A McGRAW-HILL PUBLICATION

AVIATION WEEK

JULY 11, 1949

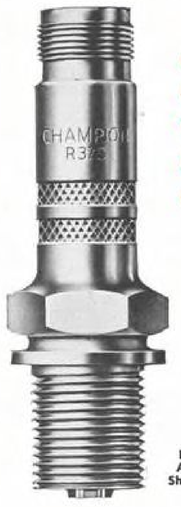
DEPENDABLE

CHAMPION

SPARK PLUGS

"Champion Dependability"—a growing by-word in aviation

Recently, as a result of outstanding performance during service testing, Champion Ceramic Aircraft Spark Plugs have been adopted for many types of engines now being widely used by the following air lines:



R 37 S—1
Actual Size
Shielded Type

AMERICAN AIRLINES, INC.
AMERICAN OVERSEAS AIRLINES
CAPITAL AIRLINES (P.C.A.)
CHICAGO & SOUTHERN AIRLINES, INC.
COLONIAL AIRLINES, INC.
DELTA AIR LINES, INC.
EASTERN AIR LINES
HAWAIIAN AIRLINES
NORTHWEST AIRLINES
NORTHEAST AIRLINES, INC.
PAN AMERICAN AIRWAYS
SLICK AIRWAYS
TRANS WORLD AIRLINES (I.C.D.)
UNITED AIR LINES
WESTERN AIR LINES

C26—
Unshielded
Actual Size 2⅜"

Many of these air lines report—fewer flight interruptions attributed to spark plugs—lower, more uniform electrode erosion rate. These performance advantages coupled with lower initial cost and lower operating costs due to longer life, combine to reduce spark plug costs to a new low—at a time when costs generally are soaring. Thus Champion's traditional dependability is once more reaffirmed, and the very desirable combination of low cost and increased performance which dependable Champions insure, warrants the serious consideration of every aircraft operator, large or small.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

FOLLOW THE EXPERTS

USE CHAMPIONS AND FLY WITH CONFIDENCE

Helps a plane get out of tight spots

CONVAIR'S new liaison plane, the L-13, recently took off and landed with just 100-foot runs with normal ground winds! And the no-wind takeoff distance is still only 290 feet, landing only 227 feet.

Getting in and out of tight places is part of this Air Force plane's everyday job. And that puts heavy demands on the landing gear equipment. B. F. Goodrich engineers met these demands with a large (7 x 1½) brake mounted at the side of a small (8.50 x 6) wheel.

The powerful B. F. Goodrich Expander Tube brakes keep the plane from inching forward while its 245 h.p. engine is revved up to full power before takeoff. And in landing, their full-circle braking action—with pressure applied *directly* to *all* brake blocks—brings the plane to a quick, sure stop.

The high strength B. F. Goodrich wheels can take the shocks and jolts of rough, unimproved fields. The B. F. Goodrich Type III tires have a stronger cord construction that resists bruises and blowouts and a wide "footprint" for better flotation on soft ground, better control anywhere.

B. F. Goodrich engineers have an outstanding record for designing the *right* combination of wheel, brake and tire to do the job—at minimum weight, minimum cost. That includes personal planes like the Navion, giants like the Constitution; the P2Vs, B-45, Stratocruiser and many others. For help with the design on your drawing boards, write *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F.Goodrich

FIRST IN RUBBER

AVIATION WEEK

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Crisis in Naval Aviation—An Analysis

Naval aviation is currently facing one of the worst crises in its long history.

Immediate symptoms of the crisis include:

- **Cancellation of the 65,000-ton supercarrier USS United States.**
- **A $36 million cut in fiscal 1950 research and development funds for Naval Aviation.**
- **Reduction of Naval aircraft procurement for fiscal 1950 to 843 new planes at a cost of $687 million.**

The first two blows in effect put an artificial ceiling on the technical development of Naval aircraft. The USS United States was a prototype whose development was a requirement for an entirely new generation of Naval aircraft. Scrapping of the supercarrier prototype also meant scrapping the generation of planes designed to use it, as indicated elsewhere in this issue. A comparable case would involve the Joint Chiefs of Staff decreeing that U. S. Air Force planes would be limited to runways of a certain length and thickness despite the ability of the Corps of Engineers to build longer and stronger runways.

Research Cut

The cut in research and development funds means the abandonment of development work on five Naval aircraft prototypes and at least a year's delay on four others. This, of course involves another mortgage on the future of Naval aviation.

Slashing procurement funds (in contrast to the 1590 planes and $753 million for fiscal 1949) means, according to Vice Admiral John Dale Price, deputy chief of naval operations, that the Naval Air Force would be operating only about 3000 planes by 1955 if the fiscal 1950 procurement rate were maintained. Navy is rapidly running out of war surplus plane reserves and will soon have to reply entirely on new procurement for its operational forces.

Thus the picture now is of a Naval Air Force that is rapidly shrinking in physical size with a definite technical ceiling imposed on its future. This current crisis stems from two deep-seated conflicts: one between the Navy and Defense Secretary Louis Johnson and the other the long-standing interdepartmental scuffle between the flying Navy and the "black-shoe" Navy that is still determined to keep the Navy's future on the sea and not above it.

Navy Policy

An interesting prelude to the Navy's conflict with Johnson lies in the top level Navy policy of the past two years of studied neglect of presenting its case directly to the public in favor of a policy of relying on political support on Capitol Hill. The relation between public support and political support does not appear to have been as clear to the top level Navy policymakers as it was to the Air Force leaders. The fact that the Air Force victories on Capitol Hill during the past two years have been bi-partisan and are closely related to the widespread public support of the Air Force, now seems to be at least partially recognized by Navy brass.

However because there was never any clear-cut public presentation on what the supercarrier was all about or how it fitted into the overall defense picture Johnson's action in cancelling it struck a popular note among an economy-minded public and Congress. The Navy will find this lack of grass roots support a continuing hindrance in its campaign for a comeback. Nor is there still any clear picture of just where the Navy itself expects Naval aviation to fit into the overall defense picture in general and how it will dovetail with the Air Force in particular.

Johnson's Plans

Johnson has now proferred his approval (against a 2-1 vote of the Joint Chiefs of Staff, authoritative sources say) of the Navy's carrier modification program as a substitute for the supercarrier prototype. Since this was already a part of the Navy's air program the Navy is not impressed with Johnson's generosity. Johnson has also assured Navy Undersecretary Dan Kimball that he (Johnson) has plans for expanding Naval aviation. Naval aviators are awaiting the disclosure of those plans with interest.

For the flying Navy is still engaged in constant struggle against the only partially reconstructed versions of the "battleship admirals." Nowhere is this struggle more bitter or significant than on the future role of Naval aviation. There is a group of "black-shoe" Navy admirals who believe that loss of aviation is inevitable for the Navy and the wisest course is to jockey for as much control over other slices of the defense pie as is practicable. This group welcomes the recent acquisition from the Army of all water transport although it means an increasingly large share of the Navy's budget devoted to non-combatant forces.

In a large Navy-operated transport fleet there would be more berths for the surface sailors.

In the rapidly increasing prominence of anti-submarine warfare there is the strange spectacle of Naval experts testifying on the subject before Congress without a Naval aviator in the group. Similarly Naval aviation had no representative on the Navy's legislative liaison group until recently. Although the Navy claims its aviation is its dominant element, the head of the Navy is still a sailor not a flyer.

Congress Aware

Congress is not unaware of this division within the Navy's ranks. In the recent debate on the fiscal 1950 military appropriation many advocates of Naval aviation voted against a $343 million increase for Navy planes because they had already voted over $5 billion for the Navy and felt it was up to the Navy itself to provide an adequate Naval air force out of that substantial sum. They voted against providing a big surface Navy and a big Naval air force in addition.

Naval Air Future

Naval aviation cannot take many more defeats such as it has suffered during the past two years and remain an effective and integral part of the defense structure.

There are a number of possible lines along which naval aviation could develop. The Dan Gallery school of thought which advocated that the Navy take over the Air Force role of strategic bombing has been pretty well discredited. There is another group of Naval aviators who see in the Air Force neglect of tactical airpower a chance for carrier-based Naval aviation to specialize in that role providing the Army with air support from carriers off the beachhead on through to bases ashore. Whatever course the future of Naval aviation takes it will continue to have rough sledding unless it strengthens its internal position in the Navy and states its case clearly and accurately to the public and Congress.

AVIATION CALENDAR

July 11-13—Annual meeting, Natl. Assn. of University Administrators of Aviation Education, Kent State University, Kent, Ohio.

July 13-14—Aircraft research and testing committee—Navy BuAer meeting, Carlton Hotel, Wash., D. C.

July 19-20—National Assn. of State Aviation Officials board of directors meeting, Grand Hotel, Mackinac Island, Mich.

July 20—National Aircraft Standards Committee eastern division meeting, Cleveland Hotel, Cleveland, Ohio.

July 21—Air Cargo Clinic, sponsored by Aviation Committee, Oklahoma City Chamber of Commerce, Convention Hall, Skirvin Tower Hotel, Oklahoma City.

July 21-22—IAS annual summer meeting, IAS Building, Los Angeles.

July 26-27—Air Force-Navy-industry meeting on revision of ANS-52A (machine screw), Tempo "U" Bldg., Wash., D. C.

Aug. 6-7—Second annual International Air Fair sponsored by Aero Club of Michigan, Willow Run Airport.

Aug. 6-14—1949 West Coast soaring championship, Palmdale Airport, Calif.

Aug. 7-14—Second annual southwestern soaring contest, NTAC airport, Grand Prairie, Tex.

Aug. 22-23—ARTC, western division meeting, Boeing plant, Seattle, Wash.

Aug. 25-28—Flying Farmers national convention, Fort Collins, Colo.

Aug. 29-Sept. 1—Aeromedical Assn. annual meeting, Statler Hotel, N. Y.

Sept. 1-7—International conference of Federation Aeronautique Internationale, Wade-Park Manor, Cleveland, Ohio.

Sept. 3-5—1949 National Air Races, Cleveland, Ohio.

Sept. 6-8—Annual spark plug and ignition conference, sponsored by Champion Spark Plug Co., Hotel Secor, Toledo, Ohio.

Sept. 7-11—10th Society of British Aircraft Constructors flying display and exhibition, Farnborough Airfield, Hampshire, England.

Sept. 9-12—Clinic on maintenance of industrial instruments, Instrument Society of America, Statler Hotel, St. Louis.

Sept. 18-20—International Northwest Aviation Council convention, Spokane, Wash.

Oct. 5-8—SAE national areonautic meeting and aircraft engineering display, Biltmore Hotel, Los Angeles.

Oct. 30-Nov. 2—Annual convention, National Assn. of State Aviation Officials, New Orleans.

Nov. 9-11—Seventh annual meeting, Aviation Distributors and Manufacturers Assn., French Lick Springs Hotel, French Lick, Ind.

Jan. 13-15, 1950—All-American Air Maneuvers, Miami.

PICTURE CREDITS

14—Republic; 16—USAF; 17—(F88) USAF, (F86) North American; 27—AF Air Materiel Command.

NEWS DIGEST

DOMESTIC

Boeing Aircraft Co. will have to add 3700 more workers at its Wichita division within the next year to carry out B-47 Stratojet production, according to J. E. Schaefer, vice president and division manager. Wichita now has nearly 10,000 employees.

James D. Redding, manager of the aeronautical department of Society of Automotive Engineers, was appointed executive director of the Committee on Aeronautics, Research and Development Board, National Military Establishment. He is succeeded at SAE by his assistant, M. LeRoy Stoner.

Negotiations between Local 927, UAW-CIO and Curtiss-Wright's Columbus Airplane division have bogged down. About 500 employees are reported to have voted 16-1 for strike action if no settlement is reached. Issues include union shop, Christmas bonus, a sick leave clause and several "fringe" requests by the union. Current contract expired June 21.

Curtiss-Wright Corp. named Theodore B. Focke vice president and general manager of the Wright engine division and H. Fletcher Brown general manager of the airplane division.

PAA and Panagra announced reductions in cargo rates from 15 percent to 50 percent on shipments between the U. S. and South and Latin American countries. New rates become effective Aug. 1.

FINANCIAL

Pacific Airmotive Corp. preliminary report for six months ending May 31 indicates loss of $90,782. First quarter loss was $84,230. Sales for the six-month period were $4,750,726, an increase of 13 percent over comparable period last year. PAC is reducing inventory at the rate of nearly $100,000 per month.

INTERNATIONAL

Australian DC-3, crash near Perth killed 18. Bound for Darwin, plane was flying in a rainstorm when the accident occurred. Plane belonged to Mac Robertson Miller Aviation Co.

ICAO (International Civil Aviation Organization) voted a budget of $2,810,607 for 1950 operations, a reduction of $261,000 from original estimates. Budget for 1949 is $2,649,685.

French National Assembly passed a bill reorganizing nationalized aircraft plants, ordering others closed. Reports from Paris indicated several thousand workers would defy the government order and continue to occupy plants scheduled to close.

INDUSTRY OBSERVER

► American Airlines is modifying the safety relay interlock between nose wheel, throttle and automatic propeller feathering device on its Convair-Liners to make the relay fail safe. AA Convair-Liners experienced unintentional reversing of propellers recently (Aviation Week, June 6) during approaches to Newark and Washington.

► Air Transport Assn. has asked the Society of Automotive Engineers to develop a manual for airline use in standardizing transport cockpit layouts. Variety of cockpit layouts is a current headache in airline pilot training and operations.

► A. V. Roe, Ltd. of England is doing preliminary design work on a delta-wing supersonic fighter. Indications are that it will utilize a prone pilot cockpit.

► French have begun production of the British De Havilland Vampire at the south-eastern plant of the nationalized French aviation industry. Known as the Vampire FB Mark 5 it will be powered by a French-built version of the Rolls-Royce Nene turbojet, and be equipped for use as a fighter-bomber. French are also expected to use some imported De Havilland Goblin turbojets in their Vampires.

► British are planning to fly experimental versions of the Handley-Page Hermes and Marathon transports powered by turboprops. Hermes will take four Bristol Theseus rated at 2290 hp. to give it an anticipated top speed of 350 mph. at 15,000 ft., and maximum cruise of 322 mph. at 30,000 ft. Gross weight will be about 84,000 lb. Experimental Marathon will have two Armstrong Siddeley Mamba turboprops specially modified for civil use to produce 1000 hp. apiece.

► National Aeronautical Corp. (NARCO) is preparing a map of omni-range stations for use with its new omni-range radio set for personal planes. It will serve pending issuance of the delayed official CAA charts for omni-range users.

► Approximately 95 percent of all bent or damaged McCauley aluminum propellers sent back to the factory are returned to service after repairs. Some propellers have as many as four straightening jobs. Company spokesman says the first case of actual propeller failure in the postwar Met-L-Prop has not yet been reported, although there are approximately 17,000 of the propellers now in service.

► New stainless steel helicopter blades built by Parsons Corp. aircraft division, Traverse City, Mich., use the 8-H-12 NACA airfoil section for helicopter blades, designed for optimum hovering characteristics, and are expected to result in improved altitude performance when flight-tested soon on a Sikorsky H-5 at Wright Field.

► Sensenich Corp., Lancaster, Pa., has already shipped out about 60 of its new fixed-pitch aluminum propellers. First installations will probably be on the new four-place Piper Clipper.

► Continental Motors is expected to start work soon on a sizeable order for jet engine starters for USAF planes.

► Despite surplus oxygen equipment competition, Scott Aviation Corp. is making quantity sales of its new oxygen equipment to airlines and executive plane users.

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AVIATION WEEK

July 11, 1949

Airlines on Way to Record-Breaking Year

All types of traffic come back with bang in first half for all types of carriers.

By Charles Adams

The surprising surge in airline business during the first six months of 1949 gives bright promise that the industry this year will earn its first substantial profits since war-lush 1945.

Preliminary estimates show that the 16 domestic trunklines in first-half 1949 increased their passenger traffic from 13 to 15 percent over the same period last year. Whereas in the first six months of 1948 the domestic trunklines showed a combined operating loss of more than $10.5 million, they earned a minimum of $5 million operating profit (and possibly upwards of $7 million) in first-half 1949.

▶ **Flag Carriers Gain**—U. S. international and overseas carriers showed a slightly larger passenger traffic gain than their domestic counterparts. Indicated profits of American flag lines as a group were good during first-half 1949, but these earnings are subject to considerable change because of mail pay uncertainties.

Feederlines also made progress during the first half of this year. Passenger traffic jumped around 90 percent, although deficits were still numerous.

How long the airlines can buck the general business recession is a lively topic of discussion among industry officials.

There is some belief that traffic should continue well ahead of last year through the summer, with a more than seasonal dip possible in the fall unless overall business conditions improve.

▶ **New Headaches**—Even now the carriers are finding new headaches go hand-in-hand with rosy earnings figures. Unions are rumbling with talk about higher wages, state governments are reconsidering whether the carriers can stand higher fuel taxes, and the airports are making their pitch for higher fees.

Only a precipitous reversal of present trends can prevent the domestic and international trunklines (and the feeders) from breaking all passenger traffic and revenue records in 1949. Cargo business will also hit new peaks this year, and mail volume will be at a peacetime high.

▶ **Business Boosters**—Completion of first-half 1949 without a passenger fatality by either domestic or international scheduled carriers was a major factor in boosting traffic. The first-of-the-week family fare plan and expansion of sky-coach services also contributed to the business upturn.

Extension of family fares through this summer, together with the newly-effective 10 percent discount for military travel (AVIATION WEEK, July 4), will undoubtedly spur domestic ticket sales during the next few months.

Looking ahead to next winter's business, the International Air Transport Assn. has announced that reduced-rate, trans-Atlantic roundtrip fares will again be offered from Oct. 1 through Mar. 31. These bargain, off-season excursion tickets between the U. S. and Europe will be good for 60 instead of 30 days as was the case last year.

▶ **Profits Come Early**—The domestic trunklines began chipping away their normal winter losses at an early date this spring. In April, they showed a combined operating profit of about $4,412,000 almost to wipe out a first quarter operating deficit of $4,755,000.

Fifteen of the 16 domestic trunklines showed an operating profit in April; and the 16th—Continental Air Lines—was in the black during May. Last year, only four of the 16 were in the black during April.

▶ **UAL Traffic Soars**—Typical of the glowing six-months reports now being issued by the domestic carriers was United Air Lines' announcement that it shattered all company passenger and cargo records during first-half 1949. UAL flew an estimated 1 million passengers 627 million revenue passenger miles from January through June to hang up increases of 17 and 16 percent, respectively, over the same period last year.

Passenger load factor for the six months averaged 67 percent, against 66 percent for the same 1948 period, United said. UAL's freight ton miles rose more than 21 percent; mail ton miles gained 30 percent; and express volume was down about 24 percent.

During the first quarter of this year, United had the highest domestic operating loss in the industry—a total of $3,183,000.

But this figure was cut sharply by substantial profits in April, May and June.

▶ **AA Big Money-maker**—American Airlines, which had a domestic operating loss of only $257,000 in the usually-poor first quarter, stepped ahead as the industry's biggest money-maker in the second quarter. The company showed an operating profit of $1,193,000 in April and expected to do about as well in May and June.

During May, AA carried more than 313,000 domestic revenue passengers to set an all-time world's record. The company's previous high mark was 297,000 passengers carried in the month of September, 1947.

▶ **TWA Sees Record Revenues**—TWA, which had combined domestic and international gross operating revenues of $101 million last year, estimates it will take in $115 million this year. After reporting an operating loss of $2,651,000 in the first quarter of 1949, TWA's domestic division showed an operating profit of $465,000 in April and $700,000 in May.

A $428,000 operating profit in April more than erased a first quarter loss of $173,000 on TWA's international division, and further earnings were anticipated in May and June.

▶ **EAL, NWA Report**—Eastern Air Lines turned in a handsome $4,197,000 domestic operating profit during the first four months of this year. With its Florida traffic season over, the company's earnings were expected to fall sharply in May and June.

After losing $1,391,000 domestically in first quarter 1949, Northwest Airlines rebounded with a $141,000 operating profit in April. May and June earnings were considerably higher as traffic showed a marked springtime improvement.

Overall May revenues were the highest in NWA history.

• **Delta Air Lines** estimated its net profit at $320,000 during the first half of 1949.

Net income for Delta's fiscal year ended June 30 was placed at $647,000.

• **Capital Airlines** will show a profit for the first six months of this year. First quarter operating loss of $353,000 was balanced by a $198,000 operating profit in April, a $210,000 operating profit in May, and further sizable earnings in June.

• **Mid-Continent Airlines** reported a $53,909 net profit in May, bringing its net earnings for the first five months of 1949 to $90,563.

• **Northeast Airlines** earned about $7000 operating profit in both April and May but probably was unable to shave its $191,000 first quarter deficit sufficiently to finish in the black for the first half.

• **Braniff Airways** had $102,000 domestic operating profit in April and $113,000 in May. The company lost $366,000 domestically in the first quarter.

• **National Airlines** and Chicago & Southern Air Lines will both show domestic profits for the first half of 1949.

