a low level attack plane for the U. S. Air Force in addition to its present function as carrier based bomber.

CURTISS-WRIGHT ROAD SHOW

Curtiss-Wright Corp. President W. C. Jordan (left) and Vice President for Engineering R. W. Young view the Span of Flight chart that is part of the C-W travelling road show on the history of aviation. Exhibit covers the 46 years from the Wright brothers first flight in 1903 to aviation at present time.

of the year, but there is no adequate area for testing them, according to Dr. Karl Compton, chairman of the Research and Development Board.

• **The "base area"** of the proposed $200 million project would involve establishment of a complete community, with an estimated population of 13,000, centered around shops, laboratories, and concrete launching sites, Brig. Gen. William Richardson reported.

• **The "range area"** would be strung with observation stations every 50 miles for at least the first 500 miles of its "over 3000" mile stretch, Richardson said.

• **Missiles** with a 5000-mile range are now "within the range of possibility," Compton said.

The proposed proving ground would be constructed by the Air Force and operated under the direction of the Secretary for Defense, with the three services participating.

Comment Requested On Gas, Oil Sale

Comments concerning a proposed revision of the regulations administering the Federal Airport Act with respect to the sale and delivery of aviation gas and oil are being sought from the aviation industry and interested parties by D. W. Rentzel, Administrator of Civil Aeronautics.

The present Part 550 of the Civil Air Regulations has been in effect since Mar. 8, 1948. Since that time many conflicting points of view have been presented to the CAA as to how the sale of gasoline and oil at airports participating under the Federal Airport Act should be handled. Present survey is being made in order to obtain the views of all concerned including airport operators, fixed base operators, airlines, state, county and municipal associations and oil companies.

Part 550 allows airport sponsors to grant or exercise an exclusive right to sell aviation gasoline and oil on their airport, but assures to all aircraft users of the airport the right to purchase gasoline and oil off the field and to have it delivered for their own use. The sponsor, however, may charge a reasonable fee representing the cost of services in connection with any delivery of gasoline and oil. Rentzel requested that interested parties submit their comments by Mar. 10.

WAA Bill

Bill to continue the Office of War Assets Administrator and the War Assets Administration from scheduled date of expiration Feb. 28 to June 30 (as forecast in AVIATION WEEK, Jan. 31) has been passed by the House, and is expected to get Senate approval and become law before the expiration date.

The expected extension of the life of WAA means that surplus aircraft disposal presumably will continue without change until June 30, instead of switching to Department of Air Force control, the alternative if WAA had expired Feb. 28.

Delegates to ICAO

Approval of three West Coast aircraft factory representatives to represent Aircraft Industries Assn. at airworthiness division sessions of the International Civil Aviation Organization in Montreal Feb. 22 was voted by Aircraft Manufacturers Council of AIA at Los Angeles.

Ivan Shogran, Douglas; G. G. Green, Convair; and P. A. Colman, Lockheed were chosen as the Aircraft Industries Assn. delegates in discussions of power, structures, and flight performance, respectively.

North American, Navy Check XAJ-1 Crash

North American and the Navy are investigating possible causes of the crash recently of an XAJ-1 experimental attack bomber.

The XAJ-1 crashed into Santa Monica Bay during a flight to conduct yaw tests. Navy divers have recovered engines and portions of the airframe from 120 ft. of water. Preliminary investigation indicates that the bomber apparently shed its outer folding wing panels and tail surfaces at an altitude of about 4000 ft.

▶ **Pilots Dead**—Both pilots, Al Conover and Charles E. Brown were killed. Conover was a veteran North American test pilot and narrowly escaped death last year when the canopy of a North American FJ-1 blew off during dive tests at Patuxent River, Md. Conover credited his escape without serious injury then to a specially constructed crash helmet designed by Charles Lombard of the University of Southern California Medical School.

Brown had been a test pilot for the Allison Engine division of General Motors and joined North American last December. He led the qualifiers for the Thompson Trophy Race last year at Cleveland with an average of 418 mph. in a souped up Bell P-39 and was leading the Thompson race when he was forced out on the 19th lap.

▶ **Folding Wings**—The ill-fated XAJ-1 was the second of two experimental models built for the Navy. The plane was powered by two Pratt & Whitney Wasp Major piston engines and an Allison J-33 turbojet engine. It was the largest Navy bomber ever designed for carrier use and had folding wingtips and a folding vertical fin to allow for carrier storage.

North American has a Navy order to build 28 AJ-1s for service-testing.

New Yearbook

Exactly how much money will be spent for aviation products this year?

What will it buy?

Who will spend it?

More money than ever before made available in peacetime is being spent this year to strengthen U. S. aviation. What does this mean in terms of rebuilding our air power?

Next week, Feb. 28, AVIATION WEEK makes a comprehensive report on these questions in the 16th Yearbook, the second Inventory of U. S. Air Power. Air Power is planes (specifications are given for every U. S. plane in production); it is the manufacturing establishment (production figures, employment, plant area, financial health are tabulated); it is transport (size of the airlines, numbers of their planes, and the most comprehensive report yet published on the Berlin airlift are included). All the basic facts and figures of aviation and of air power are reported.

The Inventory of U. S. Air Power will be received as usual by all regular subscribers. Advance orders for extra copies are growing. Only a limited number of extra copies is being printed. They will be available at $1 each on a "first-come, first-served" basis. Last year, extra copies were sold out within two weeks of publication.

Super-show for Super-audience

USAF displays latest fighters, bombers to President and Congressmen at House Committee request.

President Truman and members of Congress last week witnessed a demonstration of U. S. Air Power conceded to be the most spectacular flight show ever performed in this country.

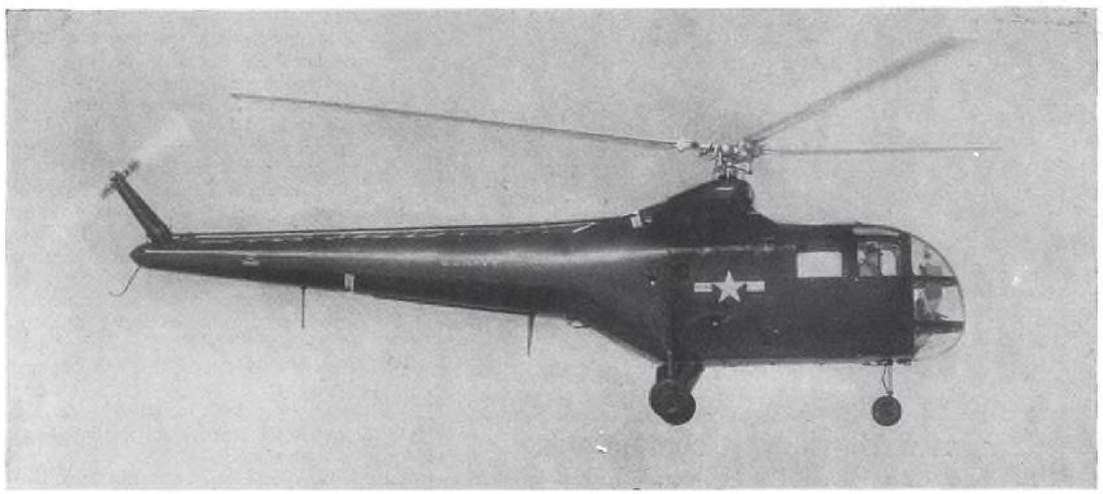
The super-show, which had a super-audience of about 250 persons, was an "Air Progress Demonstration" at Andrews Air Force Base, near Washington. In addition to the President and his cabinet members the demonstration was witnessed by a large delegation of Senators and Representatives.

Except for the press, the show was limited to the official group. It was arranged in response to a House Armed Services Committee request to Air Force Secretary Symington to view "today's Air Force."

▶ **Impact on Funds**—Impact of the show on the future of Air Power in the total national defense picture can be considerable, and will be watched anxiously by the aviation industry and Air

BLADE FOLDING

Unusual view of new Sikorsky five-place Navy XHJS-1 shows all-metal rotor blades folded for compact stowage on shipboard. Craft is first large Sikorsky model with original metal blades expected eventually to replace composite construction blades.



EXPERIMENTAL FIVE-PLACER

First flight photo of the new experimental five-place Sikorsky Navy XHJS-1 helicopter shows lines basically similar to the current Navy HO3S four-place Sikorsky model. Two of the experimental five-placers are under test at Patuxent Naval Air Station.

Power advocates. It was well timed in relation to Congressional appropriations for national defense.

Most dramatic event of the show was the JATO takeoff of the Boeing XB-47 which only last week established a new transcontinental record of 3 hr. 46 min. between Moses Lake Air Force Base, Washington and Andrews AFB. Midway down its takeoff run the swept-wing bomber fired 18 1000-lb. JATO units which launched its 63-ton bulk into the air like an elevator.

▶ **Jet Races**—The six-jet XB-47 also astonished the closely-screened guests in a race with a standard Lockheed F-80C fighter (which lost) and a second race with a North American F-86A fighter (which won). These races effectively bracketed the speed of the new bomber between 600 and 670 mph., with observers agreeing it was much closer to the latter.

The trim Northrop YB-49 Flying Wing bomber impressed President Truman, who toured its interior before the flight demonstration. He climbed back down its ladder with the comment that he would buy it. Secretary Symington countered with "How many?" But the President's reply went unheard. The big Wing got off smartly under the power of its eight G.E.-Allison J-35 turbojet engines and demonstrated an astonishing rate-of-climb.

▶ **Smooth Timing**—Smooth timing of the show was in evidence in the fly-past, at one minute intervals, of the following: Northrop F-61 night fighter, Republic F-47 Thunderbolt, North American F-51 Mustang, North American F-82 Twin Mustang, Lockheed F-80 jet fighter, Republic F-84 and the North American F-86, world's fastest airplane, thereby giving a graphic review of the evolution of the fighter plane since the beginning of World War II. Bombers followed the same pattern with the North American B-25, Douglas B-26, Boeing B-17, Boeing B-29, Boeing B-50, North American B-45, Northrop YB-49, Boeing XB-47 and the monster Convair B-36.

Squadrons of Lockheed F-80s and Republic F-84s then flew past followed by an acrobatic display by a team of five F-80s of the Fourth Fighter Group, based at Andrews. The final review was a massed formation of Boeing B-29 bombers followed by a thundering group of 16 Convair B-36s, the largest number of these latter types yet shown publicly.

▶ **Static Show**—In two hangars was a static display of old and new aircraft, cut-away reciprocating and turbojet engines and special displays of electronics, instruments, accessories and other requirements of the modern military aircraft. The show continued the following day for military attaches, later to be opened to the general public.

SEC Reports Show Varied Stock Shifts

Large scale stock transfers among aviation officials during December, 1948, were revealed in reports recently released by the Securities and Exchange Commission.

TRANSCONTINENTAL COPTER TOUR

United Helicopters' Hiller 360 model is shown hovering before the firm's Palo Alto plant before starting on the first leg of a transcontinental demonstration flight. Mayor Walter Gaspar of Palo Alto (left) and Stanley Hiller, jr., company president, are on the ground. Flight crew consists of C. L. Washburn, operations manager, F. W. Petersen, chief test pilot, and G. E. Rice, sales manager.

Concentrated buying of Consolidated Vultee Aircraft Corp. stock by the Atlas Corp. continued every market day of December. During that month, a total of 65,900 shares of Convair were acquired. Purchase of 2600 additional shares during January boosted holdings of the Atlas Corp. up to 418,200 shares or about 18 percent of the total issue outstanding.

▶ **PAA Distribution**—Pan American Airways distributed stock to key officials during December as a form of additional compensation. The shares so distributed, their recipients and total holdings:

Recipient	Gift Stock	Total Holdings
Erwin Balluder	380	13,287
Harold M. Bixby.....	271	4,271
Howard B. Dean.....	652	6,000
Henry J. Friendly.....	597	1,804
Franklin Gledhill	543	4,856
H. Preston Morris.....	135	1,372
Andre A. Priester.....	271	4,250
Samuel Pryor, Jr.....	543	3,492
J. Clawson Roop.....	163	1,342

C. G. Cheston, a recent addition to the board of directors, purchased 1000 shares of common of American Airlines in December, following the purchase of a like number of shares the previous month to bring his total holdings to 2300 shares. As a form of contrast, Ralph S. Damon, former president, liquidated 4000 shares in January- 1949, retaining 1000 which may have been sold since.

▶ **Capital**—George R. Hann, a director, while purchasing $48,000 in Capital Airlines debentures, bringing total holdings in this issue to $351,000; was in the process of selling 2700 shares of common, reducing his holdings in this category to 5333 shares. J. C. H. Bryant, also a director, in November increased his common shares by 600 for a total of 10,900 and also held $20,000 of debentures.

Improving cash resources is evident for Lockheed Aircraft Corp. in that it resumed accumulating shares in Pacific Finance Corp. After purchasing 1700 shares in November, another 1400 shares were acquired in December, bringing total holdings to 313,637 shares or about 57 percent of the entire issue.

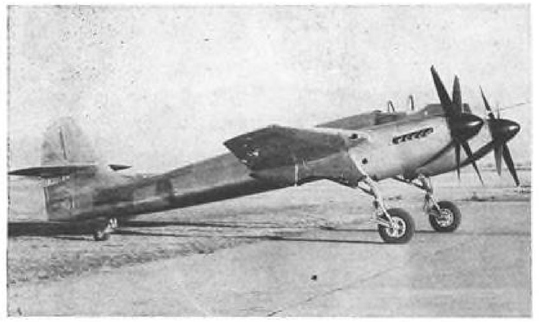
Further accumulations of Bell Aircraft stock by the controlling investor group was accomplished in the closing months of 1948. Lancaster Corp., an affiliated investment trust of the First York Corp., which owns 150,444 shares of Bell, purchased 4700 shares in November and December.

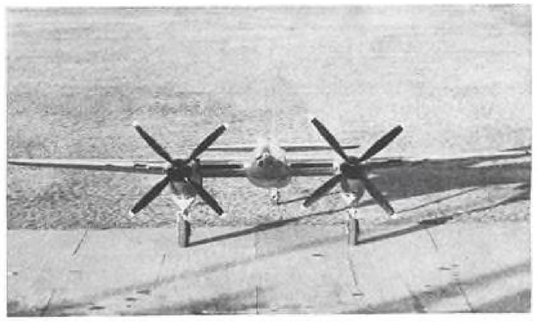
▶ **Selling Side**—The selling side also came in for prominent attention among aviation officials.

George A. Butler, a director, liquidated 3400 shares of Braniff retaining 1600 at the year-end.

Hugh Knowlton, a director of Eastern Air Lines, continued to liquidate by selling 1000 shares in December, holding 500.

Sigmund Janas sold 1800 shares of Colonial Airlines, retaining 16,538 at the close of the year. E. E. Ridley disposed of 233 shares in November, keeping 1000. At the same time, Francis Hartley, Jr., bought 200 shares boosting his holdings to 13,004.





NEW ARGENTINE FIGHTER

Latest product of the Argentine government aircraft factory at Cordoba is the twin engined Nancu, modeled after the British Hornet. Design of the Nancu is credited to an Argentine engineer, S. Pallavincio. It is powered by two Rolls Royce 1800 hp. engines and has hit better than 700 kilometers per hour in flight tests. It carries only a pilot and will be used as a fighter-bomber.

Bendix Annual Report Shows Aviation Gains

Bendix Aviation Corp. 1948 annual report discloses that for the first peacetime period in 20 years of the company's existence, its corporate title reflects an accurate designation and is no longer a misnomer.

For the fiscal year ended Sept. 30, 1948, aviation equipment took first place among Bendix billings, accounting for about $68 million or some 42 percent of total sales of around $162.5 million. Prior to the war, aircraft products contributed less than one-third of sales, while automotive equipment provided more than 60 percent. Last year, Bendix sales of automotive equipment accounted for $60 million or about 38 percent of total billings.

Sundry activities, accounting for only 6 percent of sales in prewar years, rose sharply to 24 percent in 1947 and receded slightly to 20 percent in 1948. This postwar rise was accomplished largely due to the company's entry into the home radio field, which trade reports indicate as having been unprofitable.