Western Air lines was close to the break-even point.

Navy Studies New Attack Planes

Supercarrier cancellation causes search for lighter plane with performance of planned turbojet bomber.

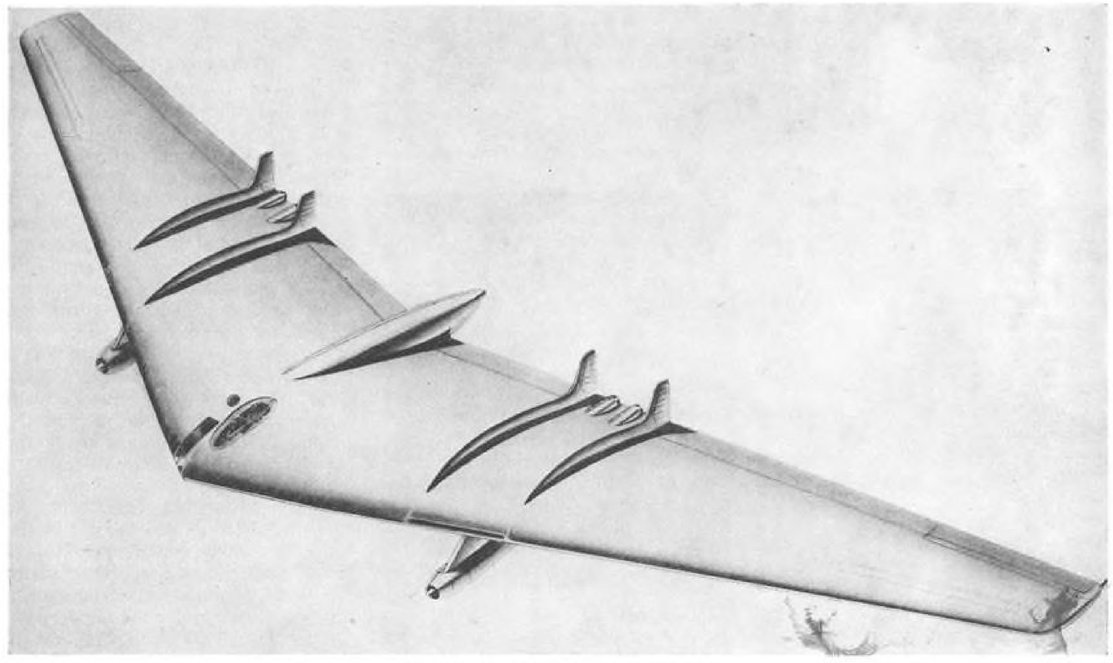
Navy is in the market for a new model turbojet-powered, carrier-based attack plane as a result of the cancellation of the 65,000-ton supercarrier USS United States (AVIATION WEEK, May 2).

The new Navy plane requirement is essentially a scaling down of its future attack bomber, the backbone of its proposed carrier air groups, to the size of the carriers it will have available in the foreseeable future. The design competition for turbojet bombers to be used on the USS United States indicated a gross weight of about 100,000 lb.; a bomb load of about 10,000 lb.; and a combat radius of over 1000 miles.

▶ **Weight Cut**—Now the Navy requirement involves a gross weight cut to about 65,000 lb., a somewhat reduced bomb load and a slight reduction in range. By dumping overboard a heavy weight penalty in armament, electronic gear and auxiliary equipment, the Navy hopes to get roughly the same performance out of the much lighter plane. The big weight reduction is required by the fact that, instead of the reinforced flush deck of the USS United States, Navy planes of the foreseeable future will be limited to the weaker and smaller flight decks of the 45,000-ton Midway-class carriers.

Design limitations of future carrier-based planes have been fairly definitely outlined by the cancellation of the USS United States and the modification program currently underway on the Navy's two largest classes of carriers—the 45,000-ton Midway class and the 27,000-ton Essex class.

▶ **Midway Modified**—The three 45,000-ton carriers (Midway, Coral Sea and FDR) required only minor modifications to beef up their three-inch armored



NEW NORTHROP JET WING

Northrop Aircraft, Inc., artist's drawing of the YB-35 Flying Wing converted to turbojet power plants. U. S. air force has contracted with Northrop to convert eight of the YB-35 Wings, originally powered by six Wasp Major pusher engines, into jet models each powered by six Allison J-35-19 turbojets developing 5200 lb. static thrust. The Allison engines will be mounted in pairs between the vertical fins at the trailing edge of the wings with single engine installations in pods slung below and forward of the wing leading edge. Of the eight Wings to be modified, seven will be used only for further testing of Flying Wing flight characteristics, while the other will be equipped with full military load as the YRB-49A, a service test prototype of the Flying Wing strategic reconnaissance plane originally scheduled for production in Convair's Ft. Worth plant. Another YB-35 will be equipped as a flying test bed for the Northrop Turbodyne, turboprop power plant aimed at developing 10,000 hp. Remaining YB-35s will be cannibalized to provide spares for the modified planes. Northrop originally built 13 piston-powered B-35s and two jet powered YB-49s. One YB-49 was destroyed in a crash. First jet powered YB-35 is to fly late in August.

flight decks to take the heavier pounding required by a 50-65,000 lb. plane. These modifications were completed during each carrier's normal shipyard overhaul.

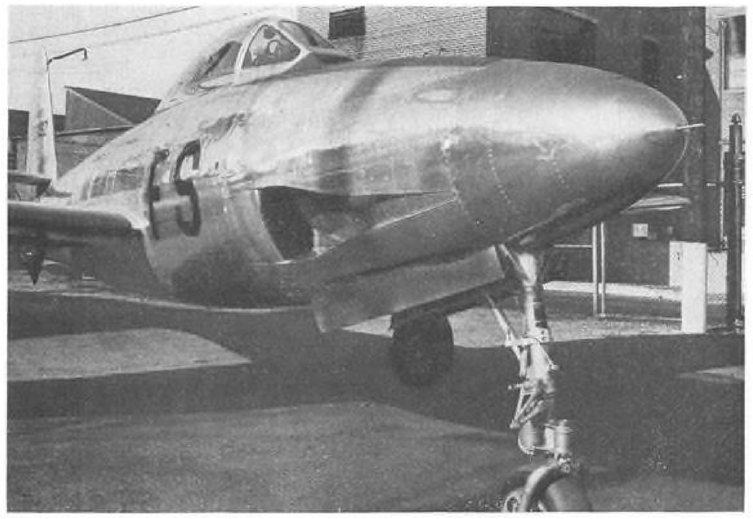
The eight 27,000-ton carriers require more extensive modifications to take more than the 16,000-lb. Douglas AD series and the heavier 26,000-lb. Martin AM-1.

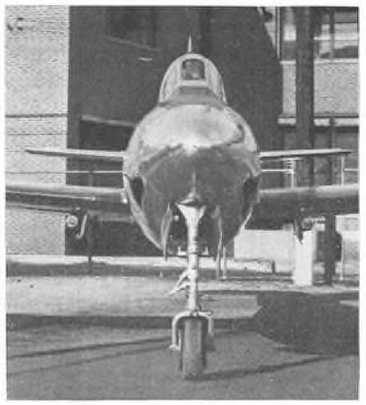
Included are major reinforcement of the flight deck, enlargement of elevators and strengthening of catapults. The Essex class modifications are expected to cost about $38 million per carrier. Cost of USS United States was estimated at $189 million without planes. The Essex and Wasp are now nearing completion of their modifications at Puget Sound and Brooklyn Navy Yards respectively.

► **Carrier Program**—Two other 27,000-tonners are scheduled for modification out of fiscal 1950 funds and a third, the Oriskany which is still building at Brooklyn, is being modified as a construction proceeds.

The current phase of the carrier modification program has been approved by Defense Secretary Louis Johnson as a substitute for the supercarrier. However the Navy planned the modification program as a supplement, not a substitute for the supercarrier.

► **No Substitute**—Even with modification the present Navy carriers will be unable to handle the type of heavier, longer-ranged planes planned for the supercarrier. It is doubtful if the eight Essex-class carriers will be able to handle planes in tactical quantities any larger than the North American AJ-1 (55,000 lb gross) now in initial production at NAA's Downey, Calif., plant. The Douglas A2D, next step in the AD series and powered by the Allison T-40 turboprop, will be sufficiently small and light to be handled by the Essex class.





ALL-WEATHER THUNDERJET

Although there is little that is recognizable, this is the familiar Republic F-84 in new guise: all-weather fighter (top). Nose air intake (left) has given way to radar antenna equipment and air for the turbojet engine is now taken aboard through NACA-developed flush air inlets, seen on either side of the lower forward fuselage. These inlets provide the same quantity of air at the required pressure as the nose inlet, while permitting installation of equipment in the nose. Republic says performance of the airplane is not impaired by the change and the rate-of-climb has been improved. The new design has been developed as a private Republic Aviation Corp. project. It has made eight flights and company test pilots pronounce it satisfactory. Air Force has not yet expressed procurement interest in the new Thunderjet but it further illustrates the trend towards all-weather capabilities of all fighters of the future through installation of nose radar equipment. North American F-93 all-weather fighter features a similar change over the nose inlet of the F-86, from which the new model is derived.

Crash of 2-O-2

CAB says cause was fatigue crack apparently due to faulty design.

Official results of exhaustive investigation into the crash of a Northwest Airlines Martin 2-O-2 Near Winona, Minn., last Aug. 29 have been made public by the Civil Aeronautics Board.

Probable cause of the mishap, CAB declared, was the loss of the outer panel of the left wing, which separated from the aircraft because of a fatigue crack in the left front outer panel attachment fitting. This crack—apparently induced by faulty design of the panel attachment fitting—was aggravated by severe turbulence encountered in the thunderstorm through which the plane was flying at the time of the mishap.

All 37 occupants of the plane, bound from Chicago to Minneapolis, were killed. The aircraft was destroyed, with parts separating from the ship in the air and striking the ground along the plane's flight path for a distance of nearly two miles.

► **Fracture Described**—CAB said the fillet of the fourth step inboard of the lower left front center section spar flange revealed a fatigue fracture about ⅞-in. long and ⅛-in. deep. The remaining area failed in tension.

The separation which occurred in the lower front center section spar flange was followed by separation of the left rear spar lower flange and of the top connections of the outer panel to the center section of the wing. Deprived of the left wing's lift, the plane rolled to the left and crashed.

► **Similar Cracks Found**—Several hours after the Winona accident, fatigue cracks similar to those found in the wrecked plane were found in the wing root fittings of another Martin 2-O-2 which had flown through the same storm area. A complete separation had occurred in the front spar lower flange of the second plane's right wing at a point corresponding to the initial failure found in the first plane's left wing.

Two days after the accident, three other 2-O-2s were found to have fatigue cracks in similar locations. Three of the five 2-O-2s affected had fatigue cracks in both wings, and the other two had fatigue cracks in one wing only.

► **Tests Made**—The 75ST aluminum alloy in the spar flanges of the two planes that passed through the storm area was tested for chemical composition and strength at the National Bureau of Standards. It was found that the material was of proper chemical composition and that its tensile strength, yield strength, and elongation were at or above the specifications for the material. But a photomicrograph of the mating portions of the spar flanges which had failed in the two planes revealed that several fatigue cracks had developed.

It was not definitely determined how long a period of time would be required to develop the fractures found in the two planes. However, expert opinion concerning the failed right lower front spar flange of the 2-O-2 which passed through the storm area safely was that its appearance indicated fatigue had developed over a period of time prior to actual separation.

Before certification of the Martin 2-O-2, the wing was subjected to cycling tests during which 1885 applications of loads from 30 to 100 percent of the limit load were made. The structure was then inspected visually, and no sign of any type of failure was found.

► **Inspection Repeated**—But after the Winona accident, this same test wing was again inspected. This time the zinc chromate paint was removed from the wing root fitting; the fitting was caustic-etched and then microscopically examined. This inspection showed that the cycling tests had developed fatigue cracks in the lower front wing root fitting.

Separation of the lower front spar flange may have resulted from a wind gust which had a velocity in excess of that for which the plane was designed —53 ft. per second at 225 mph. The second possibility is that the separation occurred as the result of a gust of lower velocity but after the strength of the material had been reduced by fatigue.

CAB emphasized that had the spar flange in the plane involved in the Winona accident not failed at that time it would have failed at a later date unless the defect from which the separation originated had been discovered. The Board said the design of the connection of the lower flange for the front spar of the outer panel to the center panel on the Martin 2-O-2 was inducive to high local stress concentration and thus readily susceptible to fatigue.

► **Modifications Underway**—CAA-approved temporary changes were made in the wings of Northwest's 2-O-2s last fall. A new modification, involving a basic change in the spar and giving a permanent solution to the wing problem, is now being made by the Glenn L. Martin Co.

Nine of NWA's 24 2-O-2s were ready to go back in service by last week after final spar improvements. Eight more Northwest 2-O-2s are at the Martin factory; and modification of the last seven planes should be completed by October. Latest modifications will permit elimination of short-term inspections of the wing structure specified by CAA last fall.

► **Other Improvements**—Planes sold to Chilean carrier LAN and to the Venezuelan Line LAV also are having wing changes made by Martin. While back at the Martin plant, all the 2-O-2s are having other improvements made not connected with the spar structure (AVIATION WEEK, May 23).

Meanwhile, Kenneth R. Ferguson, NWA's vice-president in charge of operations and engineering, announced recently that the "shake-down of the Martin 2-O-2s is substantially accomplished, and its ton-mile and seat-mile costs are now the best in the industry for short-haul, twin-engine aircraft." Northwest's president Croil Hunter declared he is more than pleased with the 2-O-2's performance, efficiency and economy.

J-47 Shutdown

The Lynn, Mass., plant of General Electric Corp. was back in production on J-47 turbojet engines last week after a two-week partial shut-down due to discovery of a defective type turbine bucket in a new model engine.

The defect resulted from a design change that passed initial tests successfully but became apparent after flight testing. General Electric ordered temporary cessation of production pending remedial action and requested the Air Force to ground North American F-86 fighters with the particular model J-47 installed until bucket blades could be replaced.

Production delay was not long enough to materially affect J-47 deliveries to USAF contractors installing them in production aircraft. The J-47 is now used in the North American F-86 and B-45C jet bomber and will be used in the production version of the Boeing B-47 bomber.

NAA Plans Annual Policy Review

National Aeronautic Assn. will prepare an annual review of all aviation policies recommended by public groups and present its analysis of these policies to the President and Congress each December.

This action was voted at NAA's annual convention recently in Akron. NAA also voted to explore the possibilities of re-vitalizing its annual aviation clinic and raised dues from chapter members to national headquarters from $3 to $5. The increased dues will be used to finance a national program to aid individual chapter programs.

► **Leverone President**—Louis E. Leverone, Chicago, was re-elected president of NAA. E. B. Newill, general manager of the Allison division of General Motors, was elected first vice-president, and Eugene E. Wilson, chairman of the board of the Aircraft Industries Assn. and a director of the McGraw-Hill Publishing Co. was named chairman of the NAA board.

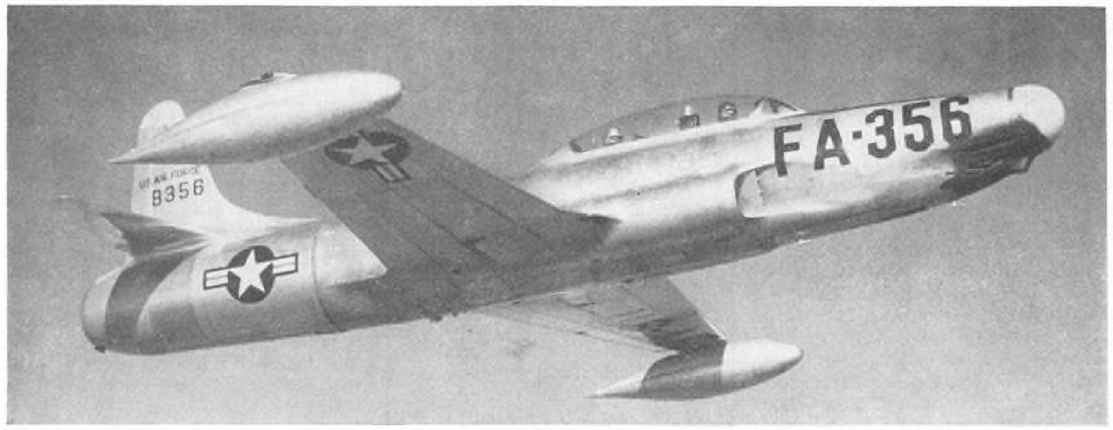
Other officers, re-elected to serve for another year are: Frederick C. Crawford, second vice president; Mrs. William E. Brown, secretary; Horace P. Bromfield, treasurer; R. M. Phelps, executive vice president; William P. McCracken, Jr., general counsel; and Miss Mae Simpson, assistant treasurer.

► **Division Heads**—Divisional vice presidents elected are: for FAI activities, Roger Wolfe Kahn; for national policy, Joseph T. Geuting, Jr.; for national defense, Lt. Gen. Ira C. Eaker (Ret.); for national safety, Sidney J. Williams; for air transport, Robert Ramspeck; for private flying, J. B. Hartranft, Jr.; for youth activities, Edward C. Sweeney; for airport activities, Cyril C. Thompson; and for community development, A. Paul Vance.

Members of the Board of Directors elected by the delegates are Harry Coffey, Dudley H. Dorr, Joseph T. Geuting, Jr., Mrs. Frances Nolde, Robert Walker, Earl F. Slick, Wesley Keller, and Harry R. Playford. Members appointed for one year by the board are: Lester F. Beck, Dr. Lynn Bollinger, Jacqueline Cochran, Arthur Currey, Harold S. Darr, James H. Doolittle, J. J. Ide, Don W. Martin, Ray Nyemaster, W. A. Patterson, L. Welch Pogue and Edward J. Thomas.

Kansas Air Strip

An air strip now under construction at the Kansas State Fair Grounds, Hutcheson, is scheduled for completion in time for the state fair and will be used by approximately 200 flying farmers and their planes on Flying Farmers Day at the fair, Sept. 20.



LOCKHEED F-94 with radar nose and afterburner in tailpipe is a step toward USAF's goal of a new type of all-weather fighter.

USAF Seeks Multi-Purpose Fighter Type

But with that goal some years away, three categories are stressed: Interception, all-weather, penetration.

By Robert Hotz

U. S. Air Force fighter development is aimed at producing a single type of plane that can successfully perform all functions required of modern fighters.

This is admittedly a long term USAF goal. There is little immediate prospect that any aircraft manufacturer will turn up with anything soon that will satisfy all USAF requirements for an all-purpose fighter.

▶ **F-86 Series**—Closest current approach to the all-purpose goal is North American Aviation's F-86 series. Here a single basic design has been modified resulting in three fighter models each with a specialized function.

In the meantime USAF fighter development has been split into three functional categories: interceptor, all-weather fighter and penetration fighter.

The interceptor, which now has a high development priority, marks a sharp break with USAF fighter tradition. It is the first fighter developed for the primary function of attacking bombers. This is in contrast to earlier USAF requirements which slanted fighter design primarily for combat with enemy fighters and only secondarily for attacks on enemy bombers.

The interceptor competition is wide open with at least a dozen airframe manufacturers scheduled to submit preliminary design ideas to USAF vice chief of staff Gen. Muir Fairchild. Convair, Douglas, Lockheed, North American and Republic have already done considerable design work on the interceptor requirement.

Interceptor requirements are simple tactically but complex technically. Technical requirements include:

- **Extremely fast rate of climb** (50,000 ft. in less than five minutes).
- **Supersonic top speeds** to provide sufficient speed advantage over high subsonic speed long range bombers likely to remain in operation over next decade.
- **Delta wing designs** to combine sweepback necessary for supersonic speeds with low wing loadings required for high altitude maneuverability.
- **Armament of air-to-air** missiles equipped with target homing devices.
- **Semi-automatic controls systems** to relieve pilot fully of responsibility for manually controlling the plane particularly at high speeds.

▶ **Lighter Metals**—Because of peculiar atmospheric conditions encountered at extreme altitudes where the interceptor is called upon to give its best performance some interesting structural departures from conventional fighter practice are possible. Considerable compromise can be made with present standards of structural strength in favor of better performance. Considerable use of magnesium and other newer metals with good strength-weight characteristics is indicated.

Tactical job of the interceptor is clear-cut: fast take-off and climb to its fighting altitude; locate enemy bombers or missiles; destroy them before they reach the target; and return to base. Because of the large quantities of interceptors required for air defense of the United States (another new problem USAF is facing) simplicity and cheapness of production are likely to rate high in USAF contract awards.

▶ **All-Weather Fighter**—Eventually all USAF fighters will have to function as all-weather fighters. Improvements in navigation and radar bombing equipment have extended the scope of profitable bomber operations into bad weather and darkness on a scale barely hinted at during the closing months of World War II.

The defensive fighter must inevitably follow into this murky battlefield. Already USAF has doubled the strength of its all-weather fighter groups at the expense of the day fighters. Air National Guard plans call for a big increase in all-weather fighter squadrons as soon as equipment is available.