▶ **Total Sales Up**—Last year's total sales of $162.5 million were up considerably from the $141.6 million reported for the 1947 fiscal year. Current gains reflect the improvement in aircraft product sales.

Net income last year amounted to $11,280,742 and was equivalent to $5.33 a share on the 2,117,453 common shares outstanding. This compared with adjusted net income of $5,248,999 or $2.48 per share recorded for the fiscal year 1947.

It is also significant that the company is beginning to reestablish improved profit margins peculiar to normal conditions. Before taxes, profit margins amounted to 11 percent of sales for 1948, compared with 6.5 percent for 1947 and an average of 8.5 percent from 1936 to 1939.

Bendix also remains in a sound financial condition with net working capital last reported at almost $70 million, which is equivalent to more than $32 per share.

F-84D Modifications

U. S. Air Force has revealed detailed modification of the Republic F-84D now in production at the firm's Farmingdale, Long Island plant. The F-84D will be followed by the F-84E, featuring a more powerful version of the Allison J-35 jet engine now powering the F-84 series.

New features of the F-84D:

- **Reinforced** metal skins on wings and ailerons.
- **Winterized** fuel system.
- **Substitution** of a mechanical landing gear retraction system for the hydraulic system.
- **Hinged gun deck** cover making it possible for one man to open the gun cover from the ground.
- **Shift of the pitot** tube from the tail fin to the nose duct air divider making it more accessible for maintenance and permitting engine changes without disconnecting the pitot tube.
- **New armament**, exterior lighting system and new cabin pressurization system.

Kimball Nominated

Dan A. Kimball, of Aerojet Engineering Corp., Azusa, Calif., has been nominated by President Truman to be Assistant Secretary of the Navy for Air. Kimball will succeed John Nicholas Brown, whose resignation has been accepted and will become effective Mar. 15.

Kimball is executive vice president of Aerojet and a vice president and director of General Tire and Rubber Co. of Akron, Ohio. Aerojet has been a pioneer in development of solid fuel propellants particularly for jet assisted take-off of aircraft.

Nomination of Kimball will put naval air under the direction of a former Army Air Corps pilot. Kimball served as a pilot in World War I after taking flight training in the same group with Jimmy Doolittle. Kimball is a native of St. Louis and now lives in Los Angeles. He is a close friend of Navy Secretary John L. Sullivan.

ANDB Engineers

Three electronic engineers have been hired by the Air Navigation Development Board to fill out its technical staff under Douglas H. Ewing.

They are:

- **J. Wesley Leas**, formerly with the operations division of the Air Transport Assn., Aeronautical Radio, Inc. and Airborne Instruments Laboratory. Leas was associated with the design of experimental distance measuring equipment while serving with U. S. Air Force research groups during the war.
- **Norman Caplan**, formerly with the advanced development section of Radio Corp. of America's Victor division. Caplan was a radar officer in the Air Force, won the Legion of Merit for his wartime work in developing operational use of ground and airborne radar equipment.
- **Maxwell K. Goldstein**, formerly of the Office of Naval Research where he was in charge of primary research of radio aids to air navigation. He also served as a radio engineer at Wright Field and with the Civil Aeronautics Administration.

PRODUCTION

Subcontracts

B-47 program extended with orders totalling $13.5 million.

Boeing Airplane Co. has extended its subcontracting program on the B-47 six-jet bomber, to 32 firms with orders totalling $13.5 million.

Largest of the new subcontracts announced by Boeing will go to Bendix Aviation Corp., South Bend, Ind., and the Cleveland Pneumatic Tool Co. Bendix won its subcontract with a bid of $1,962,693 for supplying the outrigger and front main landing gear. The Cleveland tool company bid $483,604 for the rear main landing gear.

▶**New Contractors**—Another 28 firms have smaller subcontracts totalling $656,036. They are:

General Mills, Inc., Minneapolis; Vard, Inc., Pasadena, Calif.; Pachmayr Gun Works, L & M Engineering Co., Tapered Sheets, Inc., and Rezolin, Inc., all of Los Angeles; Westholt Manufacturing, Inc., Product Engineering & Manufacturing Co., Inc., Associated Co., Inc., and Mid-Western Steel Treating & Forging Co., Inc., all of Wichita; Vulcan Tool Co., Dayton, Ohio; Master Machine & Tool Co., Foote Bros. Gear & Machine Co. Both of these firms are in Chicago.

Superior Tool & Die Co., Castaloy Corp., Argo Machine Co., Heidrich Tool & Die Co., Detroit Kellering Co., Star Tool & Die Works, all of Detroit; Atlantic Manufacturing Co., Philadelphia; Sargent Engineering Corp., Huntington Park, Calif.; Weston Hydraulics, Ltd., North Hollywood, Calif.; American Machine & Foundry, Buffalo, N. Y.

Luscombe Airplane Co., Dallas, Tex.; Midwest Tool & Engineering Co., Indianapolis; Reynolds Engineering Co., Rock Island, Ill.; Engineering & Research Corp., Riverdale, Md.

Previously announced subcontracts include: $7,807,316 to Bell Aircraft Corp., Buffalo, for power packs, horizontal and stabilizers, elevators and seats; $1,345,874 to Curtiss-Wright Airplane division at Columbus, Ohio, for ailerons and flaps; and $1,272,141 for building dorsal and vertical fins and rudders.

▶**Production Plan**—Boeing now has a $40-million USAF letter of intent to build 10 B-47s at its Wichita No. 2 plant this is generally considered to be only the beginning of a sizable B-47 production program that may stretch out for as long as five years. There is a substantial figure earmarked for B-47 production in the USAF fiscal 1950 budget now under scrutiny.

STRATOJET LINE BEGINS

Production tooling for the swept-wing Stratojet bomber (B-47) is under way at Boeing's Wichita No. 2 plant. Wing jigs shown under construction here reveal extreme sweepback of Stratojet wing. Modification line for B-29s being reclaimed from storage and B-50s from Boeing's Seattle plant moves by in the background.

Employment at Boeing-Wichita has now passed the 7400 mark in contrast to the 1500 persons employed there last March. Tool fabrication workers, including template layout men, tool and die makers and jig builders, are still badly needed.

Preliminary production tooling on the B-47 line is already well under way with jigs for major subassemblies now under construction. Modification of Boeing B-29s reclaimed from storage depots and B-50s continues at the Wichita plant.

Stockpile Project Almost Completed

DAYTON—Project to stockpile approximately 40,000 machine tools (general purpose) for use in emergency by USAF contractors is approximately 75 percent complete.

Industrial equipment branch, resources planning section of the Air Materiel Command's Industrial Planning division has also assigned to industry 2226 machine tools, of which 1290 were taken out of the reserve and the remainder shipped direct to the manufacturers from War Assets Administration custody.

▶**Tool Stockpile**—The tool stockpile is divided between two huge aircraft plants of World War II, now giant warehouses, at Omaha, and Marietta, Ga. The stockpile was acquired from War Assets Administration and Reconstruction Finance Corp. plants deactivated at war's end.

USAF acquired approximately 10,000 of the tools in its stockpile before the formation of the Joint Army-Navy Machine Tool Allocation Task Committee, which coordinated the allocation of surplus tools to services who requisitioned them.

▶**Tools Aging**—Total number of machine tools, government and service owned in 1945 was estimated at from 650,000 to 725,000, of which 60,000 were estimated at over 15 years old.

Machine tools used in World War II totalled 1,778,000, of which approximately 250,000 were used for air power, 175,000 for the Air Force requirements and 75,000 for Navy Bureau of Aeronautics requirements.

▶**Stockpile Problems**—The industrial equipment specialists at Wright Field offer a strong argument with anybody who contends that obsolescence seriously limits the useful stockpiling life of general purpose machine tools. They point out that in World War II one Michigan plant was using some machine tools built in 1878. Rock Island Arsenal had some lathes of World War I vintage in mothballs and turned them over to Continental Motors for useful service in an emergency.

ENGINEERING

Flight Refueling Broadens Aircraft Utility

Procedure offers wide benefits in commercial, military operations.

A 1914 engineering law and a 1924 "stunt" have been coordinated to produce a 1949 highlight in aircraft design and employment.

The law was developed by Louis Breguet and established the basic relationship between airplane size and range. Modern aircraft design has now approached closely the upper limit of this relationship. USAF Chief of Staff, Gen. Hoyt S. Vandenberg recently revealed that a study of aircraft size vs. range resulted in the Air Force conclusion that "an aircraft of an acceptable size could not be built to perform its mission at the desired range unless air-to-air in-flight refueling were employed."

The 1924 "stunt" was the mid-air transfer of fuel from one D.H. 4 to another over Rockwell Field, Calif. This fuel-transferring enabled Lts. Smith and Richter to remain aloft 24 hr.

The 1929 endurance record of the Fokker "Question Mark" of 150 hr. generated a wave of refueling flights that continued for 6 yr. and culminated in the existing endurance mark of 653 hr. 34 min. set by Al and Fred Key.

▶**Operating Procedure Evolved**—But while mid-air fuel transfer remained merely a stunt in the U. S., it became serious business in England and Flight Refuelling, Ltd. (of which Mr. Latimer-Needham is chief engineer) was formed in 1936 to develop methods and techniques.

The company has expanded steadily through the years until flight refueling has become a standard operating procedure. It was employed over the English Channel during 44 flights in 1946, near Bermuda in 11 weekly scheduled flights in 1947, and in 16 scheduled BOAC London-Montreal flights in 1948.

With this extensive experience available, Flight Refuelling now believes the stage is set for en route replenishing on the world's long-distance commercial air routes.

▶**Connection Details**—Equipment required includes special line hauling and connecting devices in the transport and special contact and fuel releasing components in the tanker aircraft. The receiver aircraft is fitted with a bell-mouthed reception coupling mounted on the stern. The refueling hose is pressed into this mouth against Neoprene seals by four hydraulically-operated toggles to form a fuel-tight joint. Hauling line extends through the center of this reception coupling and is operated by a hydraulic motor turning a drum.

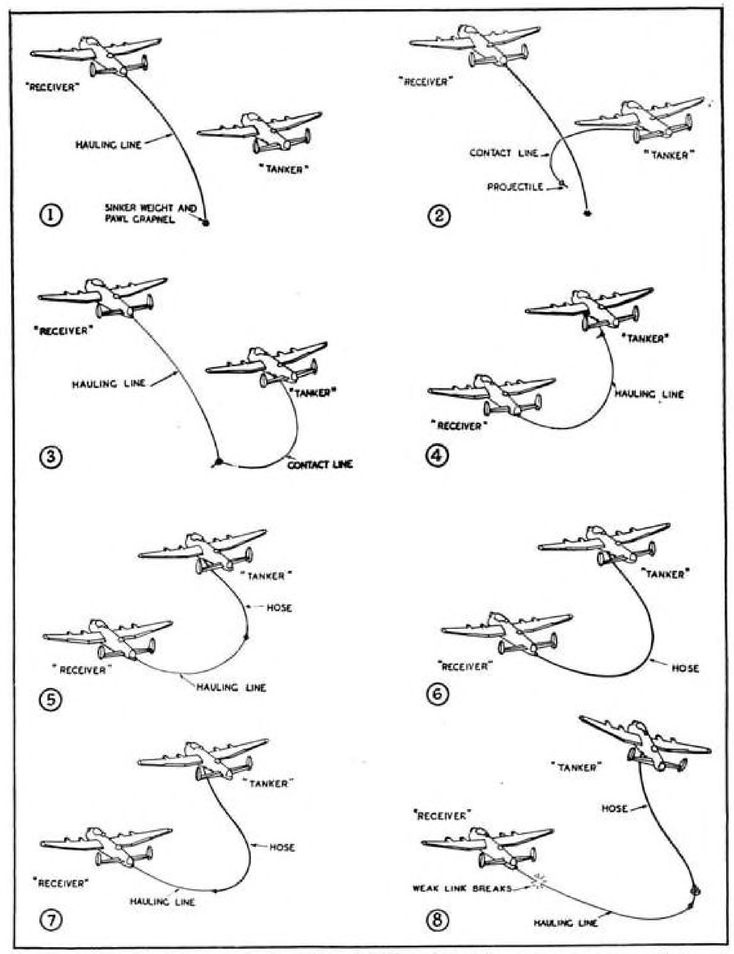
Inside the reception coupling the fuel line is divided to pass on either side of the hauling line—a 350-ft. steel cable, 150 ft. being reduced in size and a 6-in. length comprising a "weak link."

▶**Transport, Tanker Equipment**—The transport tanks have special valves and fittings to permit entry of fuel from the stern reception coupling, to prevent siphoning if the tanker drops below the transport, and to accommodate surging that may develop in the line.

In addition, the transport carries a radar beacon unit to permit the tanker to "home" while making contact during periods of restricted visibility.

The tanker aircraft carries fuel supply tanks connected to the drum-wound hose. The drum is hydraulically operated and contains 235 ft. of 2-in. hose lined with fuel-resistant synthetic rubber and reinforced with steel wire.

A small parachute is attached to the



Procedure for in-flight refueling, from initial craft-positions to contact separation.

Based upon a paper by C. H. Latimer-Needham presented at the Annual Meeting of the Society of Automotive Engineers, Detroit, Jan. 10-14, 1949.

lower end of the line to prevent thrashing in mid-air, particularly during winding in.

The tanker also employs a line-throwing gun, drum brake levers, fuel cocks and special valves and equipment. In addition, it may be equipped with pumps for increasing delivery rate, and nitrogen bottles for flushing the system prior to transfer. It carries radar equipment for contacting the transport in bad weather or at night.

▶**How Contact Is Made**—The technique of the operation has been reduced to a comparatively simple procedure. The tanker seeks out the transport, which trails its hauling line. The tanker assumes a position on the rear starboard quarter of the transport and fires a line forward of the arc of the hauling line.

The contactor line from the tanker slides down the transport's hauling line until it is engaged by the pawls of the latter. The transport operator then winds in the hauling and contact lines, removes the grapnel, and attaches the contact line through the reception coupling to the winch.

▶**Fuel Transfer**—The tanker allows the hose to unwind and the transport sets its drum in motion to haul in. As this operation is in progress, the tanker climbs slightly until it is about 70 ft. above the transport to permit the fuel flow by gravity (pumps will make this unnecessary and permit the tanker to be located below the receiving aircraft).

As soon as the hose is secured to the reception coupling, the system is flushed with nitrogen gas to replace the air with inert gas as a fire prevention measure.

Tanker fuel cock is then opened and the fuel flows into the transport at the rate of about 120 gpm.

▶**Disconnection**—After fuel transfer, the system is again flushed with nitrogen, the transport releases the hose and pays out the hauling line to its full length, the "weak link" line being exposed.

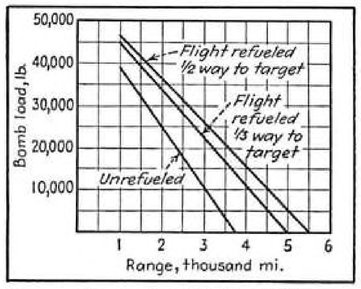
The tanker pilot then banks to starboard, breaking the weak link. The tanker takes in its hose and major portion of the hauling line, the transport taking in the remaining portion of its hauling line.

About 3000 gal. may be transferred in about 30 min., the flight of the transport being uninterrupted, with passengers unaware that 9 tons of fuel have been taken on.

▶**Precautionary Measures**—Great care has been taken to develop a system that insures safety.

Tests have been made of a special device which flushes the reception coupling with methyl bromide immediately after the hose has been released.

Any difference in electrical potential between the two aircraft is neutralized upon initial contact of the hauling and grappling lines, which takes place at a considerable distance from the two planes so that a spark would be dissipated harmlessly into the air.



How employment of flight refueling enhances the performance of the B-50 bomber.

Throughout the refueling operation aircraft remain electrically bonded through the metal reinforcement in the hose.

In the event the two aircraft lose position during the transfer, the hose will pull loose from the reception coupling at a predetermined load. The hauling line will then pay out until the weak link is parted. Aside from emergency breakaways, which are a part of practice training, there has been no instance of the hose being forced from the coupling.

▶**Automatic Handling**—It is apparent that special operators are required in both aircraft to accomplish several duties by hand.

Although operations to date have been carried out with this necessary amount of handling, completely automatic equipment has since been developed that does not require any special personnel. The drum is electrically operated through a magnetic clutch. As contact is approached, the pilot flips a switch and the hauling line trails out, the drum's rate of rotation being controlled by an air brake driven by the drum.

Upon contact, a second switch is thrown and the drum reels in the hauling line with hose attached. The coupling is accomplished by hydraulic pressure and sequence switches. The coupling is released by a solenoid valve upon completion of the fuel transfer.

▶**Benefits**—Advantages of flight refueling are obvious. The amount of weight an airplane can carry depends on its speed; that is, the faster a given airplane flies the more weight it can support. This simple fact presents the basic takeoff problem of large aircraft—from a standing start the airplane accelerates at a speed depending upon its power and drag until a speed is reached at which it can lift its own weight.

Attaining this speed will require a takeoff run that varies with the weight to be lifted. Thus, as weights have gone up, runway lengths required to attain flying speed have also increased.

Flight refueling solves this growing runway problem by permitting a given airplane to take off with a greatly reduced fuel load, thereby permitting either a heavier payload or a shorter runway length requirement. Once in the air at cruising speed, the fuel weight is transferred to the plane, a weight it can then support easily.

Flight refueling makes fueling stops unnecessary, thereby permitting the transport to cover 150-200 mi. while the tanks are being supplied, instead of losing this distance, altitude, and time for landing.

In military operations, it permits bomber range to be increased indefinitely, depending upon tactical limitations laid down by the location of friendly bases.

▶**Commercial Aspects**—In commercial operations, the advantages of flight refueling are extensive but complex.

As air transport has increased, there is a growing trend towards the design of craft intended specifically for certain routes, operation over other routes proving either impractical or uneconomical.

In the U. S., for example, four different sizes of aircraft are now generally considered necessary to do the job of carrying passengers and cargo by air. Flight refueling can reduce this number to two by permitting an aircraft with a self-contained range of 3000 mi. to operate economically over the longest-distance routes in the world.

Flight replenishment would permit the elimination of uneconomic fueling stops. For example, London-New York route operators schedule stops at Shannon and Gander merely for fuel, stops that are costly, time-taking and involve additional landing and takeoff hazards.

With flight refueling, an airliner would take off from London at light weight and climb to a high altitude (25,000 ft., for example) en route to Shannon. Over Shannon fuel is taken aboard and the flight continued over the Atlantic to the vicinity of Gander, where fuel is again transferred in midair, the flight terminating in New York.

On the west-east crossing, only the one refueling over Gander would be necessary, the favorable winds permitting the Gander-London flight to be made safely.

Greatest advantage can be taken of flight refueling by the design of aircraft particularly for this type of operation. In such designs, only fuel sufficient for a still-air absolute range of 3000 mi. need be provided, resulting in an aircraft that is either smaller and faster or one that carries considerably more payload. The heavy penalty of reserve fuel need not be paid, the fuel required for alternate landing or "holding" over destination being provided by the tanker. (*Continued on page 21*)

► **U. S. Activity**—While the British have pioneered commercial flight refueling, principal interest of the U. S. in the operation is for bombardment aircraft. Taking advantage of British experience and techniques, the U. S. Air Force began to pay serious attention to the novel development shortly after V-J Day and has modified a number of Boeing B-29 and B-50 bombers as both tankers and receivers.

Following successful experiments, the Air Force recently disclosed that a Boeing B-50 had flown 9400 mi. nonstop with the aid of two flight refuelings (AVIATION WEEK, Dec. 20, 1948).

Considering the possibilities of flight refueling in the realm of long-range military operations, some observers believe that the additional Convair B-36 bombers ordered recently (AVIATION WEEK, Jan. 24, 1949) will be equipped as both tankers and receivers for mid-air replenishment.

When flight refueling is considered against a framework of military operations it assumes a slightly different picture.

For example, bases would be restricted to those easily held by friendly troops and the transfer will have to be made in areas remote from the possibility of being intercepted by any enemy aircraft.

► **Bomber Use**—There are a number of ways in which flight refueling can be used to extend the normal range of the bomber.

The bomber and tanker can take off together, the bomber carrying a heavy bomb load and fuel sufficient for only ⅓ of its normal range. At this ⅓ point, the bomber is supplied by the tanker with fuel equal to its normal range. The bomber continues over a range of 4/3 its normal range, or an increase of ⅓ through flight refueling.

A second method is for the bomber to take off with a full fuel load and fly ⅓ greater distance to its target, picking up the tanker on the return trip ⅓ its normal range from its home base.

But principal planning of current USAF refueling operations is in the use of shuttle bombing in which the bomber lands at a base thousands of miles away from its takeoff point. In this operation, it may be refueled over a wide spread of ranges on the way to and away from the target.

One of the principal tactical advantages of flight refueling lies in the ability of the bomber to choose any one of countless routes to and away from the target. For example, a bomber taking off from the continental U. S. could refuel over the Arctic region and from there fly any one of a number of routes to a target, instead of an expected route, which could be protected easily.

Another benefit of bomber flight refueling is in the reduction of number of aircraft required over the target to deliver a predetermined number of bombs.

In a mission requiring the dropping of 2000 tons of bombs on a target 3000 mi. away, an unrefueled operation would require 400 aircraft, each carrying 10,000 lb. of bombs but, by refueling, only 308 aircraft would be required of which only 154 would be bombers actually flying over the target, the remaining 154 being tankers which would return to base.

This reduction is made possible by increase to 26,000 lb. in bomb load of each bomber.

► **Reconnaissance, Fighter Use**—Advantage of flight refueling to long-range reconnaissance lies in reduction in size and increase in speed of aircraft used on such missions. World War II indicated the advantage of small, high-speed craft for photo-recon work but their short-range characteristic limited their usefulness.

Flight refueling would permit them to operate over extended ranges and render unnecessary the construction of large, slow and expensive long-range types for such work.

Fighter operations can be greatly increased with this type of refueling. A single large tanker could refuel as many as three fighters and such operations might even be carried out deep in enemy territory since two fighters could provide cover while the third is being refueled. Such operations would prove particularly practicable in regions in which air security had been obtained and the principal fighter duty was ground cooperation. Operations during and immediately following the invasion were of this type and fighter crews shuttled back and forth across the Channel for fuel. This would have been unnecessary if the fighters could have been refueled before their "sweeps" or immediately after, so increasing sweep-time.

Even in the military transport field, flight refueling offers substantial advantages.

Thus, in the case of air-landed and air-dropped supplies, considerably increased cargo loads could be used with refueling taking place shortly before entering the combat area or immediately upon leaving.

Overshadowing all of these possibilities, however, is the application to the fast-spreading turbojet engine in military craft, which, at least in present model engines, slashes the range of fighters and bombers in half.

This serious range curtailment is a problem of exceptional tactical magnitude—one that has required the retention of piston-engined aircraft of both categories.

In the jet aircraft field, flight refueling may prove more than an advantage; it may quickly develop into a genuine necessity.

General Carl Spaatz is often quoted as saying: "We have not yet repealed Breguet's Law, but we are making some important changes in it." There now seems to be little question but what he had flight refueling in mind, for this newly perfected technique holds vital consequences for future commercial and military operations.

All-Weather Blades Use Laminated Plastic

The growing use of plastics in aircraft structural applications is typified by application of this material in the new all-weather helicopter blades built by Goodyear Aircraft Corp. and installed on a Sikorsky R-5 for flight testing.

Leading edge of this rotary wing is .030-in. stretched stainless steel. There are no seams or spices, and support is via two spanwise spars spotwelded to the skin. Leading edge rigidity and static balance are afforded by a strip spotwelded to the blade's inside curve and fitted with lead counterweights.

► **Plastic Sandwich**—Behind the main spar installation, according to the "Bakelite Review," construction is an .007-in. core of laminated plastic, produced with Bakelite phenolic resin by the Formica Co., sandwiched between .0015-in., type 302, ¼-hard stainless steel sheets.

Material bonding is accomplished with a thermosetting adhesive, under pressure.

This makeup covers the ribs which form the contour of the aft two-thirds of the blade section. It offers the advantages of affording practically the same rate of thermal expansion as the leading edge stainless steel section combined with maximum stiffness per unit weight and maximum weather resistance.

► **Splicing, Riveting**—Because of limitations in available sheet size and in the size of the curing press, skins are cured in sections approximately 5 ft. long, later spliced into a single section via a 1-in. lap joint of .0015 stainless steel on each surface.

Flush rivets hold the skin to the airfoil structure. Skin is dimpled and reinforced with ¾-in. wide, .010-in. aluminum bonded to the surface of the inner sheet.

At ¾ in. back from the trailing edge, the inner steel sheet is stopped to allow bonding of the two skins to a wedge-shaped trailing edge piece of laminated phenolic material.

Titanium Groomed For Future Aero Role

Metal possesses many characteristics desirable for aircraft applications. Alloying studies are under way.

This report on titanium has been prepared to afford a basic familiarization with this new metal, which shows so much promise for use in aircraft and engine applications. Additional data will be provided from time to time as manufacturing methods and application techniques develop.

On the basis of preliminary reports, titanium has everything—it is light, strong, heat and corrosion-resistant and plentiful in nature. It is expensive—about $3.00 per pound—but aluminum cost $16.00 per pound at the start of the century and it sells now for 16¢ a pound.

At the moment, major interest in titanium centers around its heat-resistant qualities for it has a melting point of 3272 F. in its pure form.

As its availability increases, its application to aircraft structures will follow on the basis of its high strength/density ratio.

► **Withstands Corrosion**—Accompanying these qualities is high corrosion-resistance, comparable to well-known 18-8 stainless steel. The high chemical activity of titanium forms an oxide surface film, even at room temperature—protecting the metal against corrosion—a process identical to that occurring with aluminum and chromium.

Both cold-worked and annealed test strips of titanium have been exposed to salt spray for 30 days and showed no signs of corrosion attack or impairment of tensile strength. Even concentrated nitric, hydrochloric and acetic acids and ammonium and sodium hydroxides did not attack titanium samples appreciably.

► **No Alloy Data Yet**—To date, chemical and physical properties are available only on pure titanium but these data are all the more remarkable when compared with similar data on highly alloyed versions of other metals.

Alloying of titanium is only now getting under way at Remington Arms Co., a du Pont subsidiary, but no significant information is available presently.

It is obvious, however, that its unalloyed characteristics will be improved proportionately as greatly as those of aluminum, steel and other industrial metals.

► **Versatility**—The promise of titanium as an aircraft structural material follows from its high proportional limit (59,000 psi. annealed, 84,000 psi. cold worked) and its low density, making it ideal for low-weight, high-stress construction.

Its corrosion-resistance indicates application to flying boat hulls and seaplane floats, and these structures are already under way experimentally at the Naval Air Materiel Center, Philadelphia.

The admirable hardening characteristics of the metal (Rockwell 88B annealed) render it advantageous for use in parts subject to frictional wear, such as landing gear struts and bearing applications.

It has high electrical resistance (50 ohms per cu. cm.) indicating use as a metallic electrical resistor.

Application of titanium to aircraft turbine blading will require extensive research. Work in this field is now being pressed, but no accurate conclusions can be drawn, as yet. Air Force, Navy, industrial laboratories, universities and government research agencies are conducting programs designed to evaluate the high temperature characteristics of various titanium alloys, and theoretical calculations indicate properties superior to presently used materials.

► **Supply Plentiful**—Availability of titanium sources is no problem since it is the fourth most abundant structural metal, the ninth most plentiful element in nature. Actually, there is more titanium in the world than all the lead, tin, zinc, copper, antimony, nickel, gold and silver combined. There is 23 times as much titanium in the earth's core as carbon, an essential element in steel manufacturing.

Titanium dates from Revolutionary days. It was discovered by Gregor in 1791, but was not isolated until 1825, when Berzelius reduced potassium fluotitanate with potassium.

Hunter prepared titanium by the reduction of titanium tetrachloride with sodium in an iron bomb. Kroll modified this process by substituting molten magnesium for sodium, which eliminated the necessity for employing high pressure.

► **Pilot Plant Functioning**—The Kroll process was adapted to large-scale operations by the Bureau of Mines, which is now operating a pilot plant at Boulder City, Nev. Production capacity is 100 lb. per day, and studies are now being made for expanding output to a ton per day.

Titanium occurs in nature principally as ilmenite (ferrotitanate) and rutile (titanium dioxide).

Ilmenite deposits are present in the New York's Adirondack mountains, and in Virginia, Arkansas and Wyoming, and in the sands of Florida's east coast. Ilmenite is also plentiful in the beach sands of Travencore (India) and this ore was the principal source of U. S. imports of the metal prior to World War II. Since 1942, however, the U .S. has supplied its needs from its own domestic sources.

Rutile is present in Virginia, and extensive deposits have been discovered in Canada. Quantities of rutile are known to exist in sands along the coast of Japan and in the U.S.S.R.

► **Impurity at First**—Titanium actually began its industrial life as an undesirable impurity in iron. Many iron-ore deposits were abandoned because they were "contaminated" by the presence of titanium.

It was a du Pont research program aimed at "purification" of iron ore that produced the first substantial quantities of titanium and developed its first commercial application—pigment for paints, enamels, linoleum, paper and other products.

By 1931 du Pont was producing titanium oxide for pigments and some iron deposits are actually being worked today for their titanium "impurity," not for their iron.

► **Marketed Now**—Titanium is now

Physical Properties of Titanium and Comparison With Other Aircraft Structural Materials

Material Condition	Tensile Strength psi.	Yield Strength psi.	Density	Tensile Strength Density Ratio	Yield Strength Density Ratio	Elongation % in 2 in.
Titanium, annealed.....	80,000	65,000	4.5	17,800	14,200	25
Titanium, cold-worked...	120,000	113,000	4.5	25,700	25,100	8
24SRT, heat-treated.....	65,000	50,000	2.77	23,500	18,000	20
24ST-36 AL, heat-treated, cold-rolled.....	73,000	57,000	2.77	26,400	20,600	13
75ST-6 AL, heat-treated, cold-rolled.....	82,000	72,000	2.8	29,300	25,700	11
Dowmetal E, hard-rolled.	45,000	34,000	1.8	25,000	18,900	9
Dowmetal M, annealed...	32,000	16,000	1.8	17,700	8,890	15
Mg Alloy AM59S, wrought	51,000	38,000	1.82	28,000	20,800	9
Stainless Steel, annealed..	80,000	30,000	7.91	10,100	3,800	80
Stainless Steel, wrought..	185,000	140,000	7.91	23,400	17,700	8

available from du Pont in a porous form called "sponge" but will soon be had in ingot form. The sponge sells for about $5 per pound but this is merely a pilot-line figure and the price is seen as subject to rapid change in the very near future.

Free samples of titanium sponge are being provided industrial and university laboratories by du Pont in the interest of application development.

Bureau of Mines is supplying powdered titanium for about $3 per pound, but this form requires compacting by powder metallurgy techniques into the desired bars or sheets.

Present high price results from $1.04 per pound cost of titanium tetrachloride, which is used in the Kroll process, whereas the ilmenite ore itself costs only $0.04 per pound.

Bureau of Mines is studying various other methods of extraction and production, which already promise sharp reduction in costs.

Twist Detector Aids Torquemeter Studies

To facilitate the development of more accurate torquemeters for measuring power delivered by propellers and turbojets, Westinghouse Electric Corp.'s research laboratories have brought out a new twist detector which shows changes in weight as small as 1 part in 100,000 and measures less than 1/1,000,000 in. twist.

Designed by company technicians William P. Welch and Benjamin J. Cammetti, this elastic drift measuring machine is so sensitive that it will detect the twist in a shaft caused by the weight of a feather.