▶ **XF-89 Wins**—The Northrop XF-89 twin jet night fighter has been adjudged best of the current crop of night fighters in a USAF competition with Douglas XF3D carrier-based twin jet night fighter now being built for the Navy. Speed and altitude were the principal scores by the XF-89 over the XF3D.

However USAF's goal is a much lighter, single-seater all-weather fighter that will be both cheaper to produce in quantity and more economical in tactical operations. The Lockheed F-94, an all-weather fighter version of the TF-80 tandem trainer is a step going in this direction.

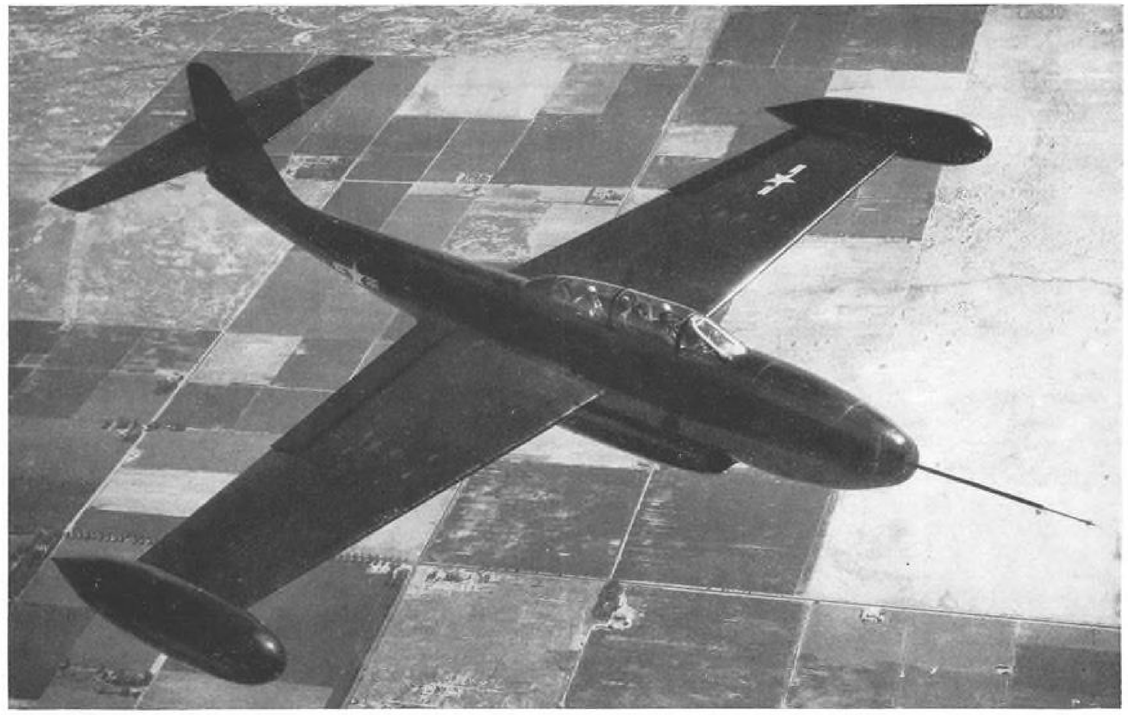
Equipped with Hughes Lightweight airborne radar with an 18-in. diameter antenna the F-94 will be used to gain much needed operational experience in post-war all-weather operations and eventually as an all-weather trainer.

First Lockheed F-94 flew last week. Major changes noticeable over the TF-80 trainer version included armament of four 20mm. cannon mounted underneath the nose radome, and a solar afterburner on the Allison J-33 turbojet engine. The afterburner will give about 30 percent increase in power for short periods such as during initial climb and combat emergencies.

▶ **Antenna Bulk**—Much of the bulk of the XF-89 fuselage is required by the large radar antenna of its airborne equipment. The production version is also likely to be considerably heavier than the 33,000 lb. experimental models

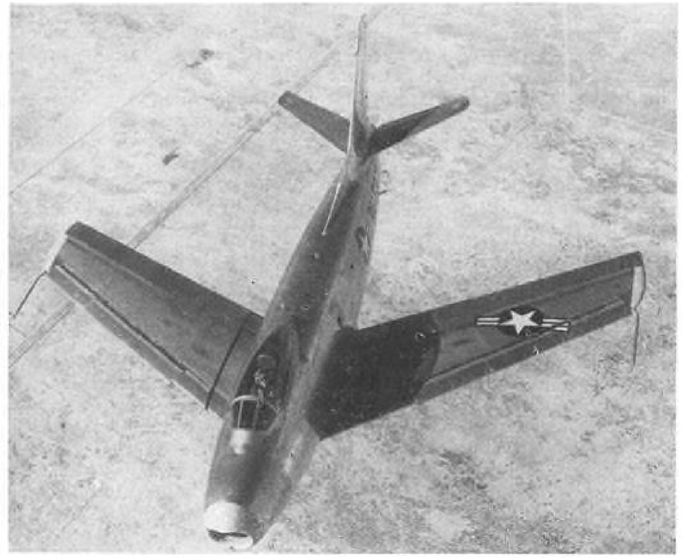
North American's F-93, a modified version of the basic F-86 design will probably also be equipped with the Hughes radar system for functioning as a single-seater all-weather fighter and is more along the line of USAF's ultimate goal in this category.

Function of the penetration fighter is similar to that of the fighter-bomber of the last war. Its job is to make deep penetrations into enemy territory for attacks on railroads, waterways, airfields and troops. Its principal requirements are high speed, heavy firepower, long range and durability. USAF seems well satisfied with the two present contenders in this category, Lockheed F-90 and McDonnell F-88.



NORTHROP XF-89 at the moment is the best of the night fighters, shading the Navy's Douglas F3D in speed and altitude.

McDONNELL F-88 meets penetration requirements.



NORTH AMERICAN F-86 modified will be the F-93 all-weather fighter.

FINANCIAL

Copter Stock Put Before Investors

Helicopter Air Service, Chicago, first to make public offering of stock in interesting financial experiment.

The first public financing of a certificated commercial helicopter service is being accomplished with the current sale of capital stock by Helicopter Air Service Inc., Chicago.

Net proceeds of $262,000 is expected to be realized by the company through the sale of 80,000 shares of Convertible Class "A" 6 percent stock at $4 per share. Underwriting discounts aggregate 60 cents per share and other expenses of the financing are estimated at about $10,000. The financing is being sponsored by Cruttenden & Co., a New York Stock Exchange firm with main offices in Chicago.

The funds obtained through this stock sale will increase the assets of Helicopter Air Service more than threefold, from $80,953 as of Apr. 30, 1949, to more than $340,000.

► **To Buy Bell**—Of the new funds received, $150,000 is allocated to the purchase of six Bell Model 47D helicopters. Another $30,000 is to be devoted to spare parts and equipment. Ground equipment and other facilities are estimated to require $10,000. Landing site installations are projected at $500 per site and placed at $20,000 for 40 locations. The balance of $52,000 remaining from the financing will be devoted to working capital.

It is significant that communities in the company's service area have been cooperative in making appropriate landing sites available for a maximum charge of $1 per year for any site.

Scheduled operations are expected to be inaugurated on July 23rd with a helicopter shuttle service of air mail and air parcel post between the Chicago Municipal Airport and the Chicago Post Office. The company is also authorized to serve three major suburban segments and plans to activate each of these units at intervals of about two weeks after the original starting date.

► **Five-Year Trial**—Helicopter Air Service's major intangible asset is its certificate of public convenience and necessity granted by the Civil Aeronautics Board, authorizing the company to transport air mail and property within the Chicago metropolitan area, comprising the territory within a radius of 50 miles of the city of Chicago. An ample period affording the company with the opportunity of proving the efficacy of its service is provided in the five-year authorization contained in its certificate.

At the outset, all of the carrier's revenues will be in the form of mail compensation to be awarded by the CAB. The company anticipates that mail pay alone will insure it of reimbursement of operating costs plus "a reasonable rate of return on invested capital."

► **LAA Pattern**—Many of the projections of Helicopter Air Service can be based on the experiences of Los Angeles Airways, Inc., which is the first certificated helicopter air mail company in the United States. The Los Angeles operation is truly one of pioneering and has done much to advance the cause of commercial helicopter service.

It is noteworthy that for the twelve months ended Dec. 31, 1948, Los Angeles Airways received mail compensation averaging around $13 per revenue ton mile. For the first quarter of 1949, this revenue declined to an average of $10.27 per revenue ton mile. This rate of compensation is far less than that paid most conventional-type feeder airlines.

Los Angeles Airways recently estimated that the cost to the government of handling the mail in its operation was down to 2.9 mills per letter, representing but 5 percent of a 6 cent stamp. For this payment, the carrier expedites the mails on an average of between 4 to 24 hours.

The activation of the Chicago operation may afford an interesting contrast in experiences with that in Los Angeles.

► **Copter Comparison**—The west coast company has been operating with an average of four helicopters—Sikorsky S-51s. This type machine costs more than $70,000 and can carry about 650 lb. of mail. The midwest carrier proposes to fly the Bell Model 47D which has an average cost of $25,000 each. Until the Bell machine is regularly flown in scheduled service, no accurate cost experience may be available. Company projections, however, indicate that the Bell product may be about one-half as expensive to operate as the Sikorsky helicopter.

Helicopter Air Service proposes to keep four machines in the air at any one time, with a 50 percent stand-by in the form of the two extra units. The Bell helicopter has a capacity of about 400 lb. and thus will not have the same peak load capacity available in Los Angeles' Sikorsky S-51. As an offset, however, the Chicago service should enjoy a higher average load factor which should make for increased utilization and greater efficiency.

An added advantage should accrue to the midwest carrier in that a more orderly maintenance program can be followed with a greater number of machines.

► **Background**—Helicopter Air Service was organized in November, 1946 and has a constructive background of its own in the pioneering, development and maintenance of commercial helicopter usage. At the outset, the company engaged in considerable charter work.

Presumably, this same contractual activity will be pursued to supplement the carrier's revenues. Such additional services comprise power line inspection, agricultural spraying and dusting, aerial photography, traffic control and similar adaptations. The Chicago carrier has previously served United States Steel Corp., National Broadcasting Co., International Harvester Co., Libby, Owens Ford Glass Co., Public Service Co. of Northern Illinois, Chicago Sun, Chicago Tribune and the McDonnell Electric Co.

► **Stock Arrangements**—The new issue of convertible Class "A" stock is attractively priced to assure ready investor acceptance. Dividends on this stock are cumulative from Jan. 1, 1950, and must, of course, be paid before any disbursements can be made to the common shareholders. Further, provision is made for conversion into common on a share-for-share basis.

► **Privately Financed**—It is significant that private enterprise is responsible for the evolution and development of Helicopter Air Service. It was this private capital which assumed the risk in nursing the company through its formative period first in the hope of obtaining the valuable certificate and later in the ultimate hope of the carrier attaining profitable operations.

The CAB records are replete with instances where applicants for feeder certificates have promised "adequate" financial support from sponsors in the event of authorization. Yet, despite these assurances, many certificated feeders have not yet inaugurated their authorized operations due to the lack of the necessary capital.

Helicopter Air Service fulfilled the promises of financial support evidenced in its earliest application and carried through with the same sponsorship. Completely lacking has been the frenzied search for new financial backers which has characterized a number of feeders.

—Selig Altschul

Aero Commander Offered for Military Use

More powerful engines would aid performance of executive transport.

A proposal to equip the Aero Commander, twin-engine executive transport now flying as a prototype on the west coast, with more powerful engines for use as a light military personnel transport, has been suggested.

Prototype Aero Commander is powered with two 190-hp. Lycoming Model O-435-A engines and its performance with these is quoted at: 187 mph. top speed, 175 mph. cruising speed (sea level); 181 mph. cruising speed at 10,000 ft. (at approximately 75 percent sea level rated power but full throttle); and 61 mph. stalling speed, flaps down.

► **Power Boost**—Under the proposal, present engines would be replaced by two geared Lycomings, Model GO-435-A, which are turned up to 3300 rpm. for 260 hp. at takeoff and 3000 rpm. for 240 hp. normal rating. Reduction gear with 77:120 ratio reduces propeller rpm. to 1930 at normal rating and to 1650 at cruise power.

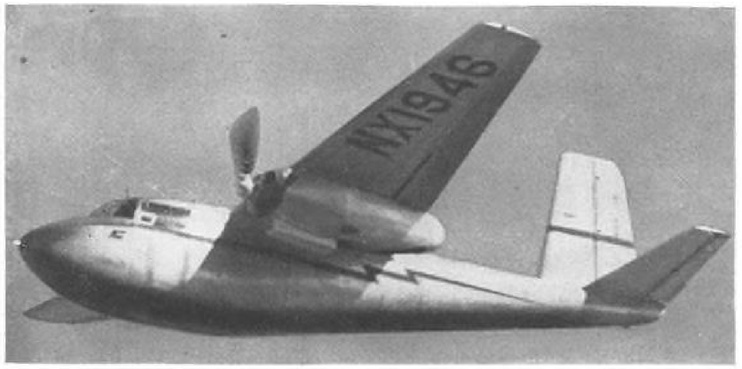
With the alternate engines, performance is estimated at: 198 mph. top speed, 180 mph. cruising speed at sea level, 196 mph. cruising speed at 10,000 ft. and no change in stall speed.

It is estimated that takeoff at sea level over a 50-ft. obstacle would be 1200 ft. with the geared engines as against 1350 ft. with the less powerful engines and that landing over a 50-ft. obstacle would require 1450 ft. as against 1350 ft. with the original engines. First minute rate of climb at sea level would be increased to 1800 ft. from 1400 ft.

The 190 hp. engines have been tested with Aeromatic and Hartzell controllable propellers but the propeller combination for the geared engines has not yet been selected.

► **Business Plane**—Aero Design Engineering Corp., Culver City, Calif., builder of the five-to-seven-place plane, developed it to sell for around $25,000 as a relatively low-cost answer to high performance and twin-engine reliability in business planes.

It would offer new competition in a field now largely pre-empted by the Beech Model 18 executive transport, which has larger engines, relatively comparable performance slightly greater capacity, costs about three times as much.



FEATURES: 180 mph. cruising speed . . .

. . . high visibility factor . . .

. . . five to seven places.

The all-metal high-wing Aero Commander is designed to offer good visibility for all occupants, with deluxe airline type interior seats and upholstery. Designed to carry five persons, it can be converted to carry a maximum of seven with less fuel, subject to CAA approval. Step into cabin is only 20 in. from the ground and cabin sits almost level when the plane is on the ground, due to the tricycle gear.

► **Construction**—Full cantilever wing structure is of five component sections, a center section extending through the fuselage and attached thereto with shear ties; outer panels; and tip sections, for total span of 44 ft. Single slotted flaps, hydraulically actuated, with 33 sq. ft. of area, are provided. Wing area including aileron is 240 sq. ft.

Fuselage is semi-monocoque construction with channel-type frames and extruded longitudinal members. Approximately 75 percent of the fuselage shape is straightline, so very little preforming is necessary for the skin sheets. Floor structure is designed to protect cabin occupants in wheels up emergency landing.

Baggage compartment aft of rear seat is accessible in flight by pulling seat forward, and has external door for ground access.

Fuel is carried in bladder type tanks in the wings, between fuselage and nacelles, with a total of 57 gal. capacity for each engine. Electric fuel boost pumps are provided and engines are equipped with automotive-type starters and generators.

► **Instrumentation**—Flight instruments provided include: airspeed indicator, sensitive altimeter, rate of climb indicator, turn and bank, flight attitude gyro, directional gyro, magnetic compass, outside air temperature indicator.

Engine instruments are: tachometer indicator, dual type; engine gauge unit for each engine, including oil temperature, pressure and fuel pressure; fuel quantity indicator; manifold pressure gauge, dual type; cylinder head temperature gauge, dual type; and ammeter.

Electrical equipment includes: dual ignition switch with master cutoff; master battery and generator cutoff; starter button switches; lighting switches; hydraulic system actuating switch; electric hydraulic pressure system; landing gear warning horn and relay; and optional landing gear warning lights; circuit breakers and/or fuses as needed; sealed beam landing lights, navigation lights, cabin dome light and map light.

General Electric type AS1C transceiver is standard radio equipment, with other radio equipment optional. Two-in. Fiberglas soundproofing is provided for the cabin.

It is anticipated that first airplanes will be certificated at gross weight of 4500 to 4600 lb., while later, gross weight may be increased to 5000 lb. Weight empty is 3150 lb., giving disposable load of 1450 lb. at the 4600 lb. gross weight.

► **Designers**—Developed by a group of well known engineers, most of them associated with Douglas and Convair, the Aero Commander is aimed at a business plane market which wants twin engines and instrument flying if necessary, at less cost than the models now available.

With indications from the Army Field Forces that they are looking for several types of small planes for personnel transport as well as for liaison and observation, the Aero Commander might also fit into one of these categories.

Ice Detector

Carburetor conditions cause cockpit warning light to flash.

The Lindberg Carburetor Ice Detector has been approved by the CAA for installation on Continental C-75, C-85, C-95 and C-145 engines, powering most of the personal aircraft now in production.

The unit operates from a sparkplug lead, weighs only 12 oz., and can be fitted in about 30 min. to planes powered by these engines.

The device was invented by John E. Lindberg, Jr., Pan American Airways staff engineer, who also is credited with the Engine Analyzer, produced by Sperry Gyroscope Co. The detector is now being manufactured by Lindberg Instrument Co., Berkeley, Calif. and is being adapted to other lightplane engines.

► **Special Plug Lead**—The system consists of an energy pick-up, ice pick-up, coupling unit, and an indicator unit.

The energy pick-up is a piece of metal braid mounted around the sparkplug lead to provide an inductance of current from the lead. The braid is contained within a special sparkplug lead, supplied with the unit, which replaces the existing lead.

The current is fed to a radio-frequency transformer, wound in such a manner that only VHF currents are transmitted. These frequencies are beyond the range of those used for normal plug sparking and, as such, are unused. Thus, the special lead draws little or no useful current from the ignition system.

► **Ice Pickup**—This VHF current is fed to the ice pick-up, a simple condenser consisting of two metal plates. It has two threaded fittings, so that one may be screwed into the carburetor primer line hole and the primer line then attached to the other.

This obviates the necessity for drilling a special hole for the unit. During priming, the raw fuel passes directly through the probe and into the carburetor.

► **Probe Action**—When no ice is present, the system is fully balanced and no current flows to the indicator unit on the instrument panel.

When ice forms on the pickup probe, the capacitance of the condenser is changed, unbalancing the circuit and causing current to flow to the indicator.

► **Sensitivity**—The detector system has undergone extensive development since it was first tested by Lindberg. For example, it was found early in the program that the dielectric constant of ice was not the 80 or 90 stated in reference books but, instead, was only 4 to 7, probably because of included air and gasoline.

This required a considerable increase in the sensitivity of the unit. The present design is so sensitive that a change in capacitance of only one micro-microfarad is sufficient to unbalance the bridge circuit and light the indicator.

► **Flight Tests**—While this sensitivity presents a problem in the operation of the unit, it was selected after extensive study and test of various water and icing conditions.

The CAA flight tests on a Continental C-75 engine used a spray of water forced into the carburetor under icing conditions. The tests recorded length of time between spray and warning indication together with the length of time between application of heat and engine pickup.

It was on the basis of these CAA tests, together with those conducted by Continental Motors and Lindberg, that the present high sensitivity was adopted.

Varying degrees of water density provide varying degrees of warning light operation, a characteristic that is inherent in the condenser capacitance type of probe.

For example, water droplets may cause intermittent faint flashing of the indicator, a large droplet may cause a moderately bright indication, ice melting on the probe may cause a bright indication which builds up slowly and goes out suddenly. There is also the possibility that engine priming may cause a slight response, since the fuel passes directly through the probe on its way into the carburetor.

Despite this variation in indication with different conditions, the high sensitivity of the unit is a superior quality to an insufficient sensitivity, which could create dangerous conditions.

While the detector is not the ultimate solution to the warning problem, it is an ingenious and effective design. It goes far towards lifting ice detection out of the "rpm. drop" stage, which has cost many lives.

Ducted Fan Engine Under Study

Unit combines best turbojet and turboprop features to close great performance gap between the two.

By Robert McLarren

The ducted fan engine, combining the economy of the turboprop with the high thrust of the turbojet, offers interesting possibilities as a means of closing the substantial performance gap between these two powerplants.

It is a conventional turbojet type with abbreviated propeller blading enclosed in a separate duct. By this means, the higher propulsive efficiency of the propeller-driven flow offsets some of the low propulsive efficiency of the expanding jet flow, improving the economy of the latter and the output of the former.

Both the Germans and the British developed ducted fan engines almost simultaneously. Both were run initially during the latter part of 1943.

► **German Unit**—This was the Daimler-Benz 007 developed by Prof. Leist.[1] In addition to the ducted fan feature, the engine contained numerous original ideas that are only now being examined more thoroughly.

The compressor and the ducted fan were mounted on two counter-rotating drums. Inner drum carried 9 stages of compressor blading, while outer drum mounted 8 stages of compressor blading internally, 3 stages of fan blading externally.

The turbine was cooled by partial admission[2] over 30 percent of its circumference by air drawn from the ducted fan circuit.

One of these units was built and placed in operation, but the German Air Ministry ordered its design abandoned because of its complexity and the (then) critical need for development speed in new gas turbine powerplants.

► **English Configurations**—The British engine was developed by the Metropolitan-Vickers Electrical Co., Ltd. It was an adaptation of the Metrovick F.2 engine, to which a ducted fan augmenter was added.[3] The combination became known as the Metrovick F.3.

The unit consists of a 9-stage, axial-flow compressor, a 2-stage turbine unit driving the compressor, and a 4-stage counter-rotating turbine unit driving a 2-stage counter-rotating ducted fan. It has undergone extensive tests and a number of developments are now underway.

One of these consists of the Metrovick F.5 "unducted fan" engine, in which the fan blading is extended to a diameter of 5½ ft. and installed remote from the basic engine, connected only by 26-in.-diameter ducting.

Power Jets, Ltd., British government-owned consulting firm, also has conducted evaluation of a ducted fan version of the W.2 engine (original Whittle engine) on the test stand. However, this work ceased when the company stopped construction and test work, becoming a coordinating and consulting group only.

► **British Enthusiastic**—Thus, there has been little practical experience with the ducted fan engine and no flight test results.

So far its promise is confined to theoretical calculations plus some test bed experimental work by Metrovick in England.

Because of their consuming interest in developing the aircraft gas turbine as an economical engine (in contrast to primary U. S. interest in its high-power potentialities), the British have been the most enthusiastic supporters of the ducted fan engine. Air Commodore Sir Frank Whittle has been one of its most widely publicised advocates, particularly during the course of his lecture tour in this country in the summer of 1946.

► **Jet, Prop Data**—The simple turbojet engine suffers poor propulsive efficiency at low speeds, its efficiency increasing with the speed of the airplane in accordance with the relationship:

$$\eta_p = \frac{2v_o}{v_o + v_n}$$

in which v_o is the inlet velocity and v_n the outlet velocity of the air.[4]

It is obvious that this efficiency reaches 100 percent when the inlet and outlet velocities are the same, or, when the speed of the airplane is equal to the speed of its jet.

The high propulsive efficiency of the propeller-driven plane can also be seen in this relationship, in which v_n is the velocity of the air directly behind the propeller, the equation being multiplied by propeller efficiency.

Since the propeller jet velocity is comparatively low, it is not difficult for the airplane speed to approach this velocity much more closely than in the case of the tailpipe jet, hence, propulsive efficiency will be much higher. Fig. 1 shows this relationship graphically, using simplifying assumptions and typical values.

► **How Ducted Fan Works**—It is apparent that a combination of these two curves would provide better turbojet efficiency at low speeds, and higher turboprop flight speed for a given efficiency.

This is done in the ducted fan engine by locating a row of blading in a special circumferential duct extending from the air intake of the engine to the tailpipe nozzle. This accomplishes two purposes: It increases the total air mass flow going through the engine, since this ducted air is in addition to that going through the main turbojet unit; and it takes power out of the turbine, which extracts energy from the internal airflow, thereby slowing the main jet velocity.

Downstream of the turbine and the fan, the two streams of "hot" and "cold" air may be carried to the nozzle in separate ducts or may be mixed in a common duct. The latter scheme offers some advantage in over-all cycle efficiency.

Reference to the foregoing equation will indicate that the larger the ratio of

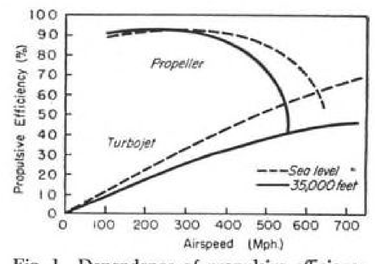


Fig. 1. Dependence of propulsive efficiency on airspeed. (Ref. 6)

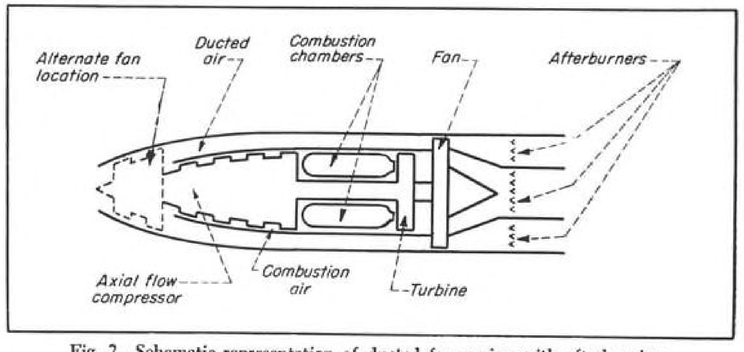


Fig. 2. Schematic representation of ducted fan engine with afterburning.

ducted fan flow to jet efflux flow, the higher the propulsive efficiency of the engine. Thus, the designer has a wide latitude in selecting the desired efficiency and performance of the ducted fan-powered aircraft.

An interesting variation of the ducted fan engine is the installation of tailpipe afterburning equipment in the "cold" airflow in conjunction with conventional afterburning equipment in the main jet tailpipe (Fig. 2).

While output of the afterburning equipment in the fan duct will not be as high as that in the turbine exhaust, it still provides a net increase in thrust over afterburning in the exhaust alone.

► **Parameters**—To determine the exact band in the propulsion spectrum where the ducted fan engine operates most favorably, it is necessary to select a parameter serving to compare accurately the turboprop, the ducted fan and the turbojet engine.

One of the most useful of these is the amount of thrust the engine develops for each pound of air it uses.[6]

An additional useful parameter is the familiar specific fuel consumption expressed in pounds of fuel used per pound thrust developed per hour of operation.

► **Specific Output**—Fig 3 indicates the comparative specific output of the ducted fan and simple turbojet engine over a range of subsonic Mach numbers. This shows a principal criticism of the ducted fan engine in that, although its propulsive efficiency at low speed is superior to the turbojet, it is this very fact that results in a severe limitation on its ability to produce high thrust from the air it uses.

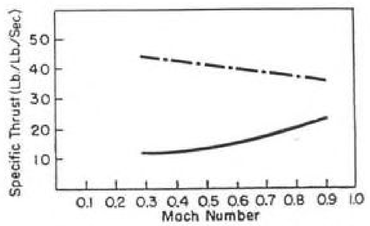


Fig. 3. Thrust per pound of air produced by ducted fan, turbojet engines. (Ref. 5)

This follows from elementary considerations: Only a portion of the total air taken aboard is being burned in the combustors and expanded through the tailpipe; remainder is simply accelerated through a duct. Thus, by definition, the ducted fan has a poorer specific thrust than does the turbojet.

► **Economy Factor**—This relationship is further expressed in Fig. 4, showing the specific fuel consumption, plotted against speed, for the turboprop, ducted fan and turbojet engine. The relationships in this figure can be deduced from those in Fig. 1. It is seen that the economy of the ducted fan lies almost midway between the two basic engines from which it has borrowed its principal features.

It will be noted that the turboprop is the most economical of the three over a range of speeds up to Mach 0.85 (645 mph. at sea level, 575 mph. at 30,000 ft.), after which, rapidly-diminishing propeller efficiency carries it far beyond the economy of either of the other two engines.

It will also be seen that the economies of the two jet engines are converging at this speed, indicating an eventual identical consumption for both engines just beyond Mach 1.0.

It is important to compare Figs. 3 and 4, which indicate that, although at low speeds (Mach 0.3) the ducted fan has a specific fuel consumption 27 percent lower than the turbojet, its specific power output is only 27 percent of the latter.

Relationship at high subsonic speed (Mach 0.9) is generally similar. Although ducted fan specific fuel consumption is some four percent lower than that of the turbojet, its specific power output is only 64 percent of the latter. (It is impractical to determine the specific power output of a turboprop engine without laborious calculation of the "mass air flow" through the propeller; hence the turboprop is not shown in Fig. 3.)

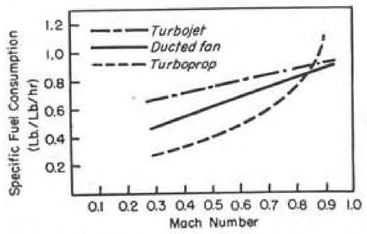


Fig. 4. Variation of specific fuel consumption with Mach for gas turbine engines designed for maximum economy. (Ref. 5)

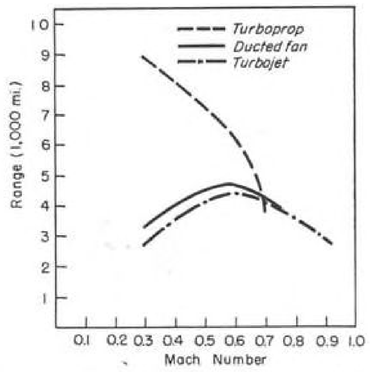


Fig. 5. Flight range of gas turbine engines designed for maximum range. (Ref. 5)

► **Range, Speed Data**—To combine these variations in specific fuel consumption and specific thrust into a comparable parameter, it is useful to assume a typical aircraft design powered by hypothetical turboprop, ducted fan and turbojet engines and calculate their respective ranges.

This has been done in Fig. 5, which illustrates clearly the rapid decrease in range with speed for the turboprop engine, increase in range with speed to an optimum for both the ducted fan and turbojet, and the convergence of ducted fan-turbojet speed-range performance above a speed of Mach 0.7.

Thus, the greater economy of the ducted fan engine at low speeds is compromised by its low thrust output. Its range-speed performance is not noticeably superior to the simple turbojet engine.

It will be noted, for example, that the range of the ducted fan engine is superior to that of the turbojet engine only at low speeds giving inferior range.

In other words, since greater range can be attained with either engine by flying at higher speeds, this low-speed range superiority of the ducted fan is of no practical importance.

► **Mechanical Considerations**—There are a number of mechanical difficulties with the ducted fan engine not shared by the turbojet.

Since the ducted fan is essentially a turbojet engine with added air duct, its weight obviously will be greater in all cases together with the added complication of fan blading, fan-drive turbine, bearings, lubrication, etc.

One of the important ducted fan problems is the fact that it is essentially a fixed-pitch propeller with its accompanying inflexibility in meeting variations in air mass flow, and Mach-limited tip speed.

With the fan blading designed for a particular flight speed, the blades will be overloaded at the same engine speed under static or very low speed conditions.

This problem has been partly solved in the Metrovick design by the use of a driving turbine entirely separate from that used in the straight Beryl turbojet to which it is added.

Thus, this fan turbine may slow down under static conditions without impairing the efficiency of the main compressor, as in the case of the main turbine reducing speed.

Another advantage to this arrangement is that the fan section is not cranked by the engine starting system.

► **Potential**—The ducted fan engine offers interesting possibilities in economy for the operation of aircraft in the medium-speed range and possesses some of the desirable characteristics of the turboprop without its attendant gearing and control difficulties.

At higher speeds, however, even with afterburning, its reduced power output brings its economy down to values within range of the turbojet with afterburning, so that the latter is a more logical choice with its important high power output.

The British, because of their policy interest in economical gas turbine engines for medium-speed transport operation, are pursuing its development and their work may make significant changes in the applicability of the ducted fan engine to the aircraft speed-range spectrum.

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Cylinder Plating Production Boosted

Critical demand for longer engine life on aircraft serving overtime on the Berlin Airlift has skyrocketed production at the $1,500,000 cylinder chromium-plating plant at Kelly Air Force Base, Texas.

In the past nine months, production has jumped from 250 cylinders chrome-plated per month to 200 processed per day. Chromium used each month is enough to plate 2,000,000 automobile bumpers.

Impetus for stepped-up program originated in October 1948, when 3000 cylinders for airlift C-54s had to be plated by the end of November. New methods were quickly developed and necessary skilled workers acquired. Over 150 plating anodes were redesigned and fabricated. Large quantities of plastic plating aids were utilized.

Plating method at Kelly is the "channel-type porosity" process. This process uses a chromic acid density of 250 gm. to 1 part of water for plating solution.

Emphasis is placed on plating conditions and control. Solutions are analyzed daily for chromate, trivalent chromium, copper and iron content, and amount of sulphate. Findings and corrections keep solution as standard as possible.

Cylinders treated by porous chrome plating are reported to outwear standard steel cylinders and do not rust or corrode. Although surface is extremely hard, it has an oil-retaining effect which gives efficient engine operation.

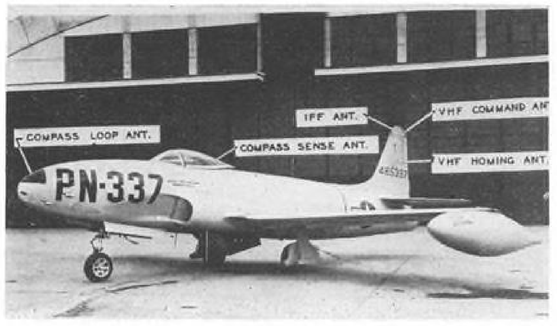
Escalators Speed Pilots to Flight Deck

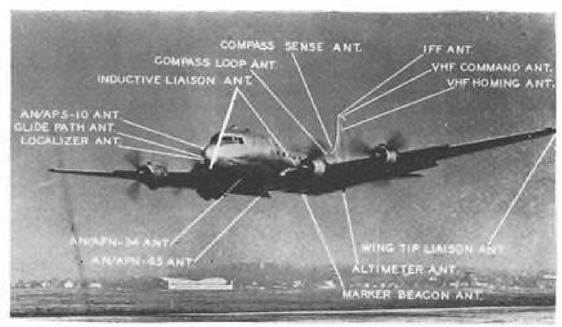
Moving stairways, capable of carrying 30 pilots per minute from the hangar to the flight deck, are being installed aboard three Essex class aircraft carriers.

The new equipment is aimed at speeding preparation for jet flight operations. Pilots are loaded down with 40 lb. of clothing and other items when they leave ready room on the second deck to rush up to the flight deck 28 ft. above. And limited area and rapid takeoff schedules on carriers demand careful disposition and timing of flight personnel.

Resembling department store escalators and built by Westinghouse Elevator division, the stairs are electrically operated, move at a standard speed of 90 ft./min. They are 32 in. wide and set at a 30 deg. angle.

A sliding support at the lower end permits adjustment to strains caused by heavy seas, concussion or varying temperatures. Step threads are Micarta plastic instead of conventional aluminum. To withstand shock, cast steel is being used instead of cast iron in the driving machinery, and bronze replaces aluminum in the step brackets.





ANTENNAS "TAILORED" FOR HIGH SPEED

Prohibitive drag created by externally-mounted objects on high-speed craft is forcing antennas under the skin. Air Materiel Command engineers have completely equipped this F-80 (left) and C-54 at Wright Field with zero-drag antennas. It is estimated the 15 flush-mounted units on the C-54 save several hundred horsepower. Tests revealed it took 200 hp. to offset drag created by a single 1-ft. antenna projecting from a plane traveling 600 mph. Other advantages are freedom from icing and break-off.

Propeller Expert Answers Loening

Sensenich chief engineer disagrees with "practically all" of consultant's criticisms of today's lightplanes.

It is believed by the writer that Mr. Loening's comments on light plane design, as presented to members of the Institute and Royal Aeronautical Society, (AVIATION WEEK, June 13) will be looked upon with some amusement by many people now actively engaged in the manufacture and development of personal aircraft in the United States.

In each of his many comments Mr. Loening appears to have taken cognizance of major factors, but at the same time passed over them lightly. In many cases he points out, then ignores the very crux of the matter.

The writer feels that he can disagree, with some justification, with practically all of Mr. Loening's claims.

▶ **Volume**—Mr. Loening's comments regarding the light plane volume trend of 33,000, 16,000, 6900 and 3000 for the years 1946, 1947, 1948 and 1949, respectively, which he attributes to complacency by aircraft manufacturers, may be more readily attributed to the two factors not taken into consideration by him.

First is the stored up demand for personal aircraft which resulted from the war; and the second are the restrictions more recently placed upon the GI Bill of Rights as applied to aviation training.

While Mr. Loening passes lightly over the considerable improvements and progress which have been made in design detail and reliability, he points out the only improvement in personal aircraft in 15 years has been to raise cruising speeds 30 to 40 mph.

▶ **Improvements**—The writer feels that a 30 to 40 mph. improvement in cruising speed, accompanied by improvements in load carrying capacity at equivalent horsepower and the matching of equal capacity and performance with less horsepower, along with the very considerable improvements in reliability, comfort, and operational economy, speak well for today's personal planes as compared with those produced 15 years ago.

Mr. Loening's extrapolation of the trend in dollar volume for the industry to 1952 may only be true if there is a general business depression.

The writer feels that Mr. Loening's statement as regards performance is somewhat ambiguous wherein on one hand he states that private airplanes should have speed of at least 200 mph., and the other hand he comments favorably on the Koppen-Bollinger Helioplane, which falls far short of this mark.

▶ **Progress**—Our experience with the speeds

Leslie J. Trigg

of the aerodynamically cleanest of racing planes, as compared with the speeds obtainable with the cleanest personal planes now available, in the opinion of the writer favorably demonstrates the progress in aerodynamic design which has been made with today's personal planes.

People intimately related to today's personal aircraft industry prefer to reserve judgment on such aircraft as the Helioplane until the economics, both with regard to initial cost and serviceability, have been substantiated, at least in some small degree.

Mr. Loening's comments with regard to the manufacturer's use of NACA facilities are in direct contradiction with NACA policies as stated during visits by the lightplane people to the Langley Laboratory in the past few years.

One experienced manufacturer, in attempting to apply the findings of NACA research to his product, found that the cost of the product incorporating these so called refinements would not permit their application to aircraft being sold in a competitive market.

▶ **Comparisons**—Mr. Loening derides the industry for its lack of aggressiveness on one hand, and then in contradictory manner compares the Beech Bonanza of today with the Fairchild F-24 of 1934. A further comparison, favorable to today's lightplane on the basis of cost, performance, and reliability can be made by comparing today's Piper Clipper with yesterday's Fairchild F-24.

The writer feels that substantial rebuttal to Mr. Loening's general statements regarding aviation progress may be made by making specific comparisons between these airplanes on the basis of performance in all regimes, as well as reliability and maintenance costs, taking into consideration of course, the change in the value of the dollar between 1934 and today.

▶ **NACA Role**—Further referring to NACA developments for personal aircraft, with the exception of certain basic research on airfoils as yet of unproven value to the personal plane industry, NACA has produced no technical development which is economically applicable to the personal plane industry of today.

Insofar as we know, there is no person on the NCA staff of paid employees specifically assigned to problems of the lightplane industry.

Insofar as we have been able to determine, the Committee has restricted itself to basic research, as opposed to the actual development of a practical aircraft or technical developments economically applicable to lightplanes.

In the opinion of the writer, who has had 12 years experience in use of all types of personal aircraft both in business and in testing and development, the development of a personal airplane capable of speeds from 0 to 200 mph. is ultimately feasible. However, NACA or Mr. Loening will be performing a great service to the lightplane industry if they can demonstrate how this can be accomplished at a reasonable price, utilizing all the technical information yet published by NACA.

LESLIE J. TRIGG
Chief Engineer
Sensenich Corp.
Lancaster, Pa.

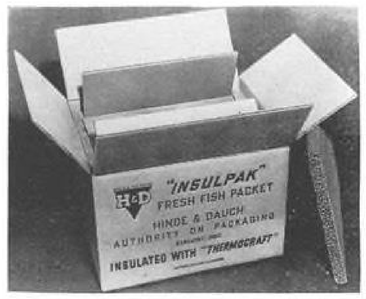
What Do *You* Say?

As a service to its readers, AVIATION WEEK is inaugurating this Engineering Forum as a place where they can air their views—favorable, unfavorable, or supplementary—on engineering subjects reported in AVIATION WEEK or such engineering topics as they may choose.

The Editors hope this space can be an engineering tool of value to all aeronautical engineers. Like any other tool, its value will depend on how well and often it is used. Address your letters to:

Engineering Forum
AVIATION WEEK
330 West 42nd Street
New York 18, N. Y.

NEW AVIATION PRODUCTS

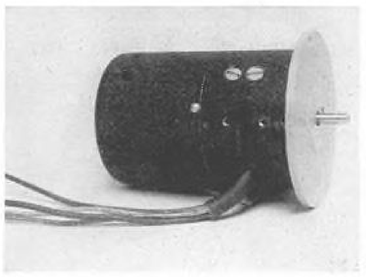


Air Food-Shipments

Non-refrigerated, coast-to-coast shipments of fresh poultry, seafood and other perishables are claimed to be practical and economical with use of "Insulpak" shipping boxes developed by **Hinde & Dauch Paper Co.**, Sandusky, Ohio.

Box is regular lap-end container lined with multiple layers of heavy corrugated "Thermokraft" insulation, paper product about 1 in. thick and which may be cut to any size or shape. It is represented to eliminate need for dry-ice.