The device consists of a 1-in. steel shaft 25 in. long, bolted to the center of a cross-arm at one end and fastened at the other end to be held immobile, shaft twist being in proportion to weight placed on the cross-arm. With the aid of sensitive electrical contacts that close with twist, movement at the surface of the shaft can be measured.

As each successive weight is added, shaft twist is determined in relation to the distance a minutely calibrated gage must move to close the contacts again. By removing weights in the same succession, twist is measured in the reverse direction.

The ideal shaft would show the same amount of twist in both directions for each weight, but actually there is a very small variation between the "up" and "down" stages—caused by elastic drift. One of the major aims of the company's research in this field is to find a shaft material that will reduce the variation to a minimum.

"Rotochute" Lands Instruments

A supersonic parachute for insuring easy letdown of delicate research instruments ejected from a rocket at high altitudes has been developed by General Electric Co.

In effect, the device—known as a "rotochute"—is a huge dart housing 20-30 lb. of instruments. Most successful model developed by GE is approximately 4 ft. long, the body about 8 in. in diameter. It is fitted with a hinged rotor which extends about 8 ft. when fully opened.

At the peak of the rocket's flight, the rotochute is expelled, and as the air increases in density during descent, the blades begin to revolve, gradually being forced out to assume a horizontal position.

Resultant braking action slows the device from its very high speed to about 27 mph. by the time it hits the ground.

In a year of intensive study, 23 different designs of the rotary wing brake were tested. Experimental models were checked in wind tunnel air flows up to about 1300 mph. Other rotochutes were dropped from a B-29 at 35,000 ft., from lightplanes at 1000-12,000-ft. heights, and expelled from rockets.

Future possible applications for this type of device, according to D. C. Prince, GE vice president in charge of the general engineering and consulting lab, include use as an escape medium from fast, high-flying planes, and for dropping food, medicines, and other equipment. Another important function would be to obtain chemical samples of the upper atmosphere.

Inventor of the rotochute is I. B. Bensen, GE engineer.

CADO to Process Additional Documents

Central Air Documents Office has received more than 700,000 additional captured enemy documents for cataloging. These are in addition to the 55,000 documents already processed by Air Documents Division of CADO.

The additional reports are part of the original 1500 tons of material captured by intelligence teams of the Navy and Air Force in Germany and Japan after the cessation of hostilities. Technical teams followed combat troops into factories, government offices and private homes to "liberate" documents before they could be destroyed.

Of this total, about 300 tons of aeronautical reports were shipped directly to Wright Field and this quantity processed the 55,000 reports already issued. Meanwhile, the remaining 1200 tons were sent to the Department of Commerce in Washington for processing.

Commerce now finds it impossible to handle this material, comprising more than 700,000 documents, and has sent them to Wright Field for processing.

These documents are not primarily aeronautical but cover data largely in the chemistry, metallurgical, optical and allied physical fields.

Air Force does not plan to process this material as completely as the aviation reports. It has decided to select those documents having aeronautical usage and invite manufacturers' representatives to Wright Field at a later date to go over the material which has been screened.

Reports selected by the representatives will be microfilmed for use by interested groups.

Test-Engine Economy

To accomplish rapid, inexpensive screening of fuels and lubricants, engineers at the Texas Co.'s Beacon (N. Y.) laboratories utilize a single-cylinder Lauson engine.

While affording results which compare closely with those obtained from full-scale runs, tests with the small power unit cut fuel requirements from 200 to 15 gal. and reduce oil needs from 12 to 3 quarts.

Tests run on the engine include determination of effects of oils on powerplant cleanliness, action of additives in varying concentrations, bearing lubrication characteristics, and general performance.

Airport Fire-Fighter

Extinguishing media consisting of 4500 lb. of low pressure carbon dioxide and 230 gal. of mechanical foam solution is carried in fire truck built by Cardox Corp., 307 N. Michigan Ave., Chicago 1, Ill. Unit weighs approximately 32,000 lb. with full load, has cruising speed of 60 mph. Feature is new type, front-bumper-mounted, 10-ft. boom with working elevation of 18 ft. Capacity of boom nozzle is 1,250 lb. of CO_2 per min. Oscillating ground-sweep nozzle directs 750 lb. CO_2 per min. at base of flames and prevents fire break-through beneath truck in close-range fighting. Two foam makers, also mounted on front bumper, discharge 60 gal. of solution per min. ahead of truck in intersecting arcs. In addition to hand lines there is bayonet type nozzle for piercing plane compartments, engine nacelles or other enclosed spaces. Single control mechanism directs movement of the boom up, down or sideways, as well as the movement of the boom nozzle itself "in" and "out" in a vertical plane. Control valves on truck's instrument panel release CO_2 and foam from ground-sweep apparatus.

NEW AVIATION PRODUCTS

Supercharger Holds Up in Tests

Problems being overcome through extensive testing of Stratos Corp. device; airline installations expected.

The recently designed, simplified cabin supercharger manufactured by the **Stratos Corp.**, Farmingdale, Long Island, N. Y., has been operating under scheduled flight conditions for over 1,000 hr. with only a minimum number of malfunctions, according to airline sources in New York.

The unit is somewhat unique in concept in that it is extremely compact, light in weight, and mounts directly on an engine drive pad, thus obviating troublesome and heavy drive shafts or hydraulic transmission.

The supercharger, two of which are installed on a Constellation, has proved entirely adequate to supply the maximum allowable differential cabin pressure of 8.40 in. Hg. and maintain an 8500-ft. interior pressure at 21,000 ft.

Only significant problems have been:

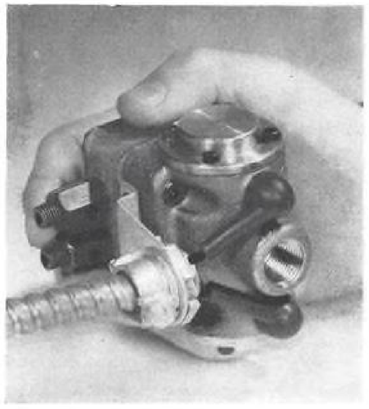
Loss of oil through the breather. This entailed no serious consequences since only result was stoppage of the impeller when the "fluid drive" ran dry.

Oil had been able to pass by the seal into the impeller section, then into the air ducts leading to the cabin. Both of these problems have been remedied.

Initially, a gear in the low-speed train failed frequently. A harder gear is being substituted and it is believed that elimination of this trouble will result in overhaul time for the unit being raised from its current 200-hr. interval to 1000-hr. period.

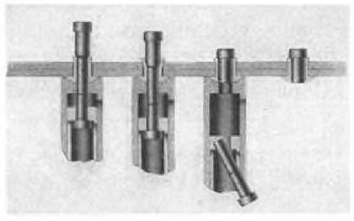
From a practical standpoint, only apparent disadvantage of the device is reduced accessibility afforded in the engine's accessory section. On a Constellation, this problem is not too severe, since the only unit rendered hard to reach is the engine-driven fuel pump, which rarely requires replacement.

It is believed that one of the largest domestic airlines is contemplating installation of this blower on an entire fleet of twin-engine planes.—**G. C.**



Air-Powered Valve

Solenoid-actuated air control unit built by **Bellows Co.**, 222 W. Market St., Akron, Ohio, has cylinder end caps which hold small, 8v. solenoids, whose plungers, operating through only 1/32 in., release full pressure of supply line to drive lightweight cushioned, piston for shifting fourway shear-flow valve. Operating on 5–150 lb. line pressure, valve speed exceeds 2200 movements per minute. Solenoids, mounted in expanding air stream to dissipate heat, consume only 6w. Unit is stated to operate submerged, or covered with coolant, chips or dust. Water or oil in the air line is claimed not to affect operation. Low voltage protects against flashover. Device is adapted to direct connection or remote control of standard air cylinder. Switches for operating may be placed either in 8v. secondary or in 110v. primary circuit. Port sizes are ¼ and ⅜ in. Special transformer reduces normal line voltage to required 8v.



Saves Production-Line Time

Availability of new type rivet designed primarily for application where high tensile loads are not a factor, is announced by **Cherry Rivet Co.**, 231 Winston St., Los Angeles 13, Calif. On installation, shank expands as stem is pulled into rivet and stem fractures at groove flush with rivet head to provide self-plugging rivet installed as fast as company's hollow-type unit. Material is A17ST aluminum alloy and rivet is reported to compare favorably in strength to solid rivets of same material except for slight reduction in strength when used in thin sheets. For higher shear strength, rivet can be had in 24ST. Stems are 17ST. Speed of installation of device renders it suitable to many assembly processes where rivets are not now used.

"No-Recoil" Hammer

For use in machine, mold-manufacturing, die, and metalworking shops, 1-lb. hammer with 1⅜-in. non-marring Tenite tips, made by **Drake Industries Ltd.**, 681-683 E. Hastings St., Vancouver, B. C., features metal head containing charge of steel grit. As tip is lowered, charge follows, practically eliminating hammer recoil. This reduces shock to wrist and arm and is stated to afford approximately 30 percent harder blows. Tough, resilient plastic tips withstand heavy impact without cracking or flaking, and are force-fitted directly onto grooved nipples of hammer head.

For Aircraft Interiors

Decorative thermal and acoustical insulation has been developed by **Jason Corp.**, Hoboken, N. J., for aircraft interiors. Material is stitchless, quilted sandwich of glass fibers between Vinylite plastic sheetings with front surface plain or embossed in patterns resembling leather, sharkskin, or fabrics. Material has usual advantages of Vinylite sheeting—wide range of colors; resistance to scuffing, abrasion, alcohol, grease and dirt; easy cleaning with soap and damp cloth—and can be tacked, sewed, cut and sealed.

FINANCIAL

TWA Seeking More Vital Role

Analysis of financial status on eve of stock issue sees necessity for recasting of capital structure.

Encouraged by highly favorable reaction to Ralph S. Damon's election as president, Transcontinental & Western Air is proceeding with a public stock flotation. Under present market conditions, less than $4 million is expected to be realized from this financing.

Stockholders will receive the right to subscribe to one new share of common stock for each five currently held. The Hughes Tool Co., owning 1,486,523 shares or about 74 percent of TWA's total, has indicated it will take up all of its rights and in this manner supply about $3 million in additional funds. This minimizes the risk of the underwriter, Merrill Lynch, Pierce, Fenner & Beane, in the offering of 404,112 shares of TWA stock.

▶ **Tangled Finances**—The TWA registration statement reveals the tangled web of the company's finances resulting from past ill-conceived policies. Most of this responsibility lies with the Equitable Life Assurance Society of the United States which saddled TWA with $40 million in debt with but a small cushion in equity capital available for protection.

The bulk of the Equitable loan, instead of being utilized to finance the purchase of aircraft, was consumed by operating losses. A larger equity base properly would have absorbed the operating deficits and left the Equitable loan intact for aircraft purchases. The failure of the insurance company to understand the economic facts of life concerning airline operations, has led to recurrent financial crises for TWA.

▶ **Alternatives**—Had the Equitable loan been prefaced on the condition that new equity capital be brought into the company at the same time, TWA could have avoided the present financing, to say nothing of having the resources to preclude the series of complications of recent years. Further, equity financing in 1945 could have been accomplished very readily and at a far smaller price than is being paid in the present instance.

Assuming a minimum of $50 a share, easily attainable in the highly favorable airline markets of 1945, TWA would have needed to sell only 80,000 shares to realize $4 million. The company now is forced to sell at least five times as many shares to realize the same sum of money, all at the expense of severe dilution of the equity.

▶ **Loan Status**—In the meantime, the Equitable loan, for all practical purposes, continues to sink lower in the capital structure scale of TWA. This is partly reflected in the valuation assigned these debentures by the National Assn. of Insurance Commissioners. As of Dec. 31, 1947, the insurance company was directed to carry its TWA paper at 60 cents on the dollar. Indications are that a lower valuation may be declared as of Dec. 31, 1948.

Occupying the top secured position in TWA's capitalization are the 3 percent promissory notes issued to finance recent Constellation purchases. As of Feb. 1, 1949, a total of $16,390,404 of these notes was outstanding, secured by 20 Constellations.

▶ **Rights Modified**—To permit recent financial adjustments, Equitable has relinquished or modified certain rights contained in the original indentures securing its loans. No less than three supplemental indentures and collateral agreements already have been made. Among the more important changes was extension of maturity of $10 million debentures (Series B) from Dec. 1, 1951 to Dec. 1, 1956. Fixed sinking fund payments were also substantially reduced.

Pending are further revisions incorporated in proposed fourth and fifth supplemental indentures. The most interesting provisions, if approved, may permit TWA to waive temporarily all sinking fund payments. At present, $2 million in sinking fund payments is due during 1949, $3 million annually for the subsequent four years, $4 million in 1954 and $2 million in 1955. In addition to the Series B debentures, in the amount of $9.5 million there were $29,500,000 in Series A debentures, outstanding as of Feb. 1, 1949.

▶ **Fund Revision**—The proposed sinking fund revision would permit such payments to be made on a quarterly basis but only to the extent that payments would not reduce TWA's consolidated net current assets below $9 million plus any proceeds in excess of $3 million from the current sale of common stock. All such sinking fund payments, however, would be cumulative and would be payable on any succeeding sinking fund payment date which would not so reduce consolidated net current assets.

Applying the formula specified, it appears that TWA, at the present time, would not be required to make any sinking fund payments. This is evident with TWA's net current assets amounting to $8,113,718 as of July 31, 1948.

The registration statement also notes that studies "have been made and are being made of aircraft which might be used for . . . replacement" of the DC-3 aircraft now operated. This is "dependent upon the availability of a suitable replacement and the ability to finance the purchase."

▶ **Key Avenue**—It is likely that new secured financing, necessitating further subordination of the Equitable debentures, will remain a key avenue through which the proper replacements may be acquired. Yet, to maintain its competitive position, TWA must install new type low operating cost aircraft. Some lease arrangement may accomplish the same objective. Lease rentals would become a prior charge, ranking ahead of the interest costs.

Pertinent changes in the capital stock outstanding were noted by virtue of the conversion on Aug. 24, 1948, of the notes and interest by Hughes, at $10 per share.

▶ **Vital Role**—There is little question that with its new management direction, TWA may be expected to assume a more vital role in the domestic and international areas. The decided improvement in operations and organization expected to flow from the new president's efforts may not have their full effect until or unless the dead hand of past financial blunders is removed.

This must perforce necessitate a major rearrangement of the company's capital structure, through further modifications or a scaledown of the debentures now held by the Equitable. Until this is done, TWA's basic financial problem will remain.

—**Selig Altschul**

To Aid in Study

Appointment of Selig Altschul, aviation consultant and financial writer for AVIATION WEEK, to conduct studies relating to the mobilization of civilian air transport in wartime has been announced by the Department of Commerce.

Altschul's work, to be carried on within the transportation division of the Office of Domestic Commerce, will aid the Commerce Department in carrying out its part of the industrial mobilization planning responsibilities of the Air Coordinating Committee.

Morrisey "Nifty" Undergoes Tests

Performance figures and other details given on new low-wing trainer; price tentatively set at $2695.

A new tricycle gear low-wing tandem trainer, designed to accommodate any Continental engine from 65 to 90 hp., the Morrisey Nifty, has completed more than 100 hr. of flight test at Long Beach, Calif.

Plane was built by Morrisey Aircraft Co., under direction of W. J. Morrisey, transport test pilot and former CAA flight engineering inspector and is tentatively priced at $2695 flyaway.

► **Figure**—Performance with the C-90 engine most recently installed, includes the following actual figures, the designer reports: zero wind corrected takeoff, slightly over 280 ft.; first minute climb, 1120 ft./min.; cruising speed at sea level 108 mph. with low pitch propeller. Morrisey reports he recently climbed the plane to 20,200 ft. in 55 min. with rate of climb at that altitude over 150 ft./min. No further increase in altitude was attempted because no oxygen was carried.

The Nifty is reported as stalling at 42 mph. and the stall is described as a gentle downward pitch preceded by a tail buffeting warning. Recovery after the pitch, he states, is effected with maximum loss of 30 ft. altitude even if full up elevator is held during stall.

Complete lateral and directional control is maintained with no yaw or roll. Sudden power application in the stall causes immediate climb with no roll or turn.

► **Modifications Possible**—Morrisey has designed the Nifty as a spinnable trainer in the CAA utility category, but it can be easily modified to be made characteristically incapable of spinning, if desired.

Advantages of low-wing and tricycle gear in landings, takeoffs and taxiing make the plane a non-vicious plane to handle. Ground cushion effect created by the low wing, flattens out the flare. With brake application ground roll may be stopped in less than 350 ft. In taxiing rudder turns the plane at speeds over 10 mph. and a touch of toebrake makes turn at lower speeds. Pilot can see the ground from front seat 12 ft. ahead of nose, making S-turns unnecessary.

► **Construction**—Construction is welded steel tubing fuselage, vertical tail, rudder and elevators, with aluminum cowl and tail cone, and plywood two-spar wings, with formed metal wing tips. Except for cowling and tailcone, entire plane is fabric-covered. Ailerons and horizontal stabilizer are plywood sheet over spruce spars.

Canopy raises from left side and is closed by a spring loaded handle which operates fore and aft locking pins. Fixed landing gear is oil spring type, built in Morrisey's plant. Main tires are 6.00 × 6 and nosewheel is 5.00 × 4. Goodrich brakes are installed.

Ailerons and elevators are controlled by push-pull steel tubes and rudder by cable, all tested for low friction and ease of operation.

► **Soloed From Front Seat**—Cockpit is 30 inches wide with bucket type metal seats. Stick, rudder pedals and engine controls are placed to require minimum body movement, and instruments are installed for front seat occupant only. Plane is soloed from front seat.

A 15 gal. gravity feed fuel tank installed just forward of the instrument panel allows 280 mi. range with reserve, for the prototype. It is expected that a production version would use a 20 gal. tank.

Morrisey has carried out his development program at a minimum cost, and is currently making personal demonstrations with the prototype to West Coast operators. He is delaying any plans for production of the plane pending further stability in the plane market, but has already received several offers to buy the planes at the estimated flyaway price of $2695 with 90 hp. installation.

► **Strong Competition**—Morrisey takes pride in the prototype development which he believes has been brought up to type certification stage at "the lowest investment ever made in such an enterprise" yet he believes it is finished with quality and appearance rarely found except in more expensive aircraft. He expects that the low development cost and its design features will make the plane strongly competitive in any light trainer market, assuming market volume justifies its production.

Specifications of the plane include: 29 ft. span; 20 ft. length, 7ft. 2 in. fin height, 6 ft. 10 in. wheel tread; 134 sq. ft. wing area.

Prior to tests with the C-90 engine the plane was successfully flight tested with a Continental A-65 engine in more than 40 hr. of flight in which Morrisey determined that the plane "more than adequately met CAA type certification requirements with the lower horsepower." Gross weight for A-65 model is 1215 lb.

Promise Fulfilled

When Washington State Aeronautics Commission secured a $200,000 appropriation from the 1947 state legislature, it promised to build three emergency landing fields to aid flyers in getting across the most rugged parts of the state.

Despite rising costs, the Commission has more than fulfilled its 1947 promise, building four fields instead of the promised three and preparing plans for three more.

The fields are located at Bandera, five miles west of the summit in Snoqualmie Pass; Lester, five miles west of the summit in Stampede Pass; Skykomish, west of the summit in Stevens Pass; and at Mason Creek, on the easterly slope in Stevens Pass. Elevations range from 998 ft. at Skykomish to 2170 ft. at Mason Creek. Bandera and Lester have been turfed; the other two will be in the spring.

The runways are 200 and 300 ft. wide, 2050 to 2400 ft. long. Bandera and Lester have an additional turfed plane parking area of 15,000 sq. ft. each. All have such emergency equipment as first aid kits, fire extinguishers, etc., and all have a segmented circle marker and wind indicator. All were built with CAA aid. All except Lester are located adjacent to a cross-state highway.

Before construction of the Skykomish and Mason Creek fields, the flyer crossing the state at that point had to fly over 120 miles of the roughest kind of terrain without a single airport facility.

Costs of the fields were held to a minimum, by careful site selection, redesign to reduce costs where necessary and CAA cooperation in reducing the required runway lengths and widths without loss of utility.

Light Signals Revised

Revision of airport portable traffic control light signals under international agreement (ICAO) has been put into effect throughout the United States.

Signals and their meanings under the new agreement:

- **Steady green:** on ground "clear for take-off." In flight "cleared to land."
- **Flashing green:** on ground "cleared to taxi." In flight "return for landing" (to be followed by steady green at proper time).
- **Steady red:** on ground "stop." In flight "give way to other aircraft and continue circling."
- **Flashing red:** on ground "taxi clear of landing area (runway) in use." In flight "airport unsafe—do not land."
- **Flashing white:** on ground "return to starting point on airport."
- **Alternating red and green:** general warning signal—exercise extreme caution.

BRIEFING FOR DEALERS & DISTRIBUTORS

TRAINING BOOST?—Stanford research study comparing efficiency and expense of training pilots and mechanics at military bases and at civilian schools is now under way with report expected to be received by USAF by the end of May. Plan is for researchers to examine civilian schools of all types to see how they might fit into a cadet training program if needed, including typical large schools which trained cadets under contract in World War II and small schools.

Some civilian school operators have contended before the Air Policy Commission and elsewhere, that civilian school cadet training is superior to and more economical than cadet training offered in USAF schools. Record of civilian school training in World War II is cited in support of this contention.

If report bears this out and USAF accepts it, there is possibility of a boost for civilian training schools in new USAF training contracts.

RESEARCH PLANES—CAA recently disclosed it has loaned two airplanes to non-profit organizations for experimental purposes, a Piper Cub trainer to the Aeronautical Research Foundation in Boston for its aircraft noise research projects, and an Ercoupe to the Flight Safety Foundation, New York, for a series of lightplane flight research problems.

STATE ENFORCEMENT PAYS OFF—Indication that the Pennsylvania Aeronautics Commission's enforcement program against low and reckless flying pays off in results is shown in the 1948 accident report forwarded by Bill Anderson, state aeronautics director.

Despite increase in airplane hours flown all over the country, 1948 figures showed a reduction of 23.75 percent in total accidents, from 1947 figures, from 240 to 183. Similar or greater reductions in other accident categories reported: decrease of 44.5 percent in all fatal accidents; decrease in accidents due to low and reckless flying, 58.34 percent; and decrease in fatal accidents due to low and reckless flying, 53.34 percent; decrease in total number of persons killed in fatal accidents, 31.58 percent.

Violation reports showed a comparable decrease of 12 percent for all violations and a reduction of 11.7 percent in low and reckless flying.

DISTRIBUTORS NAMED—Ryan Aeronautical Co. has recently announced appointments of Buffalo (N. Y.) Aeronautical Corp., headed by F. Leslie Marsden; Northern Air Service, Inc., Grand Rapids, Mich., headed by O. C. Hall, and Baker-Eberle, Aviation Corp., Detroit, headed by Paul W. Eberle, as distributors for the Ryan Navion, in Western New York, Western Michigan, and Eastern Michigan respectively.

NORTHWEST MERGER—Beechcraft distributors for Washington, Oregon and Alaska have merged their three companies into a new firm, Flightcraft, Inc.

Participating in the merger are Portland Aircraft Co., whose president, Cyrus F. King will head the new organization; Pacific Aircraft Sales Co., Seattle, whose chief, Wally Timm, will head up sales for the new combination; and Harry K. Coffey, Portland, head of Harry K. Coffey & Associates, which has had the Beech Alaska distributorship. King will have charge of aircraft service for the organization.

NONSKED OPERATORS MEETING—Sixth annual convocation of the non-scheduled operators of fourth CAA region will meet at Ft. Worth, Mar. 7, 8 and 9, and this year a new idea has been dreamed up which might well be copied in some other aviation sessions.

Each operator attending is asked to bring along the editor of his local newspaper for public relations day, the first day of the session. Bill Berry, Fourth Region personal flying development CAA specialist, and George Haddaway, editor and publisher of Southern Flight, are co-chairmen of the meeting, which last year attracted some 300 operators and other aviation people.

Meeting is three days of discussion on any problems the operators want to take up. CAA Administrator Del Rentzel, AOPA Manager J. B. Hartranft Jr., and other CAA and CAB officials will go out from Washington for the sessions.

—ALEXANDER McSURELY

"Give us the tools . . ."

McGraw-Hill Surveys BUSINESS NEEDS

If it can get the money American industry in 1949 will go full steam ahead with a vitally-needed program of improving its facilities. This program since V-J Day has kept business expanding and has made belated headway in modernizing industry.

Furthermore, if it can get the money American industry will carry on for the next five years with its unprecedented program of expenditure for new plant and equipment. Plans already made call for spending about $55 billion.

These are findings of the McGraw-Hill national survey of "Business' Needs for New Plants and Equipment." Major results of the survey, which have been rechecked since election day, are summarized on the following page. They report what American industry is now planning to spend for new plant and equipment. *They do not and cannot show what will be done if the plans are hamstrung by political action.*

In 1949, the survey shows, American industry plans to spend $14.1 billion for new plants and equipment. That is only about 5% less than was actually spent in 1948.

If these plans are carried out, actual capital expenditures this year may be somewhat larger than they were in 1948. That is because expenditures usually prove to be larger than planned.

Fulfillment of American industry's plans for investment in new plant and equipment this year would no doubt mean a continuation of general prosperity. The record shows that when capital expenditures are high general business thrives.

Even more remarkable than the 1949 prospect is the fact that:

Industry already plans to spend $41 billion in the years 1950-53 to improve its plants and equipment.

Plans tend to taper off, of course, as they are pushed further into the uncertain future, five years from now. But the striking fact is that plans for expenditures so far ahead are as great as they are. They show American industry's need for tremendous improvements in its plants and equipment.

Again, let there be no mistake. These survey findings are not a five-year forecast. They report what leading corporations now are planning to do — *if they can get the money.*

But — won't industry be top-heavy with plants and equipment if it carries through any such program?

The answer is clearly — "No".

Here are some of the reasons why not that were disclosed by the McGraw-Hill survey:

First, manufacturing industries are shifting emphasis from expansion to improving efficiency.

They have increased their total capacity 56% since 1939. Their expenditures in 1948 went almost 50-50 for expansion and improvement. But in the next five years they plan to spend three-quarters of their funds to replace and modernize facilities, only one-quarter for expansion.

Second, the prospective rate of expenditure for new plant and equipment is relatively low.

Planned expenditures for new plant and equipment in 1949 represent about 7.5% of the present value of all plant and equipment. That rate of capital expenditure is no higher than the rate during previous periods of prosperity. And industry must overcome years of starvation for new equipment, caused first by the depression of the 30's, then by diversion to war production.

Third, industry is following an extremely cautious policy in buying new equipment.

Three out of four companies report that they will not buy equipment unless it will pay for itself within five years. And a third of the companies report that they expect new equipment to pay for itself within three years. The reason most frequently given for such expectations was that all the money available can be spent on equipment which does pay for itself quickly.

The program of capital expenditure planned by American industry is one of the greatest bargains ever offered to the American people.

To pay for itself in a few years, as equipment must if most companies are to consider buying it, that equipment must promise to produce much better products or make great savings in labor and material. The savings go first to the companies buying the equipment but, as they always have, they soon spread to everyone in the form of better products at lower costs.

Where does industry expect to get the money to buy this bargain for the American people?

Most of the companies covered by the McGraw-Hill survey (76% of the total) count on their own resources — largely profits — to pay for new plant and equipment. About 15% of them expect to borrow money, although only 4% like the idea of getting saddled with fixed debt. Only 9% of the companies expect to sell stock to investors, although twice that many report they wish they could.

What are the chances that business can get the money?

The survey provides no answer to that question. No survey can.

The answer will come from Washington — in what Congress does about taxes on profits and taxes on the millions of Americans who might invest a part of their income in industry's new plants and equipment.

The answer will be found also in the energy and skill shown by investment bankers, particularly in mobilizing the resources of the millions of Americans whose incomes have increased enough since 1940 to make them potential direct investors in industry.

Still another important part of the answer will be given by labor leaders. About half the companies surveyed by McGraw-Hill are holding back on new construction — primarily because of high costs. What organized labor does about wages and productivity can swell or shrink that percentage.

The McGraw-Hill survey leaves no doubt that American industry is fulfilling its responsibility. It is planning the capital improvements needed to make the nation secure, prosperous, and progressive.

But business today lacks confidence and badly needs added incentives. Proper taxation and increased depreciation allowances are vital if we are to open the capital markets to finance industry.

What will happen now depends in large part on what is done in Washington. In his State of the Union message, the President said that "business should plan for steady, vigorous expansion." But in his budget message he proposed new taxes which would divert a substantial share of the money industry is using for expansion and improvement. Moreover, he said nothing about the vital issues now freezing the capital markets.

It is not possible to have it both ways. Fulfillment of the President's tax program means cutting industry's program for new and better equipment. It means slowing down industrial progress. It means delaying the advance toward much higher standards of living tomorrow in order to have a little more government spending today.

I urge you to see that your Representative and your Senator have all the facts on industry's needs for new plant and equipment. What they do to this program will have a decisive bearing on the nation's security and welfare.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This is the fourth editorial of a special series on industry's needs for new plants and equipment—and what these needs mean to all Americans.

WHAT THE SURVEY SHOWS

O HERE ARE THE MAJOR FINDINGS of McGraw-Hill's survey of "Business' Needs for New Plants and Equipment". Rechecked since Election Day, results show what industry is now *planning* to spend for new plants and equipment. They do not forecast what will actually be spent. The survey shows:

1. Industry now plans to spend $14.1 billion in 1949 — and almost $41 billion in the four years beyond, 1950-53.
2. Manufacturing industries alone plan to spend $7.2 billion in 1949. This is 7.5% of the estimated value — $96 billion — of all manufacturing facilities.
3. Manufacturers estimate conservatively that it would cost $136 billion to completely replace their facilities with the most modern plants and equipment available.
4. Postwar expansion is virtually complete in most manufacturing lines. Major exceptions: steel and petroleum refining.
5. Expansion programs of railroads, utilities, and oil companies still have two to five years to run.
6. Manufacturing industries have increased their capacity 56% since 1939. But expansion is slowing down. Increase planned in the next five years is only 13%.
7. Efficiency is emphasized more and more in planning new facilities. Manufacturers plan to devote almost three-quarters of their funds to replace and modernize. In 1948, 58% went to increase efficiency this way.
8. Equipment should pay for itself in five years or less, say three out of four manufacturing companies. New buildings, say 77% of them, should pay out in 15 years or less.
9. Profits and reserves are counted on to pay for new buildings and equipment by three out of four manufacturing companies. Some 15% expect to borrow, only 9% plan to sell stock. However, 20% would like to sell stock, only 4% want to borrow.
10. More liberal depreciation allowances for income tax purposes would prompt almost two-thirds of the companies to speed their purchase of new plants and equipment.

O A copy of a complete report on "Business' Needs for New Plants and Equipment" may be obtained by writing me at McGraw-Hill Publishing Co., 330 West 42nd St., New York 18, N. Y.

AIR TRANSPORT

Airlines Turn to Senate for Aid

Committee plans hearing in March, calls "healthy" airline operations essential; puts off nonskeds.

Problem-burdened scheduled and nonscheduled air carriers are looking to the Senate's Interstate and Foreign Commerce Committee for a helping hand.

Last week it appeared that the hand would be extended only to the scheduled airlines, but nonskeds remained hopeful. There were two major developments.

► **Financial Troubles to be Aired**—First, plans for a thorough public airing of the financial problems of certificated airlines moved forward. Committee chairman Sen. Edwin Johnson (D., Colo.) estimated that the hearings would open "about Mar. 1".