Company cites this example to demonstrate effectiveness of product: "Fresh oysters . . . were first shucked, then sealed with natural juices in transparent Pliofilm bags, pre-cooled in cold storage, and finally packed in the Insulpak shipping box. Insulpak retained the temperature of product in shipment, with measured heat loss of only .6 deg./hr., at 75-85 F."



Special Motor

Speed-controlled, continuous duty, d. c. motor, for airborne recording equipment, is announced by **Bendix Aviation Corp.**, Red Bank, N. J.

Unit has 28v. input, is rated at .018 hp. and has 3600 rpm. normal speed. Centrifugal governor also acts as fan to give additional cooling and allow reduction in motor overall size. Weight is 2 lb. 6 oz., diameter, 2¾ in., length 4⅞ in.

Thin Plastic Tape

"Polyken 822," plastic-backed electrical adhesive tape with a dielectric strength of over 10,000v., is announced by **Bauer & Black Div.**, 2550 S. Dearborn St., Chicago, Ill.

Product is represented to have insulation and electrical characteristics of its parent material, polyethylene, and is claimed to be ten times more resistant to moisture than vinyl tapes. Thickness is .009 in., tensile strength, 22 lb./in. of width.

'Robot' Card File

Adaptable to airline and factory office procedures, "Robot-Kardex" electrically-operated record file offered by **Remington Rand, Inc.**, 315 Fourth Ave., New York City 10, N. Y., automatically selects desired record and delivers it on firm writing surface at desk-height.

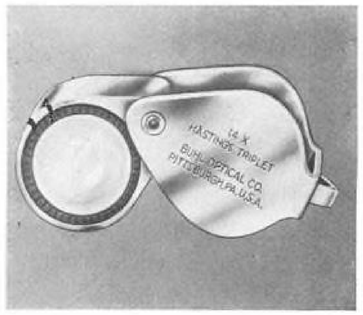
The device consists of metal cabinet holding 4020 sets of records in 60 trays and a desk-top extension. When clerk taps one of control panel keys on desk surface, tray that has been used returns into cabinet and new selection appears, positioned mechanically for quick reference or posting.

Unit takes about three seconds to produce proper tray and holds 59 percent more sets of visible records than standard Kardex housing.

File has visible indexing, colored signaling, incorporates automatic computing charts, and trays may be quickly removed.

Company estimates clerk can boost her efficiency by 30 percent with unit. In event of power failure, the device is equipped with hand-operated controls.

Cabinet is 25⅝ in. wide, 63 in. high and 53¼ in. deep, including desk extension.

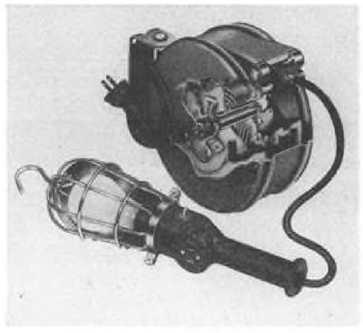


Inspection Aid

Compact inspection glass of high magnification, offered by **Buhl Optical Co.**, Pittsburgh 12, Pa., is intended for critical inspections requiring undistorted, color-corrected field. Device has 14-power, cemented, three-element lens system of ½ in. dia.

Lens elements, based on Hastings formula, are precision ground and centered to produce flat, true image throughout field of vision. Glass is represented to have wider field of useful vision than larger ordinary-type magnifiers.

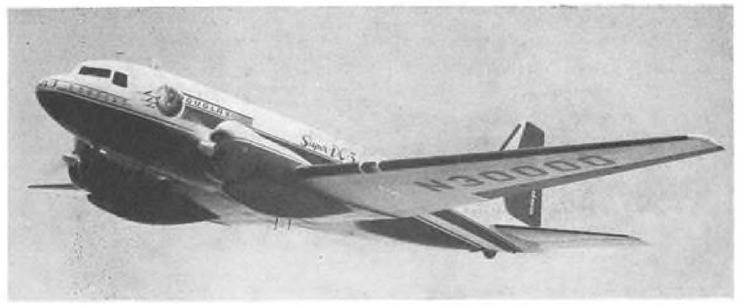
Although designed for fine inspection work, product also is recommended for casual inspection where repeated use of ordinary magnifying lens would cause excessive eyestrain. Lens assembly is housed in solid, machined barrel folding into protective case.



Electric Reel

Electric cord reel, model RI, made by **Aero-Motive Mfg. Co.**, 1803 Alcott St., Kalamazoo 24, Mich., is equipped with roller outlet cable guide which minimizes abrasion and prevents snubbing action of cable around outlet. Unit incorporates new type internal lock and retrieving mechanism and has swivel mounting bracket which can be installed on wall or ceiling.

Plug-in lead is 30 in. long and handle is a heavy duty industrial type designed for severe service. Reel comes in 25 and 45 ft. sizes.



Super DC-3 Makes First Flight

Second prototype due to fly soon, then both planes will tour country to drum up business for Douglas.

A brightly painted red-white-and-blue transport climbed up from Clover Field at Santa Monica in its first test flight, carrying on its newly swept-back wings hopes of the Douglas Aircraft Company for a large scale conversion program for obsolescent DC-3 and C-47 airplanes.

Chief pilot John F. Martin flew the twin-engine prototype Super DC-3 for an hour, then landed to describe it as "lively and sweet-flying." Plans to introduce the plane at the National Air Fair at Chicago were under consideration last week.

► **Two Prototypes**—The first of two prototype Super DC-3s is powered with Wright R-1820-C9HE engines and has an executive transport interior. The second which follows it closely will use the alternate Pratt & Whitney R2000-D7 engines, and will have more of a standard airliner interior.

The manufacturer compares the new prototype with the old standard DC-3 as follows: it has 550 more takeoff horsepower, cruises 40 mph. faster and has over 2000 lb. greater payload.

► **Shorter Wing**—Wingspan is 90 ft., shorter by 5 ft. Overall length is 67 ft. 8½ in., which includes lengthening of the passenger cabin by 39 in. for additional seating capacity. Height is 18 ft. 3 in. as compared to 16 ft. 11 in. for the old DC-3. Gross weight of 29,500 lb. is 4300 lb. heavier than for the DC-3.

Various optional seating arrangements are provided ranging from 30 to 38 passengers for airline use. (Douglas has apparently dropped the snug 40-passenger cabin version shown in a sketch in AVIATION WEEK, April 18.) Standard DC-3 was a 21-passenger transport, although a few later seating arrangements carried 24 revenue riders.

► **Major Changes**—Major structural changes besides the 39 in. fuselage insert include new flush-riveted outer wing panels which have 15.5 degree sweepback and removable wingtips. Wing center section is reworked for higher strength requirements. New ailerons are provided, and flaps are reworked to extend 14 in. farther outboard for greater flap area. Tail group is reworked and enlarged by extending tip ends.

A new passenger loading door 30 by 60 in. is located farther forward. It is equipped with bottom hinges and opens downward. Five steps are built into the door so that it serves as the plane's passenger loading ramp when lowered. Old cargo loading door is enlarged to an opening 28 by 40 in.

► **Faster Retraction**—Main landing gear is fitted with new Goodyear wheels and spot brakes, and new hydraulic actuating mechanism aided by shock-cord bungees in the nacelles to speed retraction time. Hinged fairings are supplied to complete the enclosure of the gear when retracted. The fairings resemble those used on the old Douglas B-23 bomber, which was developed from the DC-3. Tailwheel, which was fixed on the predecessor DC-3 now is partially retractable into a recess in the aft end of the fuselage, by hydraulic mechanism operating simultaneously with the main gear retraction.

Nacelles are reworked for the new power plant installations, new V-type heat anti-iced and impact-resistant windshield is provided, and three cabin windows are added on each side, making a total of ten on a side.

► **Cruising Speed**—Performance of the Super DC-3 is quoted at 243 mph. cruising speed at 12,000 ft. with the Wright engines, and 235 with the Pratt and Whitney engines, and a top speed of 270 mph. with either installation. Stalling speed remains at above 75 mph. With the Wright engines rate of climb is given at 1400 ft./min. as compared to 1250 ft./min. for the Pratt & Whitney engines. Maximum absolute range is quoted at 2300 and 2190 miles for the alternate installations, and service ceiling around 2300 ft. for either installation.

The 29,500 lb. gross weight requires an automatic propeller-feathering installation, otherwise the gross weight is limited to 28,300 lb.

► **Prototypes On Tour**—Douglas expects to send its two prototypes around the country in demonstrations for the services and potential airline customers. Cost of revamping an old DC-3 or C-47 into a Super DC-3 has been set at $140,000 to $200,000 depending on the extent of optional modifications.

With less funds expected to be available to the services for transport airplanes, Douglas may stand a better chance of selling its "economy package" conversion deal on the Super C-47 and its Navy counterpart the Super R4D, to the services, which have considerable stocks of these planes.

Latest Bid Awards to Industry by U. S. Air Force

Air Materiel Command Procurement Division makes available to AVIATION WEEK the latest bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPPSX72, (AMC will resume in the near future the issuance of data on invitations for bids.)

ABSTRACTS

For 2020 gasoline cans (49-1299):
Companies sharing—George D. Ellis & Sons, Inc., Philadelphia, on a bid of $1419.60; New Delphos Mfg. Co., Delphos, O., on a bid of $1511.10; Tennessee Can Co., Fayetteville, Tenn., on a bid of $5198.40, and Eagle Mfg. Co., Wellsburg, W. Va., on a bid of $800.70.

For cotter pins (49-1390):
Companies sharing—American Steel Co., Pittsburgh, on a bid of $2370.08, and Lamson & Sessions Co., Cleveland, on a bid of $9730.40.

For bellows & bracket assemblies (49-1404):
Companies sharing—R. R. Robertson Co., Chicago, on a bid of $2059.20; Morse Instrument Co., Hudson, O., on a bid of $2521.65; Golde Mfg. Co., Chicago, on a bid of $212.66; Ferd Wagner Co., Cincinnati, on a bid of $5157; Graflex, Inc., Rochester, on a bid of $7483.63; Eastman Kodak Co., Rochester, on a bid of $844.74, and Technicraft Corp., Kansas City, Mo., on a bid of $1904.50.

For photographic equipment (49-1421):
Companies sharing—Charles Beseler Co., Newark, on a bid of $225; Graflex, Inc., Rochester, on a bid of $3165; Williams, Brown & Earle Inc. Philadelphia on a bid of $68.40; FR Corp. New York on a bid of $3841 and Camera Equipment Co. New York on a bid of $843.75.

For elastic cord (49-1519):
Thomas Taylor & Sons Inc., Hudson, Mass., on a bid of $4346.38.

For 775,615 gallons cleaning aircraft compound (49-1567):
Companies sharing—E. F. Drew & Co., Inc., New York, on a bid of $292,625.92, and R. M. Hollingshead Corp., Camden, N. J., on a bid of $130,698.

For electrical equipment (49-1598):
Companies sharing—Gavego Laboratories, Inc., New York, on a bid of $1156.40; Electrons, Inc., Newark, N. J., on a bid of $21,280, and Standard Electrical Products Co., Dayton, on a bid of $420.36.

For 8540 valve assemblies (49-1633):
J. O. Mfg. Co., South Gate, Calif., on a bid of $341,154.30.

For 10 indicators (49-1664):
Hawthorn Co., Kansas City, Mo., on a bid of $15,521.90.

For 106,000 gallons compound carbon removal (49-1687):
Companies sharing—Turco Products, Inc., Los Angeles, on a bid of $107,398.60, and R. M. Hollingshead Corp., Camden, N. J., on a bid of $35,245.

For crystal units (49-1716):
Premier Crystal Laboratories, Inc., New York, on a bid of $18,003.16.

For 1500 capacitors (49-1717):
Companies sharing—Concord Radio Corp., Chicago, on a bid of $872.50; Sprague Electric Co., North Adams, Mass., on a bid of $84.50; Kellogg Switchboard & Supply Co., Chicago, on a bid of $159.80, and Aerovox Corp., New Bedford, Mass., on a bid of $1620.

For counter type scales (49-1725):
Companies sharing—Detecto Scales, Inc., Brooklyn, on a bid of $1186.37, and Howe Scale Co., Cincinnati, on a bid of $42,287.

For switches (49-1734):
Companies sharing—Continental Electronics, Brooklyn, on a bid of $2874.50; Graybar Electric Co., Inc., Dayton, on a bid of $110.42; John A. Becker, Dayton, on a bid of $817.90; Westinghouse Electric Supply Co., Dayton, on a bid of $4369.29; General Motors Corp., Detroit, on a bid of $316.80, and Martin Electric Co., Dayton, $2093.

For cement (49-1735):
Minnesota Mining & Mfg. Co., Dertoit, on a bid of $50,181.41.

For flexible sheets (49-1742):
Dobeckmun Co., Cleveland, on a bid of $18,860.40.

For 2370 electron tubes (49-1571):
Companies sharing—Raytheon Mfg., Co., Newton, Mass., on a bid of $376.20; Mercury Electric Corp., Kansas City, Mo., on a bid of $4080; Niagara Radio Supply Corp., New York on a bid of $2416.50 and Continental Electric Co. Geneva, Ill. on a bid of $1480.

For aircraft batteries (49-1879):
Electric Storage Battery Co., Cleveland, on a bid of $265,650.

For cellulose dope (49-1324):
Companies sharing—Atlas Powder Co., Stamford, on a bid of $44,785, and Andrew Brown Co., Los Angeles, on a bid of $23,320.

For sealant patching (49-1295):
Pressite Engineering Co., St. Louis, on a bid of $63,504.

For test unit assemblies (49-1507):
Companies sharing—Greer Hydraulics Inc., Brooklyn, on a bid of $2533.56, and Pacific Airmotive Corp., Burbank, on a bid of $103.56.

For sealant patching (49-1916):
Minnesota Mining & Mfg.., Co., Detroit, on a bid of $16,613.28.

For cord (49-1942):
Companies sharing—Manhattan Lighting Equipment Co., New York, on a bid of $2537.60; Midway Electric Supply Co., Inc., New York, on a bid of $189; General Cable Corp., Cincinnati, on a bid of $1629.12, and L. B. Electric Supply Co., Brooklyn, on a bid of $1633.38.

For welding brass rods (49-1947):
Mueller Brass Co., Port Huron, Mich., on a bid of $5985.86.

For valve & stem assemblies (49-2049):
Companies sharing—Superior Valve & Fittings Co., Pittsburgh, on a bid of $2724; Kerotest Mfg. Co., Pittsburgh, on a bid of $3218.01, and Bastian-Blessing Co., Chicago, on a bid of $1228.63.

For film (49-2051):
E. I. du Pont de Nemours & Co., Inc., Wilmington, on a bid of $6835.91.

For relays (49-2294):
Standard Electrical Products Co., Dayton, on a bid of $20,282.50.

For brushes (49-1616):
Companies sharing—S. A. Felton & Son Co., Manchester, N. H., on a bid of $6691; Delta Brush Mfg. Corp., New York, on a bid of $907.30; Gerts, Lumbard & Co., Chicago, on a bid of $4050; Joseph E. Frankle Co., Philadelphia, on a bid of $2348.04; R. P. Clarke Co., Washington, D. C., on a bid of $1318.20; Ohio Brush Co., Cleveland, on a bid of $2046, and M. Grumbacher, Inc., New York, on a bid of $51.70.

For brass rods (49-1813):
Titan Metal Mfg. Co., Bellefonte, Pa., on a bid of $10,765.33.

For 1033 microphone headsets (49-1818):
Telephonics Corp., New York, on a bid of $8109.51.

For brass sheets (49-1828):
Williams & Co., Inc., Cincinnati, on a bid of $4565.53.

For hydraulic aircraft jacks (49-1834):
Jumbo Steel Products Co., Azusa, Calif., on a bid of $62,567.80.

For lamp assemblies (49-1883):
Companies sharing—Weksler Thermometer Corp., New York, on a bid of $200.26; G. M. Mfg. Co., New York, on a bid of $399; Jas. P. Marsh Corp., Skokie, Ill. on a bid of $190; Weston Electrical Instrument Corp., Newark, N. J., on a bid of $2761.20, and Thwing-Albert Instrument Co., Philadelphia, on a bid of $3527.10.

For mercerized cloth (49-1915):
Companies sharing—Wellington Sears Co., New York, on a bid of $243,450; William Whitman Co., Inc., New York, on a bid of $90,300; Flightex Fabrics Inc., New York, on a bid of $31,942.50, and Scotland Mills, Inc., Laurinburg, N. C., on a bid of $99,500.

For 7000 pounds cadium anodes (49-1747):
Udylite Corp., Detroit, on a bid of $15,050.

For 167 stand assemblies (49-1753):
Companies sharing—Greer Hydraulics, Brooklyn, on a bid of $175,560, and United Mfg. Co., New Haven, on a bid of $158,795.

For parachute assemblies (49-1766):
Companies sharing—Capewell Mfg. Co., Hartford, on a bid of $24,500; Irving Air Chute Co., Inc., Buffalo, on a bid of $13,371.25; American Optical Co., Southbridge, Mass., on a bid of $16,750; K. Kaufman & Co., Inc., Newark, N. J., on a bid of $11,200; M. Steinhall & Co., Inc., New York, on a bid of $132,399.54; General Textile Mills, Inc., New York, on a bid of $203,961.06; Burdett Oxygen Co., Brooklyn, on a bid of $2800.

For phosphoric acid (49-1767):
Companies sharing—Monsanto Chemical Co., St. Louis, on a bid of $16,376; Cole Laboratories, Inc., Long Island, N. Y., on a bid of $5676; Monsanto Chemical Co., Boston, on a bid of $24,190.21, and Phipps Products Co., Boston, on a bid of $12,669.27.

For de-hydrating agent (49-1775):
Davison Chemical Corp., Baltimore, on a bid of $243,291.68.

For alloy sheets (49-1782):
Alton Iron Works, Inc., New York, on a bid of $16,075.95.

For photographic film (49-1790):
Companies sharing—Anken Chemical & Film Corp., Newton, N. J., on a bid of $5059.67; General Aniline & Film Corp., Ansco Division, Binghamton, on a bid of $5212.50, and Eastman Kodak Co., Rochester, on a bid of $11,149.79.

For 5802 optical systems (49-1791):
Companies sharing—Radio Corp., Camden, N. J., on a bid of $8800, and Beltone Sound Systems Co., Englewood, N. J., on a bid of $1320.

For 14,050 yards cloth (49-1920):
Companies sharing—Hubbell & Miller Co., New Rochelle, N. Y., on a bid of $5775, and H. M. Sawyer & Son Co., Cambridge, Mass., on a bid of $14,463.

For nylon cloth (49-1922):
Cheney Brothers, Manchester, Conn., on a bid of $17,500.

For cotton tape (49-1931):
Companies sharing—American Cord & Webbing Co., Inc., New York, on a bid of $2195; Hope Webbing Co., Pawtucket, R. I., on a bid of $2230; R. G. Buser Silk Corp., Paterson, N. J., on a bid of $550, and Southern Weaving Co., Greenville, S. C., on a bid of $4733.

For cables (49-1932):
General Cable Corp., Cincinnati, on a bid of $60,868.50.

For 2820 envelopes (49-1945):
Companies sharing—Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind., on a bid of $16,102.20, and Vanat Products Inc., Tomah, Wis., on a bid of $11,560.

For 354 swaging machines (49-2056):
James R. Kearney Corp., St. Louis, on a bid of $57,368.

For braid tinned copper (49-2022):
General Electric Supply Corp., Dayton, on a bid of $3598.18.

For electric terminal (49-2023):
Companies sharing — Patton-MacGuyer Co., Providence, on a bid of $144.05; H. B. Sherman Mfg. Co., Battle Creek, on a bid of $1884.26; Aircraft-Marine Products Inc., Harrisburg, on a bid of $31.82; Winslow Co., Newark, N. J., on a bid of $817; Belknap Hardware & Mfg. Co., Inc., Louisville, on a bid of $799.48; General Electric Supply Corp., Dayton, on a bid of $10,834.90, and Graybar Electric Co., Inc., Dayton, on a bid of $34.02.

For fuses (49-2032):
Companies sharing — General Electric Supply Corp., Dayton, on a bid of $2311.74; Metropolitan Electric Mfg. Co., Long Island, N. Y., on a Bid of $832.33, and Monarch Fuse Co., Jamestown, N. Y., on a bid of $1526.

For 48 degreasers (49-2034):
Phillips Mfg. Co., Chicago, on a bid of $28,272.

For 96 pick up assemblies (49-2039):
Control Engineering Corp., Canton, Mass., on a bid of $4756.80.

For clamp clips (49-1949):
Companies sharing—Marman Products Co., Inc., Inglewood, Calif., on a bid of $35,913.30; Adel Precision Products Corp., Huntington, W. Va., on a bid of $11,293.22; Breeze Corporations, Inc., Newark, N. J., on a bid of $1462; Aero Supply Mfg. Co., Inc., Corry, Pa., on a bid of $429.95, and Air Associates, Inc., Teterboro, on a bid of $613.75.