A resolution authorizing the investigation and providing $50,000 for it has been approved by the Interstate and Foreign Commerce Committee, and early approval by the Rules Committee is expected. Sponsored by Johnson, the resolution emphasizes that "maintenance of domestic and international airline operations of the United States in healthy financial condition is indispensable to the national security."

► **Long Range Solution Sought**—It then points out that "Financial distress has been experienced by many. . . . airlines during a period of general business prosperity, and reasonably may be expected to be further aggravated in the event that general levels of business activity should decline in the future". The resolution calls for a "long-range solution" which would keep the airline industry on a sound financial basis.

Johnson commented to AVIATION WEEK that "some have suggested that mail pay increases are the only way to make the airlines financially sound—but I hope that this is not so." The committee's hearings, it is expected, will mobilize sympathetic understanding for the airlines.

► **Nonskeds Rebuffed**—A second Capitol Hill development was the closing of the door—at least temporarily—on a public airing of the nonskeds' case against new Civil Aeronautics Board economic regulation. The Board last week held an oral argument on its proposed crackdown on irregular operators (AVIATION WEEK, Dec. 20).

After informal sessions with representatives of the National Independent Air Carriers, 16 senators petitioned Johnson to "take immediate steps to inquire into this problem" and "request the CAB to refrain from taking any further steps which may culminate in eliminating irregular air carrier operating authority, until . . . full study of the matter has been made by your committee."

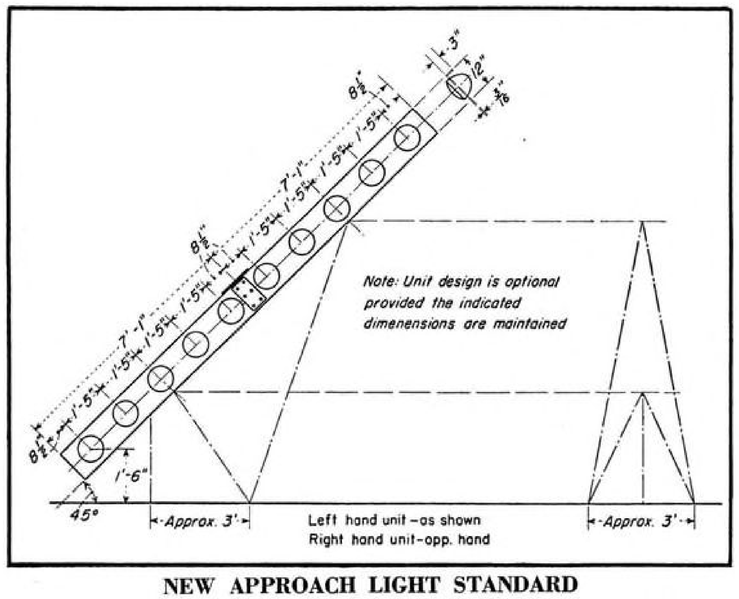
Two members of the Senate Interstate and Foreign Commerce Committee signed the petition—Warren Magnuson (D., Wash.) and Homer Capehart (R., Ind.). Other senators signing were: Hubert Humphrey (D., Minn.); John Sparkman (D., Ala.); Estes Kefauver (D., Tenn.); Zales Ecton (R., Mont.); Guy Gillette (D., Iowa); Bert Miller (D., Ida.); Wayne Morse (R., Ore.); Matthew Neely (D., W. Va.); Harley Kilgore (D., W. Va.); James Murray (D., Mont.); Claude Pepper (D., Fla.); William Langer (R., N. D.); Paul Douglas (D., Ill.); and Ralph Flanders (R., Vt.).

► **Action Deferred**—Replying to the petition, Johnson declined to take any action until oral argument has been completed on the CAB-proposed regulation providing for a case-by-case review of irregular carriers' operating authorization. However, before the Board reaches a decision on the regulation, Johnson said he would arrange a closed-door session of his committee and CAB members, to which the 16 senators interested in the nonskeds' plight would be invited.

Representatives of the National Independent Air Carriers hope that the closed session will lead to a public airing at which nonskeds can present their case—a development on Capitol Hill that airline representatives are attempting to stave off.

► **CAB Position Endorsed**—Johnson's reply indicates that he endorses CAB's position in regard to the nonskeds. "When the Board gave blanket authorization for irregular operations," he commented, it "was not intended to permit a service that would be competitive to the certificated carriers.

"As I understand it, the CAB has now proposed and suggested for comment a regulation which, if and when it becomes effective, will provide for a review of the authorizations heretofore granted on a group or wholesale basis to the large irregular carriers. . . . if the . . . regulation should be adopted, each large irregular carrier . . . will be given 30 days within which to file a specific application for authority to operate."



NEW APPROACH LIGHT STANDARD

Detailed specifications for the manufacture of the new slope line aproach light configuration which will be standard for all military and civil airfields have been drawn up by the Civil Aeronautics Administration. Individual light assemblies will be built to form a 45 deg. angle with the ground on both sides of an extended runway center line. Left hand assembly is shown above mounting 10 individual incandescent sealed beam lamps on a 14 ft. supporting bar and wired to light simultaneously. Individual lamps must be mounted to allow a shift in their vertical angles between 5 and 20 deg. The light assembly must operate satisfactorily at altitude up to 10,000 ft.; temperatures from minus 64 deg. to plus 104 deg. Fahrenheit and be resistant to salt spray and sand storms.

Continental Offers To Buy Pioneer

More barbs are being directed at the feederlines as the expiration dates of their franchises draw closer.

Worried by diversion of its traffic, Continental Air Lines, in a petition to CAB, has offered to buy Pioneer Air Lines, the nation's first feeder, and to operate PAL's routes at "almost 50 percent savings to the government." Robert F. Six, Continental's president, said that Pioneer has required increasingly large subsidies until now it receives almost $2 million annually in mail pay.

► **Service Would Continue**—Six emphasized that Continental is requesting permission to serve all of Pioneer's routes and cities. Pioneer's temporary certificate expires on Nov. 14, 1949.

Continental officials said that originally they did not oppose the principle of feederline operations. But, they contend, Pioneer's routes have been greatly extended since the original authorization until now they parallel and directly duplicate Continental's permanent links in Texas and New Mexico. The diversion of passenger revenues by Pioneer has increased Continental's need for mail compensation, Six declared.

► **Setback for Florida**—Meanwhile, Florida Airways has received another setback in its fight to stay in business. A CAB examiner has recommended that the feeder's application for a certificate extension to cover three full years of actual operation be denied.

Last September, CAB refused to expand Florida's system or extend the feeder's temporary certificate beyond Mar. 28, 1949, because of the high subsidies involved. Service was started in January, 1947.

CAB examiner J. Earl Cox conceded that Florida has taken all possible steps to curtail expenses. Nevertheless, he found that there are no new facts sufficient to warrant a different conclusion than that reached by CAB last fall.

► **Southern Airways Certificate**—While Florida was in danger of losing its franchise, CAB decided to issue a certificate to Southern Airways, Birmingham, Ala., which was selected for a feeder route in April, 1947, contingent on a showing of adequate airport facilities. Southern hopes to open Memphis-Atlanta and Atlanta-Jacksonville service in May. The new three-year certificate extends to February, 1952.

In a dissenting opinion, CAB member Harold A. Jones said Southern should not be issued a certificate since the company's financial statements show it now is neither fit nor able to perform the service authorized. Last December, Florida Airways asked the Board to transfer Southern's certificate to Florida on the ground that Southern lacked resources to activate its system. In granting a certificate to Southern this month, CAB turned down Florida's petition.

Coincidentally with issuance of Southern's certificate, CAB instituted an investigation to determine whether Empire Air Lines' Pacific Northwest feeder route franchise should be extended from Sept. 27, 1949, the present expiration date, to Dec. 31, 1950. Late last year, CAB extended the lives of certificates held by two Rocky Mountain area feeders, Monarch Air Lines and Challenger Airlines, from Mar. 30, 1949, to Mar. 30, 1950.

PLANE TALK

American Airlines has installed public address equipment in its entire fleet of 50 DC-6s to supply in-flight reports and call attention to points of interest along the way. The company said the step was taken because the DC-6's speed and large passenger capacity have outmoded the old method of supplying information in writing or by word of mouth. In most cases the "broadcasting" gets underway while the plane is taxiing for takeoff, with the stewardess giving the route and flight plan to the next stop, the weather ahead, outside temperature and meal information. When the DC-6 reaches cruising altitude, the captain provides such information as altitude, speed and estimated time over the next checkpoint. Placed at strategic spots throughout the cabin, the speakers were installed at a cost of $25,000. They are manufactured by the Altec Lansing Corp., New York.

Dress Rehearsal Preludes FIDO Use

Latest estimates on the commercial installation and operating costs of FIDO were offered this month when the firing of a single triad burner gave a preview of the Los Angeles Airport installation, scheduled for full operation in March.

A 50-passenger transport probably will be able to use FIDO to get into the terminal at a cost of $3 per passenger as compared to the cost of $8 to $10 per passenger in moving passengers by bus to Los Angeles after a landing at Palmdale, desert alternate now used when the former is closed by fog.

► **Visibility Improves**—The Los Angeles FIDO system is expected to raise a 75 ft. ceiling to 300 ft. and extend visibility of ⅜ mi. to more than ¾ mi. in two minutes at a cost of $200. Dispersal of fog to a minimum operable ceiling height in 1½ min. is anticipated.

Final cost of the installation will be $842,000, borne by CAA and the Los Angeles Department of Airports. The city's capital investment of $386,541 is to be amortized in five years by American, Pan American, United, TWA and Western airlines, which also will underwrite operating and maintenance charges.

► **Triad Burners**—The L. A. Airport system uses 392 triad burners on frames 14 in. above ground and paralleling both sides of the main east-west runway and approach zone for 6000 ft. The burners use diesel fuel at not less than 1000 psi. Burner lines parallel both sides of the runway for 4000 ft. and then fan out into the 2000 ft. approach zone where they "hook" to left and right to form burning patterns best suited to normal wind drift. Separation of burning lines ranges from 400 ft. to 870 ft. from the center line of the runway and approach.

Operation of burners is from a control booth having maximum visibility into the approach zone, and flame intensities can be "played" by buttons and levers on a control panel.

► **Ceiling Goes Up**—Controlled heat of the Los Angeles system is expected to produce ceiling heights of 400-300 ft. in the 2000 ft. approach zone; 250 ft. in the 1000 ft. touchdown zone; and 200 ft. to 75 ft. along the 3000 ft. remaining of the protected portion of the runway.

The FIDO system is the first of five coordinated navigational aids to be installed at L.A. Airport this year. During the spring and summer the terminal is to receive a high intensity (100,000 beam candlepower) lighting system; slope line approach lighting system; airport surveillance radar; and precision approach radar.

ATA Assails Forwarder Tactics

Asks new economic restrictions; cites difficulty of policing irregular operators in freight field.

The certificated airlines are still at swords points with the air freight forwarders, which obtained operating privileges from the Civil Aeronautics Board last September.

Fifteen of the certificated lines won a temporary victory over the forwarders last Nov. 15 when the U. S. Circuit Court of Appeals in Chicago delayed execution of CAB's decision. Recently, however, the court set aside its stay order (AVIATION WEEK, Feb. 7), and now the regular airlines have asked CAB to impose restraints on the forwarders.

► **Limitations Sought**—The Air Transport Assn. has petitioned the Board to amend Section 292.6 of the Economic Regulations so that no forwarder would be permitted to ship property by air except on planes operated in common carriage by certificated companies or companies such as Slick Airways and the Flying Tigers, which operate regularly pursuant to letters of registration issued under Section 292.5 of the Economic Regulations. As now written, the freight forwarders' exemption permits shipments in planes of large and small nonscheduled (irregular) carriers as well as in equipment of the regular lines.

ATA said that forwarders could obtain regular service between two points by shipping over several irregular operators. Thus, a forwarder might use nonsked A to ship between Los Angeles and New York one week, between Los Angeles and Chicago a second week, between Los Angeles and Kansas City a third week, and again between Los Angeles and New York the fourth week.

► **Rotation Process**—Meanwhile, the forwarder might use two other nonskeds in the same rotation process, thereby providing regular service between the three pairs of cities with carriers which individually operate irregularly between each pair.

This pooling device would be similar to the methods used by ticket agencies and irregular passenger carriers. CAB is now attempting to break the ticket agency-nonsked tieup.

"Natural result of the interplay of mutual interests of freight forwarders and irregular air carriers is for the freight forwarders to become the "traffic department" for a particular group of nonscheduled operators," ATA declared. "Operations of a group of irregular carriers conducted under the 'common management' of a freight forwarder will be indistinguishable from those of the certificated carriers or noncertificated cargo carriers operating under Section 292.5 who alone are authorized by the Board to provide regularly scheduled air service."

► **Policing Difficult**—ATA noted that it would be even more difficult for CAB to police irregular operators in the freight field than is the case in passenger carriage. In its efforts to enforce provisions of Section 292.1 with respect to passenger carriage, the Board has had available as evidence of violation the testimony of passengers as well as printed advertisements and published schedules.

"This type of evidence will not be available to the Board in its efforts to enforce Section 292.1 with respect to the combined air cargo service provided by forwarders and irregular carriers," ATA pointed out. "The shippers will have no knowledge as to the disposition of their goods by the forwarders, and it will be unnecessary for the irregular carriers to advertise their services to the public since it will be possible for them to provide regular air service to forwarder customers without such advertising."

► **Cut Rates Seen**—ATA also protested that the irregular airlines would be able to serve the forwarders at rates below CAB minimums. It noted that certificated and 292.5 operators can charge no less than 16 cents a ton mile for the first 1000 ton miles of any single shipment and 13 cents for ton miles in excess of 1000.

In a separate petition to CAB, American Airlines has pointed to other "dangers" resulting from the freight forwarder exemption. To prevent loss of much of its freight business, AA has called on the Board to provide: (1) That airport-to-airport rates and charges of the forwarders conform to the minimum freight rate orders applying to regular airlines; and (2) that, temporarily, the pickup and delivery rates and charges of the forwarders shall be no lower at each city served by the forwarders than the lowest charges for pickup and delivery published by any certificated carrier of all-cargo carrier operating under Section 292.5.

► **Conflict Continues**—In a blunt statement of conditions faced by the certificated lines, AA Vice President C. W. Jacob said: "As long as the petition for review of the forwarders' operating authority remains pending in the courts it is unlikely that much of the traffic the forwarders intercept or generate will come to American or other carriers prosecuting that action. To require American and others to rely on the good will of persons whose legal authority to exist they are questioning in court strains credulity beyond the breaking point.

"If the petition seeking judicial determination of the forwarders' operating authority is to cost it some portion of the forwarders' traffic, American is prepared to take the consequence of its action. But meanwhile it must be free to compete with the forwarder on equal terms."

American said the lowest rate a direct carrier may charge for a 100-lb. shipment moving from New York to Los Angeles is $19.61. For a 10,000 lb. shipment the lowest permissible rate is $16.24 a hundred.

► **Consolidation Permits Underselling**—By consolidating small packages into larger lots, the forwarder may undersell the direct carrier by charging the primary shipper a rate that lies between $16.24 and $19.61 a hundred, AA declared. "If he would charge the shipper $18 a hundred, the forwarder could undersell all direct carriers in the amount of $1.61 a hundred. This would leave a spread of $1.76 a hundred for the forwarder after paying the direct carrier's rate of $16.24 a hundred for a 10,000 lb. shipment.

American flatly describes the freight forwarders as "competitors". And it states that if the direct carriers are prohibited by Board order from meeting the forwarders' rates, all freight will ultimately be channeled through the forwarders.

► **Statements Challenged**—The forwarders deny that they will be "free to depress rates at their pleasure." They point out that their tariffs must be approved by CAB, and that, moreover, they would lose money if they charged the primary shipper less than 13 cents a ton mile—lowest rate for large lots.