For cement thinner (49-1951):
Companies sharing—Octagon Process Inc., Brooklyn, on a bid of $4461, and Phipps Products Co., Boston, on a bid of $6776.10.

For 8803 parachutes assemblies (49-1952):
Companies sharing—General Textile Mills, Inc., New York, on a bid of $9594, and Williams & Dickason, Inc., New Castle, Ind., on a bid of $2571.16.

For 943 electric hotplates (49-1957):
Dominion Electric Corp., Mansfield, O., on a bid of $9929.79.

For magnetron tuning kits (49-1966):
Watson Elevator Co., Inc., New York, on a bid of $8448.

For various chemicals (49-2000):
Companies sharing—Octagon Process Inc., Brooklyn, on a bid of $1155; Mackenzie Laboratories Inc., Chester, Pa., on a bid of $1456; Blockson Chemical Co., Joliet, Ill., on a bid of $2711.50, and E. I. du Pont de Nemours and Co., Cincinnati, on a bid of $119.50.

For sealing compound (49-2001):
Midland Glue Products Co., Inc., Detroit, on a bid of $5280.

For 9984 quarts shellac & varnish (49-2002):
Woodfinishing Products Co., New York, on a bid of $3232.32.

For tripod camera (49-2059):
Companies sharing—Western Electric Co., New York, on a bid of $4569, and Mitchell Camera Corp., Glendale, on a bid of $12,017.50.

For 11,600 valve assemblies (49-2060):
Superior Valve & Fitting Co., Pittsburgh, on a bid of $18,908.

For 18,000 table utensils (49-2099):
Helmco, Inc., Chicago, on a bid of $5580.

For 4000 envelopes (49-2127):
Companies sharing—Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind., on a bid of $34,860, and Vanant Products, Inc., Tomah, Wis., on a bid of $12,980.

For 635 extinguishers (49-2168):
Walter Kidde & Co., Bellville, N. J., on a bid of $15,589.25.

For 77,119 pounds steel (49-2253):
Baron Steel Co., Toledo, on a bid of $3771.12.

For 99,004 feet tubing (49-2254):
Ellwood Ivins Steel Tube Works, Inc., Philadelphia, on a bid of $19,591.22.

For 2700 film (49-2378):
Companies sharing—Gevaert Co., Inc., New York, on a bid of $245.91; Anken Chemical & Film Corp., Newton, N. J., on a bid of $2043, and Eastman Kodak Co., Rochester, on a bid of $9600.

For 745 rolls film (49-2397):
Eastman Kodak Co., Rochester, on a bid of $3859.10.

For 500 yards cloth (49-2007):
Willis & Geigar, Inc., New York, on a bid of $3375.

For 10,098 containers (49-2009):
Standard Molding Corp., Dayton, on a bid of $3357.59.

For antenna assemblies (49-1698):
American Radio Hardware Co., Inc., Mt. Vernon, New York., on a bid of $5325.

For cotton twine (49-1921):
A. W. Archer Co., Inc., New York, on a bid of $2783.75.

For protective hood assemblies (49-1765):
Mine Safety Appliances Co., Pittsburgh, on a bid of $37,022.

For 34,000 gallons acetone (49-1918):
Publicker Industries, Inc., Philadelphia, on a bid of $12,312.34.

For ammonium nitrate (49-1995):
Companies sharing—Innis Speiden & Co., New York, on a bid of $14,442.10, and Octagon Process Inc., Brooklyn, on a bid of $10,307.50.

For cotton & linen cord (49-1930):
Companies sharing—Samson Cordage Works, Boston, on a bid of $495; Small Brothers Mfg. Co., Fall River, Mass., on a bid of $2160, and Sunset Line & Twine Co., San Francisco, on a bid of $1600.

For desks & tables (49-1677):
Companies sharing—B. K. Elliott Co., Cleveland, on a bid of $1575, and Everybodys Office Outfitters, Inc., Dayton, on a bid of $9115.62.

For developers (49-2063):
Mallinckrodt Chemical Works, St. Louis, on a bid of $45,065.50.

For leather (49-1929):
Companies sharing—S. I. Read Co., Chicago, on a bid of $504; A. L. Gebhardt Co., Milwaukee, on a bid of $3080, and Caldwell Lace Leather Co., Inc., Auburn, Ky., on a bid of $2410.25.

For cotton cloths (49-1895):
Charles Belsky & Sons, Inc., Holyoke, Mass., on a bid of $53,974.29.

For 10,000 chamois skins (49-1954):
Thompson's Janitor Supply Co., Dayton, on a bid of $13,750.

For 970 plug & cap assemblies (49-2247):
Breeze Corporations, Inc., Newark, N. J., on a bid of $4147.

For paramide-phenol (49-2128):
Companies sharing—City Chemical Corp., New York, on a bid of $5600; Mallinckrodt Chemical Works, St. Louis, on a bid of $3119.30, and Standard Products Co., Philadelphia, on a bid of $5061.60.

For 4316 gallons metal zinc chromate (49-2076):
The Lowe Brothers Co., Dayton, on a bid of $55,754.30.

For 128,000 fitting-ends (49-2301):
The Capewell Manufacturing Co., Hartford, on a bid of $10,560.

For 495 tester assemblies (49-1764):
The Electric Sprayer Co., Sheboygan, Wis., on a bid of $11,882.

For soldering plots (49-1913):
Companies sharing—American Solder & Flux Co., Philadelphia, on a bid of $56; American Products Corp., Chicago, on a bid of $2188.04, and Anti-Borax Compound Co., Inc., Fort Wayne, Ind., on a bid of $2337.50.

For dimpling die (49-1808):
Diecraft, Baltimore, on a bid of $11,100.

For 67,500 spark plugs (49-1709):
Companies sharing—Trojan Products Co., Galion, O., on a bid of $9105.25, and Leterstone Sales Co., Chicago, on a bid of $894.25.

For spare parts (49-1880):
Bernard Rice's Sons, Inc., New York, on a bid of $20,383.06.

For 2971 parachute assemblies (49-1776):
Irving Air Chute Co., Inc., Buffalo, on a bid of $404,520.03.

For albums (49-1236):
M. Fine, New York, on a bid of $5442.72.

For 30,000 sheets board (49-1036):
Chicago Cardboard Co., Chicago, on a bid of $13,935.

For indicators (49-1574):
Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, on a bid of $8200.

For 70 stools (49-1710):
Companies sharing—Kewanee Manufacturing Co., Adrian, Mich., on a bid of $149.38, and McConnaughey Stationers, Inc., Springfield, Ohio, on a bid of $3304.

For 5995 receptacles, plugs, & jacks (49-1721):
Companies sharing—Kings Electronics Co., Inc., Brooklyn, on a bid of $472.36, and Brookfield Engineering Laboratories, Inc., Stoughton, Mass., on a bid of $6584.30.

For photographic paper (49-1756):
Companies sharing—The Haloid Co., Rochester, on a bid of $2635.22; Anken Chemical & Film Corp., Newton, N. J., on a bid of $2014.16; E. I. du Pont de Nemours & Co., Inc., Wilmington, on a bid of $600, and Grant Photo Prod., Inc., Lakewood, O., on a bid of $4430.84.

For 605 carbon brushes (49-1809):
National Carbon Co., Inc., New York, on a bid of $6776.

For 28 stand assemblies (49-1835):
Jumbo Steel Products Co., Azusa, Calif., on a bid of $60,480.

For 136 valve testers (49-1842):
Companies sharing—Cardell Manufacturers, Dayton, on a bid of $13,725.48, and Gadgets, Inc., Dayton, on a bid of $3309.13.

For nylon cloth & cord (49-1893):
Companies sharing—Bloomsburg Mills, Inc., New York, on a bid of $4235, and Thomas Taylor & Sons, Inc., Hudson, Mass., on a bid of $439.55.

For 500 cable drums (49-1906):
Herman Manufacturing Co., Lancaster, on a bid of $4515.

For 47,130 pounds manila rope (49-1927):
St. Louis Cordage Mills, St. Louis, on a bid of $17,066.41.

For 10,000 cable assemblies (49-1935):
Companies sharing—American Gas Accumulator Co., Elizabeth, N. J., on a bid of $6500, and Mines Equipment Co., St. Louis, on a bid of $5300.

For relay assemblies (49-1965):
Hartman Electrical Mfg. Co., Mansfield, on a bid of $108,632.60.

For guard switches (49-1969):
Companies sharing—Cutler-Hammer, Inc., Milwaukee, on a bid of $3827, and Herbach & Rademan, Inc., Philadelphia, on a bid of $1325.19.

For stands (49-2003):
United Mfg. Co., Div. United Adv., Corp., New Haven, on a bid of $202,264.36.

For Acid-hydrochloric (49-1917):
Companies sharing—Mallinckrodt Chemical Works, St. Louis, on a bid of $1244.02; Octagon Process Inc., Brooklyn, on a bid of $1099.50, and Monsanto Chemical Co., St. Louis, on a bid of $9862.13.

For 1,262,080 plug-engine cylinders (49-1989):
Clark Metal Products, Inc., Fairfield, Conn., on a bid of $87,083.52.

For 1200 lamp assemblies (49-2035):
Line Material Co. of Pa., East Stroudsburg, on a bid of $25,593.

For 1000 top assemblies (49-2101):
Westinghouse Electric Corp., Dayton, on a bid of $27,120.

For 300 voltmeters (49-2114):
Companies sharing—Simpson Electric Co., Chicago, on a bid of $1195, and Westinghouse Electric Corp., Dayton, on a bid of $3875.

For lead (49-2164):
The Lewis Engineering Co., Naugatuck, Conn., on a bid of $5735.

For 17,000 drain cocks (49-2173):
Curtis Automotive Devices, Inc., Bedford, Ind., on a bid of $8420.

For circuit breakers (49-2246):
Companies sharing—Mechanical Products, Inc., Jackson, Mich., on a bid of $8207.50, and Spencer Thermostat Division, Metals & Controls Corp., Attleboro, Mass., on a bid of $1554.

For indicators (49-2298):
The Lewis Engineering Co., Naugatuck. Conn., on a bid of $19,684.

For indicators (49-2310):
Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, on a bid of $86,250.

For 1765 spacer assemblies (49-2090):
Companies sharing—Quick Tool Co., Chicago, on a bid of $690.10; Gadgets, Inc., Dayton, on a bid of $874, and Radioplane Co., Van Nuys, Calif., on a bid of $1714.

For photographic chart (49-2052):
Eastman Kodak Co., Rochester, N. Y., on a bid of $6370.

For 4000 chemicals (49-2353):
Philip A. Hunt Co., Brooklyn, on a bid of $4375.

For clamps & fitting assemblies (49-2077):
Companies sharing—Wittek Manufacturing Co., Chicago, on a bid of $8461.30; Breeze Corp., Inc., Newark, N. J., on a bid of $18,426, and Aeroquip Corp., Jackson, Mich., on a bid of $33,819.20.

For photographer's equipment (49-2390):
Companies sharing—Charles Beseler Co., Newark, N. J., on a bid of $3652.38, and Moviola Manufacturing Co., Los Angeles, on a bid of $980.

For washer assemblies (49-1629):
Superior Specialty Co., Inc., Canton, Ohio, on a bid of $17,775.63.

For 1813 magnet assemblies (49-1712):
Companies sharing—Indiana Steel Products Co., Chicago, on a bid of $22,497.42; Specialty Assembling & Packing Co., Inc., Brooklyn on a bid of $11,490, and White Tuning Corp., New York, on a bid of $1566.15.

For 63 blower cleaners ((49-1732):
The Martindale Electric Co., Cleveland, on a bid of $2724.75.

For load banks (49-1904):
Greer Hydraulics, Inc., Brooklyn, on a bid of $121,550.

PRODUCTION BRIEFING

► **De Havilland Aircraft** of Canada Ltd. has delivered 60 of its single-engine Beaver bush freighters to Canadian and foreign purchasers. The Babb Co., Inc. of New York, has been appointed de Havilland representatives for the United States.

► **Fairchild Engine and Airplane Corp.** has licensed the United Engine and Machine Co. of San Leandro, Calif., to use the Al-Fin process in manufacturing bi-metallic pistons for automotive engines.

► **Kellett Aircraft Corp.** has transferred its operations from North Wales, Pa., to Central Airport, Camden, N. J.

► **McCauley Corp.** plant at Dayton, Ohio, was partially destroyed by fire recently. Damage was estimated at $75,000. Portion destroyed housed the electro-plating and anodizing facilities.

► **TEMCO** (Texas Engineering & Mfg. Co.) has a new subcontract from Boeing Airplane Co. to design and manufacture 67 separate production tooling items for the Stratojet (B-47) bomber production line at Wichita. TEMCO has also been awarded a Navy contract to manufacture 2820 aluminum alloy chart boards.

WHO'S WHERE

Lear, Inc., Grand Rapids, Mich., elected Burnham Adams vice-president. Adams was manager of firm's California division and prior to that was employed by Wright Aeronautical Corp. for 22 years.

Doman Helicopters, Inc., Danbury, Conn., elected Stephen du Pont to the board of directors. Du Pont is former chief engineer of Indian Motorcycle Co.

Fredric Flader, Inc., N. Tonawanda, N. Y., appointed Dr. Victor B. Corey manager of the Engineering Physics division. Corey, who succeeds Carl L. Frederick, has been with company since 1946. He supervised research and development on sonic true airspeed, true air temperature, Mach number indicators, long range automatic navigation.

Canadair, Ltd., Montreal, Can., named J. H. Davis European representative. Part of Davis' job will be to intensify efforts to develop an international market for company's products, including the Canadair Four aircraft, and the tri-motor assault transport "Raider," to be built under license from Northrop Aircraft, Inc. Davis is former export manager for Bristol Aeroplane Co.

SALES & SERVICE

Used Plane Buying Habits Change

Demand for four-placers for business parallels trend of new planes sales; little call for surplus craft.

By Stanley Colbert

Following a current trend in new plane purchases, more people are buying used aircraft with an eye toward business utility first and sport second, according to the world's largest used aircraft clearing house.

An AVIATION WEEK survey at Powers & George, 475 Fifth Ave., New York City, reveals these trends among used aircraft buyers and sellers:

• **Few people want prewar** and war-surplus aircraft. Demands are very slight for PT-13s, 19s and 26s; there are only occasional calls for PT-17s to do aerobatics, crop dusting and banner towing; there is little demand for AT-6s since fighting stopped in Palestine.

• **The call for 65 hp.** and tandem craft has dropped considerably with tightening of the GI flight training program.

• **Approximately 50 percent** of the people who inquire about used aircraft will end up buying a plane, and they usually want an all metal, four-placer.

An AVIATION WEEK survey last year of the used airplane market revealed that business was slack because of war surplus aircraft glutting the market, and because a would-be flying public was ignorant of upkeep costs and maximum potential utilization (AVIATION WEEK, Aug. 30, 1948).

▶ **Last Year's Trends**—At that time the survey cited these trends:

• **Maintenance, hangar** and upkeep costs were too high.

• **Buyers demanded** a starter, lights and radio equipment in the plane.

• **Buyers wanted four-place,** not two-place aircraft.

These conditions haven't changed much. But business has taken a sharp upward curve.

▶ **Business "Marvelous"**—Today, according to Powers & George, the used airplane business is "marvelous." Last year the brokers received about 40 inquiries a week; today they receive close to 100. The used plane business is far outselling new plane business, and Powers & George expect this trend will continue for the next few years, or at least as long as a plane with approximately 100 hr. flying time or less can be purchased for one-fourth to one-third less than original cost.

Last year Powers & George asked 7070 aircraft owners from Maine to Virginia whether their aircraft were for sale. About 5 percent said yes. This year the firm surveyed more than 14,000 aircraft owners in the East and some west of the Mississippi. Affirmative answers ran about the same percentage.

▶ **Potential Market**—In its next survey, however, Powers & George plans to cover all states east of the Mississippi, but will eliminate from the list of 35,000 aircraft owners those who own craft under 75 hp., 10 years old or more, or war surplus. The company expects the list of 35,000 will be cut down to about 7500. If this is the case, the potential number of aircraft owners who will be ready for new or fairly new planes within a short time is extremely high.

According to AVIATION WEEK's survey:

• **Swift 125s, Cessna 140s** and the four-place Stinson are the most appealing planes to potential used aircraft purchasers.

• **Ercoupes, Seabees, Cessna 140s** and all Stinson models are the most preva-

Used Plane Sellers' Guide

Figures quoted below represent aircraft in good usable condition, with such equipment as starter, landing lights and radio, and late licenses. Availability figure represents the approximate number listed with Powers and George, New York City aircraft brokers, as of June 1, and is given to show relative proportions of each model in the used aircraft market.

Make	Model	Price Range	Approx. Number Listed
Aeronca	Chief (1946-47)	$1400-1600	75 Chiefs and
	Super Chief (1947-48)	$1500-1800	Super Chiefs
	Sedan (1948)	$2700-3100	and Sedans
Beech	Bonanza Model 35 (1947)	$6500-7500	25 Model 35s
	Bonanza Model A-35 (1948)	$8000-9000	and
	Twin-Beech (1946-47)	$42,500-47,500	Model A-35s
Bellanca	Cruisair (1946-47)	$3650-3950	14 Crusairs for
	Cruisair (1948)	$4000-4500	all years
Cessna	120	$1200-1600	15
	140 (1946)	$1400-1800	50 140s for
	140 (1947)	$1800-2300	both years
	170 (1948)	$3500-4200	12
	190	$8000-9000	
	195	$11,000-12,000	4
	Twin-Cessna (plush executive)	$2500-3500	
ERCO	Ercoupe (1946)	$1300-1600	66 Ercoupes on
	Ercoupe (1947)	$1500-1800	hand for
	Ercoupe (1948)	$2400-2800	all years
Grumman	Widgeon G-44	$8000-10,000	14 Widgeons
	Widgeon G-44A	$14,000-17,000	on hand
	Goose	$35,000-42,000	3
	Mallard	$100,000-120,000	2
Lockheed	Lodestar (executive)	$22,000-30,000	
Luscombe	65 hp. (1947)	$1100-1500	30 on hand
	65 hp. (1948)	$1500-1900	all models
	85 hp. (1947-48)	$2450-3000	all years
Piper	Super Cruiser (1947)	$1600-2000	77 on hand
	Family Cruiser (1948)	$3600-4000	all models
Republic	Seabee (all years)	$2000-2700	37
Ryan	Navion (North American)	$5000-5600	25 on hand all
	Navion (1947)	$7000-7500	models all
	Navion (1948)	$7500-8500	years
Stinson	150 (1946-47)	$2500-2900	30
	165 (1947)	$3000-3600	50 models for
	165 (1948)	$4000-4500	both years
TEMCO	Swift 125 (Globe)	$2200-2500	20 all years
	Swift 125 (1947)	$2650-2950	all models
	Swift 125 (1948)	$3000-3300	

lent planes in the used market, usually because of the large numbers which were built.

• **Piper Super Cruisers,** Seabees and Swift 85s are the hardest planes to sell.

The two-place craft most in demand for inexpensive cross-country flying, according to the survey, is the Cessna 140. But for the number available, the Swift 125 is by far the most popular plane in the market.

▶ **Four-Place Sellers**—Because of its low price, the used Stinson is the biggest seller in the four-place field. But buyers who are looking for more speed and performance and can pay $1000 more are generally turning to the Bellanca Cruisair.

Navions and Bonanzas are cited as most practical four-place craft, and sales of used models are fairly even between the two.

Recent stories of contests between the Navion and Bonanza (AVIATION WEEK, Mar. 21) have not brought a marked increase in sales of either one model, but have helped strengthen sales of both planes.

▶ **Ercoupe Demand Up**—Last year's survey reported that many Ercoupes were available in the used plane market. Today, Powers & George says Ercoupe sales are much higher. One reason, according to the firm, is the plane is coming out of the hands of people who didn't get full utilization from it.

Few people are buying the Seabee on the used market, and some models can be purchased for as little as $2000. There is a limited market for the three-place Piper Super-Cruiser. Swift 85s are moving very slowly in the used plane market because of a general feeling the craft is underpowered.

(A commentary on the growth of the used plane business within the past year: Powers & George has moved twice to larger quarters and added to their working staff. They claim that overhead has tripled, but sales have increased 13 times.)

▶ **Few 1949 Models**—There are very few 1949 models available in the used plane market, according to Powers & George, which may indicate a tapering off in what was once a rapid turnover in new plane purchases. Now business is relatively stable, and the only period when normal sales dropped for Powers & George was between Thanksgiving and Jan. 1 of this year.

The firm still feels that as long as prices for new aircraft stay above the $5000 mark, used planes will continue to outsell new planes. The big part of the potential flying market still wants a plane with all the extras at a price below the cost of the new planes now being sold.

Right now, according to Powers & George, the only place it can be found is in the used airplane market.

Beech Sponsors Lightplane Race

A $6500 cross-country race for standard model lightplanes will be a new feature of the 1949 National Air Races at Cleveland Sept. 3-5.

The new race will start in California (probably in the Los Angeles area) and finish at Cleveland Municipal Airport on Sunday Sept. 4. It will be sponsored by the Beech Aircraft Corp., Wichita, Kans., and offer $3000 to the winner with additional prize money to the next six placers.

Total prize money offered will be $6500.

▶ **Need NC**—The Beech-sponsored race will be open to any lightplane with an NC certificate and an engine horsepower rating of less than 315 hp. This engine limitation makes all lightplanes currently in production eligible including the 300 hp. Cessna Model 195. No modifications, such as extra fuel tanks will be permitted on any of the competing lightplanes.

Starting field will be limited to ten planes this year but may be expanded to as high as 20 if the event is held in 1950.

▶ **Civilian Emphasis**—Addition of the Beech-sponsored lightplane race combined with the popular Goodyear Trophy Race for lightplanes with 190 cu. in. engine displacement will add a stronger civilian flavor to the races than has been evident during the three post-war events which have been dominated by war surplus military planes. Further modification of the Thompson Trophy Race is expected after the 1949 event to place more emphasis on specially-designed racers and shy away from the souped-up World War II military plane types.

Since the Beech lightplane event is scheduled to finish in Cleveland between 4-6 p.m. on Sunday, a night take-off will be made in California and the lightplane pilots will be required to fly their initial legs during darkness. It is estimated that the jaunt will require about 20 hours elapsed time.

▶ **Details Later**—Further details will be announced later regarding specific rules of the race including refueling techniques, check points, etc. The California-Cleveland Bendix Trophy Race for military jet engines and unlimited horsepower for civilian piston engine planes will be flown Sept. 3, the day before the Beech event.

Sweet Spray

Helicopter Service of California has shipped one of its three Bell 47-Bs to Honolulu under a two-month experimental contract for spraying sugar cane fields.

AIR TRANSPORT

95 Nonskeds File for Exemption

Blanket operating authority expires and 46 irregular carriers fail to ask for individual rights.

Forty-six uncertificated carriers using transport-type equipment officially passed from the nonscheduled airline picture late last month.

They were companies which failed to file requests for individual exemptions to replace their blanket operating authority which expired on June 20. Ninety-five other "larger irregulars" asked the Civil Aeronautics Board for individual exemptions before the deadline.

Included among the 46 companies whose nonscheduled letters of registration were withdrawn were 32 whose operating rights had been suspended earlier for failure to file proper reports with CAB.

▶ **Protest Filed**—Not all of the 95 large irregulars applying for individual exemptions will get them. A number of certificated carriers, including Pan American Airways, American Airlines, United Air Lines, Eastern Air Lines and TWA, already have protested against many of the requests.

In its "death sentence" revision of the nonscheduled exemption last April, CAB said it would grant individual operating authority only to those large irregular carriers who could show their proposed service is in the public interest. The Board will rigidly define the scope of any nonscheduled service authorized by new individual exemption and will have power to suspend the privilege without notice when it believes such action is in the public interest.

▶ **Past Violations Eyed**—One of the factors CAB will take into consideration in disposing of applications for individual exemptions will be the extent to which the applicant has engaged in illegal operations in the past and has otherwise failed to comply with regulations. Pending a decision on their individual applications, the 95 large irregulars may continue operations under CAB's strict definition of nonscheduled activity.

Final Board action on some of the exemption requests may take many months. This will be especially true in cases where hearings are held on the applications and where there is bitter opposition from certificated lines.

▶ **ATC Accused**—Shortly after the deadline for requesting individual exemptions, one of the 95 applicants was ordered by CAB to show cause why its letter of registration should not be revoked for "knowing and wilful" violations of the Civil Aeronautics Act. The company is Airline Transport Carriers, Burbank, Calif., one of the best-known nonskeds operating on the transcontinental route.

CAB's action against ATC is similar to that taken previously with regard to other irregulars such as Standard Airlines, Viking Airlines, American Air Transport and Transocean Air Lines. All of these carriers have filed for individual exemptions.

After extended proceedings against Standard, CAB last month found that carrier guilty of wilfully violating the Civil Aeronautics Act by offering regular service to the general public (AVIATION WEEK, June 27).

▶ **Rights Withdrawn**—Among the nonscheduled carriers which lost their irregular operating authority because of failure to file for individual exemptions by June 20 were: Atlantic Gulf & Midland Corp., Little Ferry, N. J.; Bruning Aviation, Fort Wayne, Ind.; Burke Air Transport, Miami, Fla.; Coastal Airlines, Portland, Ore.; Columbia Air Cargo, Portland, Ore.; Eagle Air Freight, Burbank, Calif.; International Air Freight, West Palm Beach, Fla.; Magnolia Airlines, New Orleans; Mercury Airlines, Columbus, O.; Mercury Airlines, Fort Worth, Tex.; NATS Air Transportation Service, Oakland, Calif.; Northern Airlines, Seattle; Ranier Air Freight Lines, Seattle; Resort Airlines, Pinehurst, N. C.; Southern Air Lines, Miami; Taylor Air Service, Los Angeles; Winged Cargo, Inc., Philadelphia; and Yakima Sky Chief, Seattle.

Congress Studies NWA Loan

Johnson favors appointment of RFC directors to boards of air carriers receiving large-scale government loans.

Two congressional committees have turned the spotlight on the proposed $12 million Reconstruction Finance Corp. loan to Northwest Airlines which represents the first large-scale RFC transaction with an air carrier.

RFC has made railroad loans totaling approximately $1 billion, but loans to date to air carriers aggregate only about $21 million. If the Northwest loan is transacted, RFC anticipates requests from other airlines amounting to over $50 million.

CAB, by a vote of four to one, has announced it would approve the NWA loan. Vice chairman Oswald Ryan dissented.

▶ **Urge RFC Director**—Sen. Edwin Johnson (D., Colo.), chairman of the Senate Interstate and Foreign Commerce Committee, has recommended that RFC appoint a director to sit on the board of directors of carriers to which it grants large loans, a policy that has been followed by RFC on railroad and bank loans. "If sizable loans are to be made, it seems to me a necessary precaution," Johnson commented.

Senate Banking and Currency Committee, headed by Sen. William Fulbright (D., Ark.), threshed out with CAB member Harold Jones and other Board officials the CAB's obligation to protect the proposed government investment in Northwest through mail pay awards. Fulbright quoted from a February speech made by Jones: "The present mail pay policy of CAB should give reasonable assurance to the RFC that the carrier will be provided with funds to pay the interest and principal of the loan."

Jones said that CAB's policy of assuring carriers under efficient management a reasonable profit through mail pay was laid down by Congress in the 1938 CAA Act. CAB's mail pay policy toward Northwest, he declared, would be the same whether the carrier's debt was to private banks or the government.

▶ **Testimony Highlights**—Following are highlights of the congressional testimony on the Northwest loan:

Northwest urgently needs the Stratocruisers to regain its competitive position, Ferguson said. Using DC-4s the line has lost traffic on its domestic system to United Air Lines, American Airlines, TWA, and Eastern Air Lines, which use DC-6s and Constellations.

With the Stratocruisers, he estimated, Northwest will at least regain its 1946 share of the competitive domestic market and boost its annual business volume by "probably well over $3 million."

The carrier also needs the Stratocruisers for its Orient route, in indirect competition with PAA.

CESSNA 195, selected by Purdue, likely will be used by other lightplane airlines.

Examiner Favors Lightplane Route

An experimental lightplane airline operation between Lafayette, Ind., and Chicago may get under way later this year if the Civil Aeronautics Board carries out the recent recommendations of one of its hearing examiners.

The service endorsed by Examiner Richard A. Walsh would permit Purdue Aeronautics Corp., a non-profit organization controlled by Purdue University, to carry persons and property over the 105-mile Lafayette-Chicago link. The five-place, four-passenger, 300 hp. Cessna 195s proposed for the operation would not carry mail, so the issue of subsidy is not involved.

► **Depends on Turner**—Walsh recommended that Purdue Aeronautics Corp. be certificated either for three years or until Roscoe Turner Aeronautical Corp., which has a feeder franchise for the link, starts operating. Turner expects to inaugurate DC-3 service this summer (AVIATION WEEK, June 20).

PAC plans to operate two roundtrips daily into Chicago's Lake Front Airport, which is within walking distance of the downtown business district. Air time of 55 minutes compares with nearly 5 hours by bus and over 3 hours by train between Lafayette and Chicago.

► **Student Laboratory**—Fixed base and charter services of PAC are closely coordinated with Purdue University's transportation and engineering departments. Theoretical aspects of airport and airline management are taught at the university's regular classes, and practical experience is acquired at PAC, which is used as a laboratory by the students.

Graduate students having commercial pilot licenses will be used as pilots in the proposed airline service and will provide instruction for new students enrolling in the pilot training course. Pilots will receive $2 an hour for actual flying time on the Lafayette-Chicago lightplane run.

Examiner Walsh noted that the new service not only would serve the public and train students but would offer a convenient testing ground for the traffic-developing potentialities of recently-approved single-engine aircraft operations without cost to the government. CAB last month announced it would permit use of single-engine planes in scheduled transportation on relatively short trips where the topography of the area is favorable to carrying on such operations.

Trippe Seeks End Of Parallel Routes

Pan American Airways President Juan Trippe has offered a quick, blunt way to eliminate parallel air routes: Congress should issue an ultimatum that after a certain date government funds could not be used for subsidization of uneconomic competition.

Testifying before the Senate Interstate and Foreign Commerce Committee, Trippe declared: ". . . We must return to the doctrine that the airlines are regulated public utilities; and this does not mean subjecting them to the paralleling free competitive forces properly applicable to unregulated industry. That, in turn, means mergers and consolidations on a rather wide scale."

► **Whiplash**—If these mergers are not voluntarily worked out "with reasonable dispatch," the PAA president suggested the ban on mail pay appropriations as a whiplash.

Trippe also recommended:

• **Government endorsement** of worldwide, low-cost tourist fares to stimulate mass tourist travel abroad. Although there is little hope of success, he said PAA would press for inauguration of a $350 or $400 roundtrip (regular fare, $630) tourist service to Europe this fall.

A 30 percent reduction in the current passenger rate to Europe of 9 cents a passenger mile, Trippe said, would make a 6-cent rate, approximating the overseas rate to Honolulu.

He pointed to the recommendation of the House Appropriations Committee that the Economic Cooperation Administration go all-out in promoting U. S. travel abroad, giving European nations additional purchasing power and thereby helping to speed economic reconstruction.

(Sen. Owen Brewster (R., Me.) reported internal opposition in Great Britain to that country's stand against cut-rate international air service. Although the powerful Cunard line and British Overseas Airways Corp. oppose low-rate service, he said, the British Travel Assn., backed by business interests, favors it.)

• **Compensate U. S.** flag carriers for the carriage of mail at the $2.86 ton mile rate set by the Universal Postal Convention on the important routes where American operators meet foreign competition.

This is the rate which the U. S. is paying foreign carriers for transporting U. S. mails over routes which parallel our own links.

• **Provide operating differential** subsidy for routes or services where a carrier is subjected to foreign competition. "This subsidy," Trippe declared, "should be designed to make up the difference between the wage rates paid by American-flag carriers and the lowest rates paid by any foreign carrier which is a substantial competitor on the route involved. In effect, this would constitute a subsidy to American workmen employed in international aviation."

A PAA master pilot, Trippe noted, earns $13,440 annually, compared with $6600 for a BOAC pilot. He recommended a recapture stipulation under which half of any profit for any 10-year period in excess of 10 percent a year on invested capital (up to the total of the operating-differential subsidy received) would be repaid to the government.

• **Give Civil Aeronautics Board** authority to grant additional subsidy to offset the effect of direct financial aid by a foreign government to its airline. "This," Trippe asserted, "would be necessary to meet any threat of excess subsidization by a foreign government in order to gain unfair competitive advantage over our airlines. It would also enable our government to provide any necessary subsidy to an American-flag carrier for operation of routes which are in the national interest but which because of low traffic potential cannot become self-sustaining even though there may be no direct foreign-flag competition."

• **Subsidy payments** should be determined in advance. The present system of fixing rates retroactively, Trippe charged, "has imposed a cost-plus philosophy which is highly damaging to management incentive and amounts to a dole."

Trans-Canada Plans To Stick with DC-3s

Trans-Canada Air Lines has no immediate intention of replacing its 27 DC-3s with more modern aircraft. Company officials feel that no other plane on the market today has proved its ability to give better service over Canada's short-haul routes.

This does not mean that TCA has shelved indefinitely plans for modernizing its twin-engine fleet. W. F. English, vice president-operations, explains that the company is studying new designs but is not yet ready to commit itself.

TCA has taken a close interest in development of the Super DC-3 and is looking forward to actual demonstration flights of this ship. The carrier uses four-engine Canadair North Stars on its transcontinental and trans-Atlantic services.

Criticism of the North Stars became a political issue during the recent Canadian elections (AVIATION WEEK, May 23).

PIA Planes for Sale

Aircraft and aircraft parts belonging to bankrupt Peruvian International Airways are up for sale by Luttrell & Senior, Inc., New York aviation consultants, designated representatives by the U. S. District Court.

The firm told AVIATION WEEK that inventory covers everything from chewing-gum to aircraft. Four DC-4s which belonged to PIA have been at New York International Airport for over four months.

PIA was to have received financial assistance from the Peruvian government, which had described the carrier as "the only nonsubsidized international scheduled air carrier in the world" (AVIATION WEEK, Feb. 14). But monetary exchange difficulties and a revolution delayed government aid and the carrier was officially declared bankrupt Feb. 28.

Fisheries Airlift Totals $1 Million

Although fishing operations in Alaska have been somewhat curtailed this year, due in part to higher taxes imposed by the Territory, the industry's "air lift" from the states was on the same high scale as a year ago.

An estimated 5000 fishermen, machinists and cannery workers have been flown to various points on the fishing front from Seattle, Wash., Astoria, Ore., and Oakland, Calif. Cost of the transportation, on a round trip basis, easily exceeds $1 million.

► **Four Carriers** — Transocean Airlines, Alaska Airlines and Pan American Airways, in conjunction with Pacific Northern, share about equally in the aerial traffic, with Northwest Airlines participating to a lesser extent.

Transocean has contracts with the Bristol Bay Packing Co., Columbia River Packers, Red Salmon Co. and Egegik Packing Co. Alaska Airlines contracted with Alaska Packers, Pacific American Fisheries and the Wingard Packing Co. Pan American, connecting with Pacific Northern at Juneau, and Northwest carried a number of fisheries men on their regular flights.

The movement began May 1, with maintenance men and others required to get the canneries operated, and continued until the opening day of the salmon season, June 25. The peak period was from June 12 to 25th, when daily flights were required to get the men on the scene.

► **Full Crews**—DC-4s carried the bulk of the traffic, with C-46s also in use. Most planes carried two pilots and a flight engineer, plus purser or stewardess, and served hot meals on the longer runs.

Although transportation cost exceeded $100 per passenger, the packing companies figure the added cost, as compared to water, is well worth the difference, as the worker draws wages during the trip. A journey that might take a week by boat takes only a day by air.

Forwarder Proposal

A proposal to prohibit air freight forwarders from shipping cargo via large or small nonscheduled airlines has been circulated to the industry for comment by the Civil Aeronautics Board.

The suggested amendment to section 292.6 of the Board's economic regulations provides that the forwarders may ship only on planes operated in common carriage by certificated airlines or the small group of all-cargo carriers operating under section 292.5 of the economic regulations. Revision of the regulations was suggested by the Air Transport Assn. This group is still challenging in the courts CAB's order of last September legalizing freight forwarder operations.

Comments on the proposed amendment to the forwarder rules should be sent to CAB by Aug. 1.

New Airport Building

Port of Seattle, Wash., planned to dedicate a new $3 million administration building at its Seattle-Tacoma Airport this month.

With completion of the structure, United Air Lines is moving to Seattle-Tacoma Airport from Boeing Field, using temporary hangars until its own permanent hangar can be completed this fall. Pan American Airways will continue to use Boeing Field until later this year, when it also expects to move to Seattle-Tacoma.

Northwest Airlines and Western Air Lines have been using the Seattle-Tacoma Airport since last year, taking passengers through a temporary terminal building. Completion of the new terminal gives the area an airport facility unsurpassed in the United States west of Washington, D. C., according to the Port of Seattle's chief engineer.

EAL Wins $8500 For Midair Crash

Eastern Air Lines has been awarded $8500 by a Washington, D. C., district court jury for damages to one of its DC-4s which collided in midair with a Universal Airlines DC-3 over Aberdeen, Md., in December, 1946.

Following the accident, Universal—a nonscheduled operator which soon went into bankruptcy—sued Eastern for $500,000, charging negligence. EAL filed a counterclaim.

The 60 persons aboard the DC-4 and 25 on the DC-3 escaped injury when both planes landed safely. Universal's DC-3 sustained extensive damage to its fuselage above the right side of the cockpit, and the DC-4 fuselage was damaged on the underside near the tail.

A Civil Aeronautics Board accident report blamed the crews of both planes for lack of vigilance but added that "greater laxity must be charged to the Eastern crew." The Board said each plane should have been visible to the other before the collision.

Feeder Life

West Coast Airlines' certificate extended for five years more.

Extension of West Coast Airlines' feeder certificate for five years more has been proposed by the Civil Aeronautics Board as part of its overall plan to strengthen the U. S. short-haul route network.

The tentative conclusion that WCA has shown sufficient progress to merit a longer lease on life was the third such action taken by CAB in recent months. In April, the Board proposed extending the feeder certificates of Pioneer Air Lines and Southwest Airways for five years.

West Coast operates a 688-mile, north-south system between Bellingham, Wash., and Medford, Ore. The company started service in December, 1946. Its franchise would have expired on Nov. 22 of this year.

► **Number Three**—CAB's studies showed that WCA carried 69,018 passengers last year to rank third among the feeders. Only Southwest with 97,964 passengers and Pioneer with 94,500 ranked higher.

On a revenue ton mile basis, West Coast's costs were lower than other feeders active during all of 1948, again excepting Southwest and Pioneer. WCA, which operates five DC-3s and has about 170 employes, required $792,703 in mail pay to break even last year.

► **Florida Figures**—Further indication of why CAB permitted Florida Airways' feeder certificate to run out last March and why the Board has proposed termination of Trans-Texas Airways' franchise in May, 1950, is provided in a statistical study released with the WCA opinion.

The survey showed that Florida carried fewer revenue passengers last year —12,329—than any of the eight other short-haul operators active during all of 1948. Florida's costs per revenue ton mile also were the highest.

Trans-Texas was third lowest in revenue passengers handled last year. Its expenses per revenue ton mile were second highest.

► **Route Modifications**—As in the case with Southwest and Pioneer, CAB plans to strengthen West Coast through route modifications. It proposed that McMinnville, Ore., be removed as a stop on WCA's system because of the small amount of traffic generated there. Four other towns—Port Townsend and Kelso, Wash., and Roseburg and Grants Pass, Ore.— which are not now being served by the carrier because of inadequate airports—also would be removed from West Coast's certificate.

Applications for restoration of service to the latter four points could be made if adequate airports later became available.

► **Feeder Theory**—CAB again emphasized its belief that feeder service should seldom—if ever—be competitive with trunkline operations. Traffic potential is so limited in most feeder territory that duplicate operations are usually uneconomical.

Where a feeder is duplicated by a trunkline—and the route isn't necessary to the trunkline's operation—the route should be served by the feeder alone, the Board said.

Thus CAB instituted proceedings to determine whether West Coast or United Air Lines should continue to serve Bellingham, Wash. The Board found no need for service to this point by both carriers.

► **United Divided**—Similarly, CAB proposed that United suspend service at

Salem, Ore., and that this city be included on WCA's system.

United faces the possibility that a considerable number of its smaller route points in the West will be turned over to feeders. CAB previously had proposed giving UAL's stops at Eureka, Red Bluff, Monterey, Santa Barbara and Salinas, Calif., and Klamath Falls, Ore., to Southwest Airways exclusively.

(In the Pioneer Air Lines certificate extension case, CAB proposed suspension of service by Braniff Airways, American Airlines and Continental Air Lines at five Texas cities to relieve the feeder of unnecessary and uneconomic competition.)

How hard United and other trunklines will fight to keep their smaller route points remains to be seen. UAL president W. A. Patterson has stated that if his company discontinued service to 38 small cities now on its routes it could save $4 million annually.

Drinkwater Blasts California Nonskeds

Western Air Lines President T. C. Drinkwater, in a letter to all WAL employes in California, has lashed out at the cut-rate, uncertificated, intrastate carriers which have become especially active on his company's high-traffic Los Angeles-San Francisco run during the past six months.

"Unfortunately," Drinkwater declared, "some of these unscrupulous operators have succeeded in convincing an important segment of the air traveling public that there is no difference between their type of operation and a regularly-certificated airline such as ours. The sole appeal of these barnstorming-type carriers is one of price."

▶**Fares Compared**—Five intrastate operators are now making scheduled daily flights in California. Seven months ago there were none. They charge slightly under $10 for a Los Angeles-San Francisco ticket, compared to $20 or $21 for their certificated competitors.