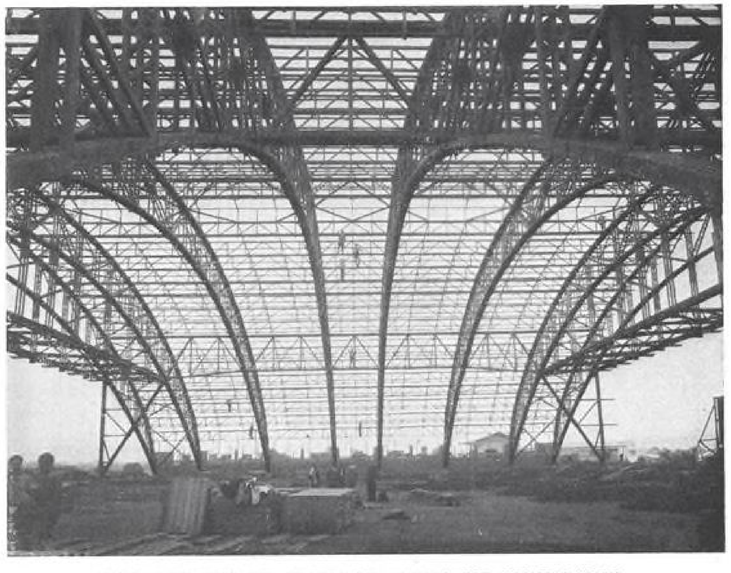
AA pointed out that on a 100 lb. shipment moving from New York to Chicago the pickup and delivery charge represents 14 percent of the total revenue collected from the shipper. As the length of haul increases, the pickup and delivery charge represents a smaller portion of the shipper's bill, but even so American believes depression of pickup and delivery rates by the forwarders to attract traffic could breed what the scheduled carrier called a series of unsound economic conditions.

American concedes that only a few forwarder tariffs have been filed with CAB and none appear to quote rates below the prescribed minimum levels with the Board.

But it adds there is no assurance that perhaps at some later date, such rates will not be filed.

CAB has issued letters of registration to five forwarders.

Sixteen other applications are pending before the Board for consideration by its members.



BIG ALL-WOOD HANGAR GOES UP IN BRAZIL

REAL, one of Brazil's fastest-growing airlines, is completing a hangar at Congonhas airport at Sao Paulo. Company describes the structure (pictured above when partly built) as "the biggest, all-wood pillarless hangar in South America." It measures 227' x 146'; maximum height is just over 55 feet; total cost is about $500,000. REAL, started in 1946, now has 15 planes, flown by 18 pilots and 18 copilots.

Good Chance of Profit

American Airlines' postwar transition period is nearly finished and the company stands a good chance of showing a profit in 1949, according to W. L. McMillen, assistant secretary and assistant treasurer.

Speaking before an Analysts Society meeting in Providence, R. I., recently, McMillen pointed out that more aggressive selling and promotional fares have attracted new business to the certificated airlines. But he emphasized that the regular carriers are the victims of unrealistic competition stemming from: (1) A certification spree from 1943 to 1947 when CAB awarded a "ridiculous amount" of competitive route mileage to the airlines, and (2) the entry into air transportation of cargo carriers and "illegal" passenger carriers.

► **Cargo Losses Cited**—McMillen asserted that the noncertificated cargo carriers have lost 20 to 50 cents for each dollar of revenue taken in.

Progress of American has been remarkable during the past two years, according to McMillen. He said AA's expense per available ton mile was 28.9 cents in 1948 against 31.5 cents in 1947 and 30.6 cents in 1946.

Break-even passenger load factor for

AA was reduced from 82 percent in 1946 to 74 percent in 1947 and 62 percent in 1948. During the last half of 1948 the break-even point was 57 percent.

American's personnel per 10,000 available ton miles flown was cut from 7.1 in 1946 to 5.7 in 1947 and 4.6 in 1948.

Despite still rising wages and prices, American's profit and loss picture improved markedly last year. The carrier earned money in every quarter of 1948 except the first, when the DC-6s were not operating. Each month of the final quarter was profitable in 1948 for the first time since 1944.

More Mail Pay

Wisconsin Central Airlines has been offered more mail pay to relieve a critical financial situation which developed because of a $77,416 loss incurred during the feeder's first nine months of operation.

CAB proposes to grant WCA a lump sum of $582,500 for the period from Feb. 24, 1948, when service began, through Dec. 31, 1948. This represents an increase of $66,300 over the total received under the existing mail rate. New temporary rate would yield Wisconsin Central about $800,000 in mail pay revenues during 1949, but a small loss probably will still be shown for 1948 pending establishment of a permanent rate.

Load factor on WCA's Lockheed 10As reached a peak of 36 percent last July and August but declined to 21.3 percent by November. Like several other feeders, Wisconsin Central's operations have been hampered by a general lack of airport lighting and navigational aids over its system.

Family Factor

One out of every 12 passengers handled by United Air Lines during the first three days of the week now travels under the reduced rate "family plan", according to Harold Crary, UAL's vice president in charge of traffic and sales.

Family plan passengers are making average flights of 1057 miles—more than 3½ times farther than the average person flying on the same days and almost twice as far as the average passenger trip for the entire week.

Emphasizing that the family plan has raised substantially the normally low load factors on Mondays, Tuesdays and Wednesdays, Crary said United now is flying as many revenue passenger miles per family fare day as on other days of the week.

In the first three weeks of January, 1949, as compared to the same 1948 period, the average number of passengers flying on UAL's family fare days rose 20 percent, while the weekend average was up only 8 percent.

Rate Floor Help

Losses averaging between $25,000 and $35,000 monthly in the first half of 1948 were converted into cash operating profits during the closing half of the year as a result of CAB's airfreight rate floor, Robert W. Prescott, president of The Flying Tiger Line, reports.

Citing March and October as his company's "best" months, Prescott said that dollar return was $40,000 higher in the latter month, under the new rates, although the same quantity of freight was handled in both months.

POA Contract

Pacific Overseas Airlines has received a contract to deliver C-46s to Grand Central Airport Co., Glendale, Calif., and Curtiss-Wright's Ohio overhaul base for service conditioning.

POA's flight crews will pick up 160 of the war wearies at Walnut Ridge, Ark., and deliver half to C-W and half to Grand Central. An additional 15 planes will be picked up at Pyote, Texas, for delivery to the overhaul bases.

SHORTLINES

► **American**—Jacques de Sibour has become vice president and general manager of American Airlines de Mexico. C. R. Smith has resumed the presidency of the carrier, a post he relinquished in August, 1947. De Sibour, European sales manager for American Overseas Airlines since last June, replaces Stanley King, who became central regional vice president of AA in October.

► **British South American Airways**—Flew 26 percent more miles and carried 38 percent more passengers and 16 percent more cargo in 1948 than in 1947. Total passengers carried last year numbered 17,510.

► **Canadian Pacific Air Lines**—Royal Canadian Air Force is leasing two Canadair "North Star" aircraft to the company to speed inauguration of a North Pacific route to the Orient. The planes will be used for flight familiarization work over the link, which will be established shortly after receipt of four Canadair 4s now being built for CPA in Montreal. Delivery of the new craft is expected to start late in May. CPA officials intend to complete familiarization work on the orient route before starting similar activity on a link to Australia and New Zealand.

► **Delta**—Has again asked CAB for a route from Atlanta, Ga., to New York via Washington.

► **Economy Airways**—Has asked CAB for a certificate or exemption to carry passengers only on scheduled skycoach flights between Los Angeles and San Francisco and New York, between New York and Miami and between New York and Dallas via intermediate points. The New York nonscheduled operator now leases a C-46F from the Air Force, and would use it and other available equipment for the service, according to Milton Gilbert, President.

► **Eastern**—Smashed existing transcontinental speed records for transport planes this month by making a delivery flight from Los Angeles to New York with a new-type Constellation in 6 hr., 17 min., 39 sec. Previous mark for the route was 6 hr., 47 min., 13 sec. set in March, 1947, by a United Air Lines DC-6.

► **Kansas City Southern Skyways**—Grounded its four DC-3s and discontinued its airfreight business after being advised by CAB that it was violating the Civil Aeronautics Act. The railroad subsidiary has been flying between Kansas City, Detroit, St. Louis and New York under contract.

► **Panagra**—Has reduced the rate on its sleeper berths from $125 to $45. The New sleeper fare applies to the carrier's "El Interamericano" DC-6 express run.

► **Pan American**—Flew 293,570,000 passenger miles in fourth quarter 1948, down slightly from the 294,612,000 total for the same 1947 period.

► **Pioneer**—President Robert J. Smith lists 1949 goals as: 98 percent operating factor, 85 percent on time factor, 35 percent load factor, costs not exceeding 78 cents a mile, and non-mail revenues exceeding mail revenues.

► **TWA**—Civil Aeronautics Board has authorized the carrier to buy two model 49 Constellations from Hughes tool Co.

► **United**—Has received a temporary exemption from CAB authorizing transportation of military cargo into and out of six of the U. S. Air Force's domestic bases.

► **Western**—Flew a record 1,453,512,089 pound miles of freight in 1948, up 55 percent over 1947.

MCA Request

Night owl flights between Kansas City and Minneapolis/St. Paul via Omaha and other points at skycoach rates as much as 39 percent below present levels will be inaugurated Mar. 1 if CAB approves a tariff filed recently by Mid-Continent Airlines. Proposed Kansas City-Twin Cities one-way fare is $21.05 on the dark-to-dawn schedule, compared with $27.45 on regular flights.

CAB SCHEDULE

Feb. 21—Prehearing conference on Chicago & Southern Air Lines' application to abandon service at Bloomington, Peoria and Springfield, Ill. (Docket 3751.)

Feb. 21—Oral argument on extension of Florida Airways' feeder certificate. (Docket 3511.)

Feb. 21—Hearing on TWA's complaint against Pan American Airways' Saudi Arabian service. (Docket 3264.)

Feb. 24—Hearing resumption in U. S.-Puerto Rico route case. (Docket 2123 et al.)

Feb. 28—Hearing on temporary approval of American-Delta equipment interchange agreement. (Docket 3609.)

Mar. 1—Hearing on Florida trunkline service. (Docket 2215 et al.)

Mar. 7—Hearing on Board's investigation of National Airlines route transfer. Postponed from Feb. 14. (Docket 3500.)

Mar. 9—Hearing on Board's enforcement action against Transocean Air Lines. (Docket 3244.)

Apr. 11—Hearing in reopened Hawaiian case. (Docket 851 et al.)

May 2—Hearing on additional southern transcontinental service. (Docket 1102 et al).

May 16—Hearing on Hughes Tool Co. control of TWA. (Docket 2796.)

DESIGN ENGINEERS
LAYOUT and DETAIL DRAFTSMEN
TECHNICIANS

Unique opportunities await you in the new and challenging field of utilization of nuclear energy for the propulsion of aircraft.

Design engineers with five years' experience in the field of original design and development of conventional and jet type aircraft power plants, control mechanisms, servo systems, installations and test equipment.

Draftsmen with three years' experience on aircraft power plant components. Experience in fields other than aircraft may be applicable to those interested in a radically new design field.

Positions also available for technicians, experienced in set up and operation of test rigs.

In reply, pleased forward resume of education, experience, salaries and pertinent personal data to:

Employment Office
FAIRCHILD ENGINE & AIRPLANE CORP.
NEPA DIVISION
P. O. Box 415 Oak Ridge, Tennessee

ENGINEERS

Expanding Engineering Department of North American Aviation, Inc., needs qualified

AERODYNAMICISTS
THERMODYNAMICISTS
STRESS ANALYSTS
AIRCRAFT DESIGNERS

and specialists in all phases of aircraft engineering, for work on military projects. Please include summary of experience in reply.

Engineering, Personnel Office
NORTH AMERICAN AVIATION, Inc.
Los Angeles Airport, Los Angeles 45, Calif.

PLANNING ENGINEER

Expanding long term research and development project requires the services of experienced planning engineer to direct engineering group of approximately thirty persons responsible for determining project requirements, designing buildings and equipment to meet requirements, and liaison with contractor erecting facilities. The supervisor for this group must have experience in such fields as project (not production) planning and scheduling, and site and laboratory design and construction.

In reply, please forward resume of education, experience, salaries and pertinent personal data to

P. 7761 Aviation Week
520 N. Michigan Ave., Chicago 11, Ill.

WANTED
SALES MANAGER

THE LEADING MIDWEST
RYAN DISTRIBUTOR

Already 2nd in national Ryan Navion sales now developing 1949 sales program. Only applicants with high qualifications considered. This is a sales job—Hot pilots save your time.

Permanent position. Good salary and commission. Demonstrator furnished.

Write full particulars. Appointments arranged. Inquiries confidential.

Rex G. Howard, Pres.
HOWARD AVIATION INC.
PEORIA, ILLINOIS

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

POSITION VACANT—Helicopter Pilots—Need several qualified helicopter pilots for foreign and domestic duties. Write full qualifications including all flight time experience, former employer and minimum salary expected, to P 8064, Aviation Week.

POSITIONS WANTED

ATTENTION AIRLINE or Aircraft Corporations. Can you use me in your advertising, sales, or maintenance department? I am a college graduate with a B.S. in Aeronautical Technology, Ex-Naval Aviator, age 27, married, ambitious, CAA certificated commercial pilot, flight-instructor rating, A&E mechanic, available on or about April 1. PW 7990, Aviation Week.

MAINTENANCE ENGINEER with B.S. Degree, A & E, Commercial Pilot, 4½ years mechanical experience on civilian aircraft, 4½ years with AAF Air Depot as civilian mechanic, crew chief-flight engineer, modifications unit head. Desire employment with airline, service representative, co-pilot mechanic, or similar work. PW 8019, Aviation Week.

POSITIONS WANTED

EXECUTIVE PILOT, 4500 accident free hours, desires domestic or foreign position with company or private individual. Airline transport, instrument, multi land-sea ratings. Highest professional references. PW 8080, Aviation Week.

SELLING OPPORTUNITY WANTED

SALES OR Company Representative-Pilot, Navy and airline trained and experienced in sales, personal contact work, and administration, desires responsible position with or without active flying. Now employed in East but desires to re-locate on West Coast or in Southwest. Airline transport rating, first class medical certificate. 14 years aviation experience. 5400 flight hours. Married, best references, age 36. RA 7958, Aviation Week.

FOR SALE

DC-3 just overhauled,
new propellers, wings pulled and new attach angles, 3800 hours total time, 21 Douglas reclining seats, new interior, airstair door, airplane radio, Pratt and Whitney 1830-92 engines. Ready for immediate delivery. FS 8024, Aviation Week.

DC-3's airline
equipped and in excellent condition. For Sale or for lease. FS 8025, Aviation Week.

Beechcraft AT-11-Cargo Conversion.
Relicensed 1/25/49—All Bulletins. Airframe 1100 hours—Engines 200 hours SOH, VHF, ADF, Command, Marker beacon, New Fabric, Tires. Completely insulated with fibreglass. Price $21,000.00. Coast Air Transport Inc., Box 312, Middletown, N. J.

Management Opportunity

The Torrance City Council will receive sealed bids up to 8:00 p.m. on March 8, 1949, for the Management of the Torrance Municipal Airport.

For further particulars call or write to the City Manager, Torrance, California.

A $2.00 deposit is required for complete plans, specifications and proposal.

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.

SAVE $116.00

ON *Firestone* AIRCRAFT ACCESSORIES
THE FAMOUS HARVEY-WELLS TRANSCEIVER
Was $159.95 NOW $43.50
LIMITED QUANTITY

FLY THE BEAM
TALK WITH THE TOWER

110 Volt Aircraft Receiver
ONLY $44.50
Complete with wood cabinet desk speaker.

Full Range & Tower Frequencies,—Plus Standard Broadcast. Ideal for home, office, or airport.

Complete two-way radio, rugged, compact, lightweight. Full range signal, full broadcast band and tower reception at a flip of the switch. Top-notch performance. Power pack can be installed separately. 12 volt. Complete with tubes, crystals, jack panel, cable & power pack. All brand new mdse. Fully guaranteed. Size 4½x5½x8.