Western concedes it is losing considerable business to the newcomers, who are not subject to CAB's economic regulation.

Drinkwater charged that the "fly-by-nights" are confusing the traveling public with misleading advertisements. He indicated that the independents operate without proper safety regulation, adding that many of them don't fly unless they get a profitable load.

▶**Unreliable Schedules**—"They cancel their schedules at will," the WAL president asserted. "Real airlines, of course, cannot operate on this basis.

"The temporary intrastate boys have no union contracts, do not pay standard wages and cut all corners whenever they possibly can. We are told that one of these so-called airlines pays its pilots $10 and its stewardesses $4 a roundtrip between Oakland and Burbank.

"Contrary to their misleading advertisements," Drinkwater continued, "these outfits do not operate under the same safety regulations that we observe. Inspection of their aircraft is not what we would consider adequate. They are not required to have maintenance supervision or shops or stocks of spare parts or servicing equipment.

▶**Training Hit**—"They don't bother with training programs either for pilots or mechanics. Their flight crews are not required to have anywhere near the experience, training or qualification that we insist our flight crews possess. Their radio, dispatching and meteorological services are practically non-existent in comparison with ours.

"Their tax obligations, airport charges, insurance coverage, sales and general corporate responsibilities cannot be compared with ours or with those of any other bona fide federally-certificated airline. Many of these new outfits let their passengers put a quarter in the insurance machine in the airport lobbies and, in so doing, mislead the people traveling with them; because the insurance purchased through those machines is only good on regular, federally-certificated airlines."

SHORTLINES

▶**All American**—Plans to start feeder service on its seventh and final route segment—from Pittsburgh to Buffalo—on July 25. Since Mar. 7, when its first DC-3 feeder flights were made, AAA has opened these routes: Washington-Baltimore-Pittsburgh, Pittsburgh-Philadelphia-Atlantic City, Washington-Baltimore-Atlantic City, Washington-Baltimore-Philadelphia, Pittsburgh-Cincinnati, and Pittsburgh-New York.

▶**American**—Is having several of its DC-4s converted into combination pasesenger-cargo planes. . . . Civil Aeronautics Board will hold a hearing July 13 in Memphis on the non-fatal accident involving an AA Convair-Liner which made a spectacular emergency landing shortly after taking off from Memphis Municipal Airport June 22. The plane, carrying 40 passengers, was landed in a clearing about the size of a football field after an engine failed.

▶**ICAO**—Third Assembly of the International Civil Aviation Organization has voted a budget of 2,810,607 Canadian dollars for operations during 1950. This will allow ICAO to continue its working program at the present level

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but does not permit expansion. Budget for 1949 is $2,649,685.

► **KLM**—Has inaugurated its new trans-Atlantic Constellation service linking Amsterdam with Montreal, Canada, and Curacao, Netherlands West Indies.

► **National**—Virtually all the Air Line Pilots Assn. pilots who participated in the strike against NAL were again flying for the company by the end of last month. Several weeks earlier (AVIATION WEEK, June 13), ALPA President David L. Behncke had accused National of dilatory tactics in putting his men back to work in accordance with the strike settlement agreement made last November.

► **Northeast**—Hamilton Heard has been elected treasurer.

► **Northwest**—Passenger load factor on NWA's transcontinental coach flights averaged better than 92 percent during the first half of June. With extra sections excluded, the average was 95 percent.

► **TWA**—Gordon Gilmore, director of public relations, has been named chairman of the Air Transport Assn.'s public relations advisory committee.

► **United**—Company's 39 DC-6s are being painted white on top of the fuselages to increase summertime passenger comfort. Reflection of sun rays by the white enamel results in passenger cabins being as much as 15 degrees cooler during loading at terminals. . . . UAL board of directors has declared the regular quarterly dividend of $1.125 a share on the 4½ percent cumulative preferred stock, payable Sept. 1.

CAB SCHEDULE

July 11—Prehearing conference on British West Indian Airways' application for Trinidad-Miami foreign air carrier permit. (Docket 3742)

July 11—Hearing on South Texas route applications of Val-Air Lines and Trans-Texas Airways. (Docket 3645 et al)

July 11—Prehearing conference in air freight rate investigation. (Docket 1705)

July 18—Prehearing conference on CAB's investigation into disposal of Parks Air Lines' feeder routes. (Docket 3965 et al)

July 18—Hearing on International Air Transport Association Agency resolutions. (Docket 3350)

July 18—Hearing on renewal of Pioneer Air Lines' feeder certificate and suspension of service at points on routes of Braniff, Continental and American. (Docket 3719)

July 25—Hearing on renewal of Southwest Airways' feeder certificate and suspension of United Air Lines' service at four California points. (Docket 3718)

Aug. 8—Hearing on Carco Air Service's lightplane route application. (Docket 3629)

Aug. 15—Hearing on Hughes Tool Co. control of TWA. (Docket 2796)

Aug. 22—Hearing on extension of Expreso Aereo InterAmericano's Havana-Miami foreign air carrier permit. (Docket 3717)

Sept. 26—Hearing on Seaboard & Western and Transocean Air Lines applications for all-cargo certificates between the U. S., Europe and the Middle East. (Dockets 3041 and 3818)

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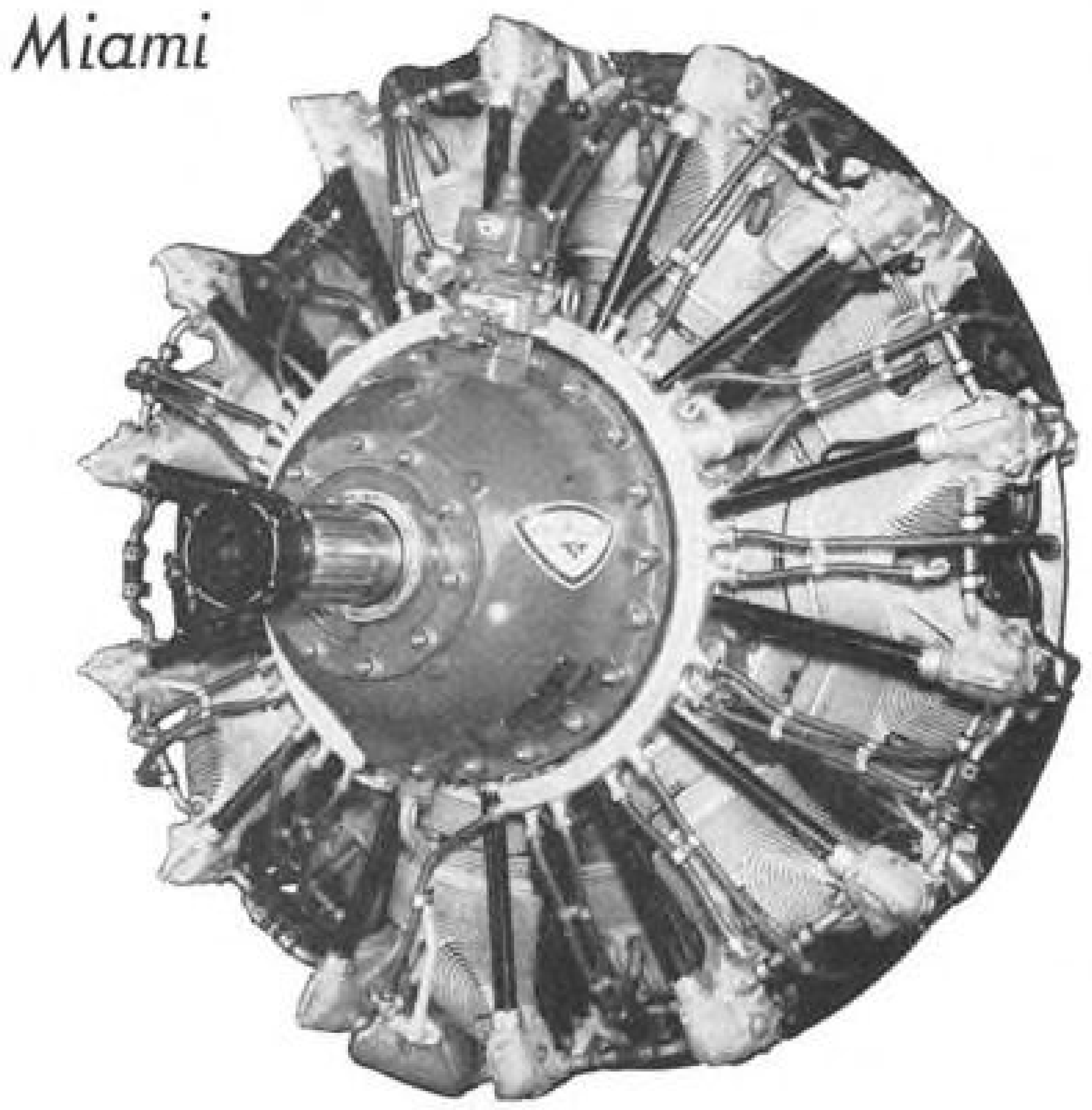

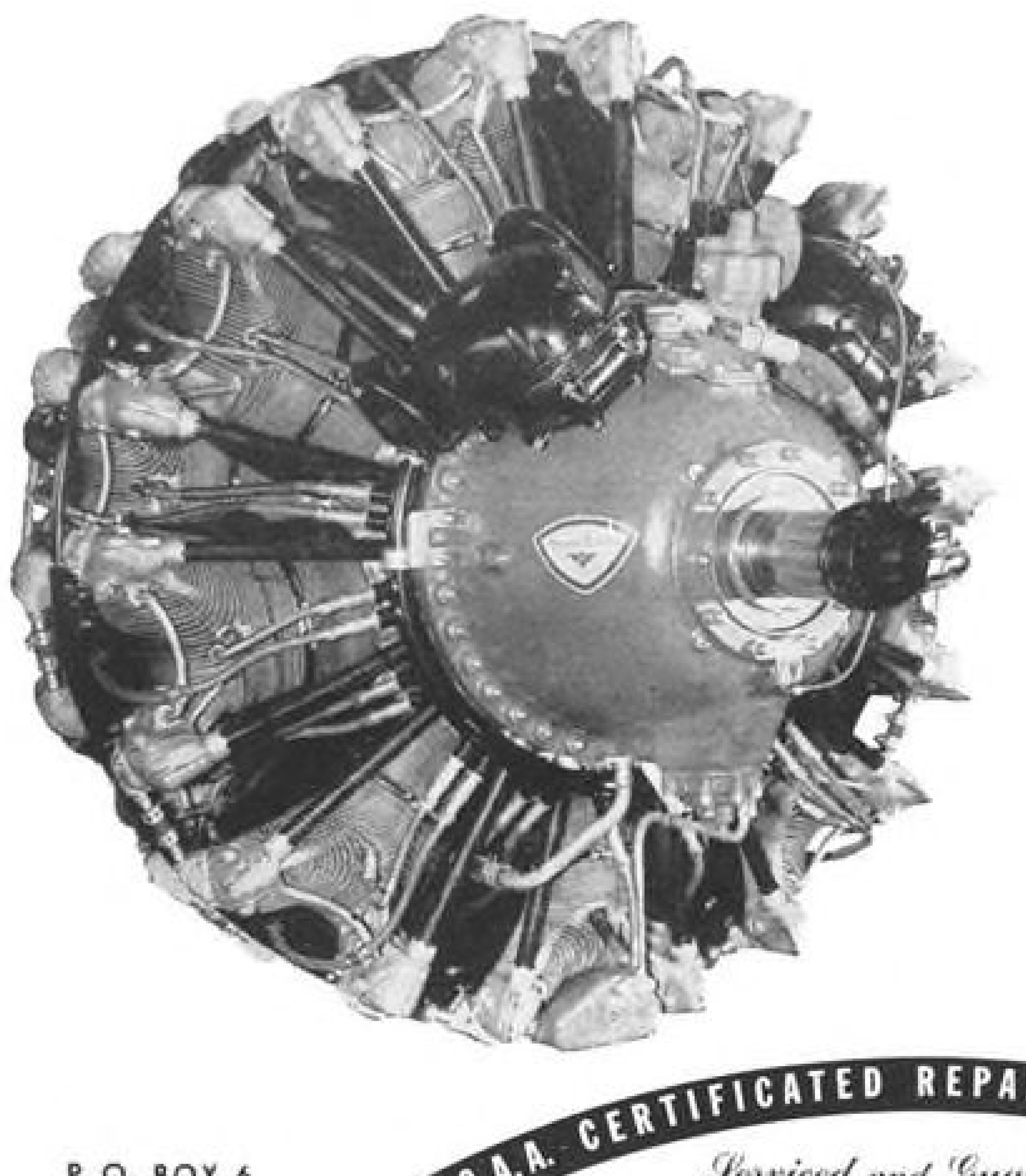

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STRICTLY PERSONAL

IT CAME IN THE SLIDE DOOR—**Bob Sibley,** aviation editor of the Boston Traveler, says he has declared an emergency and sends three contributions to keep this column alive. One concerns a lecture in Boston the other day by American Airlines' expert on air navigation, **Bob Ayer.** In the back of the room was **W. Nelson Bump,** regional vice president for American, hastily checked out on the projection room, and aiming slide after slide at the screen. By sheer coincidence, each plane pictured seemed to be American. Suddenly up popped a photo of a radar-equipped DC-4 cargo job with Pan American markings. There was a moment of deep silence in the hallowed auditorium of the Harvard Engineering Club, then a thin, small voice came from the vicinity of the projector.

"How did THAT get in here?"

America's Only Helicopter Crossing? Piasecki Helicopter Corp.'s heliport, Morton, Pa.

SQUAWK SHEETS CAN BE INTERESTING—**Avison Koch,** of Brisbane, Calif., now in UAL's engineering dept., says he ran into a squawk sheet the other day that was a dilly. It said:

"Every time stewardess pushes call button, No. 1 engine temp goes up."

And a first officer the other day wrote grumpily:

"Excessive leak in copilot's windshield should be fixed or copilot provided with bathing suit."

The mech's report followed with: "Fixed copilot's windshield on account no bathing suits in stock."

* * *

QUOTH SADIE THE STEWARDESS—**Hy Sheridan** sends through the latest sayings of Sadie the Stewardess. "In your Apr. 18 issue, in a headline, you ask: What is needed in a cargo plane? Sadie would like to answer you. Cargo, she says."

Sadie also confides that "although congressional committees are still investigating people, they will never catch up with the French fashion designers, who have been exposing literally millions of women."

She thinks the committees have had such poor success because they don't realize that just because one of their specimens is red it doesn't necessarily mean he is ripe.

* * *

IT'S A CLAM SHAME—Private pilots out near Hoquiam, Wash., have a new worry. **Ray Bloomberg** tells us that Sheriff Mike Ilgore warns lightplane owners they'd better stop landing on nearby ocean beaches because they'll disturb the clams. It seems clams are a big business around Mike's diggin's and the natives don't want those clams disturbed. Research proves that the little clams, in particular, get panicky when planes go bouncing around above them. Future violations may be reported to CAA, says the sheriff. **R. H. W.**

WHAT'S NEW

New Books

"Helicopter Engineering," by Raymond A. Young. Bureau of Aeronautics, Navy Dept. Book contains 113 curve charts, 50 construction diagrams, conversion tables, flight test data. 364 pages, published by the Ronald Press Co., 15 E. 26 St., New York 10, N.Y. Price $10.

Trade Literature

"NBS Publication AMS 5," tables of sines and cosines to fifteen decimal places at hundredths of a degree, available from Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price 40 cents.

"Who's Who in Plastics," a biographical listing of 2989 individuals, 244 pages, available from the Society of the Plastic Industry, Inc., 295 Madison Avenue, New York 17, N. Y. Price is $4.50 for SPI members and $5.50 for nonmembers.

"Die Cushions," a reference manual on uses, advantages, and maintenance of press die cushions and allied equipment, available on request to E. W. Bliss Co., Toledo, Ohio.

"Capacitor Catalog," covering types and ratings for service work, available on request to Aerovox Corp., New Bedford, Mass.

"Surface Air Heaters," a bulletin on industrial heat-treating equipment available on request to Surface Combustion Corp., Toledo 1, Ohio.

"Cooper Alloy Comparison Chart," one of a series of detailed engineering charts, available on request to Cooper Alloy Foundry Co., Hillside, N. J.

"Velocity-Power Driver," a bulletin on a driver for equipment which can drive steel studs into steel, masonry or concrete, available on request to Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

"More Safety than Meets the Eye," a bulletin on alloy steel chain, available on request to S. G. Taylor Chain Co., Hammond, Ind.

"The Problems of Public Scepticism and Fear as related to Air Travel and Advertising," a thesis prepared by Harold Littlefield for the Graduate School of Business Administration, New York University, available at the Graduate School Library, 90 Trinity Place, New York, N. Y.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—JULY 11, 1949

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SEARCHLIGHT SECTION

(Classified Advertising)

EDITORIAL

Dangerous Exhibitionism

The Massachusetts Aeronautics Commission the other day denied a request by five nurses to make parachute jumps at an air show.

According to the Boston Herald, the nurses, members of the American League of Paranurses, Inc., had filed their request with the commission. In denying the request, Crocker Snow, director of the commission, said the nurses who wished to make the jumps belonged to "an organization which was not affiliated with any recognized governmental or relief agency and there is no evidence that any of them has ever jumped before."

Snow said the commission has adopted a policy of discouraging "dangerous exhibitionism" in connection with the operation of aircraft throughout the state, adding that parachute jumps by inexperienced personnel at a public show "falls within that category."

According to the sponsors of the proposed exhibition, the nurses modeled their training program after that of similar units in Great Britain who jump into isolated areas in cases of emergency.

Ignoring the legal arguments in the case, we agree with the commission. Aviation will never grow up until it controls its "showmanship" and realizes that no preventable accident is worth its cost in public confidence. One needless, spectacular accident does more harm in a minute than months of patient, intelligent education. Safety of life is the foundation of aviation and its future. Those who are willing to take a chance with human life unnecessarily are no friends of aviation.

On Subsidies & Mismanagement

Captain Eddie Rickenbacker, president of the only major U. S. airline with a consistent record of profitable operation, told a Pittsburgh audience the other day that he does not believe in "government subsidies or handouts for anyone."

The Wall Street Journal's report of the Eastern Air Lines executive's extemporaneous speech added that Captain Eddie said too many business men "damn the government up one side and down the other" and then when they encounter difficulties "run down to Washington to beg for a handout."

He said that as long as he is with Eastern Air Lines "we'll operate in the black or I'll get into another business . . ."

Predicting that the airlines will get better in "economics and performance," he said "if our industry didn't have a marvelous potential, it wouldn't have been able to stand all the management mistakes that have been made . . ."

Captain Eddie isn't loved by many of the other airline presidents for such talk as that but it certainly makes sense to some of us.

Times Change

The New York Times headline the other day said: "Family-fare-plan hailed by airlines."

The story started out like this: "American Airlines and United Air Lines announced yesterday that they had requested the CAB to extend the family fare plan of reduced rates to the end of March 1950."

American announced that 36,000 families flew under the reduced rates in the last eight months, and popularity was still growing.

United's veteran Harold Crary, vice president for traffic and sales, was quoted as saying that the plan had been "highly popular to date and should prove even more of a success in the coming summer and fall vacation months."

Times certainly change. The success must have been a very happy surprise to United. Because originally United said this promotional plan was not feasible. It opposed the whole idea, which was originated by American's aggressive president C. R. Smith. Finally United reluctantly abandoned hope of trying to prevent the plan from going into effect. Last November, several months after American led the way with fatter passenger revenues, UAL fell into line, just about the last of the major carriers to do so.

It was also UAL that was opposed to removing the extra fare premium from the DC-6 last summer. It was UAL who protested Western's fare cut when it dropped meal service. It was UAL's president who told the Senate Airline Investigating Committee that higher fares and higher mail pay were still the best way for the industry to beat old man deficit. United is still the industry's most active major opponent of the inevitable second class passenger service known popularly as the air coach, despite the fact that the air coach offers the greatest mass passenger potential aviation has ever seen.

Times are changing, Mr. United!

ROBERT H. WOOD

Rancher...manufacturer...publisher prove *Bonanza travel pays*

Sundays. Paul Harbaugh goes to church — 200 miles away! He and his wife fly their Bonanza to Oklahoma City from their busy Texas ranch in just over an hour. Weekdays he rounds up cattle by air and even picks up mail. When roads are snowbound, the Bonanza is often the only transportation moving.

Key men of Reuland Electric Company. Alhambra. California, can now cover all distributors and sales meetings and still keep up with home office work. Two company-owned 4-place Bonanzas double their productive time. Company gives outstanding service with Bonanza emergency deliveries of Reuland Electric Motors. Says Howard Reuland. "Our Bonanzas are paying investments."

A string of newspapers from Gadsden. Alabama. to Middletown. New York. takes lots of attention. Carmage Walls, president. General Newspapers. Inc.. can do it with a Bonanza available for anytime mobility. "Doubles my capacity for work," he states.

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