OTHER SPECIAL BUYS

★ Transmitter 12 volt	$25.00	★ 3-M-907 Microphone	$7.50
★ Receiver 12 volt	25.00	★ 3-M-908 Head Set	2.75
★ 3-M-910 Antenna Kit (less load coil)	2.47	★ 3-M-909 Antenna Kit	5.50

At your dealers or order direct. Cash with order or C. O. D. only. Discount To Dealers on Any Two (2) Radios per order.

GENERAL AVIATION SUPPLY CO., LAMBERT FIELD, ST. LOUIS 21, MISSOURI

GENERATORS

Type—P-1 part No. 7A-5838
Mfgr. Westinghouse
New—in cans. Each—$34.50

STARTERS

Type JH3R—part No-280-R3
Type JH4ER—part No 2140R-12
Mfgr.—Jack & Heintz
New—Each $65.00

RELAYS—reverse current

Type GE3GTR72C1A
24 V, 300 A. Part No 94-32278A
Mfgr. General Electric—Each $12.50

Telephone Portsmouth 7-4008

AVIATION SUPPLY CO.
6207 So. Cicero Ave. Chicago 38, Illinois
Suppliers of Aircraft Accessories

the steward-davis
100 hour warranted
R-1830-92
Conversion . . .
$1695 with exchange

STEWARD-DAVIS • 13501 SOUTH WESTERN
GARDENA, CALIFORNIA • Cable: STEDAV

WHERE TO BUY

SAFER Night Flying
FLASH-AIRE
(LIGHTBODY TYPE WH-100)
Private Plane Position Light Flasher

FLASH-AIRE* gives you the added safety of flashing position lights on your plane . . . at a reasonable cost. 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.

$19.75

Patent Applied for
*Trademark
TEXAS ENGINEERING & MFG. CO., INC.
P. O. Box 6191 Dallas 2, Texas Dept. F-4

Now you can feature your business needs or "opportunities"
EVERY WEEK
for attention of more than 34,000 executives and key men who read
AVIATION WEEK
by inserting your advertisement here in
"SEARCHLIGHT"
Ads received one week appear in the issue mailed the next week.

BEECHCRAFT C18S

One of the most complete conversions in the country with all the interior features of a new Twin Beech. Tan upholstery, five reclining chairs, Airline type instrument panel, complete set dual flight instruments, 50 gallon nose tank, Deluxe soundproofing, Twin pilot tubes. Radio installation includes ADF, ILS 6 band Glide Path and Localizers, Marker Beacon, VHF Transmitters and Receivers. Relicensed to January, 1950. A real bargain. Direct inquiries

AIRPLANE SALES DIVISION
BUTLER COMPANY
223 W. Monroe Street Chicago 6, Ill.
Phone Franklin 2-5800

Automatic Machine Computation
Numerical mathematical analyses of all kinds. High speed, accurate (digital) fully automatic equipment.
Research studies, test data reduction, design analysis, operations critiques, etc.
ENGINEERING COMPUTING LABORATORY
602 S. Central, Glendale 4, Calif.
Phone CHapman 5-1700

STRICTLY PERSONAL

HIGH FLYING LODGE BROTHERS—**Hy Sheridan** says Sadie the Stewardess remarked the other day that a lot of Masons have taken up flying: "There's hardly a trip I don't have on board at least one pass master."

* * *

ONE-HORSEPOWER COHU—**LaMotte T. Cohu**, Convair's prexy, was in full cowboy regalia but down to one horsepower when he rode in the saddle in the grand entry at Fort Worth's famed Southwestern Exposition and stock show rodeo the other day, according to **Julian Stag**, our alert Dallas correspondent.

* * *

THE "FIENDISH" PILOT IDENTIFIED—**Ken Willard** identifies the Terrible Tempered Pilot named Joe, mentioned here Feb. 7, as **Joe Hammer**.

* * *

ODLUM, THE ACE—An AVIATION WEEK editor in Washington sends us an official press memorandum from **Mr. Symington's** Department of the Air Force which lists guests at a recent function. The Atlas Corp. and Convair financial wizard is identified as "**Floyd Odlum**, prominent civilian aviator." We'll wager this was no accident, but a gag instigated by Odlum's good friend Symington.

* * *

THE MAIL BAG—A new product announcement deserves passing along to you airline equipment buyers who are looking for new buffet gadgets in Connies, DC-6s, and Convairs. **Mr. Samuel Abelson** of Dalason Products Mfg. Co., Chicago, writes:

"We are in a position to make immediate deliveries on our new product, the High Boy Hot Dog Steamer and Bun Warmer Combination. Enclosed you will find a photo of the unit in operating position."

Our mail also brings one of the wonders of the English-speaking world. The staid and somber, very professional weekly press bulletin of the Society of British Aircraft Constructors interrupts its brief reviews of significant articles from the world's technical publications to quote Hy Sheridan's recent story in this column about the stewardess who was going to resign in the jet era so she would never hear a pilot say, "My fire is out."

And **Don Mockler** of AIA's Personal Aircraft Council asks us to alert the Hoover Commission at once. He writes, "Who says there ain't no economy in government?" and forwards a manila envelope from CAA's Air Marking Section, addressed to AIA. The envelope originally had been sent by AIA to CAA.

Josh Lee, CAB member, sends us an autographed copy of his new book, "The Battle of Cognac & Other Soldier Rhymes," just published.

* * *

WANT A PENGUIN? CALL THE NAVY—When Pan American starts something, it puts a lot of determination into getting what it wants. This is just as true of the publicity department, as it is of **Mr. Trippe**. But despite the whole darned Chilean Navy, a penguin made Pan Am cry uncle.

One day last month the Ford Motor Co. sent PAA an urgent demand to find a penguin. No reason. Just "find a penguin." Reports **John Creedy**, "We cabled Buenos Aires. BA said no penguins; try Santiago." Santiago failed, but not without a lusty try. **Agent Brunson** there explained by air mail how he called on the Chilean Navy to execute "Operation Penguin:"

"We confirm our cable of yesterday in which we informed you we were unable to forward the penguin, because there is no stock of penguins in Santiago. The present maximum temperature is of 92 degrees and obviously on this basis penguins cannot survive.

"We have contacted the Chilean Navy who have at present some cruisers who are relieving the Chilean possession in the Antarctic and it may be possible that they can bring them five penguins, in which event we could forward them from Punta Arenas to Santiago on LAN to re-forward them immediately by air express to New York."

But in the meantime, Ford had explained it wanted the bird for a one night stand before television cameras. The show went on Jan. 16. No penguin. Ford someday will realize that the impossible takes a little time, even at Pan American.

R. H. W.

WHAT'S NEW

New Books

"Computation Curves for Compressible Fluid Problems," by C. L. Dailey and F. C. Wood, a handbook, soft cover, spiral binding. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $2.

"The Aeroplane Directory of British Aviation," incorporating "Who's Who in British Aviation," bound in cloth, 478 pages. Published by Temple Press Ltd., Bowling Green Lane, London E. C. 1. Price 10s/6d.

Trade Literature

"Careers in Engineering and Science," a guidance booklet edited with the primary aim of offering direct presentation of the opportunities available for professional training in an engineering college. Available from Polytechnic Institute of Brooklyn, 85 Livingston, Brooklyn, N. Y.

"Corrosion Engineering Service," a booklet giving reasons for galvanic cell corrosion and methods to overcome it, available from Nickel Information Service of The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

"How to Treat a Gage," a reprint from American Machinist, Dec. 16, 1948, discusses the subject with respect to protection from dirt, proper handling and storage. Available upon request to V. W. Palen, Bureau of Public Information, New York University, Washington Square, New York 3, N. Y. Enclose 10 cents to cover cost of handling and mailing.

"Attachments and Accessories for South Bend Lathes," a 28-page illustrated catalog, available upon request to South Bend Lathe Works, South Bend 22, Ind.

"Super Alloys," Vol. 4 No. 2 of Tempil Topics, describing the most recently developed class of metals for high temperature service. Available upon request to Tempil Corp., 132 West 22nd St., New York 11, N. Y.

"Solder and Soldering Technique," a 28 page technical manual, available upon request to the Kester Solder Co., Technical Dept., 4201 Wrightwood Ave., Chicago 39, Ill.

"Bulletin D," dealing with the Dillon Dynomometer, available upon request to W. C. Dillon and Co., 5410 W. Harrison St., Chicago 44, Ill.

ADVERTISERS INDEX

AVIATION WEEK
FEBRUARY 21, 1949

■

SEARCHLIGHT SECTION

(Classified Advertising)

LETTERS

Bus Man Looks at Airlines

Local service airlines have been dubbed "flying bus lines." but no bus line ever operated with proportionately as high as 80¢ per mile mail pay and such low load factors. A bus line, or more technically, a motor coach operation, draws its traffic from such small (and even smaller) communities as the local service airlines, yet the motor coach operators are far ahead in providing public service. How? One principal factor is by association and here are a few ideas that wouldn't be worth a cent to one local service airline alone, but could be of immense value, traffic-wise, IF a majority of local service airlines participated.

Many local service airlines are Air Transport Assn. members—dues paying, nonvoting and hopelessly outclassed seniority-wise. By now, many of them are convinced that in their "club" it's practically impossible to contest the C. R. Smiths, Trippes, Drinkwaters, et al, who, though they find trouble in agreeing among themselves on their own operating policies, would unite against local service airlines whenever and wherever they felt their own interests, were at stake.

It is interesting to note that no trunkline recognizes a local service airline in any of its advertising, time tables or sales literature. Conversely, the local service airlines go out of their way to tie in their own small operations with any trunkline connecting with their routes.

Yet, many trunklines feature the routes of other trunklines in their maps and time tables of their own routes. Local service airlines are ticketing perhaps 50 percent more passengers for the trunklines than the trunklines are providing the local service airlines.

The trunklines, if they were interested not only in the full purpose of the Air Transport Assn. but also in assisting and promoting local service airlines, could provide them the same 5 percent commission they are more than willing to pay any other traffic agent. This source of revenue would at least finance the accounting, sales and advertising effort necessary for interline ticketing by the local service airlines.

Trunkline scheduling appears to duplicate rather than complement local service airlines wherever opportunity presents itself and no matter how meager the traffic potential in a given area.

True, the local service airlines have their own get-togethers but why will they not take a "tip" from another mode of transportation and, by application of their methods, take over not only *all* of their fair share of the present airline traffic but also "trip" the trunklines and the nonskeds on the controversial and promising "Air Coach" proposition?

Local service airlines might well become the oft-expressed "fascinating disappointments" unless they agree to agree collectively on such a proven system as Greyhound, American Bus Lines or National Trailways System have moulded to successfully.

CAB violation and objection? Could be—for the present, but certainly worth a fair investigation and arbitration . . .

Local service airlines now have the upper hand equipment-wise, for with possibly two temporary exceptions, they are all "Dependable Douglas DC-3" equipped and what better known and more respected aircraft flies the airlanes throughout the world today?

Here is an opportunity for pooled servicing, maintenance and parts stocks; pooled overhaul; their own interline ticketing; *sensible* interline schedule connections—not the trunklines' 6-hour-layover variety; pooled effective nationwide advertising that would permit the use of such media as the Saturday Evening Post, Colliers and Life magazines; and public relations.

This pooling of services having equal value to all local service airlines does not mean nor entail and disruption of present-day operating techniques, of the enviable and completely accident-free performance record amassed to date, of the same high standards of safety and operation as now required by CAA-approved operating and maintenance manuals . . .

If the trunklines succeed in keeping the nonskeds out of air coach business, what but their own "surplus-expensive-to-maintain-and operate" (but—fully depreciated) DC-3's and some DC-4's will they use for air coach service? And. if not for air coach, then certainly for their own versions of local service airlines. United's Spokane-Boise route and the San Francisco-Los-Angeles inland route are typical examples of what has already been done by the trunklines to blanket the country with feeder routes and indicates what they might well do in the future with their "obsolete" equipment. Either they are trunklines ostensibly fed by local service airlines or they become local service airlines. Should they be both?

Certainly as a group, local service airlines need not follow trunkline practice on ground transportation to and from airports. Nothing appears more ridiculous than 4¢ to 6¢ per mile air fares serviced by as high as 20¢ per mile ground transportation. The example, particularly apparent on local service airlines, of a $2.50 airlines fare to which is added a $3.00 city-airport-city charge, is distinctly a deterring factor in the local service airline potential traffic picture.

The temporary CAB certificates issued to the local service airlines are rapidly approaching their expiration dates. Some already have been granted one-year extensions. Will these extensions allow the local service airlines time to take a rightful place in American transportation or will they develop into "reprieves"?

The tremendous dependence on Post Office payments must be eased. CAB's recent Florida Airways decision is omnious and the newly devised incentive mail pay plans are strictly temporary. It is altogether plausible that by applying nationwide motor coach operational practices which resulted not only in economies and elimination of overlapping, but what is more important, in a standardization of service, fares and equipment at a price the American public have been willing to pay, the local service airlines can emerge from "experimental" to profitable."

No one local service airline could afford or would be permitted to spend the money necessary to organize this plan—nor could two or three, but a majority, spread throughout the country, could effectively evolve a workable solution so long as they work as a group and not as a set of trunkline executives, each bent on making his own trunkline reflect his dominating personality at the expense of the American public . . .

J. E. Presley, Advertising Manager
Vancouver Island Coach Lines, Ltd.
Victoria, British Columbia

(Mr. Presley is an American. The company with which he is associated operates more than 100 vehicles in transit, interurban, intercity, sight-seeing and taxi services and is agent for Greyhound.—Ed.)

Crash of the Twin-Quad

I notice as a leading item of your news digest on Page 8 of the Jan. 24 Aviation Week that you present the electrical system fire as the cause of the crash of the Twin-Quad Beechcraft. This is an error in reporting, and it misstates the case. The electrical system fire did *not* cause the crash. The fire was entirely confined to the inside of an electric motor driving the hydromatic pump. There was no flame outside the enterior of the motor, and there was no smoke of consequence in the pilot's compartment of the airplane. The airplane was completely airworthy until a gross personnel error was committed and the master switch which controlled all electrical circuits was pulled, and this action resulted in the complete loss of power simultaneously on all four engines.

The electrical system fire did not have any serious effects whatever except to excite the personnel in the airplane and cause one of them to commit a gross error of judgment. The airplane cannot be blamed.

We have asked the CAA and CAB to consider a clarification of the requirement for a master switch controlling all electric circuits. This crash indicates that such a switch is a potential source of hazard. We admit that the present regulations are subject to interpretation one way or the other, and we believe that one result of the accident will be to clarify this important point.

We feel that you will be doing us and the industry a favor if you will clarify your report of the cause of the accident in your next issue.

John P. Gaty,
Vice President-General Manager
Beech Aircraft Corporation
Wichita 1, Kansas

(Aviation Week's story said "an electrical system fire resulted in the crash . . ." Strictly speaking this is not inaccurate, but we are glad to give Mr. Gaty space to explain the circumstances more fully.—Ed.)

Disraeli went out on a limb... £4,000,000 worth!

A 100-mile ditch was dug across the Isthmus of Suez . . . and the world was made 5000 miles smaller. Prime Minister Disraeli realized the vast importance of the Suez Canal—a *faster* way to reach the markets of the East. So in the name of the Cabinet, he bought part of the Canal . . . to the tune of £4,000,000! Parliament, fortunately for him, backed up his wisdom with hard cash.

Disraeli, like any man with vision, knew that markets are most productive when you utilize the fastest way of getting at them.

To the aid of today's businessman comes a superior method of getting places fast, *and frequently:* company ownership of the twin-engine Beechcraft Executive Transport. Because of its 200-mph speed, executives are no longer desk-bound; business travel time is cut 75%. Personal attention to distant markets is again possible, and the profit side of the ledger reflects such increased activity. Travel in this 7- to 9-place luxuriously comfortable Beechcraft is travel as it should be—fast, relaxing and free of fatigue. And it is particularly economical transportation as well.

● A note on your company letterhead will bring you an informative 60-page brochure on "The Air Fleet of American Business." Write today to Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

BEECHCRAFT
EXECUTIVE TRANSPORT
MODEL 18

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS