AVIATION WEEK

A McGRAW-HILL PUBLICATION

APRIL 20, 1953

50 CENTS



"IMPOSSIBLE" ICECAP RESCUE

ON THE SEVENTH day, the plane overhead radioed, "We'll try to take your injured men off tomorrow."

But to the twelve men huddling against a temperature of 20° below inside their wrecked Royal Air Force transport plane, there was little hope. They had crashed where the Greenland icecap was 8000 feet above sea level. No skiplane, they thought, could take off from that altitude.

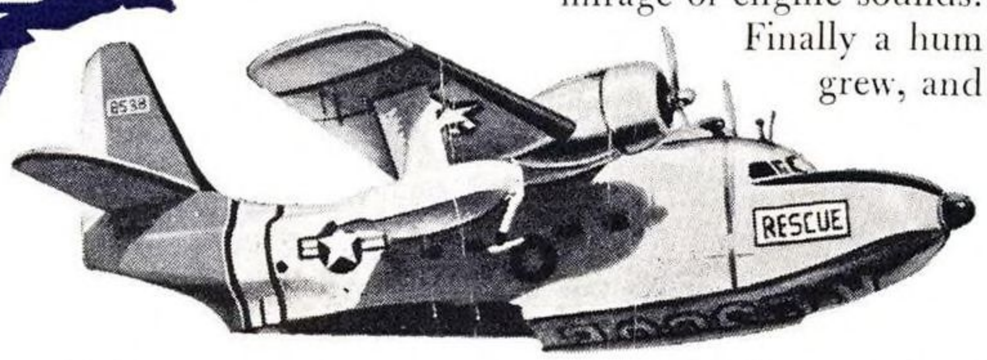
The next day, the wind plagued them with a mirage of engine sounds. Finally a hum grew, and an angel speck became a twin-engine—

"An amphibian? To land here?"

She did, then even taxied over the snow to the wreckage to load the stretcher cases. An hour of agony followed. Finally the JATO bottles were mounted to her hull, and she made the "impossible" take-off. Within two days, all were rescued.

Grumman salutes the USAF Air Rescue Services crew of that Grumman SA-16. Especially proud are the engineers who wedded a retractable ski to the amphibian keel, who created the Grumman Albatross *Triphibian* and made it possible to help save men on snow and ice, as well as sea and land.

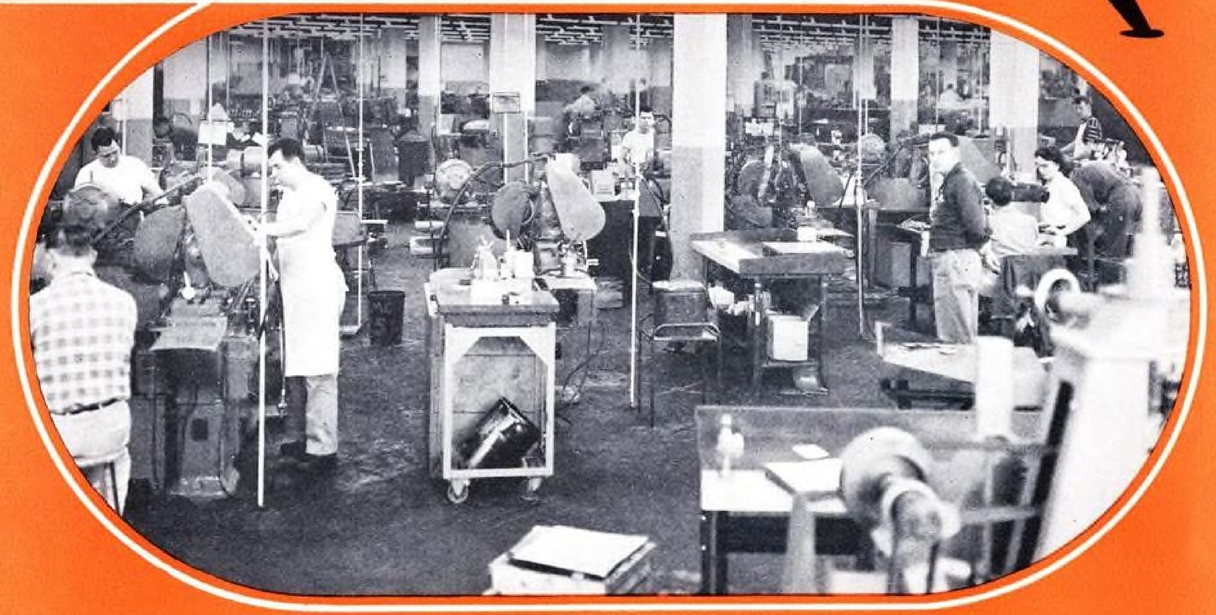
Grumman



GRUMMAN AIRCRAFT ENGINEERING CORPORATION • BETHPA IRK

SUNDSTRAND

DOUBLES PRODUCTION FACILITIES



New plant facilities increase output capacity 100%



"INTEGRAL TYPE" DRIVE
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- Mounted within the engine gear box achieving the desirable ratio of one KW power output per pound of drive weight.
- Location simplifies installation and maintenance of drive and accessories.
- Unit maintains its high efficiency even at extremely high altitudes.
- Constant speed maintained within ± ½ of 1% during normal operating conditions.

• Now in full production of Sundstrand Constant Speed Drives is a big new addition to the Rockford plant.

This extra production space has been fully equipped with specialized machinery and trained manpower to increase the output of the original plant operated by Sundstrand's Hydraulic Division.

Today, Sundstrand's production capacity for Constant Speed Drives is double that of a year ago. Other steps in a long-range program are being taken to further increase output capacity to meet the constantly increasing requirements for hydraulic Constant Speed Drives.

This production capacity increase, plus an augmented engineering and development staff at the Rockford office, plus the opening of the new Sundstrand West Coast office at Hawthorne, California, places the Company in a greatly improved position to serve the aircraft industry.

Call on us for help in adapting Sundstrand's Constant Speed Drives to your requirements... use Sundstrand's research, engineering, and production facilities.

SUNDSTRAND

SUNDSTRAND AIRCRAFT HYDRAULICS

SUNDSTRAND MACHINE TOOL CO.
HYDRAULIC DIVISION, ROCKFORD, ILL.

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LATHES • MILLING, BROACHING AND SPECIAL MACHINES • BROACHING TOOLS • MAGNETIC CHUCKS

B.F.Goodrich



New B. F. Goodrich cell weighs 38% less, carries more fuel

NO SOONER is one model of the Thunderjet in production than designers start again on their perpetual job: shave every possible ounce of weight—make room for more armaments. Save every possible cubic inch inside for fuel—make way for longer flight range.

Republic engineers figured they could carry more fuel if they could use *all* the space in the wings . . . including odd-shaped corners and crevices. But this would add weight, and it looked as though the tricky shapes couldn't be built anyway.

They brought this dual problem to B. F. Goodrich. Here, engineers tackled the assignment three ways. A thinner wall was developed that would still seal as well under gunfire. A way was found for building shapes that would fill out the odd corners, carry more fuel. And finally, a lighter fitting was worked out that saved still more weight.

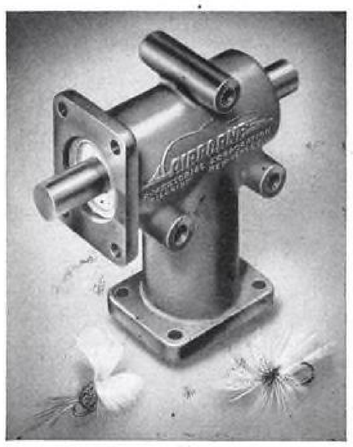
It all added up to more gallons of fuel and 38% less weight than cells in the early Thunderjets. The new B. F. Goodrich cells have been proved on the famous F-84G, will soon be seeing duty on the new F-84F and RF-84F.

The development of the lighter weight fuel cells is another example of BFG leadership in rubber research and engineering on the problems of aviation. Other B. F. Goodrich products for aviation include tires, wheels and brakes; heated rubber, De-Icers; Avtrim; Plastilock adhesives; Pressure-Sealing Zippers; inflatable seals; Rivnuts; accessories. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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ANGLgears are described fully in the I.A.S. Aeronautical Engineering Catalog. We suggest you refer to this publication for complete data.

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Aviation Week

Volume 58 — April 20, 1953 — Number 16

(Table of Contents on Page 8)

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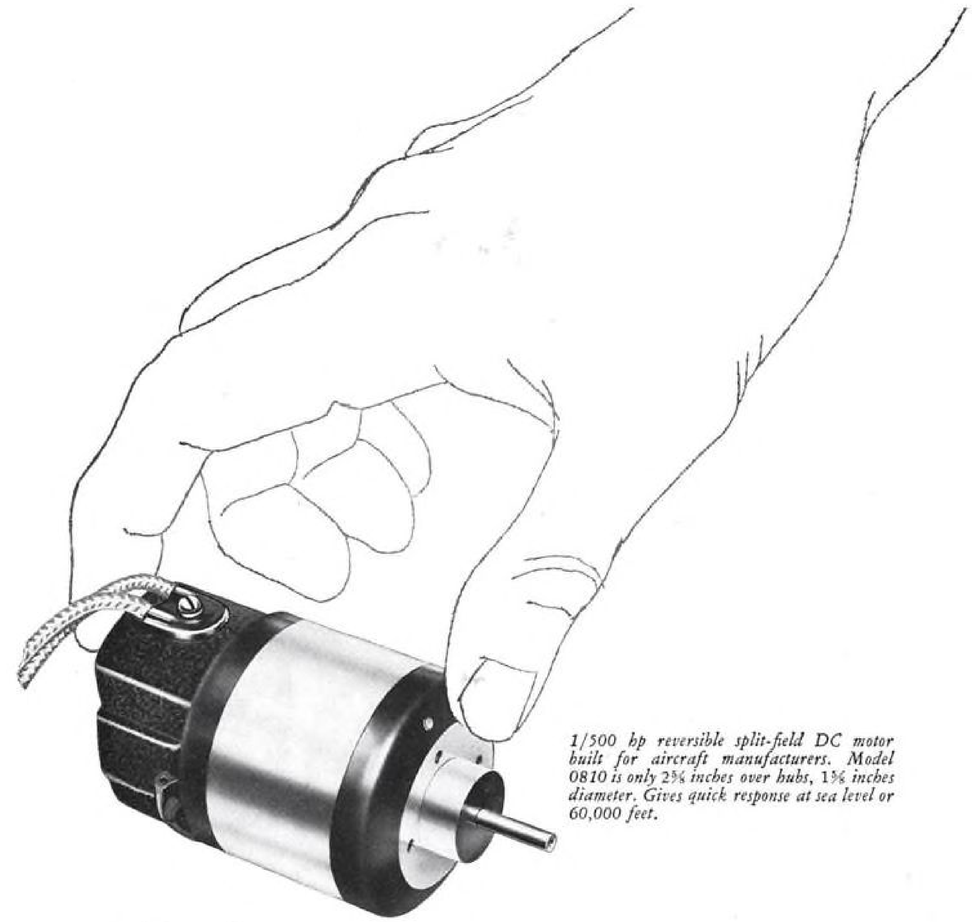
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AVIATION WEEK • April 20, 1953 • Vol. 58—No. 16
Member ABP and ABC

Published weekly by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. **Publication Office: 99-129 North Broadway, Albany 1, N. Y.**
Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.
Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 North Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 36, N. Y. Allow ten days for change of address.
Subscriptions are solicited only from persons having a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.
Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada, $8 a year; $12 for two years; $16 for three years. Payable in Canadian currency at par; other Western Hemisphere, $10 a year; $16 for two years; $20 for three years. All other countries $20 a year; $30 for two years; $40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A. Copyright 1953 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable Address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.



1/500 hp reversible split-field DC motor built for aircraft manufacturers. Model 0810 is only 2¾ inches over hubs, 1⅝ inches diameter. Gives quick response at sea level or 60,000 feet.

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What the controls call for, a Holtzer-Cabot motor will do.

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We've been building fractional and miniature motors for the best part of a century . . . and for the aircraft industry during the last two wars. Our present facilities for engineering fhp motors, servo and servo-mechanisms are at your service.

The 0810 (shown here) illustrates the work we do and *can* do for you, in the field of aircraft actuators — autopilot systems, wing flaps, trim tabs, gun charging, computor systems, all types of timing devices.

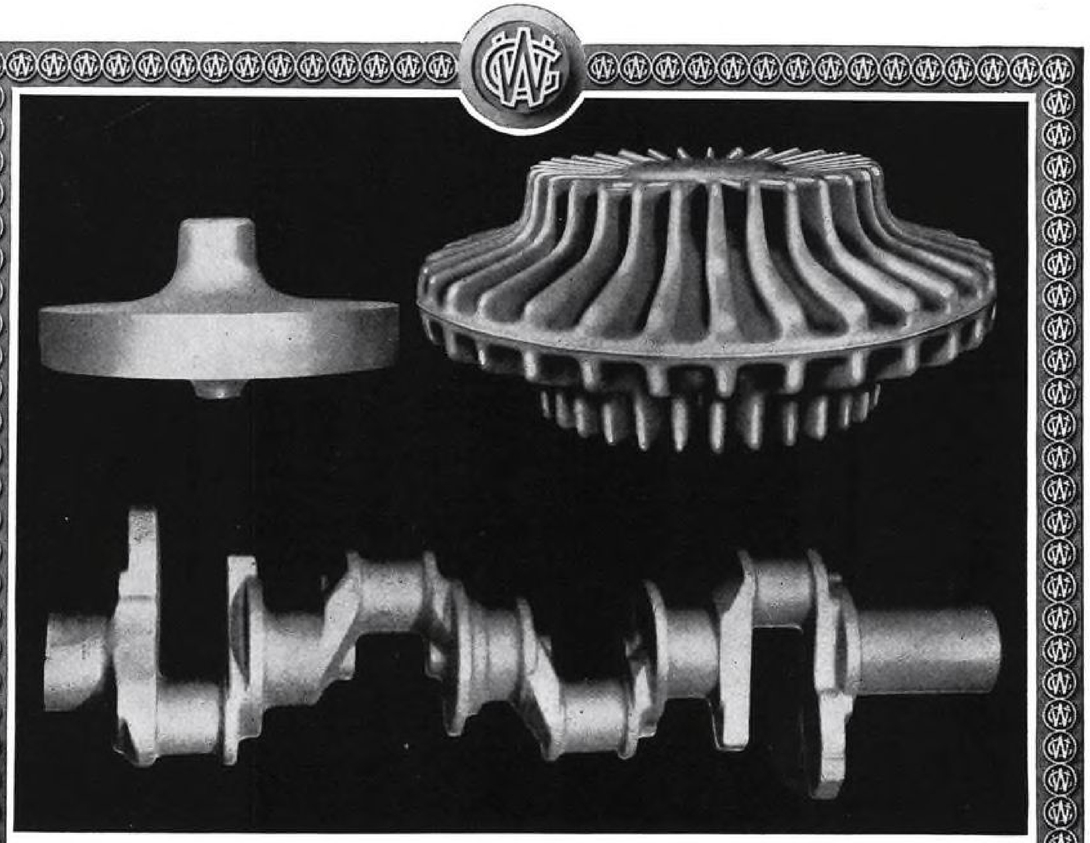
Send us your fhp motor and actuator problems. Size? We know how to make them small. Power? We make bantams to do the work of brutes. Dependability? Our experience in special motors goes back for generations. Service? We have the capacity. So — let our engineers work on the projects *you* are working on. Write us about the motor and actuator problems that are worrying you now.

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NEWS DIGEST

Domestic

David L. Behncke, who organized Air Line Pilots Assn., died at Chicago last week.

Miami Airlines' charter DC-3 crashed in the Cascade Mountains 40 mi. southeast of Seattle last week, killing six. Nineteen survived.

First DC-7 will be test flown about May 1, American Airlines' sources say. Douglas has mated wings and fuselage of the new transport, and Turbo-Compound engines, landing gear and empennage have been fitted. American has 25 DC-7s on order, plans to put the first one into operation by Dec. 1.

Lt. Gen. Samuel Anderson has been named commander of Fifth Air Force in Korea, succeeding Lt. Gen. Glenn O. Barcus. Other AF changes: Lt. Gen. Emmett O'Donnell, Deputy Chief of Staff for Personnel; Lt. Gen. Laurence Kuter, commander of the air university, Maxwell Field, Ala.; Lt. Gen. Frank E. Everest, Air Force director, Joint Staff of the Joint Chiefs of Staff.

C. C. Pearson, former president of Glenn L. Martin Co., resigned this month as the company's vice president-operations. The onetime chief engineer of Douglas Aircraft Co. and former vice president of Curtiss-Wright Corp. says he expects to continue in the aviation industry but is not ready to announce specific plans.

Bell Aircraft Corp. stockholders will vote today (Apr. 20) on a new employment contract that would postpone retirement Dec. 31 of president Lawrence D. Bell until Mar. 1, 1958. Under the new contract, Bell will remain as general manager and possibly president and/or chairman of the board at a minimum annual salary of $80,000.

Airmail stamp commemorating the 50th anniversary of powered flight will be issued May 29 at Dayton, Ohio, in conjunction with the annual American Air Mail Society convention.

F-51 piloted by Joe De Bona failed this month in an attempt to break the transcontinental speed record for piston-powered aircraft when the World War II fighter plane was forced down by a blown engine cylinder at Ft. Wayne, Ind.

Thomas Wolf, president of Pacific Airmotive Corp., says commercial business of the aircraft service company has increased 54.3% during the past three years but military work is at the lowest point since the outbreak of war in Korea. Slowdown of military business forced PAC to lay off 47% of its skilled personnel.



NEW NORTH AMERICAN T-28B advanced trainer for Navy is seen taking off for the first time from Los Angeles International Airport, Calif., piloted by NAA test pilot Bob Hoover. The plane is similar to earlier T-28As built for USAF, but has more powerful Wright R1280 engine delivering 1,425 hp. T-28A had Wright R1300 of 800 hp. Top speed of Navy T-28B is 346 mph. compared with T-28A's 283. Rate of climb of the new plane is 3,850 fpm. and service ceiling is 35,500 ft.

John Kerr (Tex) Lagrone, 61, pioneer pilot and barnstormer, died Apr. 12 in Kansas City.

New record for one-city traffic volume was set this month by American Airlines, when it flew 4,326 passengers Apr. 6 out of New York's La Guardia, Idlewild International and Newark Airports.

Military subcontracts were received recently by Cessna Aircraft Co., Wichita, calling for a $10-million extension of work on the B-47 and $7 million in additional production of components for the T-33 jet trainer.

Scheduled U. S. airlines carried 171 million lb. of airmail last year, compared with 270,000 lb. in 1926, first year of airmail contracts.

Airfreight agreement between four scheduled airlines and Air Transport Assn. carriers serving Alaska will assure adequate air cargo capacity to the territory at all times, ATA says.

Carl E. Johnson, 90, co-founder of Sterling Electric Motors and a fellow of the American Institute of Electrical Engineers, died Mar. 26 at San Marino, Calif.

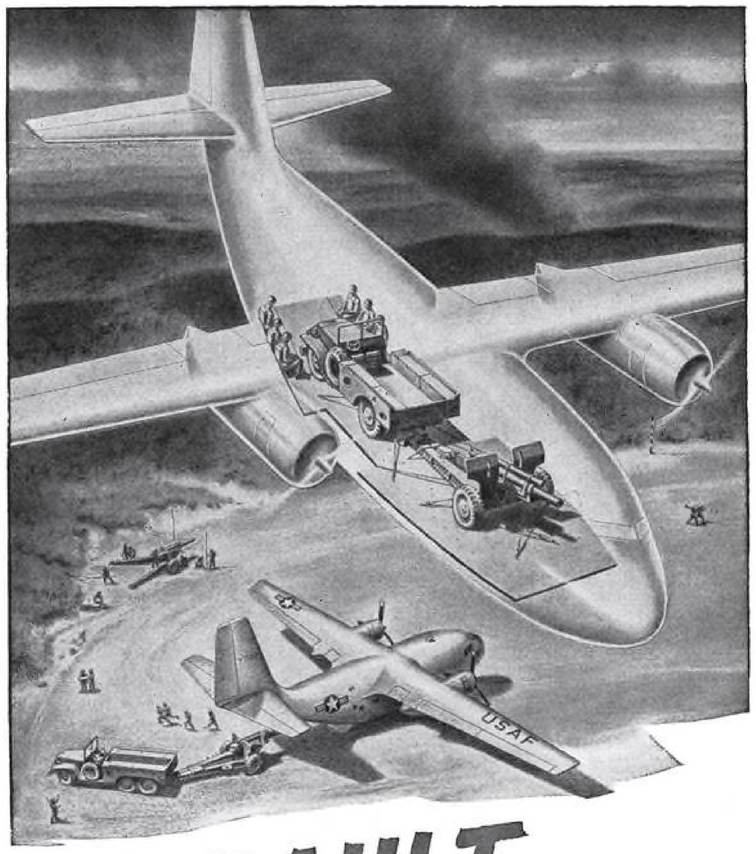
Financial

Curtiss-Wright Corp., Wood-Ridge, N. J., booked more than $1 billion in orders under definitive contracts during the first quarter of this year. Shipments during the three-month period were approximately $96,750,000, compared to $76.6 million in 1952's first quarter. Net profits for the first two months of 1953 totaled $1,634,000, increasing from $1,020,000 made during the same period last year.

Piasecki Helicopter Corp., Morton, Pa., made record net earnings last year of $826,315, more than triple the 1951 figure of $239,550. Sales also climbed to a new high of $64,450,014, two-and-a-half times the $26,366,852 total of the preceding year. Backlog of unfilled orders at the end of the year was $150 million.

Aeronca Manufacturing Co., Middletown, Ohio, reports profits totaling $852,152 from last year's sales of $12,560,707, more than double 1951's profits of $418,246 and sales of $5,565,609. Backlog of unfilled orders at the end of the year was $29 million, compared to $24,674,000 in 1951.

Delta Air Lines showed a net profit after taxes of $513,593 for the first quarter of 1953, a 4.7% increase over $490,536 made during the corresponding period last year. Operating revenues increased 4.7% from $7,525,246 in 1952 to $7,883,192 this year.



ASSAULT
and battery

An ominous phrase takes on new meaning when Chase ASSAULT Transports deliver Field Artillery BATTERY men and equipment to forward combat areas ***by landing.*** A dream in World War 2, this technique is a reality today as a result of combined research effort by the Air Force-Army-Chase Aircraft team.

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WEST TRENTON, NEW JERSEY
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The Aviation Week

April 20, 1953

Headline News

CAA Faces Major Overhaul..... 13
House Opens Fire on Airport Aid..... 14
CAB Wants Airlifts Off Fixed Rates.... 14
MiG Alley Scoreboard to Apr. 1..... 15
Piper Puts Apache in Production..... 17
Jet Transport Policy Muddle..... 17
Army Planning New Copter Designs... 21
AF Rotates Three Commands..... 21
Jet Bomber vs. Jet Transport..... 21
Eastern, United Report Salaries..... 22
National Aircraft Show Planned..... 26

•

Production Engineering

What to Do About Shortages..... 28
H. D. 31 Tests Beat Expectations..... 40
Lockfoam for the Starfire..... 41
West Coast to Get Rolling Mill..... 43
Exhaust Cone Forming Speeded..... 43
Aircraft Worker Benefits Set..... 44
Aeromedicine Gets Specialty Status.... 46
Navy Builds Anti-Sub Blimp Fleet..... 50

•

Avionics

Eastern Uses CAT to Track ILS..... 55
Meeting to Talk of Missiles..... 58

•

Equipment

Small Bearing Carries Big Load..... 61

•

Aviation Safety

ALPA Studies Crash, Fire Angles..... 16

•

Air Transport

Record Airline Revenues Seen in '53.. 79
Hellenic Airline 81
Qantas Orders Super Connie Fleet.... 82
Atlantic Lines Threaten Price War.... 82

•

Departments

News Digest 7
Picture Page 9
Who's Where 11
Industry Observer 11
Washington Roundup 12
Aviation Calendar 18
Production Briefing 53
Filter Center 60
Off the Line..... 64
New Aviation Products..... 65
Also on the Market..... 68
Letters 70, 94
Shortlines 83
So They Tell Us..... 92

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New Views Of Aircraft In the News

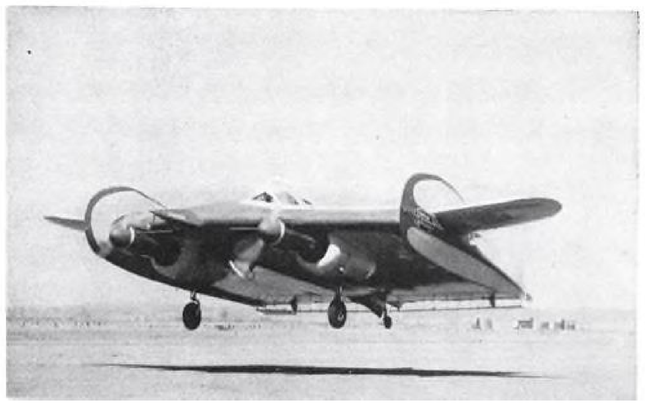


MATADOR POISED—New photo (right) of a production Martin B-61A Matador surface-to-surface missile on its mobile launcher at the company's factory, Baltimore, Md., where it will get a final check prior to delivery to USAF. The sweptwing subsonic Matador is powered by an Allison J33 turbojet. One of Martin's most important military sales items, the craft is also one of the first guided missiles to have gone into production in this country. Boost during takeoff is supplied by a single solid-propellent Rato unit, which is jettisoned when exhausted. A feature of the Matador configuration is the T-tail.



NEW TAIL FOR BRITISH FREIGHTER—The little Auster Ambulance/Freighter seen in flight, minus its rear-loading door, has undergone a modification of the vertical tail, which now extends below the boom. The 2,600-lb. craft has 110 cu. ft. of usable cargo space.

EXPERIMENTAL HORTON FLIES—Novel aircraft designed by William Horton, Santa Ana, Calif., takes off for a flight test. Two P&WA Wasps are being substituted for former Jacobs engines.

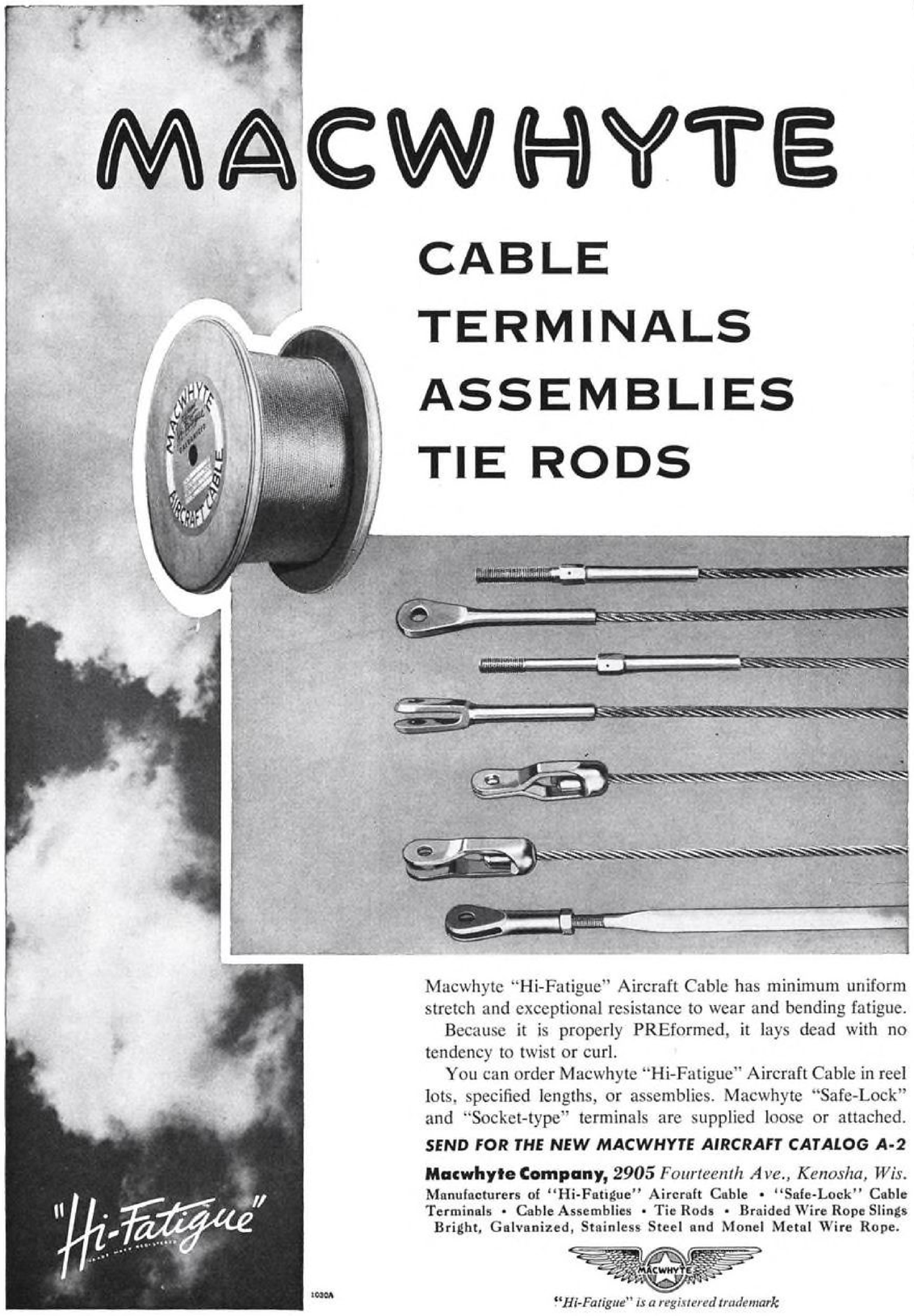


FIRST OTTER FOR RCAF—Destined for light transport and air search and rescue duties by RCAF is this de Havilland-Canada Otter. Initial plane was delivered Mar. 13. Powerplant is a 600-hp. P&WA R1340.



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1030A

WHO'S WHERE

In the Front Office

James S. Rockefeller, president of the National City Bank of New York, has been elected a director of Pan American World Airways.

S. L. Crawshaw is new president of Amgears, Inc., Chicago, subsidiary of Hupp Corp.

Charles W. Newhall, Jr., has been elected president and treasurer of Flight Refueling, Inc., Danbury, Conn.

Harry N. Bailey has been appointed vice president of the Rosan Thread Division, Rosan Engineering Co., Newport Beach, Calif. **Brig. Gen. Stanley E. Ridderhof,** USMC (Ret.), has joined Rosan as assistant to the president.

Changes

D. L. Thompson is the Canadian Defense Department's new senior representative in charge of aircraft production in the Toronto area.

Robert F. Richards has been named director of material and manufacturing control at Engineering and Research Corp., Riverdale, Md. **H. LeRoy Stout** is manager of ERCO's factory department.

Thomas P. Hennessy has been promoted to chief pilot of Northwest Airlines' eastern region. **O. A. Byrne,** former flight service director of North Central Airlines, has joined NWA as special sales counselor.

R. L. Wells has been appointed assistant manager of engineering of the Aviation Gas Turbine Division, Westinghouse Electric Corp., South Philadelphia, Pa. Other changes: **P. G. DeHuff** to manager of engine design, and **George R. Northrup,** supervisor of technical employment.

Robert L. Goodyear is chief engineer of Marquardt Aircraft Co.'s new Engineering Division, Van Nuys, Calif.

H. J. Service has been named manufacturing manager of the accessory turbine section of General Electric Co.'s Gas Turbine Division.

J. Penning has been appointed manager of Goodyear Aircraft Corp.'s new Piloted Aircraft Engineering Division. Also recently promoted: **J. L. Gimbel,** manager Finance Division; **E. A. Brittenham,** assistant chief engineer; **H. F. Hart,** in charge of factory accounting, and **W. A. Lloyd,** manager master planning department.

Honors and Elections

J. E. Schaefer, vice president and general manager of Boeing Airplane Co.'s Wichita Division, recently was awarded a jeweled 25-year service pin by president **William M. Allen.**

Robert S. Ames, canopy and laminates operations manager at Goodyear Aircraft Corp., Akron, Ohio, has been appointed to NACA's Subcommittee on Aircraft Structural Materials.

Charles M. Bradford, editor of Northrop News, has been elected president of the Management Club of Northrop Aircraft, Inc., Hawthorne, Calif.

INDUSTRY OBSERVER

►Watch for Republic Aviation's F-84F Thunderstreak to make the next attempt to boost the world speed record of 698 mph. set last year by North American's F-86D. Republic officials are confident the Thunderstreak can push the record well over 700 mph.

►Chance Vought's ground support version of the Cutlass (Aviation Week Nov. 10, 1952, p. 11) will be called the A2U and will feature an armored belly and automatic fire control for bombs and rockets.

►Grumman is the latest aircraft manufacturer specializing in fighters to come up with a lightweight day superiority fighter design. Other companies already in the field include North American, Lockheed and Northrop for the Air Force and Douglas for the Navy.

►Navy has assigned the Douglas XA2D Skyshark to Allison Division of General Motors Corp. for further development work on its T40 turboprop. The XA2D now at Edwards AFB will be flown to Indianapolis for further flight testing aimed principally at improving reliability of the twin power sections geared to contrarotating propellers. Navy expects Douglas to have a production model Skyshark early next month.

►Air Navigation Development Board is equipping a Sikorsky S-55 Marine helicopter at Quantico, Va., with VOR, DME, marker beacon receiver, glide slope receiver, radio altimeter, and ADF for a simulated helicopter airline operation on airways between the Martinsburg, Front Royal and Herndon VOR and LF ranges and into small fields in that area.

►Boeing Airplane Co. has been taking periodic audiometer tests on its flight personnel during the four years of jet operations at Wichita and Seattle. A spokesman reports no material indication of hearing loss.

►NACA program of crash tests of obsolete aircraft to isolate ignition sources for crash fires includes jet powerplants in addition to previous research with piston engine aircraft. Some recent tests have suspended jet engines in pods from the wings of Fairchild C-82s, in place of the piston engines normally used.

►One serious problem involved in the higher power climb-outs from airport now being advocated by airlines to abate the airport noise problem is the factor of additional wear and tear on the engines operating at higher power for a longer period of time, and the expected higher incidence rate of engine failure.

►NACA will flight test a specially instrumented Boeing B-47 Stratojet at Langley Field to obtain new data on loads and stresses of large jet aircraft. The special B-47 is instrumented to record some 200 different measurements with special equipment costing $165,000.

►CAA has developed a fire detection system for the B-36 that is now being installed in all of the big Convair bombers operated by Strategic Air Command. All North American B-45 jet bombers also are being equipped with a new CAA-developed fire extinguishing system featuring an extremely high rate of discharge.

►Acting CAA administrator Fred Lee told Congress that the present system of airport landing aids, including ILS, GCA, high intensity approach lights and radar traffic control when completed will permit scheduled airline operations to operate at 98% reliability. During 1952 airlines made 285,601 instrument landings—about 12% of the 2,360,502 airline landings in the United States.

►Navy has assigned a North American B-45 to Westinghouse for flight testing of its J40 turbojet engine. North American is modifying the B-45 to take a fifth jet engine. Westinghouse probably will do its testing at Baltimore's Friendship Airport where the Westinghouse Armament Division is located.

Washington Roundup

Red Peace Offensive

Initial optimism over Russia's latest "peace offensive" was beginning to cool in Congress last week, although the Executive Branch of the Eisenhower Administration was still hopeful for peace in Korea, at least. Key congressional leaders are taking a more skeptical view of the Russian overtures and analyze them as another change in Communist tactics rather than any fundamental shift in Red strategy.

Congressional feeling is that the Communists want a breathing spell to re-orient their own affairs and to lull the United States and its Allies into apathy toward the programs that pose a growing threat to Red plans.

• **Shift to co-ordinated offensive action** against Communists in Asia on a broad front from Indo-China to Korea.

• **Continued buildup,** however slow, of NATO forces in Europe. Allied air power in Europe now has the beginnings of jet bomber striking force and a growing force of F-86 Sabres capable of disputing air superiority with MiG-15 swarms over eastern Europe.

• **Accelerated U. S. defense production** that now is humming at close to peak levels after a slow start. Aircraft production delivery rates are running high enough to make a major dent in modernizing combat unit equipment of the Air Force, Navy and Marines.

Narrowing the Base

Defense Secretary Charles E. Wilson's program to narrow the defense production base will face stiff opposition in Congress. Although it is attractive to the Republican economy bloc, other congressional leaders believe it represents false economy and a dangerous military policy.

Among Wilson's supporters are Dewey Short, chairman of the House Armed Services Committee, and Homer Ferguson, chairman of the Senate Appropriations Subcommittee on Defense.

Opponents include: Leverett Saltonstall, chairman of the Senate Armed Services Committee: Edward Thye, chairman of the Senate Small Business Committee, and Richard Russell, top Democrat on both the Senate Armed Services Committee and the Appropriations Defense Subcommittee.

Industry Outlook

Current aircraft industry outlook indicates main production cuts involved in defense budget pruning will be borne by second-source producers, although some prime contractors will be affected when a complete program is canceled. If Wilson's "narrowing the base" program is approved by Congress, some aircraft manufacturers may have to return to second- and third-shift operations to absorb remnants of their second-source production.

Fred Lee Nomination

Early Senate approval of the nomination of Fred B. Lee as Civil Aeronautics Administrator is expected next week after hearings before the Interstate and Foreign Commerce Committee Apr. 22. Mild Senate opposition to Lee, stirred largely by CAA Airports Division employes, has evaporated.

CAA Critics

Congressional probing of the CAA fiscal 1954 budget revealed that $830,000 would be required to relocate VHF omniranges and ILS systems already installed because of operational unsuitability of the present sites. J. M. Beardslee, director of the Office of Federal Airways, admitted that CAA had installed some omniranges without previously testing the sites with portable equipment. Beardslee said CAA no longer installed the ranges without preliminary testing of the site.

Airline Subsidy Separation

General Accounting Office has begun an investigation of airmail costs and airline subsidies. GAO favors rigid subsidy separation legislation along lines proposed in the Kennedy bill and bitterly opposed by Air Transport Assn. Robert Ramspeck, Eastern Air Lines' executive vice president and former ATA executive vice president, is one of 10 advisers appointed for the Senate Post Office Committee investigation into postal rates and subsidies.

Airline Fare Probe

Civil Aeronautics Board Rates Division still is pressing for the general fares investigation opposed by all the certificated airlines. Deadline for CAB members to head off the investigation will come early in May when hearings are scheduled to begin.

CAB Outlook Stable

Indications are that Oswald Ryan, appointed CAB chairman by President Truman, will stay for 1953.

Transport Weight Limit

CAA's Office of Aviation Safety juggled a hot potato in a fumbling sort of way, and as a result has pilots, airlines, and CAA regional safety officials all riled up. Acting administrator Fred Lee had to step in last week and countermand an order of Ernest Hensley, OAS director, and Omer Welling, acting chief of engineering, approving a 700-lb. weight-limitation increase for the American Air lines Convair 240. Air Line Pilots Assn. had asked Lee to call a conference between pilots, airlines and Region 1 CAA officials at New York before any action was taken. Lee had agreed. But while Lee was out of town, Hensley and Welling acted. As soon as Lee came back to Washington, he moved to stop the approval pending the conference.

Air-Damages Problem

The Administration is putting the brakes on the Bricker constitutional amendment which would drastically restrict treaty and agreement-making powers and specifically would play havoc with international aviation agreements. Although 63 senators originally co-sponsored the amendment, support is weakening as the full effect of the amendment is realized. It would invalidate all executive international air agreements and also make inoperative Rome and Warsaw conventions setting ceilings on the damages passengers can collect from airlines.

—Washington Staff

AVIATION WEEK VOL. 58, NO. 16 APRIL 20, 1953

CAA Faces Major Overhaul Under GOP

- **Commerce's Murray is key man in re-evaluation.**
- **Federal airport aid is one of the first targets.**

By Robert Hotz

The Republican Administration plans to take a long, hard look at operations of Civil Aeronautics Administration with a view toward re-evaluating the role of the federal government in civil aviation. Key man in this first Republican overhauling of CAA—along with administrator-designate Fred B. Lee—is Robert B. Murray, Jr., new Undersecretary of Commerce for Transportation.

Murray is a lively, forthright fellow of 42 who has combined a civil career in finance and government economy with military service encompassing nine years of active and reserve duty in the Air Force.

Born in Maryland and educated at Mercersburg (Pa.) Academy and Harvard University, Murray worked in New York and Baltimore investment banking houses until he was commissioned a captain in the Army Air Force in 1942. He served in the AAF for four years, leaving active duty as a colonel. Since 1946, he has been a colonel in the Air Force Reserve, acting as deputy commander of the 512th Troop Carrier Wing and commander of the 512th Air Base Group at Newcastle Air Force Base, Del. Since 1946 he also has been president of the Pennsylvania Economy League of Harrisburg, one of the largest privately financed organizations in the country promoting economy and efficiency in government.

►**Tailored to Fit**—First target in this Republican re-evaluation of CAA has been the federal airport program. Although all money for future federal airport aid has been eliminated from the fiscal 1954 budget (AVIATION WEEK Apr. 6, p. 14), Murray emphasizes that this does not necessarily mean the airport program will be a permanent casualty of the Republican economy drive.

He believes the airport program needs a thorough overhauling and has directed CAA to come up with a new streamlined program before any further requests for federal funds are made.

Murray is critical of the federal airport program as it has been administered by CAA on the following accounts:

• Federal airport aid has been scattered too thinly to do much good anywhere except to saddle local airport authorities with a maze of red tape and restrictions. Murray points out that on large airport projects such as the $35-million Pittsburgh Airport, federal aid came to less than 10% of the total cost and had little influence on whether the city of Pittsburgh undertook the project. He says some CAA airport grants were for as little as $600.

• CAA has been interested in "selling" its airport-aid funds even where no real need for an airport existed or where local authorities did not want or need federal aid.

• Civil aviation has not developed along the lines predicted in 1946 when the airport program was organized. Lack of lightplane development has been countered by the tremendous growth in commercial aviation. Murray believes any federal airport program should be tailored to meet the needs of civil aviation along the lines it is actually developing rather than along lines the planners anticipated seven years ago.

►**Service Cuts**—Despite the elimination of all new funds for the airport program from the fiscal 1954 budget ($30 million) and a screening of fiscal 1953 airport funds that have not yet been committed, CAA will not abolish its airport office.

The Office of Airport Development will be eliminated and its records transferred to the Aviation Safety Office. The Airport Management Advisory Service also will be eliminated. Murray feels that CAA industry advisory services can well be dispensed with and industry can assume this function without government assistance.

In analyzing the $60-million slash the Commerce Department has recommended in the original fiscal 1954 CAA budget, Murray points out it was not an across-the-board cut and actually involved expansion of some necessary functions such as airways where increased traffic requires more personnel and aviation safety where 34 additional airframe, engine and electronics inspectors are requested.

Main areas affected by the revisions:

• **Employment.** Total net reduction of 816 positions is planned.

• **Airways.** Control towers at low-traffic-density airports will be eliminated. Some reductions will be made in airways' facilities preventive maintenance. Training for airways' maintenance personnel will be reduced. Some personnel reductions will be made in Washington and regional office overheads. Eight of the 12 airport traffic control radars programmed for fiscal 1954 have been eliminated. The remaining four ASR sets have been assigned to high-traffic-density airports where there is a genuine need for this equipment. Some savings will be made by combining communication stations with control towers.

• **Safety.** Field education program will be eliminated but a small Washington staff will be retained. Regional medical program will be eliminated. This activity will be centralized in Washington with a smaller staff. Reductions will be made in aircraft engineering both in Washington and regional offices. More air carrier inspectors will be added for airframe, engine and electronic work.

• **Construction.** The living quarters program for Alaska has been eliminated. Many scheduled relocations of airways navigation aids have been canceled by the economy drive.

• **Technical development.** Operations of the Technical Development Center at Indianapolis and the Air Navigation Development Board have been reduced to the fiscal 1953 level.

• **Airports.** The $30 million requested for new funds in the fiscal 1954 budget will be eliminated, and fiscal 1953 funds, appropriated but not yet committed, will be reduced. Included in this cut were funds for a second commercial airport in the Washington area at Burke, Va.



Robert B. Murray, Jr.

House Opens Fire on Airport Aid

By Katherine Johnsen

CAA's airport program, already set for a major overhaul by the Republican Administration, last week went under congressional fire as the result of a House Appropriations Committee investigation charging waste and questionable administrative practices at nine specific airports.

How much the investigators' findings had to do with the recent decision of Commerce Undersecretary for Transportation Robert B. Murray, Jr., to hold up any new federal airport funds for the 1954 budget, pending a thorough overhaul of the program, was not made clear. But Murray obviously was referring to these or similar cases when he indicated that the program was under attack.

Some administrative actions questioned by investigators included charges of:

• Federal employes insisting on local sponsors seeking federal airport aid in cases where they were using local funds.

• Federal employes instigating the increase of local claims against the government.

• Failure to justify need for terminals and runway lighting projects.

► **The Projects**—Here are projects under fire in the House report:

• **Orlando, Fla., Airport.** A $100,000 expansion of this facility was classified by CAA as "highest priority" to provide needed office and cargo space for airlines. But investigators reported office and cargo space was not needed and that the main purpose of the expansion was to enlarge the airport's restaurant facilities, largely to serve non-airport clientele.

• **Bowling Green, Ky., Airport.** Investigators objected that the following justification for a terminal building was not valid: "It is felt that the mining of rock asphalt, quarrying, and the agricultural interests in this area are contributing to defense. Bowling Green is in an area which raises Burley tobacco. It is felt that Burley tobacco is essential to our war efforts and to the building of morale in our armed forces and the forces of our allies."

The report commented: "The directness of the contribution which an administration building on this airport may be able to make to the well-being of the civilian economy or to the national defense, by reason of the fact that Burley tobacco is grown in the area is not apparent since it does not appear that a tobacco-growing area is inherently dependent upon, or particularly needs, aeronautical facilities."

• **Dublin, Ga., Airport.** The primary justification for a runway-lighting project was said to be the fact that numerous ambulance planes carrying litter patients to and from a nearby hospital used the airport. But officials of the hospital, investigators reported, disclosed that only one patient was transported from the hospital by plane in five years, and that was in daylight.

• **Greater Cincinnati Airport,** Covington, Ky. The manager of this airport, according to investigators, intended to finance a project for construction of cargo buildings entirely by private capital, but agreed to apply for federal funds under pressure from local CAA officials.

When informed that the airport manager did not intend to seek federal aid, the CAA district airport engineer, according to House investigators, declared that he "could not permit such an attitude to be maintained by the airport manager of one of the largest airports in the state, that such comments would sooner or later come to the attention of his regional office superiors in Chicago and that they would demand an explanation from him, that such an attitude constitutes a definite reflection on his administration of the federal-aid airport program in the state. . ."

• **London, Ky., Airport.** As another example of eagerness to use federal funds, investigators said that the CAA representative at this project "repeatedly urged the sponsor to take timely steps to insure obligation of federal funds prior to June 30 of each of the last few years." On one occasion, June 27, 1952, it was reported "he had the grant-agreement papers delivered to London from Louisville, a distance of 17 mi., by personal messenger traveling in a government automobile, so that these papers might be approved at a session of the city council called for that purpose."

• **Cordele, Ga., Airport.** This project was included in the airport program, not to meet aviation requirements, investigators objected, but simply because the local agency was willing to cosponsor the project.

• **Ashland, Ky., Airport.** This project, only 16 mi. from another project at Huntington, W. Va., was approved, investigators said, "to suit the convenience of owners of personal and executive-type craft . . . and because it was 'relatively inexpensive to develop.'"

• **Santa Ana, Calif., Airport.** The question was raised that CAA might have encouraged the board of supervisors of Orange County to boost its claim against the government for Army damage to this airport. The initial communication mentioned a claim of $1,000 plus. But the county subsequently increased this to $199,438. The amount which was ultimately recommended by CAA was $53,604.

Rep. John Rooney commented: "It is my contention that the claim was solicited . . . and that the first estimate of $1,000 plus . . . certainly should never have led to the approval of an amount of $53,604. . . ."

CAB Wants Airlifts Freed of Fixed Rates

Big-scale government-airline contracts like the Navy-Flying Tiger Line daily airfreight lift would be free from Civil Aeronautics Board rate fixing under a new economic regulation proposed by CAB.

The Board claims rate-making powers over such contracts but says tariff regulation is not necessary for large scheduled transport contracts. CAB proposes to exempt those contracts covering daily or almost-daily scheduled route operations for 90- to 365-day duration.

Sparking the CAB move to cut rate-fixing red tape was Flying Tiger's bid, lower than existing tariff, on the original Navy-Slick Airways airfreight contract last year. Navy transferred the contract to Flying Tiger and forced CAB to approve the tariff reduction.

► **Common Carriage**—The Board claims that because carriers offer their services to any agency willing to pay, these big contracts are common carriage subject to CAB powers, according to the Civil Aeronautics Act.

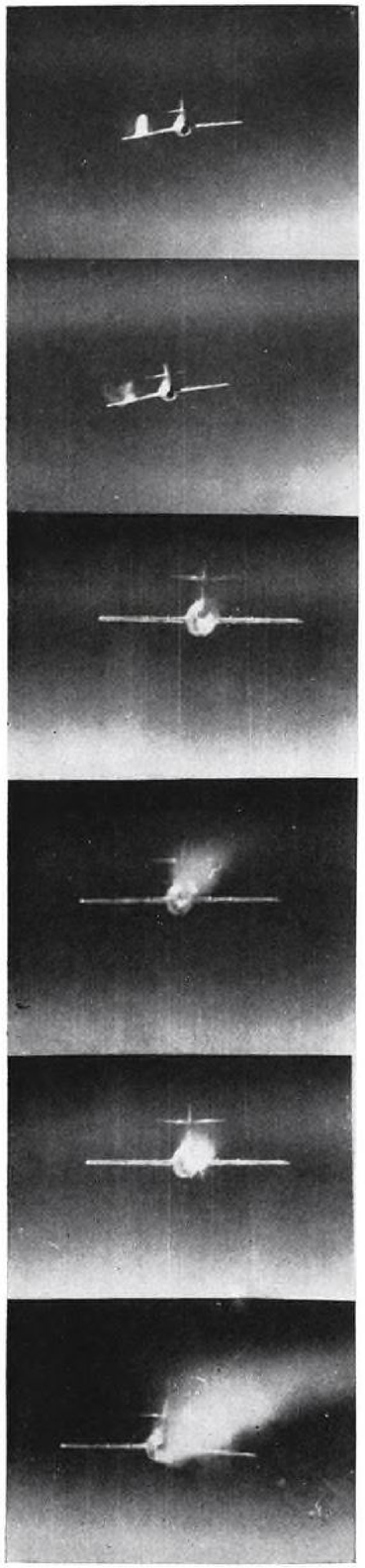
But CAB admits in the preamble to the proposed regulation that individual military charter flights (called "CAM" for commercial air moves) may not be subject to any such rate-making regulation.

"It is possible that some of the CAM services would be deemed by the Board to be contract operations and therefore fall outside the definition of 'air transportation' as set forth in the (Civil Aeronautics) Act . . ." the preamble says.

► **Bid Protection**—Types of big-scale contracts CAB proposes to free from tariff filing requirements are "extremely limited," the Board says in its proposed economic regulation amendment. CAB proposes to define it as a charter agreement, providing "minimum average of 24 one-way schedules to or from the same point . . . per 30-day period, which schedule shall be in conformance with a pre-agreed schedule pattern."

Justifying exemption of such contracts from minimum and maximum tariffs, CAB says the bid procedure appears "to provide adequate protection from excessive charges by the air carriers, while the governmental nature of the activities involved will tend to avoid possible harmful discriminatory effects which might arise if this type of charter were generally exempt from tariff and rate requirements."

Death of a MiG . . .





FLAK-RIDDLED TAIL of B-26, back from train-busting, attests to heavy Red ground fire.

MiG Alley Scoreboard to Apr. 1

The longest jet fighter-bomber combat mission in history—an 800-mi. roundtrip by 16 Republic Thunderjets to strike North Korea's industrial Chongju, less than 50 mi. from the Siberian border—highlights Far East Air Forces' air roundup for the first three months of 1953.

FEAF mounted 66,665 sorties during this period, 21,900 of them in March. North American F-86 Sabres destroyed 99 Russian-built sweptwing MiG-15s, probably destroyed 22 more and damaged 119 others in the Jan.1-Mar. 31 period at a cost of six Sabres. The Sabre scoreboard against the MiG since the start of the war to Mar. 31 was 607 destroyed against 54 Sabres lost in air battles.

► **UN Air Losses**—Allied aircraft lost during the first quarter of this year totaled 55. The breakdown:

• **Aerial combat:** six F-86s and three B-29s.

• **Enemy ground fire:** five F-80s, two ADs, nine F-84s, two F9Fs, one F4U, one Republic of Korea F-51, and three AUs.

• **Other causes:** one RF-80, one F-80, seven F-84s, four B-26s, one F-86, five Mk. 8 Meteors, three ADs and one ROK F-51.

► **Enemy Losses**—In return, FEAF inflicted these losses on the enemy: 7,505 vehicles destroyed; 2,186 buildings destroyed, 605 damaged; 1,112 troop casualties inflicted; 1,515 road cuts, 916 rail cuts; 702 rail cars destroyed, 1,049 damaged; 83 locomotives destroyed, 102 damaged; 343 supply dumps destroyed, 138 damaged, 136 bridges destroyed, 254 damaged; 11 tanks destroyed, 10 damaged; 69 gun positions silenced, 1,666 damaged.

FEAF Boeing B-29 Superfortresses flew 1,197 effective sorties during the January-March period, dropping 11,970 tons of high explosives. The smaller Douglas B-26 night intruders accounted for more than 5,000 Communist trucks.

Combat cargo aircraft airlifted 48,465 tons of supplies, 273,983 passengers and 14,329 air evacuation cases, bringing the total number of passengers carried since the start of airlift operations to more than 2.2 million.

Aircraft Losses in Korea

(to Apr. 1, 1953)

Enemy losses:	Destroyed	Probably Destroyed	Damaged
MiG-15	645	119	815
All types (incl. MiGs)	814	146	903

USAF losses:	Air-to-air	Ground Fire	Other Causes
Jet planes	79	223	67
Propeller planes	21	278	54
Other U. N. planes	6	51	21
Shore-based Marine planes	0	74	33

Aviation Safety

ALPA Studies Crash, Fire Angles

NACA water spray ring is expected to eliminate many engine blazes resulting from accidents.

By Alexander McSurely

Chicago—A new water spray safety device, expected to be a major factor in reducing aircraft crash fire hazards, was revealed here at the Air Line Pilots Assn. Air Safety Forum.

The device got its first baptism of fire in airplane crash tests conducted by the National Advisory Committee for Aeronautics at Ravenna, Ohio, with 23 airweary surplus Fairchild C-82 and Curtiss C-46 military transports. Further tests by the Air Force are scheduled.

The spray ring was disclosed during first unrestricted showing at the forum of movies of the NACA fire tests. The films have been the subject of widespread "behind the scenes" discussions in the aviation industry for more than a year.

► **Simple Solution**—Irving Pinkel, NACA engineer in charge of the tests, pointed out that purpose of the crashes was to isolate various potential fire ignition sources.

The spray-ring device, which cools the hot exhaust collector ring of an aircraft engine below a point where it may touch off a fire from a broken oil or fuel line, is seen as a simple solution to a serious potential fire cause.

► **Radar Altimeter**—Recommendations that the Navy APN-22 radar altimeter be released immediately for civil air carrier use, starting with service tests, was made at the safety forum by Trans World Airlines' Captain Dean L. Phillips as a result of an analysis of 25 major terrain collision accidents of civil aircraft.

Made by Special Working Group 10 of the Air Coordinating Committee Navigation Panel, the analysis found all the accidents but one or two could have been prevented if pilots had heeded the warning of a reliable terrain-warning indicator. Only two or three air carriers currently are using a terrain-warning device, and the Hughes Obstruction Warning Radar and early radar altimeter models are the only devices that have been available, Phillips reported.

► **Radar Policing**—Civil Aeronautics Administration has said it will not use radar traffic control as a means of policing the airways against violations, American Airlines' Capt. W. A. Jensen, told the pilot forum, but a radar controller who observes a violation through his scope is obliged to report it.

Jensen said the pilot's viewpoint was that radar should be a tool to assist the pilot and that if an incident occurs, radar should be used to correct it—"to assist the pilot, not to hang him."

► **Revolving Light**—A Grimes' G-570 revolving light (AVIATION WEEK Apr. 6, p. 74) with a red shade is being installed in the tailfins of United and American Airlines' planes for anti-collision visibility, UAL Capt. Robert A. Stone reported. The tail light sells retail at $70 and requires 14 to 16 manhours for installation.

Its white 100-watt sealed-beam bulb sends a 20,000 candlepower beam into a rotating mirror, which cuts the beam. The two beams rotate a full 360 deg. and are visible for 30 deg. up or down as a flashing light, with overlap of 2½ deg. at the horizon. In this zone, the observer picks up 120 flashes a min., but above or below the zone the observer gets only 60 flashes a min. Absorption of the other colors of light by the red shade warms the cover enough to prevent icing. In tests of the anti-collision light, Stone reported, it has been seen 94 mi. away in clear air and 30 mi. away under 12-mi. visibility conditions.

The Grimes light is not considered a final answer but is the present recommendation of ALPA studies, and several other airlines are expected to adopt it.

A practice of using stationary wing lights in conjunction with the flashing tail light was recommended by Capt. R. C. Robson, American Airlines' pilot and AVIATION WEEK columnist, so that planes on collision courses could track each other better.

► **Fire Tests**—A resolution asking Civil Aeronautics Board to make inflight testing of aircraft fire detector systems mandatory on each flight was amended by the forum after a CAA spokesman advised against it as a source of more enforcement problems.

The resolution in final form called upon pilots and airlines to make inflight tests of fire detectors voluntarily on each flight.

American Airlines' Capt. Vernon H. Brown, sponsor of the resolution, cited records on inflight fires in aircraft since 1946 involving at least 40 transports in domestic scheduled operation.

Discussion on the resolution indicated that some pilots are worried about the possibility of finding their system is not working, forcing them to dump their fuel and turn back. Others argued this was better than going on with a faulty system.

► **DC-3 Updating**—A re-evaluation program for the Douglas DC-3 so that it can be updated was urged by John Bosko of West Coast Airlines.

He called for installation of birdproof windshields, icing light installations, a new instrument panel with improved lighting, reduction of cockpit noise level, removing inverters from the cockpit, installation of wheel-well lights, improved windshield deicing and reduced paper work in the cockpit.

► **Television Towers**—A warning was sounded at the forum of "major league" opposition to air space subcommittees in protecting airport approach zones against construction of 1,500-ft. radio and television towers.

Capt. Homer Mouden, Braniff Airways, reviewed work on the subcommittee.

► **Noise Abatement**—Another warning said abrupt descents being made by airliners to comply with noise abatement procedures in various cities could only go so far before they became a hazard, or at least a serious discomfort to the passengers.

Discussion on new criteria for curtailing noise generally concurred that no technical solution was in sight yet for curbing aircraft roar at the source, the powerplant and propeller. Forecasts were made that the noise at the source would get worse instead of better with the advent of jet aircraft.

► **Necessary Complexity**—Every time an airplane's performance is improved, more work is made for the pilot with less time to do it in, William Stieglitz, Republic Aviation safety engineer, told the forum.

Stieglitz cited as one example of useful complexity a new cockpit lighting circuit that automatically dims lights to proper night value, with an override switch to make the lights full bright for daytime use. The override switch has an automatic reset to put the dimming circuit back in operation when the override is turned off. Stieglitz argued that development means more complexity and that emphasis must be put on making complexity reliable.

Sabre Bombers

Fifth Air Force reveals that at least one fighter-bomber wing in Korea has been converted to F-86 Sabres. Announcement disclosed that Sabres of the 18th Fighter-Bomber Wing leveled 11 buildings and damaged 10 more in an attack on Chongdan in western Korea Apr. 14.

Fifth Air Force ran combat tests prior to conversion of the wing to Sabres which indicated that the F-86 will be as good, and probably better, fighter-bomber than F-84s now in use.

Behind decision to convert F-86s is this fact: Sabres can tangle with MiGs, while F-84s are outmatched. Thus, use of Sabres in fighter-bomber wings also increases interceptor strength, strengthens Korea's weak air defense.

Plans call for conversion of at least one more fighter-bomber outfit to Sabres.

Piper Puts All-Metal Apache in Production

Piper Aircraft Corp. has christened its new twin-engine four-placer the Apache and expects the first all-metal production plane to be flying in June. The Apache formerly was called the Twin-Stinson.

More than 300 flight hours have been chalked up for the prototype, and static tests have been finished on the first pre-production model at Piper's Lock Haven, Pa., plant.

The Apache is expected to cost $25,000, following Piper's trend of shooting for the lowest price in its field. First production run is 10 planes, for which many components are already in production. Second run is for 100 planes.

Production Apache will be equipped with two 150-hp. Lycoming engines, turning full-feathering Hartzell propellers. It will have a fully loaded single-engine service ceiling of more than 5,000 ft., and a cruising speed faster than 150 mph.

Jet Transport in Policy Muddle

Industry takes issue with CAA proposals, asks unification of regulations for all carrier types.

A regulatory Civil Aeronautics Administration muddle about proposed jet transport certification—which former CAA administrator Charles F. Horne dumped on the doorstep of administrator-designate Fred B. Lee—is due for Lee's prompt attention soon after he hurdles final Senate confirmation.

Until a new administrator gets in, U.S. transport aircraft manufacturers are chafing under a complication of proposed policies against existing transport regulations.

There are good indications that Lee does not accept all of Horne's views on how the jet transport's future should be handled in regulatory planning. But Lee won't act without full authority.

Undersecretary of Commerce for Transportation Robert Murray, whose aviation influence already has been felt in the CAA airports program reshuffle, also may take a hand in this situation.

► **Unified Policy**—However, when and if Lee gets confirmed there is an outspoken aircraft industry statement waiting on his desk.

It takes sharp issue with the whole Horne-approved philosophy of the "proposed CAA policies for the certification of turbine-powered transports."

And what it really asks for is a unification of CAA policy on all transport aircraft to eliminate driving off in three different directions, which industry sources say has been characteristic of CAA policies in the last three years.

► **First Salvo**—"We think Fred Lee is the first guy nominated for CAA administrator since Ted Wright, who has really understood what the score is, and we are not blaming him for what Horne did," one company spokesman told AVIATION WEEK. "We just want him to correct it, that's all."

The aircraft industry statement—prepared by engineers of principal air transport manufacturing companies, members of the Aircraft Industries Assn.'s Airworthiness Requirements Transport Committee—first takes exception to the broad sweeping nature of CAA's turbine transport policies:

"Although the proposed policies purport to deal with regulatory problems of turbine-powered transport aircraft, many of the proposals relate to features or characteristics which are no more applicable to turbine-powered aircraft than to reciprocating engine-powered types. It is therefore misleading to single out such matters as unique to turbine-powered transports."

► **Basis Challenged**—The statement objects to the basis CAA has used for the jet transport policies:

"Many statements, opinions and conclusions of the CAA policies, however, are based upon what we believe to be unwarranted assumptions; and much of the discussion reflects military experience with tactical aircraft which will not be representative of commer-



FRENCH UNVEIL CONVERTIBLE AIRCRAFT

New aircraft in convertible design, the French S.O. 1310 Farfadet (Goblin), shows off its neat lines in this first photo. The all-metal craft is powered by two independent turbine power units: a Turbomeca Arrius 2 of 360 takeoff horsepower connected to the metal three-blade rotor and a Turbomeca Artouste 2 turboprop unit in the nose of 360 takeoff horsepower. Compressed air from the Arrius engine is fed to the combustion chambers at the rotor blade tips where fuel is injected. For horizontal flight, the rotors are placed in autorotation and the main lift effort is handled by the fixed wings of 21-ft. span. The rotor has a diameter of 36 ft. 8 in. Design cruise speed is 145 mph. and range is 240 mi. Dual controls are fitted and there is provision for three passengers. A larger 20-30 passenger version of the S.O. 1310 is being designed. Flight tests of the Farfadet were scheduled to begin at Villacoublay, near Paris, early this month. The tricycle landing gear on the craft is not retractable.

cial turbine-powered transports. Detailed rebuttal of such material places a burdensome and non-productive load upon industry engineering manpower, which is needed in the solution of the many design problems associated with the development of new aircraft."

► **Three Categories**—The Airworthiness Requirements Transport Committee divides the CAA policy report, a total of 85 proposed policy items, into three main categories and asks that they be disposed like this:

- Material not limited to turbine aircraft in application to the extent that CAA believes these items should be considered. The need should be substantiated by the administration for submission to CAB Bureau of Safety Regulation for consideration at the annual Airworthiness Review of Civil Air Regulation Part 4B (Transport). (51 policy items are in this group.)
- Material applicable to and possibly necessary for turbine-powered aircraft, for which there are existing regulations. These items are appropriate for joint government/industry consideration in developing either mutually acceptable Civil Aeronautics Manual material or proposed revisions to CAB 4B for annual review consideration. (20 policy items are in this group.)
- Material applicable to and possibly necessary for turbine-powered aircraft, for which there are no existing regulations. These items are appropriate only as joint government/industry study projects for developing design criteria, possibly leading to manual material or proposed new Part 4B regulations at a future date. (Three policy items are in this group.)

► **Pointed Remarks**—One item referring to maintenance was recommended for deletion from CAA's policy report as unsuitable for regulatory treatment. Another item, referring to climb requirement, was not commented on by the committee members. Seven other items were referred to subcommittees of the engineering group for additional study.

► **Prefer Usual Channels**—In effect, the industry's transport committee is asking that the CAA policies report material be absorbed in the usual CAA policy or CAB regulatory channels if government/industry conferences agree they have merit and should be added to existing policies and/or regulations.

But the industry group is worried about having the CAA policies report revised or continued in existence as a separate set of quasi-regulations. To use such policies as a basis for type certification would not be sound legally, it is argued. And it makes a potential source for confusion in the CAB Part 4B requirements for transport planes.

If the report gets quasi-official status through continued use, it provides a place for inserting new rules not necessarily approved by the industry or CAB or of proven value, as demonstrated by CAA in conference.

► **Old Problem**—Washington observers say the industry has been working for more than a year to get a unified viewpoint between unofficial statements made by former administrator Horne and the two official CAA groups—the special turbine transport team and the Office of Aviation Safety, which is the normal industry contact for regulation and certification.

Under-the-surface conflicts between the turbine transport committee and technical people left behind in OAS are not easing the industry's unification problem at CAA.

What industry wants is a united CAA front on a jet transport regulatory basis with one viewpoint instead of three, a representative of another leading transport company told AVIATION WEEK.

Although the CAA policies document is described as "material for discussion," it has been revised twice, and people in the transport manufacturing industry feel it is now being treated as a voluminous quasi-official supplement to the existing CAR Part 4B. Industry does not feel that very much needs to be done to Part 4B as it now exists to make it applicable to jet transports.

However, if the CAA Turbine Transport Committee confined its activities to collecting and giving out information on jet operating experience in the U.S. and abroad and to proposing special design problems for industry consideration, many industry engineers would welcome its assistance, AVIATION WEEK is told.—**A.McS.**

French Missile

(McGraw-Hill World News)

Paris—The French have successfully tested a new guided missile at level flight speeds of approximately 1,100 mph. at an Air Force test range in North Africa.

The missile was built by Societe Matra and is designated the M. 04. Powerplant is a SEPR rocket produced by Societe Pour l'Etude de la Propulsion par Reaction which reportedly turned out 2,750 lb. thrust for approximately 14 sec.

Although most details of its construction and performance are classified secret, the M.04 is known to be all-metal, approximately 15 ft. long and 16 in. diameter. It has a wingspan of 5 ft. 10 in. Takeoff weight is 1,012 lb. and empty weight is 770 lb.

AVIATION CALENDAR

Apr. 20-24—Aeronautic Production Forum, National Aeronautic Meeting and Aircraft Engineering display (SAE), Hotel Governor Clinton and Hotel Statler, New York.

Apr. 20-May 2—Annual Conference of Technical Committee, International Air Transport Assn., Caribe Hilton Hotel, San Juan, Puerto Rico. Helicopter Symposium will be a principal feature.

Apr. 21-24—SAE Committee A-6, Aircraft Hydraulic and Pneumatic Equipment meeting, Governor Clinton Hotel, New York, N. Y.

Apr. 25-May 2—First annual National Transcontinental Handicap Air Cruise for private planes of 300 hp. or less, Philadelphia to Palm Springs, Calif., sponsored by Philadelphia Junior Chamber of Commerce.

Apr. 27-28—Iowa Thermodynamics Symposium, State University of Iowa, Iowa City.

Apr. 29-May 1—1953 Electronics Components Symposium (AIEE-IRE) Shakespeare Club, Pasadena, Calif.

May 6-7—Second annual Skylady Derby, sponsored by Women's National Aeronautical Assn., sanctioned by NAA and conducted under FAI rules. From Fort Smith, Ark., to Memphis, St. Louis, Kansas City and return to Fort Smith. WNAA's twenty-fourth annual convention will follow at Fort Smith.

May 8-10—Oklahoma City Air Fair, Will Rogers Field, Oklahoma City, Okla.

May 11-13—National Conference on Airborne Electronics, Dayton Biltmore Hotel, Dayton, O.

May 14-16—American Helicopter Society Forum, Mayflower Hotel, Washington, D. C.

May 15—Air Youth Day, Los Angeles International Airport.

May 16—Armed Forces Day, open house programs at local USAF, Navy, Army, Marine and Coast Guard installations.

May 18-22—Fifth National Materials Handling Exposition, Convention Hall, Philadelphia.

May 18-22—Aviation Seminar, National Fire Protection Assn. annual meeting, Palmer House, Chicago.

May 19-22—Annual convention Aviation Writers Assn., Ft. Worth, Tex.

May 20-22—IAS, AIEE, ISA and IRE joint National Telemetering Conference, Edgewater Beach Hotel, Chicago, Ill.

June 11-13—Fifth annual All-Women International Air Race, Weeland, Ont., to New Smyrna Beach, Fla., sponsored by Ninety-Nines, Inc.

June 17-19—Mid-year meeting of Aviation Distributors and Manufacturers Assn., Chateau Lake Louise, Alberta, Canada.

June 9-11—Second International Aviation Trade Show, Hotel Statler, New York.

July 15-16—IAS Annual Summer Meeting, Honors Dinner. IAS Building, Los Angeles, Calif.

Sept. 5-7—National Aircraft Show and 50th anniversary of powered flight, Dayton (Ohio) Municipal Airport.

Sept. 7-13—1953 SBAC Coronation Year Flying Display, Farnborough, Hampshire, England.

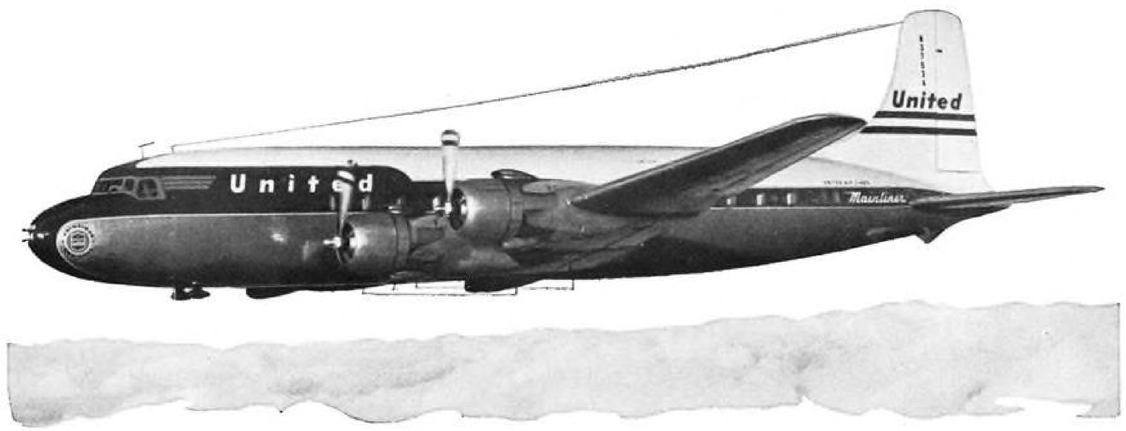


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Jet Bomber vs Jet Transport

Boeing Airplane Co. and the Air Force have built up more than 9,000 flight hours on multi-jet B-47 and B-52 sweptwing bombers, and there isn't too much left to learn about their high subsonic speed operations.

That is what John A. Fornasero, Boeing flight test director, told members of the Air Line Pilots Assn. Air Safety Forum at Chicago recently.

Admitting that the bombers use wing loadings greater than would be good practice for turbine transports, Fornasero indicated that in many other respects operational problems are similar and that "no superman" is needed to fly either type.

He sees the practical speed limitation of the jet transport in the immediate future as around Mach 0.75 to 0.82. Above this range much higher powers are required, and problems of pitchdown, pitchup and buffeting must be considered.

High-altitude operation requires that doors, windows, etc., be built as sturdily as the basic structures of the airplane, Fornasero said, but Boeing's bomber structural experience makes company engineers confident they can build a transport to "stay pressurized."

Within four to five years, he predicts, jet engines will be as good maintenance-wise as the better piston engines, and better than many piston engines.

Army Planning New Helicopter Designs

Army Transportation Corps plans its first independent new design competitions next year for a reconnaissance helicopter and for a larger utility helicopter, Col. William B. Bunker, chief of Army's Air Transportation Services Division disclosed recently at St. Louis.

Army's Bell H-13 and Hiller H-23 helicopters now used are large and expensive for reconnaissance and too small for utility, Col. Bunker stated, but they can perform both missions until better replacements are found. These and other Army helicopters now in use were not designed for Army requirements.

► **Cargo Helicopters**—He reviewed Army needs for 1½-ton, 3-ton and 5-ton cargo helicopters. Sikorsky H-19s now in use will be supplemented next year with Piasecki H-21s, and procurement of larger helicopters now under construction by Sikorsky and Piasecki, presumably the H-16 and S-56, is planned. But procurement of large 5-ton copters must await further development, probably several years, he forecast.

Proposing simplified construction of cargo helicopters by using large panels, uniform shapes and production-line assembly, Bunker advocated accepting some weight penalties to get production costs down to improve powerplant and transmission reliability.

"What we need in the rotary-wing field," he summarized, "is an aircraft with the characteristics of the dependable Model-T Ford and the DC-3."

► **Convertiplanes**—A convertiplane transport with a flight speed comparable to that of current fixed-wing planes is seen as an ultimate necessity for continued growth of commercial air transport.

As a military vehicle of the future, Bunker said the convertiplane will not replace high-performance aircraft, but may become useful as a transport and an assault vehicle.

Its use for observation and reconnaissance will depend upon its relative efficiency, compared with other craft; but he does not think the convertiplane will pay off as a cargo carrier, as compared to cargo helicopters, because of greater initial cost.

In any case, Col. Bunker pointed out, the convertiplane will have to offer a real measure of advantage over helicopter and fixed-wing craft, including a speed of at least 300 knots and landing requirements of not more than a few hundred yards.

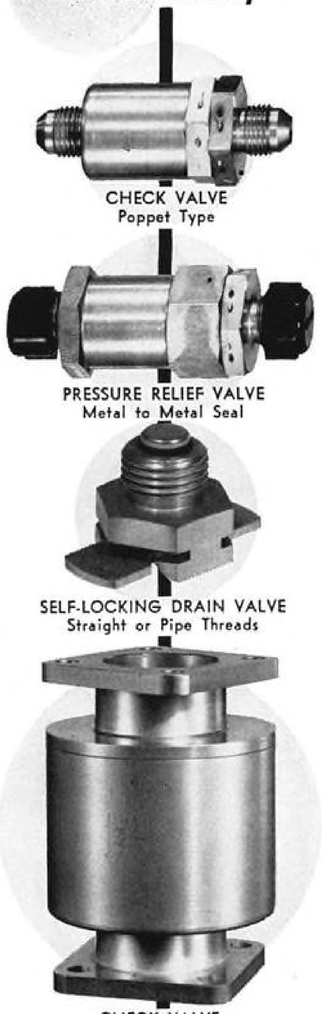
► **Fixed-Wing Status**—The Army spokesman expects replacement within the next few years of the Cessna L-19 by a higher-performance plane, if one can be provided without sacrifice of the Bird Dog's short field and slow cruising speed performance. The de Havilland Beaver L-20 is meeting requirements in U. S. and Korea and is not scheduled for modification or replacement. The Beech L-23 Twin Bonanza is satisfactory as a command transport, except that more passenger capacity would be desirable.

Future Army operations look to the helicopter to restore field mobility, which has deteriorated because of dependence of surface vehicles on improved highways for delivery to the point of enemy contact, he said.

Air Force Rotates Three Commands

Maj. Gen. Samuel E. Anderson, commanding general of the Eighth Air Force, Strategic Air Command, will be re-assigned to command the Fifth Air

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Force in Korea next month, USAF announced last week. He replaces Lt. Gen. Glenn O. Barcus, who has commanded the Fifth AF since May 1952.

Maj. Gen. John B. Montgomery, operations director of SAC, will replace Anderson as commander of the Eighth AF at Carswell AFB, Ft. Worth, Tex. Gen. Montgomery will be replaced by Maj. Gen. Archie J. Old, Jr., deputy operations director, SAC. USAF has not announced a replacement for Old.

These moves are in line with Air Force's policy of rotating combat assignments for officers.

Eastern, United Report Salaries

Salaries, compensation and stock holdings of officials of Eastern Air Lines and United Air Lines as reported to Civil Aeronautics Board show that EAL president-general manager E. V. Rickenbacker and UAL chief executive W. A. Patterson held the line when compared with appreciable increases allowed by other carriers in 1952. Salary reports for American Airlines and Trans World Airlines officials were given in AVIATION WEEK, Apr. 13, p. 68.

Eastern Air Lines

Following is reported compensation, with comparable 1951 figures shown in parentheses:

E. V. Rickenbacker, president-general manager and director, salary $50,000 (same), other compensation $13,283 ($13,022), owns 103,550 shares common stock (same); P. H. Brattain, first vice president and director, salary $30,000, other compensation $6,596 ($6,626), owns 19,000 shares; S. L. Shannon, second vice president and director, salary $27,500, other compensation $4,875 ($4,878), owns 8,000 shares; T. F. Armstrong, secretary-treasurer and director, salary $21,875 ($20,000), other compensation $3,967 ($3,816), owns 2,508 shares; L. P. Arnold, vice president, salary $22,500, other compensation $3,527 ($3,402), owns 3,600 (2,600) shares; M. M. Frost, vice president, salary $25,000, other compensation $2,730 ($2,628), owns 1,300 (300) shares; C. Froesch, vice president, salary $10,900 ($10,550), other compensation $1,973 ($1,884), owns 905 (805) shares; J. H. Brock, vice president, salary $17,500, other compensation $2,200 ($2,147), owns 903 (803) shares; W. Van Dusen, vice president, salary $18,750 ($13,750), owns 2,200 (700) shares; T. E. Creighton, assistant secretary, salary $9,083 ($7,625), other compensation $616 ($504), owns 60 (20) shares; F. L. Farley, assistant treasurer, salary $10,900 ($9,775), other compensation $1,117 ($1,005), owns 1,056 (956) shares; W. R. Blackwood, controller, salary $12,500 ($2,000).

Other directors: E. R. Cook, $100 ($400), owns 3,175 shares; J. M. Cox, Jr., $300 ($400); P. M. Davis, $100, owns 2,800 shares; G. B. Howell, $400, owns 500 shares; H. Knowlton, $900 ($400), has 100 shares beneficially (none); G. H. McCarthy none ($100); W. L. Moore, $600 ($500), owns 400 shares; S. Peabody, Jr., $500 ($600), owns 1,100 (700) shares; P. E. Reinhold, $500 ($600), owns 1,500 shares; L. S. Rockefeller, $800 ($500), owns 75,000 shares.

The company has no stock options outstanding.

Persons other than company officials re-



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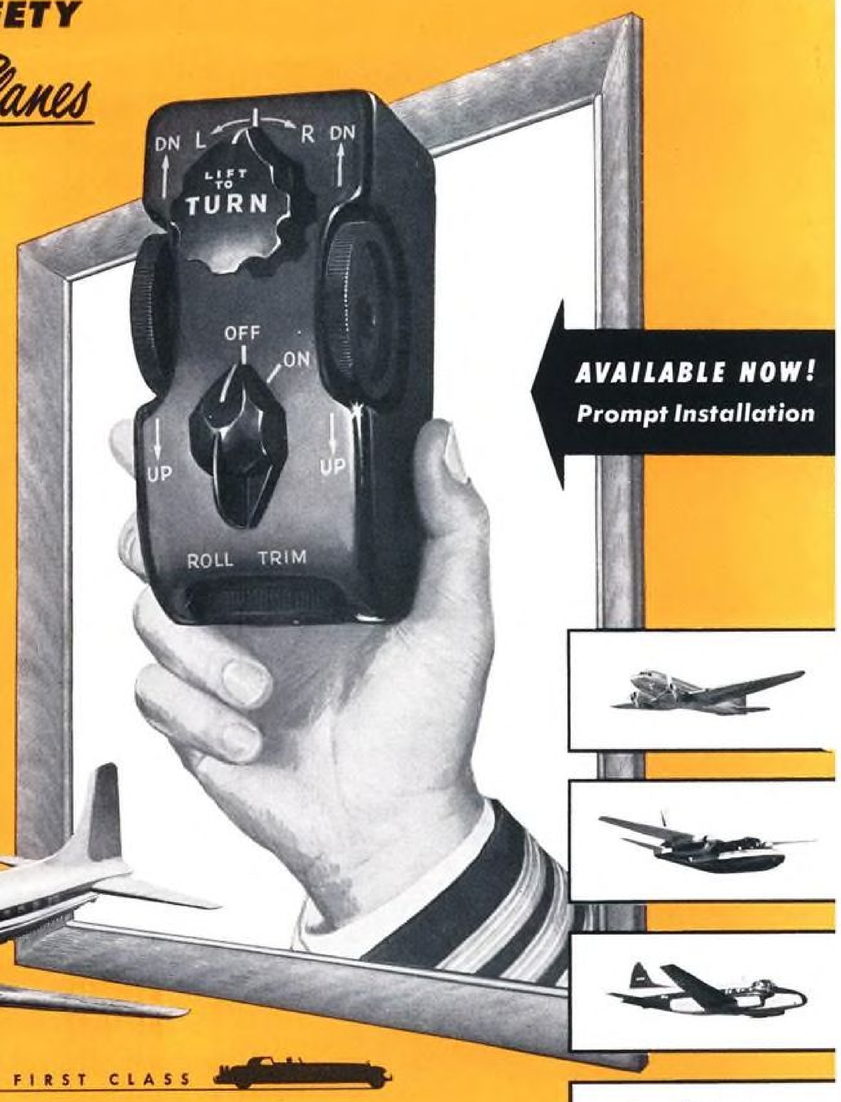
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ceiving more than $10,000 are: Gambrell, Harlan, Barwick, Smith & Russell, $100,000 (same) for legal services; and Price Waterhouse & Co. $18,000 (same) for auditing services.

Only interest reported holding 5% or more of outstanding capital stock Dec. 31, 1952 is the firm of Merrill Lynch, Pierce Fenner & Beane with 133,386 shares common stock, or 5% of the total (no person held 5% Dec. 31, 1951).

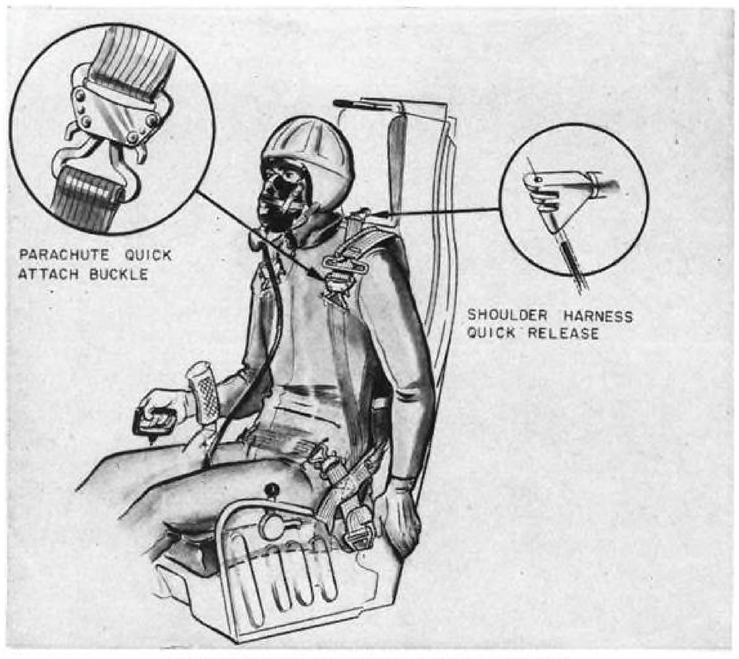
United Air Lines

United Air Lines report reveals that while president W. A. Patterson had no change in his $82,000 compensation, payments to other officials varied from moderate increases to slight salary cuts. United paid about $1.25 million to outside firms for special services during the year, including $585,592 underwriter fees on new financing.

William A. Patterson, president and director, salary $75,000 (same), other compensation $7,547 ($7,209), owns 6,667 common shares and has 315 (342) shares beneficially; Otis E. Kline, executive vice president and director, salary $45,000 ($31,917), other compensation $2,848 ($1,922), owns 7,700 (7,500) shares; J. A. Herlihy, vice president-engineering & maintenance, and director, salary $42,000 ($45,667), other compensation $3,471 ($3,625), owns 2,968 shares; D. F. Magarrell, vice president-transportation service, salary $30,000 ($26,667), other compensation $2,243 ($1,898), owns 1,080 shares; D. R. Petty, vice president-flight operations, salary $25,000 ($6,250) other compensation $1,853 ($499); Harold Crary, vice president-sales, salary $20,000 ($20,667), other compensation $3,882 ($3,428), owns 3,400 shares; Hal E. Nourse, vice president-economic controls, salary $22,000 ($20,667), other compensation $2,025 ($6,609), owns 1,080 shares; R. F. Ahrens, vice president-personnel, salary $22,000 ($20,667), other compensation $1,849 ($1,654), owns 752 (802) shares and has 50 (200) shares beneficially; R. W. Ireland, vice president-traffic administration, salary $22,500 ($21,679), other compensation $3,032 ($2,885), owns 1,045 (2,045) shares; Curtis Barkes, vice president-finance and property, salary $22,000 ($20,667), other compensation $1,619 ($1,450), owns 451 common and 41 (none) preferred; R. E. Johnson, vice president-assistant to president, salary $21,000 ($14,467), other compensation $1,409 ($905), owns 550 (650) shares; S. P. Martin, secretary and assistant to president, salary $13,400 ($12,900), other compensation $991 ($910), owns 500 (600) shares; R. E. Bruno, (new) comptroller, salary $6,000, other compensation $260; C. E. Blanchar, comptroller, salary $10,400 ($14,400), other compensation $500 ($751); A. M. Devoursney, treasurer, salary $12,000 ($10,480), other compensation $615 ($506).

Other directors: Martin C. Ansorge, salary $1,200 ($800), owns 500 (1,172) shares; H. Templeton Brown (new), salary $1,100, owns 100 shares; Gardner Cowles, salary $1,000 ($500), owns 9,200 (100) shares (had 5,900 beneficially); Justin W. Dart, salary $900 ($700), owns 20,000 (15,406) shares (had 4,594 beneficially); Paul G. Hoffman, salary $200 ($400), has 165 (136 shares beneficially, had 7 preferred); Eric A. Johnson, salary $800 ($300), owns 1,000 shares common and 100 preferred (none); John J. Mitchell, salary $1,100 ($600), owns 4,202 shares.

Persons other than company officials receiving more than $10,000: Arthur Anderson & Co., $29,019 ($33,037) audit; American Institute for Research, $17,990 pilot testing; H. J. Brunnier, $36,475 ($41,937) engineering service; Clinton Aviation Co., $54,954 flight and ground service training;



NEW LIGHTWEIGHT FLIGHT SUIT

This nylon coverall flying suit developed by Douglas Aircraft Co., El Segundo in cooperation with the Navy features built-in chute and shoulder harnesses and seat belt, thus eliminating bulkiness of former types. A new lightweight form-fitting back-type chute also has been developed. Details of the chute's attach buckle and shoulder harness release are shown enlarged for better clarity. Total weight of the new equipment, including less bulky oxygen supply tube is 12 lb. lighter than present standard gear.



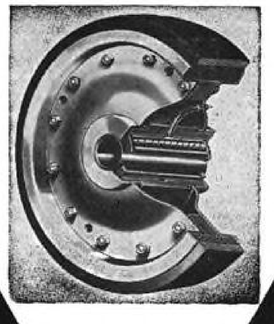
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Haight-Deming-Gardner-Poor & Havens, $73,553 legal services; Harden-Hess & Eder $10,075 legal services; Harriman Ripley & Co. $585,592 underwriters fees; Mayer-Meyer-Austrian & Platt, $263,068 ($153,522) legal services; Office Assistants, Inc. $11,199 clerical service; James Francis Reilly $35,497 ($26,667) Washington legal council; Treadwell & Laughlin, $15,766 legal service; Trippet, Newcomer, Yoakum & Thomas, $15,563 legal service; Cornell Aeronautical Laboratory, $22,042 experimental service; Industrial Relations Centers, University of Chicago $28,110 employe attitude survey; Flight Safety Foundation $16,000 flight safety research; Young & Richardson, Carleton & Deltie $11,361 ($10,000) engineering service.

Only interest holding 5% or more of outstanding stock is the firm of Merrill Lynch, Pierce, Fenner & Beane with 194,944 (157,779) shares common stock, 8% (7%) of total.

Company has no stock options outstanding.

National Aircraft Show is Planned

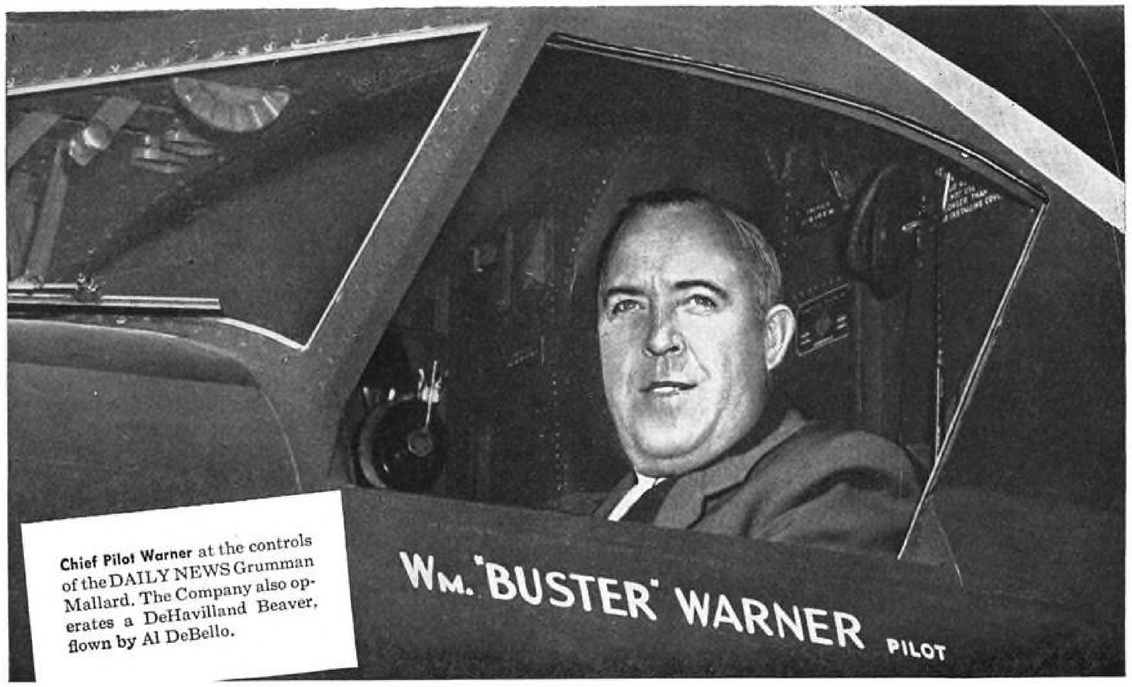
The 1953 National Aircraft show at Dayton Sept. 5-7 will combine the National Air Races with one of U.S. aviation's larges ground displays, Frederick C. Crawford, executive committee chairman, has announced.

The show will honor the 50th anniversary of the first powered flight by the Wright Brothers.

In addition to Crawford, president of Thompson Products, Inc., other members of the NAS executive committee include: Maj. Gen. A. A. Boyd; Oliver P. Echols, Northrop Aircraft, Inc.; Malcolm P. Ferguson, Bendix Aviation Corp.; Herbert P. Ladds, National Screw & Manufacturing Co.; Carl A. Lange, Apex Machine & Tool Co.; Rear Adm. T. C. Lonnquest; Max M. Monroe, General Motors Corp.; Walter F. Munford, American Steel & Wire Division, U.S. Steel Corp.; E. B. Newill, GM Allison Division; Mundy I. Peale, Republic Aviation Corp.; D. C. Ramsey, Aircraft Industries Assn.; Lt. Gen. Rawlings; C. J. Reese, Continental Motors Corp.; A. A. Stambaugh, Standard Oil Co. (Ohio); Charles M. White, Republic Steel Corp., and J. D. Wright, Thompson Products.

Overhaul Companies Form Trade Group

The Aircraft Service Assn. (TASA), a group of overhaul and modification companies recently organized to discuss mutual problems with federal government, has reported to defense agencies and CAA that members have: a $112-million investment, 54-million manhour capacity per year, and 22 million sq. ft. working area, including 3,500,000 sq. ft. of hangar, shop and warehouse space. TASA address is 2940 N. Hollywood Way, Burbank, Calif.



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CHIEF PILOT, NEW YORK DAILY NEWS

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For horizontally opposed and Ranger in-line engines. Minimizes ring- and valve-sticking, oil consumption, oil-screen clogging, and plug-fouling. Users have actually increased periods between engine overhauls as much as 100%.

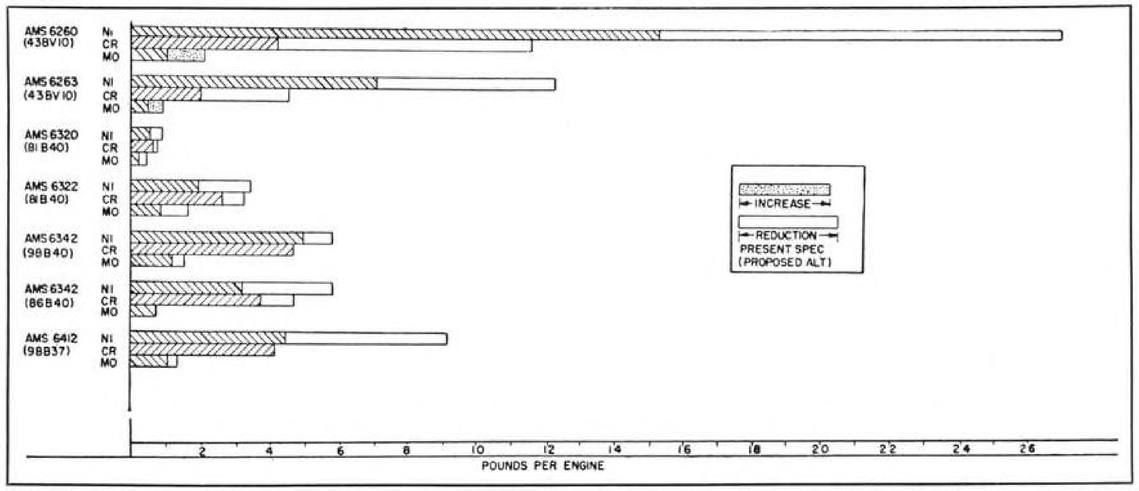


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STRATEGIC MATERIALS in the Wright Turbo Compound engine could be saved by replacing standard grade low-alloy steels with non-strategic boron grades (shown in parentheses under presently used steel, column at left). Horizontal bars, including white areas, show poundage of metals in standard alloys. White areas represent the reduction alternate materials would permit. Dotted areas show increase.

Industry-Government Meeting Hears . . .

What to Do About Materials Shortages

Critical metals can be replaced, design layout can be revised, shop waste can be controlled.

By Irving Stone

The vital need for conservation in all its forms—from manpower and materials down to a close combing for waste reclamation—is one of the problems pressing for top attention of aircraft designers and engineers.

▶ **Swap Ideas**—The urgency of the situation was pointed up last month, when the Air Force sponsored the first exchange of ideas on conservation among industry members on the East Coast.

Air Materiel Command's Eastern and Northeastern Air Procurement Districts brought together in New York almost 500 representatives of government, management and engineering activities to reveal the scope and ramifications of conservation, with the aim of getting more Air Force per dollar, and study how to save on critically short items.

While material conservation is only one phase of the over-all conservation picture, it is one which directly affects the aircraft and engine activities. Not only are the materials consumed by these activities expensive, but these two industry segments probably constitute the largest consumer of some of the materials that are in shortest supply.

That is why the use of alternate (substitute) materials can play a big part in boosting the over-all potential of aircraft and engine production.

▶ **Engine Approach**—An indication of how these alternate materials can be applied in engine makeup was revealed by J. M. Kelso, conservation engineer with Curtiss-Wright Corp.'s Wright Aeronautical Division.

Wright Aero's conservation program originates in the engineering department and functions through a committee which includes membership from other departments. The company is firmly convinced that a major contribution to the conservation effort can have its beginning at the design layout and drafting board stages.

This emphasis on the engineering phases does not mean that other conservation phases are ignored—it merely establishes the philosophy that if something does not have to be incorporated into the engine, this detail never reaches the production floor.

▶ **Additional Weeding**—The parts that make up Wright's various engine models have been under constant surveillance with respect to downgrading of their alloy content.

During World War II, Wright made full use of the NE (national emergency) or triple-alloy grades (low chromium-nickel-molybdenum) in hundreds of parts. This was done, Kelso says, after exhaustive laboratory tests indicated no detrimental change in physical characteristics and after many hundreds of hours of experimental engine tests had confirmed the lab results. These leaner alloys are still in wide usage.

As a further step in this direction, he claims, the use of non-strategic boron-intensified steels in both through-hardening and carburizing grades offer still further reduction in alloy content. On Wright's Turbo Compound engine, studies for proposed replacement of the standard grades of steel by the boron grades as alternate materials indicate considerable alloy savings.

Thus, replacing AMS 6260 with 43BV10 in particular applications will reduce nickel content about 12 lb. per engine, chromium content by approximately 7 lb., while boosting the molybdenum content per engine by about 1 lb. (see chart, above).

Another big saving would result by using the 43BV10 material for the engine's AMS 6263—cutting the nickel content per engine by about 5½ lb., the chromium by about 2½ lb., while molybdenum would increase only about one-half pound.

COMPONENT	NI	CR	W	CB	CO
1. COMPRESSOR ROTOR	2.5	6.9			
2 COMPRESSOR STATOR	2.9	14.3			
3 CENTER MAIN BRG. SUPPORT	13.5	1.0			
4 BURNER PLATE ASSY	8.1	2.9			
5 COMBUSTION CHAMBER	10.5	24.0	16.0		
6 TURBINE ROTOR	17.0	6.8			
7 TURBINE STATOR	34.8	21.9	38.0		
8 MAIN BEARINGS			24.0		
9 EXHAUST CONE	7.7	16.2	22.0		
10 MISCELLANEOUS	3.0	6.0		100.0 (WELD ROD)	

DISTRIBUTION OF STRATEGIC metals, percentagewise, in some Wright J65 components. Tables like this indicate targets for substitution of alternate materials.

Replacing AMS 6412 with 98B37 would cut nickel per engine by about 4 lb. and molybdenum by a little more than one-quarter pound.

▶ **Parts Involved**—Some of the major parts affected on the Turbo Compound are the articulated connecting rods (98B37 or 98B40 replacing AMS 6412); crankcase (98B37 or 98B40 for AMS 6342); piston pin and accessory drive gears (43BV10 for AMS 6260); and cylinder barrel capscrew (81B40 replacing AMS 6320).

On Wright's J65 Sapphire, alternate materials are applicable to these major parts: compressor rotor shroud (81B40 replacing AMS 6412; compressor rotor disk (98B40 for AMS 6342); and turbine and compressor rotor shafts (98B37 or 98B40 replacing AMS 6412).

Almost all the boron steel intended for prototype testing of representative parts on the Turbo Compound and the J65 has been procured. A good portion of the forgings are fabricated and the bar stock parts are now in the process of being machined.

▶ **Example of Savings**—Kelso pointed to the small turbine wheel hub of the Turbo Compound engine as an excellent example of strategic alloy savings.

The original design specified Inconel-X, a nickel-base alloy with about 15% chromium, 2½% titanium and 1% columbium. Modification of the design has resulted in a decrease in operating temperature to a point permitting the use of a heat-resistant material containing only 1¼% chromium and ¼% vanadium.

Several of these wheels have successfully completed hundreds of hours of experimental testing and the change looks very promising as a production application. This hub forging weighs about 14 lb., and with three per engine, the saving in strategic material would be considerable.

Several of Wright's reciprocating engine models incorporate a fuel injection system with lines extending from pump to cylinders. Originally, the tubing spec permitted the use of AISI 347, columbium-stabilized 18-8 stainless steel.

To conserve columbium, the material was changed to AISI 321, the titanium-stabilized grade. A subsequent change to AISI 304 with controlled carbon composition (.06 max.) is now specified. By holding the carbon content at this figure, brazed assemblies do not exhibit harmful carbide precipitation.

▶ **Jet Change**—When Wright first started to build the J65, the design specified that certain flanged rings at the mid and rear portions of the engine be made from heavy, pot-type centrifugal castings of a high chromium-nickel-tungsten alloy. The castings required radiographic examinations to insure quality, machining operations were time-consuming, costly. The finished rings were only a fraction of the original casting weight.

Redesign now calls for a ring with greatly reduced cross-section, fabricated from a mill-rolled and butt-welded bar of a less strategic chromium-nickel analysis. This means less expense, machining and inspection to get finished parts which are in every way equivalent from an engine performance standpoint, Kelso claims.

▶ **Engine Analysis**—Some of the more highly alloyed jet components were examined by Kelso to see what might be done to attain material conservation.

The trend in compressor design is



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NO. 1607
LOCK ASSEMBLY

This flush-type exterior lock has been designed for use in a turbo-prop transport. Withstands pressure of 18.5 PSI and provides positive security with rugged convenience. Button releases handle which rotates in either direction to open. Inside handle supplied. Length 9⅛" overall. Weight approximately 2 pounds.



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Four pin-tumbler construction for use on one of latest flying boats. Although not pressurized, this cylinder is made throughout of solid stainless steel for salt water exposure and is used on a pressurized door.

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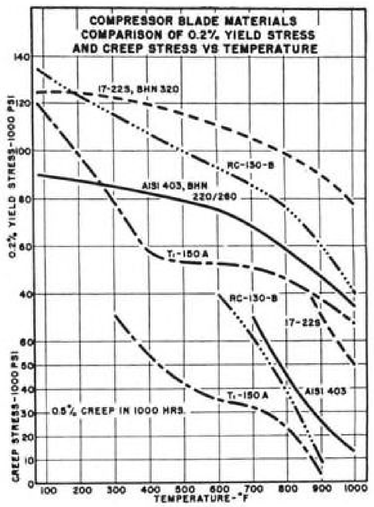
toward higher compression ratios, hence higher operating temperatures. Concurrently, every effort is made to keep the rotating weight at a minimum.

To satisfy these demands, two materials appear to have the necessary qualifications over the stainless grade AISI 403) now in use for compressor blading, Kelso reports. One of the grades of titanium alloy exhibits satisfactory yield and creep stress up to operating temperatures of 700-800F.

In the 800-1,000F range, low alloy 17-22S shows good yield and creep stress properties, but suitable coating would have to be used to protect against corrosion.

▶ **Combustion Chamber**—In the combustion chamber housing, design considerations call for sheet metal construction with necessary formability and weldability plus adequate strength at operating temperatures to permit minimum thicknesses compatible with freedom from wrinkling and distortion inherent in the use of thin sheet.

If provision is made for cooling the housing with secondary compressor air, Kelso says, low-alloy 17-22S is a possible alternate material, based on its mechanical properties over that of AISI 321 presently specified. Here again, protection must be provided against corrosion.



▶ **Tailcone Alternate**—The tailcone—another sheet assembly—is subjected to thermal stresses and fatigue loads. At present, a material similar to AISI 310 is used.

The proposed alternate is a carbon steel, ceramic-coated. This non-strategic steel is selected because it provides greater heat conductivity, while the ceramic coating adds damping properties, hence better fatigue resistance.

Kelso sees the metallurgical-design engineering team as a key factor in the success of the strategic material conservation program.

▶ **Martin Action**—Highlights of conservation procedures at the Glenn L. Martin Co. were outlined by H. B. Gunther, head of the organization's manufacturing section. Martin's full scale coverage centralizes four main segments of conservation under a single section, called Manufacturing Services. This setup embraces manufacturing liaison, material review, a change board and basic conservation and reclamation activities.

- **Manufacturing liaison,** an assist organization to factory activities, contributes directly to savings through improvement in tools and methods, and whittles manhours by assuming full responsibility for factory problems, thus releasing the supervisor for his production projects.
- **Materials review** closely checks rejected parts to determine remedial action for the prevention of further rejects. In some instances, this activity salvages rejected parts by determining a repair method to prevent total loss of manhours and material involved.
- **Change board** checks on material on hand, its availability and proper sequencing of steps for economical incorporation of changes with least disturbance.
- **Conservation and reclamation** deals more directly with the business of con-

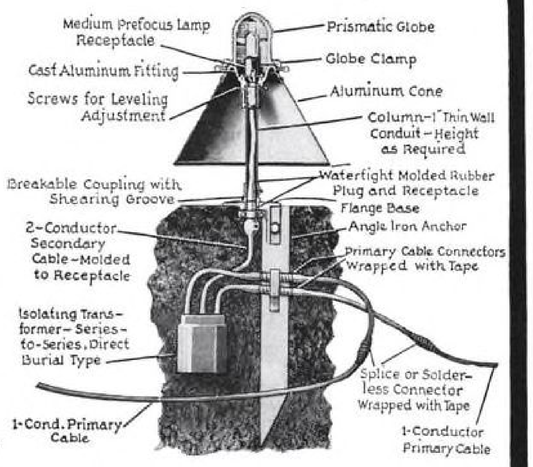
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Crouse-Hinds type ERL Elevated Marker Light with transformer housing

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Specifications L-802 and L-822



Style A Mounting, as illustrated above, consists of surface flange and 30-inch anchor stake, with a direct earth burial type transformer. This provides the simplest and most economical installation.

Style B Mounting is illustrated in the assembled view at the left. It consists of a base plate and gasket to fit transformer base housings. It is used for converting existing flush marker light fixtures to ERL fixtures or for new installations at large airports or wherever a first-class wiring installation is desired. This mounting provides maximum accessibility of the transformers and connections and will save considerable time in case of wiring difficulties.

Style C Mounting is for multiple circuits and consists of a junction box with a hub cover on top, two squeeze connectors for through-feed cables at the bottom, and a 30-inch angle iron anchor. This mounting is especially useful for short runways and for taxiway lighting.

Style D Mounting consists of an integral cast Feraloy base housing and transformer complete with anchor stake.

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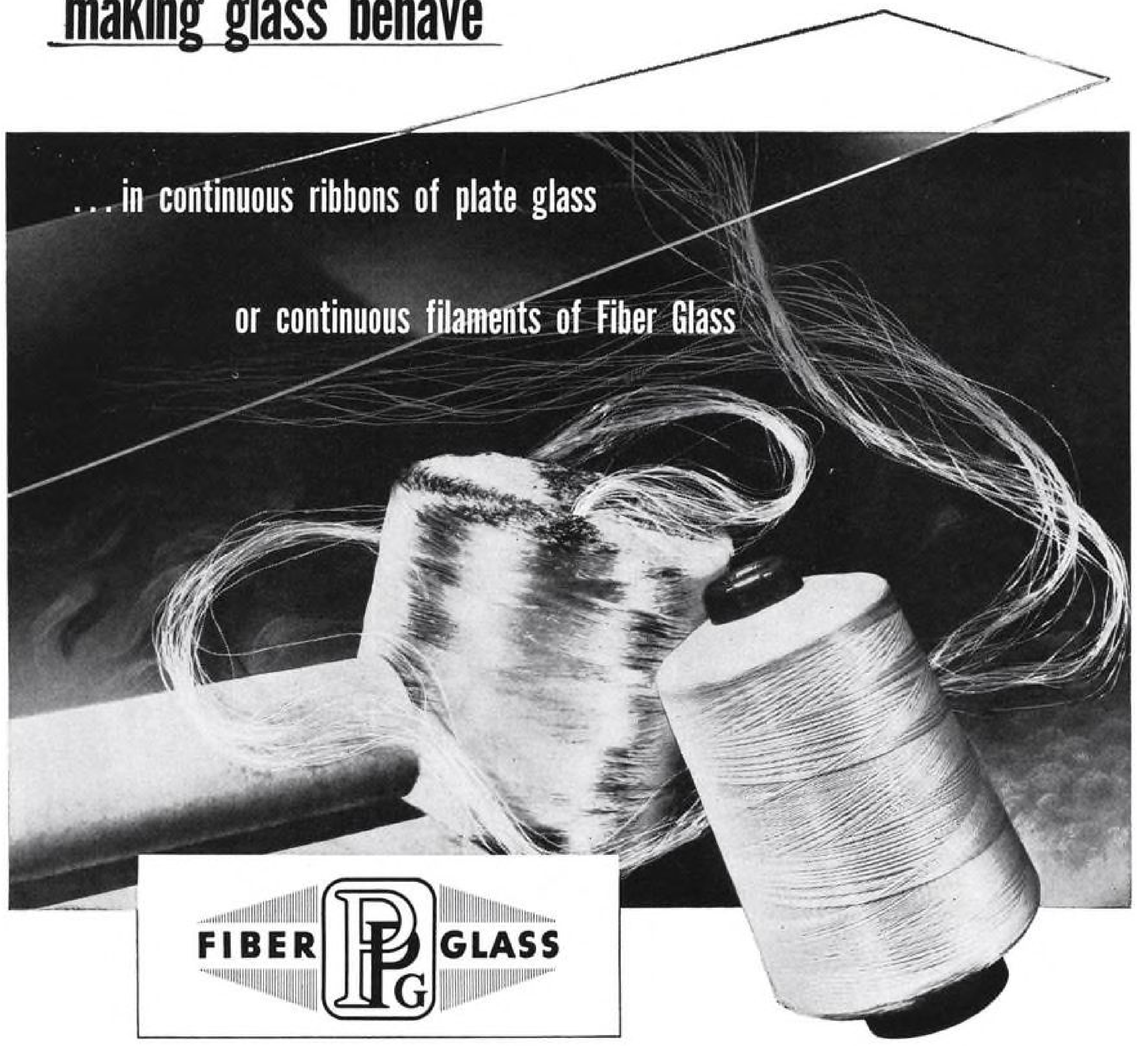
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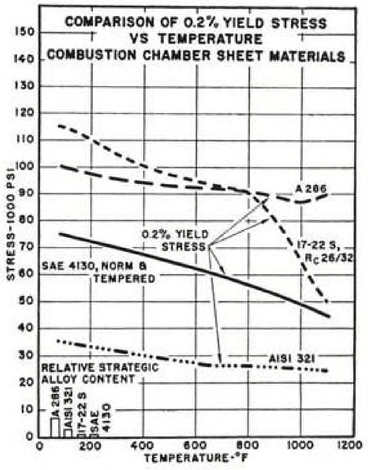
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serving in the general sense. This activity coordinates the various segments of conservation. It introduces training methods through committee meetings and individual contacts and maintains statistics on new approaches to conservation, furnishing reports to management. As a reclamation group, the activity serves as a stop-gap to prevent total loss of many items of equipment and material through segregation and return to use when requirements exist.

► **Floored Hardware**—Reclamation at Martin does a big job to minimize floored hardware—saving rivets and miscellaneous items from floor sweepings.

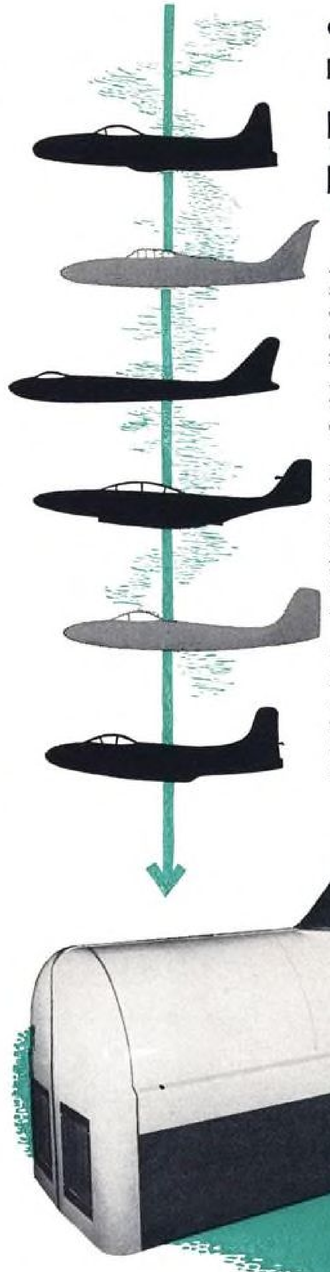
A simple system has been devised, whereby the operator is provided with a small, divided-compartment box holding enough rivets for a particular job. When rivets become mixed or other sizes are required, the operator returns the tray to a central supply rack and selects another tray for his needs. This rack also holds Cleco clamps so that the operator can get them the same way he obtains his rivets.

A space at the rack bottom accommodates empty and mixed-rivet trays and periodic checks by an attendant assures continual rivet supply and minimizes snowballing of mixed items at the central station.

This rack system has so reduced Martin's rivet losses, Gunther claims, that it is no longer economical to sort the small quantity of rivets picked up in the floor sweepings.

► **Bolt, Nut System**—Martin stores more than 7,000 different items of bolts, nuts and other standards in open bins adjacent to the areas where they are required. Operators are never allowed to return parts or mixed units to these bins, but containers are provided nearby for overages and mixtures.

Janitors dump floor sweepings into a screen-topped 55-gal. drum, remove the trash from the mixture, sieve the dust through and dump the residue into



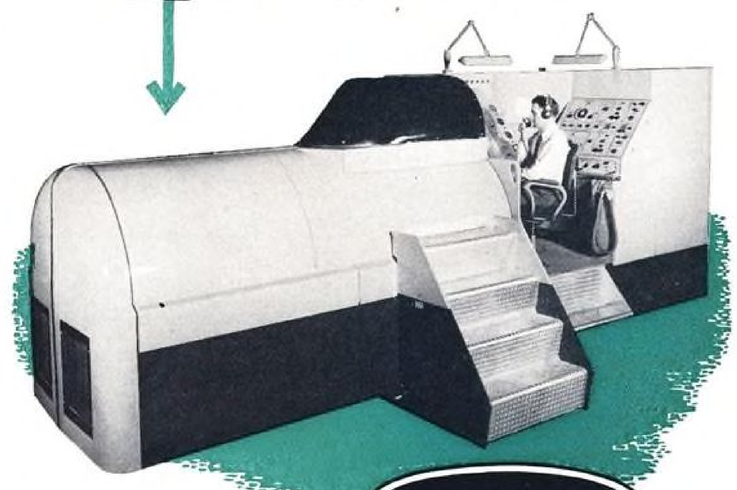
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The New EASE Computer, now manufactured by Berkeley Scientific is specifically designed to meet the growing demand for an Analog Computer which is low in cost and yet flexible enough to be successfully utilized by design engineers in every industrial, military, research and educational group working on problems of dynamics.

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By far the lowest priced quality instrument in the field, the EASE Computer is the ideal equipment for use as an equation solver, simulator or tester. The unitized design employing compact rack-mounted components permits the user to select a custom computer which meets his particular requirements.

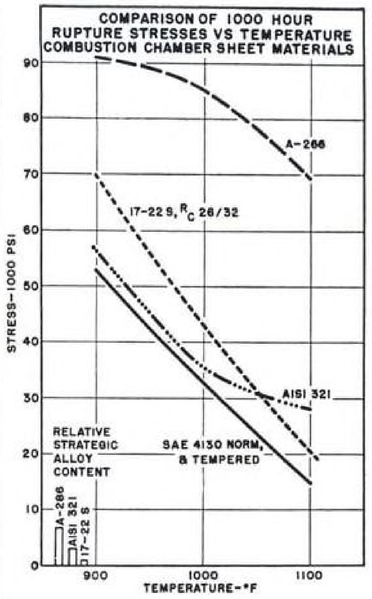
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M-8



small containers for transmittal to the parts-sorting area. This eliminates the chance of bolts and other items with damaged threads getting back into circulation.

Perhaps 90% of material conservation can be achieved by starting in product design, according to G. T. Willey, Martin's vice-president, manufacturing. But for best effectiveness, he claims, conservation must be adopted as a working philosophy, actively practised by management, and continued down through the plant, right to the shop floor.

► **Order Stressed**—Industrial housekeeping is rated as one of the major conservation factors by George W. Lescher, administrative assistant to management at Fairchild Aircraft Division.

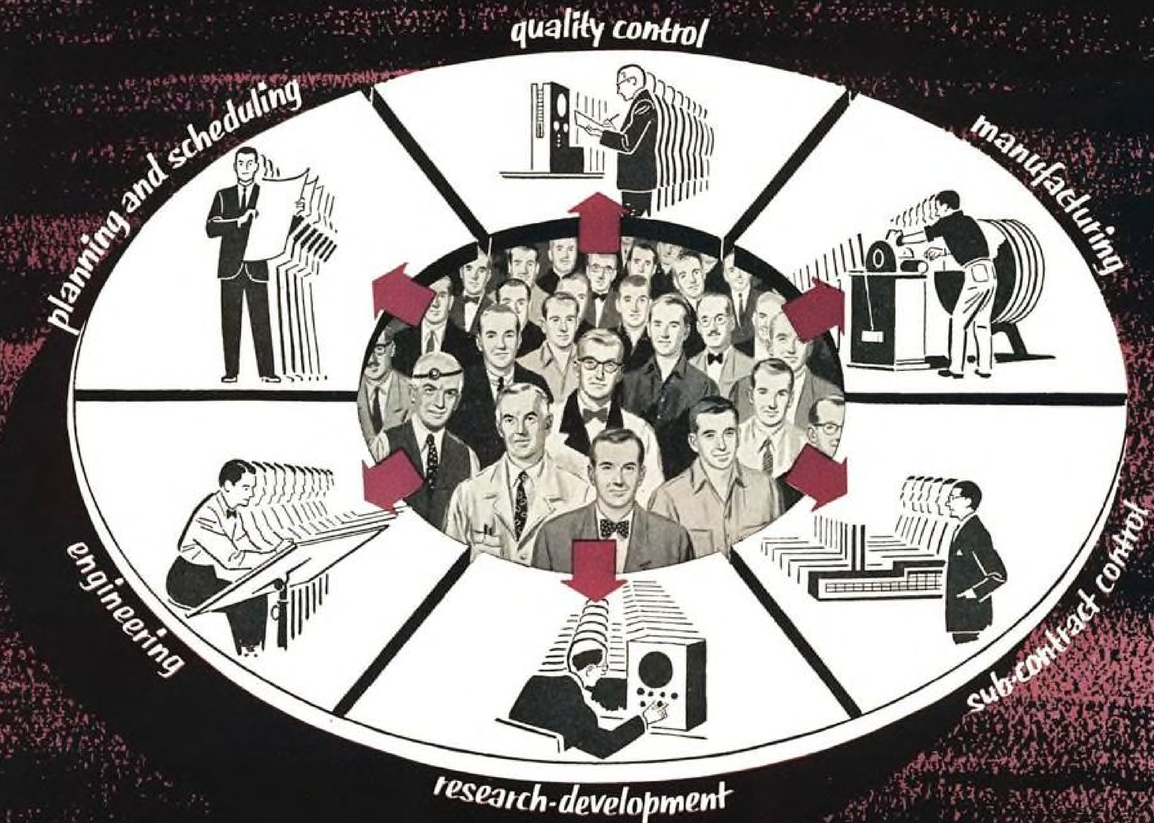
In an industrial plant there can be perhaps as much waste attributable to disorder as there is in the physical scrap material generated in a single day, he claims. Material scrap can be seen and measured, but inferior industrial housekeeping is a hidden source of wasted effort, money and time. Good housekeeping at Fairchild is conducted as an active, continuing program.

An Approved Rating Committee keeps the degree of housekeeping effectiveness before all levels of supervision.

The rating committee consists of three members, one from Manufacturing, another from Inspection and a third from the local Air Force office. Without notice, it makes surveys about once each month and corrective action is taken promptly.

An award evaluation is made every two months followed by a worthwhile dividend in the form of an outing or trip at company expense for the entire

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RACK SYSTEM at Glenn L. Martin has reduced the company's rivet losses.

supervisory force within the winning department.

On occasion, the award goes to a group as large as some 30 or 40 supervisors. This costs money but it pays good dividends, Lescher says.

▶ **Sloppiness Award**—Fairchild makes a "Hog Award" for substandard housekeeping within an area. This adverse recognition is a sign about 6 by 4 ft., painted on both sides, showing a typical hog pen surrounded with litter, plus the wording: "This is the sloppiest department in the plant." It's hung high for everyone to see and there's no advance notice of its bestowal.

This "award" is given only after sufficient instructions have been given to effect improvement normally. Lescher says the recipients seldom enjoy keeping it for more than a few days.

▶ **Material Data**—Some of the general aspects of materials availability and conservation were outlined by Frank Huddle, Munitions Board's conservation division chief.

The seriousness of the short supply of additive metals is pointed up by his observation that today the jet engine and the guided missile, taken together, might quite conceivably take as much as half of our direct military requirements for nickel, cobalt and columbium, and large percentages of chromium, tungsten and molybdenum.

Minor changes in these two areas of military requirements exert a very important influence on our total military requirements for these materials. Thus, nickel is used in quite a wide range of other military items—armor plate, gun steels, electric cable reinforcement, electronic equipment, engineering steels and cupro-nickel for corrosion-resistant ship components, he reveals.

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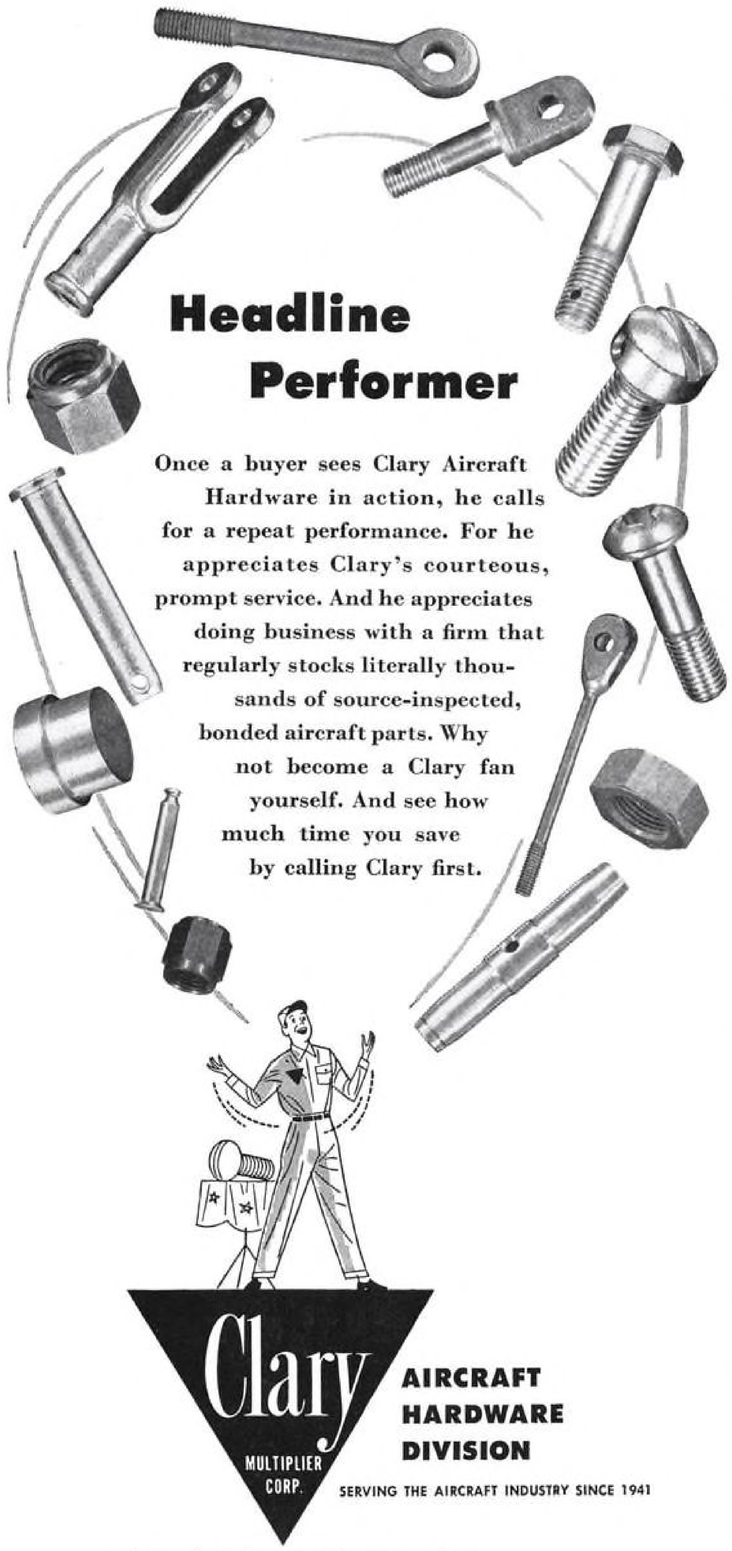
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Hemisphere are being developed and studied, and Huddle reports that no practical way to expand our supplies for nickel for mobilization remains unexplored. Despite this, he observes, we do not have enough nickel, and the margin of our deficit is a substantial and serious one.

▶ **Conservation Preparation**—One development is a Spot Materials Conservation Program to intensify savings in nickel, cobalt, columbium, tungsten and molybdenum in the military items requiring the bulk of each.

Only 10 end items or categories of end items are involved. One of the 10, Huddle says, consists of a small number of selected parts of five models of jet engines—one from each of the five principal engine makers.

The three military services have been requested to develop detailed information and an evaluation of prospects for conserving the materials in these items. This will allow the Munitions Board to judge the magnitude of the calculated risk resulting from supply deficiencies of these five materials, then evaluate the urgency of additional conservation measures.

Huddle says it is not inconceivable that this might even form the basis of a judgment on the part of those in high place as to which of several designs should be pursued at a time when mobilization appears close at hand.

▶ **Critical Scale**—Relative criticalness of various materials was another topic underscored by Huddle. For a long time the need has been recognized for specific, accurate guidance for military designers as to which of several materials or alloys should be considered as more or less critical.

Huddle says: "We believe that at last we have the answer to this question." Work was started almost a year ago on a formula, which was finally evolved last September. Figure refinement for this formula is now going on and other specific judgments are being made to have the formula reflect, with as much precision as possible, the relative criticalness of the materials involved.

When this document is published it will be in the form of a Department of Defense directive requiring the departments involved in any application in which several materials are suitable, to make use of materials less critical in place of those more so.

Huddle points out that in the field of jet engines, where it has been customary to measure conservation of critical materials in pounds per thousand pounds of thrust, savings per engine sometimes seem to be moving rapidly on a treadmill.

While consumption of critical materials per thousand pounds thrust is going down, thrust is going up—with



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. . . the advantage of teamwork that stays "on the ball"



Fafnir Self-Aligning, Torque Tube Type Ball Bearing . . . a variation of an AN 202 KP-B Series.

Two recent additions to the Fafnir Line of Aircraft Bearings feature design simplifications for improving control systems on high speed aircraft. The DSRP Series offers not only the greatest capacity for its weight and size, but also the simplest, fool-proof construction. The KP-BS Series is a means not only of cutting down on space and weight, but of greatly simplifying bearing installation with a resultant saving in cost and time.

These far-reaching advantages are typical of the results gained by Fafnir's continuous research, experimentation and collaboration with aircraft design engineers. They reflect a determination to stay "on the ball", to keep in step with aircraft progress. That explains why *Fafnir continues to get and to welcome "tomorrow's jobs" to do today* . . . and why Fafnir is the largest supplier of bearings to the industry. The Fafnir Bearing Company, New Britain, Conn.

Every new achievement serves as a "take-off" for still another Fafnir advance.

1933
Aircraft types
K, KC, KS Bearings

1934-35
Aircraft Rod Ends
Bell Cranks, Double Rows

1940-41
Aircraft Fairlead, Guide-Roll and Track Roller Bearings

1945
Plya-Seals in
Aircraft Bearings

1947
NASC Aircraft
Pulley Bearing Series

FAFNIR
AIRCRAFT BEARINGS
MOST COMPLETE LINE IN AMERICA

consumption of critical material per engine staying about the same.

▶**Technology Factor**—The measures taken for improved utilization of materials available under total mobilization are faced with influences or trends working to increase the unbalance. The most important influence, Huddle says, is technology itself. The trend toward increased operating temperatures is a significant factor.

As a general rule, increased temperature in turbines—turbojets, steam and gas units—means increased efficiency. Huddle says that thus far the challenge has been met with stainless steels, with nickel-or cobalt-base alloys, and with coated metals. But as operating temperatures continue to go up, he says, sooner or later we will exhaust the capacity of any of the metals to endure such high temperatures.

It is Huddle's conviction that a maximum effort should be made to accelerate work in non-metallic structures, or else these new materials will not be ready for use at the time that they are needed.

▶**Problems**—Timing in the pace of a new development is another important factor, Huddle contends. Old models are constantly being phased out and new ones are coming in.

The engineer designing a new product or prototype tends to use the highest quality material in it, to insure performance. Only after a new design has passed its initial tests do the engineers begin to reduce the content of critical materials, so that the item can be produced in quantity. Huddle claims this is true not only with turbojets, but also in the field of rockets and guided missiles and other items of military equipment.

The rapidity with which new models make their appearance means that at all times our very latest models— which should be the ones selected for mass production at a time of full mobilization—are loaded down with unnecessary quantities of nickel, cobalt, columbium and other critical materials which will have to be designed out, he contends. This means, he says, that a very painful readjustment would be inescapable at the outset of mobilization.

The possible alternatives are seen involving these compromises:

- **Producing a less-advanced,** less-efficient model until critical materials are designed out of the latest model.
- **Obtaining a smaller number** of items of the new model than would be required.
- **Taking a calculated risk** of performance, and putting a hastily and arbitrarily down-graded item into service with adequate tests.
- **Developing and applying** something new in the way of accelerated testing techniques.



H.D. 31 Tests Beat Expectations

By Ross Hazeltine
(McGraw-Hill World News)

Paris—Results of first flight tests of the Hurel-Dubois H.D. 31 have exceeded its designers' expectations. This is focusing attention on the advantages of this high-aspect-ratio-wing two-engine transport design for both commercial and military uses (AVIATION WEEK Sept. 8, 1952, p. 21).

The plane's builders are confident it will be able to carry a 40% greater payload than a transport plane of conventional design with the same engine power. Flight tests already have proved that the H.D. 31 can take off and land in less than 1,000 feet of runway.

In addition, the plane is designed to sell at a relatively low price, and engineers say its ground maintenance requirements will be very low. French aviation circles believe the H.D. 31 will prove to be a highly efficient, low-cost commercial carrier or military attack transport even in the coming age of jet airliners.

▶**History**—Societe des Avions Hurel-Dubois began building the H.D. 31 Sept. 1, 1951. The first engine tests were made Dec. 21, 1952, and the first flight took place Jan. 27, 1953.

The first prototype is powered by two Wright Cyclone C7BA1 engines of 800 hp. each. Wingspan is 148 ft., and the aspect ratio is 20.2. The wings are fitted with double Fowler flaps. Wing chord measures 7 ft. 10¼ in. Length is 72 ft.; empty weight is 18,852 lb.; loaded weight is 29,768 lb.

Engineers' estimates made before the first flight set the takeoff run at 1,148 ft., the landing run at 1,346 ft., and cruising speed at 155 mph. Payload was estimated at 9,481 lb. over 311 miles, 8,379 lb. over 622 miles or 6,174 lb. over 1,244 miles.

Some of these figures now seem too conservative. In test flights, without a full payload, the H.D. 31 has taken off and landed in less than 900 feet, and indications are that its cruising speed will prove to be slightly higher than the pre-flight estimate.

▶**Description**—The H.D. 31 is an all-metal, braced monoplace with fixed tricycle landing gear. The passenger version carries a maximum of 36 seats and can be converted quickly into a cargo carrier with a capacity of 1,766 cu. ft.

An improved version of this plane, to be called the H.D. 32, is being built and probably will be ready to make its initial flight in June. The H.D. 32 may become the production version of the plane if tests are satisfactory. It is the same design as the H.D. 31 except that it is somewhat sturdier, and will be powered by two Pratt & Whitney R1830 engines of 1,200 hp. each. Its total weight will be higher, but its payload will be substantially increased.

▶**DC-3 Comparison**—Performance estimates for the H.D. 32 are intended to be conservative. But, if the plane in operation does only as well as the estimates, the H.D. 32 will stack up against the DC-3 like this:

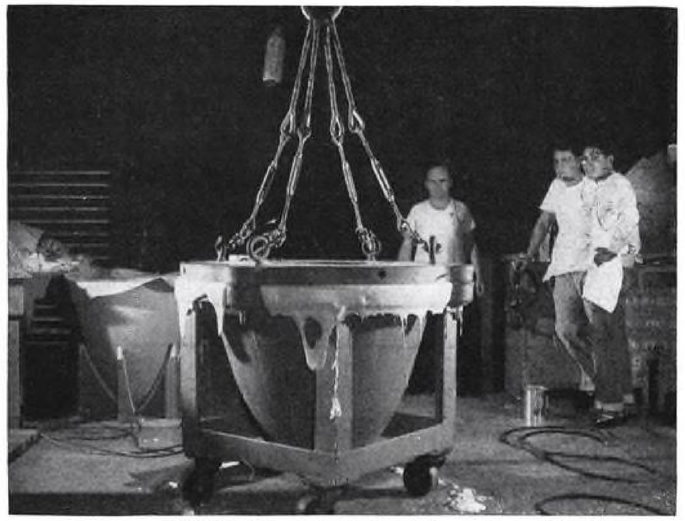
- DC-3 will fly about 30% faster.
- DC-3 payload will be 45 to 56% lower.
- DC-3 cost of operation per ton-mile will be 35 to 73% higher.

Piasecki Forms New Service Subsidiary

Aimed at providing service and overhaul facilities for Piasecki helicopters abroad and arrangements of licenses for their manufacture in foreign countries, Piasecki International Corp. has been formed in Delaware by Piasecki Helicopter Corp., Morton, Pa. Frank N. Piasecki, board chairman of the parent firm, will also be chairman of the board and president of the new subsidiary.

The move was prompted in part by purchase through U. S. Navy of HUP shipboard helicopters for the French Navy. Continued export to France and other countries is expected, Piasecki stated.

Aviation Week Picture Brief

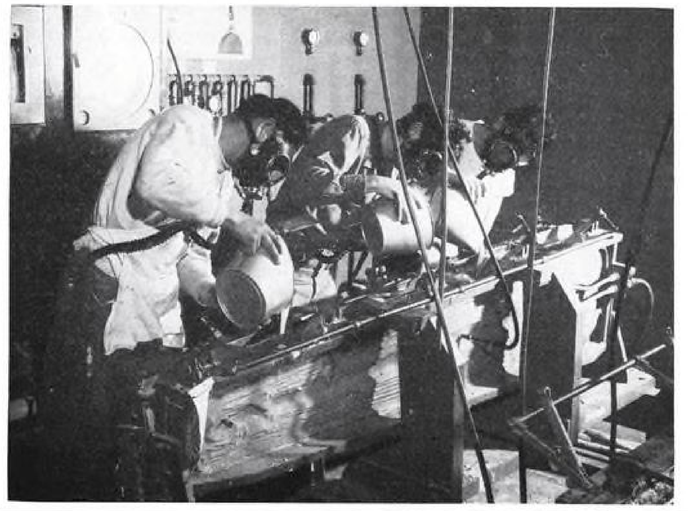


RADOME of F-94C is formed of glass-cloth surface and Lockfoam core. Liquid is poured into heated lower die, then upper die is lowered. Lockfoam expands to fill space between die linings, and excess oozes over top. After curing period, dies are separated and radome removed.

Lockfoam for the Starfire

Lockheed Aircraft Corp. is making extensive use of its Lockfoam foamed plastic as a stiffening material and for structures such as the radome on the F-94C Starfire. The plastic takes the place of some conventional internal members and reduces vibration effects in F-94 rudder, elevator and tab cavities. Lockfoam is a thermosetting, gas-expanded material resulting from chemical reaction. Applied as liquid, it fills structural cavities, bonds itself to the skin envelope. Other uses: P2V Neptune antenna housings; Super Connie cabin ventilating system.

AILERON control surface for Starfire is surrounded by steam-heated fixture as Lockfoam is poured into cavity of structure by workers wearing safety masks. Excess material will ooze through holes in web of leading edge. Cure will complete the operation, as in radome forming.



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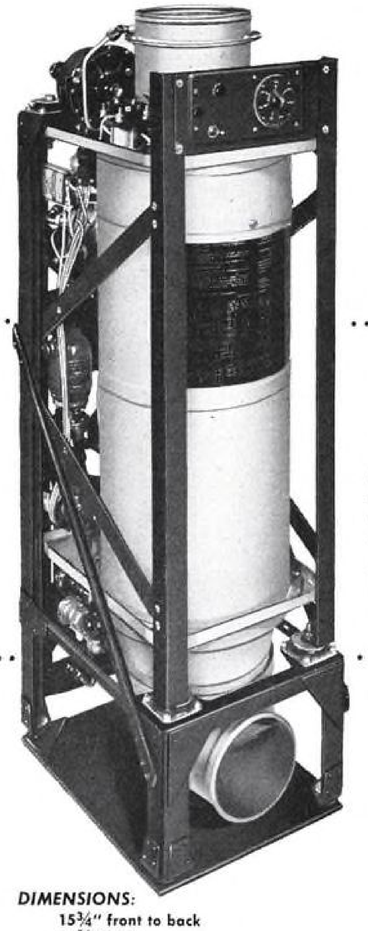
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West Coast to Get New Rolling Mill

Aluminum sheet supply is scheduled to be simplified for West Coast fabricators when a planned new $20-million rolling mill is built. The mill—first of its type in that area—will be put up for Harvey Machine Co., Inc., Torrance, Calif. Work will begin as soon as a site is selected.

The project will be privately financed and will be used for turning out strip and circular shapes as well as aluminum sheet.

When the new mill goes into operation, it will be able to supply a substantial portion of the product needs of the area, Harvey says. The planned facilities will include heat-treat equipment required for the high-strength material used in the airframe industry.



Exhaust Cone Forming Speeded

Ryan Aeronautical Co. is getting big savings on its stainless steel exhaust cone fabrication line from use of a new cone roller designed by Reed Engineering Co., Carthage, Mo.

The machine does a fast job, produces a single-piece cone and eliminates a lot of hand work. Previously, Ryan built the cone in two sections—a truncated portion plus a small end cone. The truncated section was produced on a standard rolling machine with parallel-sided rollers, because it wasn't possible to roll a complete cone with this set-up. This made it necessary to form the small end cone on a press.

After the cone and the truncated section were Heliarc-welded along the longitudinal seams, they had to be precision-jigged for mating and hand-welded around the transverse joining seam—requiring 22 in. of welding and considerable grinding to smooth the seam.

With the new machine, a sheet of pattern-cut stainless is placed between the tapered rolls and pushbuttons do



Lockheed F-94's in formation

IN LINE

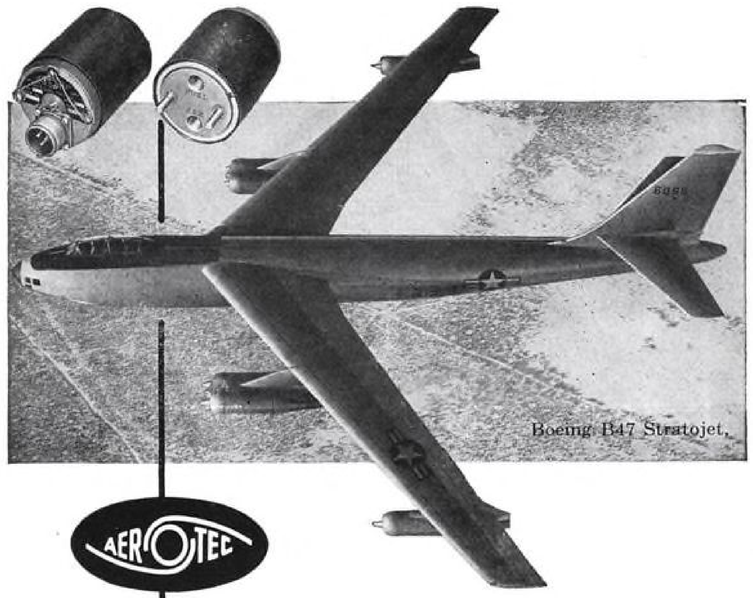
The straight in-line center section stands out on Fletcher tanks. Lighter, stronger and more flexible in size, Fletcher tanks are in line with the demands of defense. The expandable feature of adding "barrels" to make tanks grow in size is exclusive with Fletcher.



Camloc is part of the production team that keeps deliveries in line with defense requirements.

Camloc fasteners are light, strong and versatile . . . says L. D. Bonham, Assistant Chief Engineer, in charge of all tank projects for Fletcher Aviation. "Our purchases cover over a million Camloc fasteners each year with complete satisfaction to us and our customers."

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Specified by Boeing Engineers for the Boeing B47

Manufacturers like Boeing find Aerotec Pressure Switches built to exacting specifications for aircraft such as the B47 Stratojet, where performance qualifications are most demanding.

Now in production, Aerotec M-818 is vibration resistant up to 500 cps with 10 g's acceleration. It is capable of withstanding surge pressure of 120 psi., without change in setting. Rated for 28 volts DC, 3 amperes inductive, up to 45,000 feet.

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1102 West Glenoaks Boulevard

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the rest to produce a complete cone ready for longitudinal-seam welding. This is done on an automatic Heliarc-welder in one pass. This procedure eliminates the former practice of forming the small end cone, fitting of sections before joining, the 22 in. of transverse-seam weld and its subsequent grinding. It also gives a sounder structural piece, the San Diego maufacturer reports.

The Reed machine will roll any pointed cone in which the included angle is greater than 24 degrees. Each of the three rolls is powered by its own 1½-hp. motor. Other motors provide for angling the rolls to meet dimensional requirements. The rolls slide in calibrated guideways so that setups may be duplicated.

New Aircraft Worker Benefits Set by UAW

North American Aviation will be confronted this year with the CIO United Automobile & Aircraft Workers' first real push to establish what the union calls "economic shelter" for aircraft employes.

UAW-CIO will make its move when the North American contract covering plants at Inglewood and Fresno, Calif., and Columbus, Ohio, comes up in October. A few months later, the same demands will be presented to Temco Aviation at Dallas, United Aircraft's Chance Vought Division at Dallas and Sikorsky Division at Bridgeport, Conn., and to Bell Aircraft at Ft. Worth and Buffalo.

▶ **Strikes**—Walkout deadlines have passed at Douglas Aircraft's Tulsa, Okla., and Long Beach, Calif., plants and at Ryan Aeronautical's San Diego plant; but UAW-CIO will not press its new bargaining program at this time with these plane makers. The union is seeking a union shop, which the now extinct Wage Stabilization Board recommended at Douglas a year ago, and a wage increase.

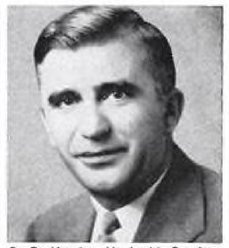
These plans were disclosed to AVIATION WEEK at the union's 14th convention at Atlantic City. They came from Paul Russo, assistant director of UAW-CIO's national aircraft department.

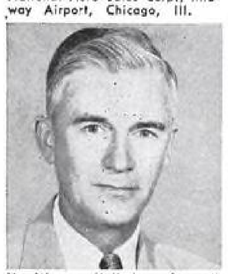
▶ **Demands**—The "economic shelter" was developed at the union's national aircraft conference at Chicago last October (AVIATION WEEK Nov. 10, 1952). Crux of it is a demand for severance payment of $150 for every year of service, up to 10 years, at layoff time. Payments after 10 years would be tied to a pension plan.

These demands in aircraft will take the place of the UAW-CIO drive for a guaranteed annual wage in other industries.

Other economic demands UAW-


I. H. "Monty" Montgomery, National Aero Sales Corp., Midway Airport, Chicago, Ill.


B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.


H. Warren Holladay, Stonnell and Holladay, Washington, National Airport, Washington, D. C.


C. W. "Wayne" Crussell, Southern Aero, Inc., Municipal Airport, Atlanta, Georgia.


Don Pennington, Carolina Aero Company, Municipal Airport, Asheville, North Carolina.


Don Hood, Air Sales and Service Company, Wier Cook Municipal Airport, Indianapolis, Indiana.


Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.


George Harte, Harte Flying Service Municipal Airport, Wichita, Kansas.


H. Leibee Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.


J. K. "Johnny" Hamp, Aero Sales Division, Houston Transportation Co., Municipal Airport, Houston, Texas.


Fred Smith, Sales Manager, AiResearch Aviation Service Co., 5907 W. Imperial Highway, Los Angeles 45, California.


H. William "Bill" Blake, Sales Manager, Washington Aircraft and Transport, Boeing Field, Seattle, Washington.


Cy Willock, Sales Manager, Dowtown Air-Park, Inc., 1800 South Western, Oklahoma City, Oklahoma.

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CIO has in store for aircraft management:

- An 18-cent hourly wage increase "to erase the differential between aircraft and automobile wages."
- Annual "productivity" increase of five cents an hour.
- Improved health insurance coverage with the employer paying the full cost.

The union will base its wage demands largely on aircraft profits. UAW-CIO officers reported to convention delegates that 1952 profits for the 15 leading aircraft companies will total at least $100-million, which is more than the $86-million the union says the industry earned in wartime 1944. The figures given by the union are after taxes.

The union's officers reiterated their proposal that aircraft plants and workers be utilized for mass production of homes "when military production tapers off."

Aeromedicine Gets Specialty Status

Aviation medicine has come of age with its recognition as a specialty by the American Medical Assn.

This is the first time a branch of medical science which started as a purely military study has attained specialty status. Recognition by the AMA climaxes a five-year campaign conducted by aeromedical leaders to secure certification for specialists in aviation medicine.

(In the organization of the medical profession, an area of practice is not recognized as a specialty until so designated by the AMA; a doctor practicing in that area is not a specialist until he has been examined and granted a certificate by one of the specialty boards.)

Brig. Gen. Otis O. Benson Jr., Commandant of the USAF School of Aviation Medicine, has been named Vice Chairman for Aviation Medicine on the American Board of Preventive Medicine, the supervising group with cognizance over aeromedical practice, teaching and research. Benson served as chairman of the Aero Medical Assn.'s Interim Board, one of the leading groups in the drive for formal recognition of aviation medicine as a specialized practice.

Requirements for certification include a medical degree from an approved school, interneship, graduate study, a two-year residency and not less than two years of teaching or practice. In addition, the aeromedical specialist will have to participate in regular flights.

Currently Johns Hopkins University offers a one-year course in aeromedicine, and Harvard, among other schools, is prepared to train students in this specialty. The Mayo Clinic offers a residency in aviation medicine.

A civilian Institute of Aviation Medicine, sponsored by the Aero Medical Association, is soon to be established.

Thompson Expands Test Facilities

New facilities to step up research and development activities in the testing of aircraft pumps and turbine drive assemblies under altitude conditions ranging as high as 80,000 ft. are being installed by Thompson Products, Inc.

The new project is going into the company's Accessories Division laboratory and a new adjacent building in the company's Tapco plant, Cleveland, Ohio.

Total cost will be close to $1,250,000. Under a Navy Bureau of Aeronautics contract recently received, Thompson will be aided by government-furnished testing facilities which have a value of about $800,000. Orders for the BuAer-furnished equipment are now being placed. On the Thompson-paid portion of the project, work has been in progress for some time.

First phase of the project is expected to be in operation by April, while the entire facility is scheduled for operational status the latter part of the year.

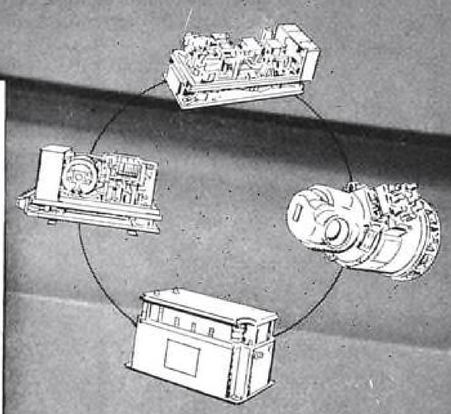




TOMORROW'S AIRCRAFT:

One step closer

"Airborne electrical systems are subject to severe demands"





The current standardization work on a-c control panels is the latest development by Westinghouse in aircraft electrical systems. This development is aimed toward an automatic control system, including paralleling and synchronizing of the generator. These automatic systems will be particularly valuable for aircraft having a limited crew—and will ease crew duties and provide more reliability.

Imagine an electrical system where circuits are next to a tank car of gasoline! Where temperatures range from 160 degrees to minus 67 degrees F and change rapidly. Where the whole system is subject to vibrational stresses. Finally, add routine functions of accommodating sudden load changes, system surges, and of meeting switching requirements. These are the severe problems that Westinghouse designers of modern aircraft power systems have had to overcome.

For more than 36 years, Westinghouse has been producing high-quality a-c and d-c equipment to provide continuity of service for aircraft. In fact, Westinghouse pioneered the research, development, and production of a-c systems . . . alternators that provide power to start engines, operate pumps for heating and ventilating, flight control, lighting, and electronic devices. And to complete the electrical system Westinghouse also supplies regulators, breakers, generators, control panels, motors, hoists, rectifiers and transformers. All these products have been tried, tested, proved by millions of airborne kilowatt-hours.

You'll find this same background of research, development, and experience in the Westinghouse approach and solution to many current aviation problems. Call your Westinghouse office, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-91001

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Ground equipment

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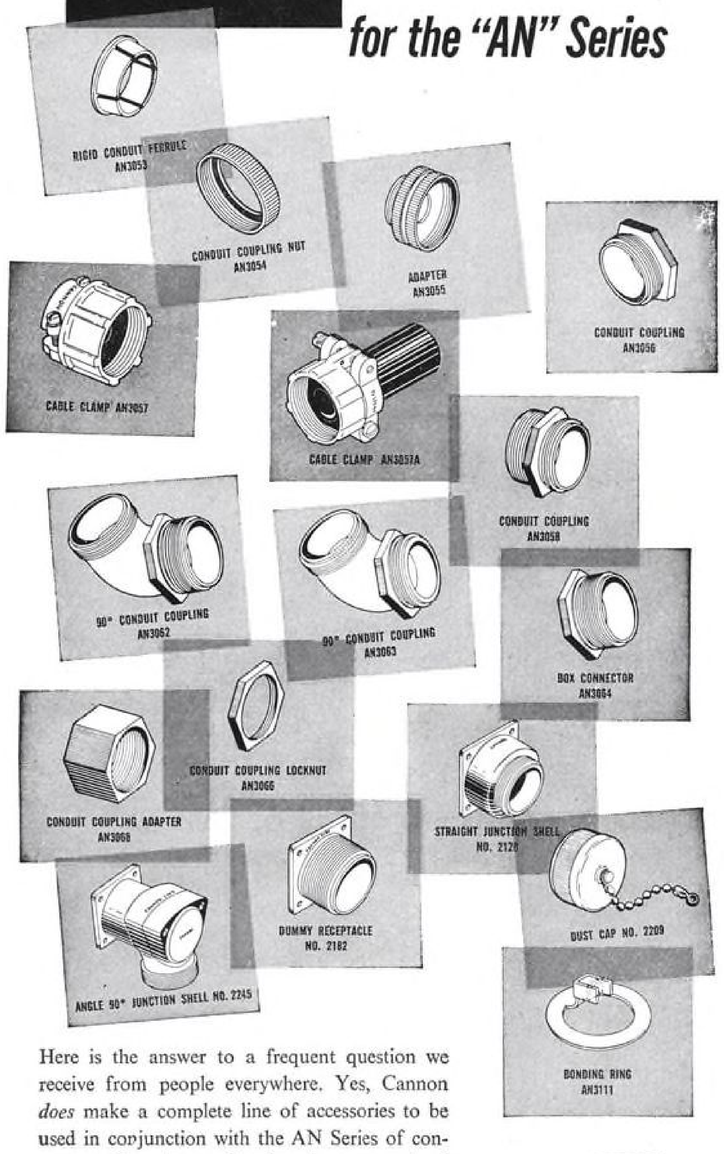
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for the "AN" Series



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Navy Builds

Goodyear's XZPN-1, latest addition to the U. S. Navy's lighter-than-air anti-submarine fleet, is now undergoing extensive flight test and evaluation at the Lakehurst (N. J.) Naval Air Station. A Navy crew and Goodyear technicians are conducting the tests.

"Nan" is the first LTA craft specifically designed for anti-submarine warfare. It is equipped with the latest in ASW gear and has a performance far better than that of its predecessors. Nan's two Wright R1300 engines of 800 hp. each can drive the blimp at 86 mph. Although this is said to make the ZPN the world's fastest lighter-than-air ship, the craft nevertheless can hover practically motionless or match the relatively slow speeds of surface or undersea craft. The ship is equipped for surface-to-air refueling and for reballasting through a pickup of ocean water.

A single pilot, using an airplane-type control column and wheel, may fly the ZPN, controlling both altitude and direction. Hydraulic boosters actuate tabs on the control surfaces, eliminating the cable systems formerly employed.

Earlier LTAs require two men for operation—the pilot works a large wheel that operates the elevators for horizontal control, while the co-pilot's wheel operates the rudder for turning. Nan mounts "ruddervators," set at 45 degrees with the horizontal and vertical, for control, whereas older types have their control surfaces mounted in the usual vertical and horizontal manner.

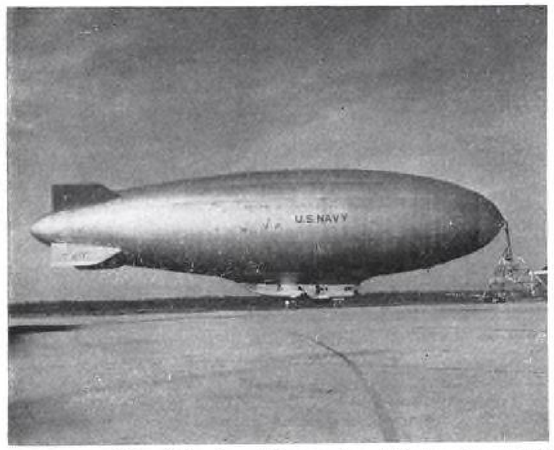
The two Wright engines on the ZPN are mounted inside the engine room of the car and can be serviced and maintained in flight. Shafts lead through the outriggers to a gearbox in the nacelle, driving 18-ft. three-bladed Curtiss Electric full-feathering, controllable-pitch, reversible props. Either engine can drive both props, if necessary.

The 10-ft.-long legs of the main landing gear are hydraulically actuated, swing back into nacelles.

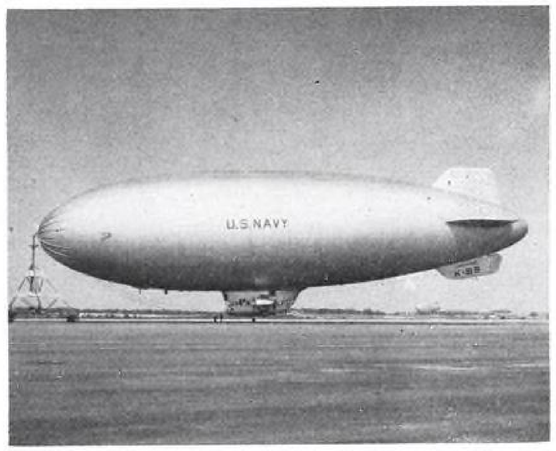
Nan's three-ply cotton-Neoprene bag has an area of 58,230 sq. ft., contains 875,000 cu. ft. of helium. It takes 10 hours to inflate fully. The two-deck control car is suspended by a system of cables that run internally from the top of the bag to the top of the car. Navy crew of 16 men will be carried in the cabin when the ship goes into service. The car is made of aluminum alloy sheet sandwiching a balsa wood center.

It is expected that Nan's surface-to-air refueling system and its reballasting equipment will enable it to better the world's blimp record of more than a week of sustained flight. This record is now held by one of Navy's smaller M-type blimps.

Anti-Submarine Blimp Fleet



ZPN-1 first of Nan-type blimps and world's largest non-rigid LTA craft, was designed for ASW.

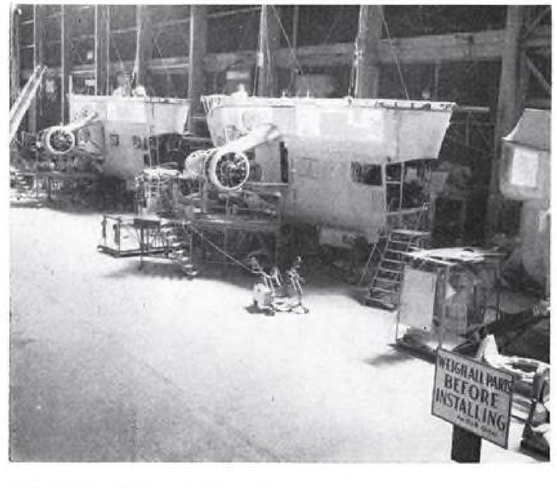


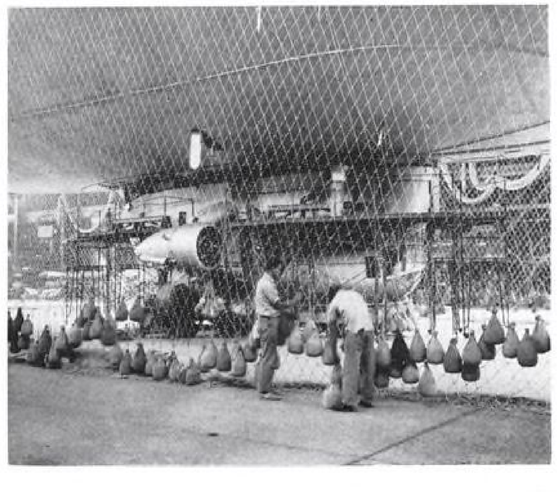
ZP3K is latest blimp of K type. Control surfaces are horizontal-vertical; in Nan they are at 45 deg.

Navy keeps its anti-submarine blimp fleet in top shape by an assembly-line reconditioning procedure at Lakehurst Naval Air Station. Blimps are brought in for complete overhaul every two years. The process takes three-to-four months for each ship. Since weight is a critical factor in lighter-than-air craft, each part is weighed and recorded before it goes back into the ships. During overhaul, Navy is modifying all of its ZPKs to the ZP2K or -3K models, the difference being in electronic gear and arrangements in the cars.

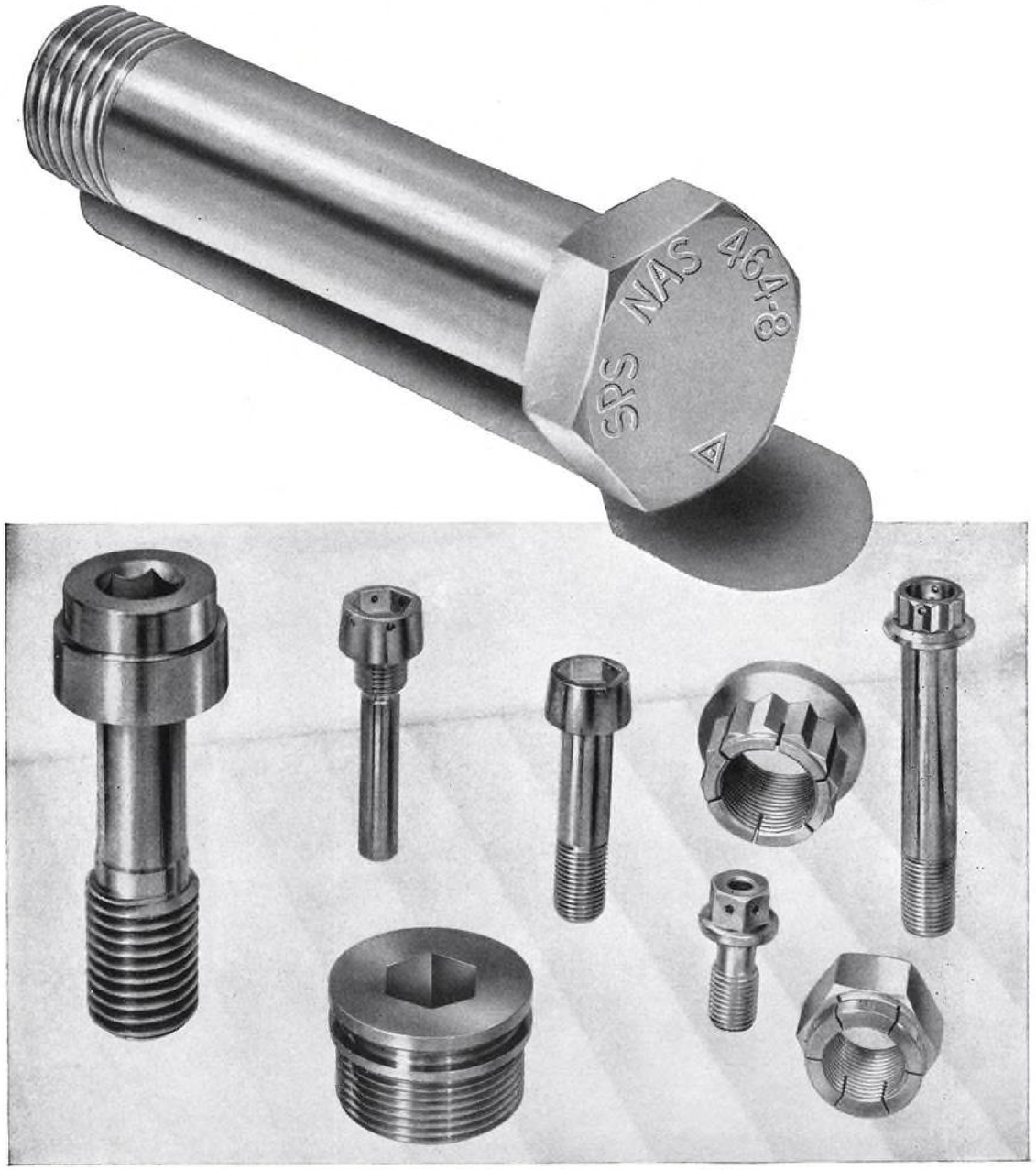
The photo at right and those below show a K ship being overhauled. The K-type of ship is 243 ft. long, 79 ft. high, with a cabin length of 43 ft. At least 300 thirty-five-pound sand bags are used during the inflation and car-attaching process. Control is attained by changing the number and positions of the bags.







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Huge New Rolling Mill To Taper Aluminum

A new rolling mill for production of tapered aluminum plate and sheet, reported to be the largest installation of its kind, is being constructed by Hydropress, Inc., New York, for Reynolds Metals Co., Brookfield, Ill.

The four-high rolling mill will be 145 in. wide and will be adaptable for hot and cold rolling of material from .032 to 3 in. in thickness. Operation of the new installation is scheduled for late this year.

PRODUCTION BRIEFING

► **Temco Aircraft Corp.,** Dallas, has received from Boeing-Wichita an order for more than $5.5-million worth of additional B-47 Stratojet rear fuselage sections. Temco also has broken ground on a 58,000-sq. ft. addition to its office building at the Naval Industrial Reserve Plant near Grand Prairie, Tex. This $796,940 contract was let by Chance Vought Aircraft Division of United Aircraft Corp. serving as prime contractor for the Navy. It will double Temco's engineering and administrative space. Completion is scheduled before Dec. 1.

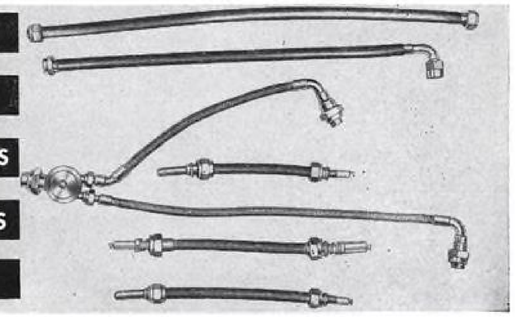
► **Continental Aviation & Engineering Corp.,** Detroit is planning initial production this year of its Palouste turbine engines for use by USAF as portable compressed air generators for pneumatic starters. USAF has given the firm a $5.4-million contract for production of the turbines.

► **Pesco Products Division** of Borg-Warner Corp., Cleveland, has sold its supercharger business, including all manufacturing, sales, engineering and service facilities, to Dexter Folder Co., Pearl River, N. Y. Increasing demands of the aircraft industry and defense program for hydraulic equipment prompted Pesco to undertake the transaction.

► **Grand Central Aircraft Co.,** Tucson, has received an additional contract for modification of B-47 Stratojet bombers from Boeing Airplane Co. Grand Central is completing final phases of a $5-million expansion program at its Tucson base, including lengthening of a runway to 12,000 ft., construction of an electronics building and one million sq. ft. of preflight ramp.

► **Detroit Stamping Co.,** Detroit Mich., has opened a new assembly plant in Birmingham, Mich., to make De-Sta-Co toggle clamps used for production work holding.

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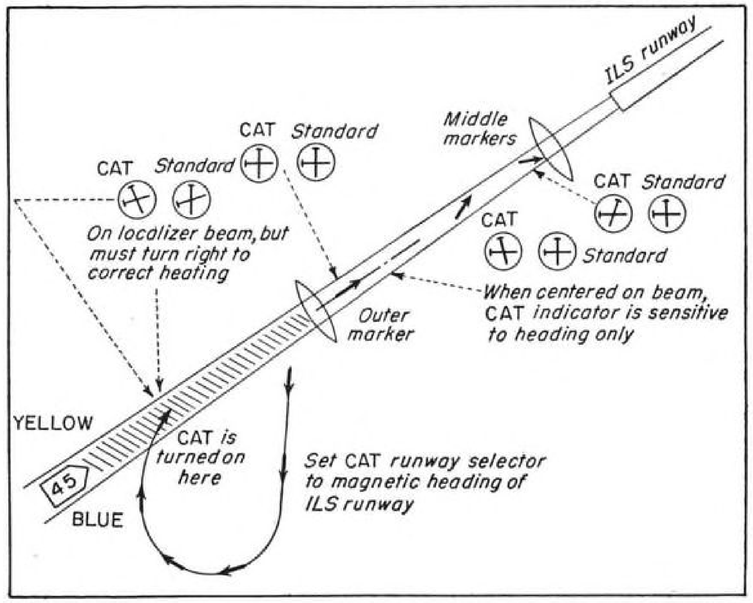
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HOW CAT TRACKER does its job is illustrated in sketch of typical approach.

Eastern Uses CAT to Track ILS

New 8-lb. Wilcox unit makes instrument approaches easier; combines localizer and heading information.

By Philip Klass

Wilcox Electric Corp. and Eastern Air Lines have recently taken the wraps off a small eight-pound device designed to make it easier for a pilot to track the ILS localizer beam in an instrument approach, a task generally conceded to be more difficult than tracking the glide slope.

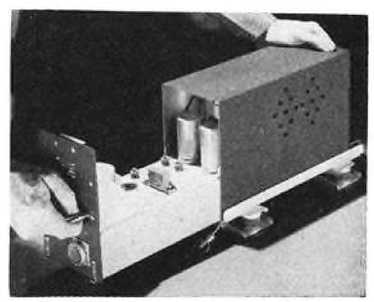
Wilcox, which builds the device, calls it a "computing automatic tracker," or "CAT" for short. Because of its simplicity and low cost ($495), an EAL engineer dubs it "the poor man's Zero Reader."

The idea, initially conceived by EAL engineers and operations people, was converted into prototype equipment by Wilcox and quietly service-tested in 20 EAL aircraft starting two and a half years ago. Today, all of Eastern's four-engine aircraft and roughly half of its twin-engine aircraft are using Wilcox-built CATs. The entire fleet will be using device by this fall.

▶**Eastern's Experience**—How effective has CAT been in reducing missed ILS approaches? Eastern has no quantitative answer.

However, EAL's D. C. McRae, director of communications, calls CAT "a very valuable aid." He adds that "the greater ease of making an ILS approach (with the CAT) . . . has resulted in the completion of many approaches which otherwise would have been missed."

▶**What It Does**—The unit "shows the pilot where he is going with reference to the localizer beam rather than where he is at that particular moment" (as with conventional ILS), is the way that Eastern explains the CAT's operation to its pilots. The CAT does this by combining ILS localizer and magnetic heading information and displaying them on a single pointer.



CAT IS SMALL, weighs only 8 lb. RCA 10,000-hr. tubes have been removed from sockets in this photo.

The vertical needle on the pilot's ILS deviation indicator (ID-48) normally displays a localizer receiver output signal which shows airplane position relative to the beam center. With a CAT, this signal is combined with another signal proportional to the difference between the airplane's heading and the heading of the ILS runway. The combined signal is presented on the ID-48 vertical needle.

The glide slope receiver signal is fed directly to the horizontal needle on the ILS indicator and is unaffected by the unit.

When the tracker is in use, vertical needle will be centered if the airplane is centered on the localizer beam and the airplane's magnetic heading corresponds to that of the ILS runway, providing there is no cross wind.

If a cross wind exists, flying the plane to center the vertical needle will set up the proper airplane crab angle for the pilot. Under such conditions the plane tracks the localizer slightly downwind of the beam center .

▶**Easy to Use**—A pilot flies the CAT much like he would the regular ILS except that he must set the magnetic heading of the ILS runway into his omni-bearing selector (OBS) which has been modified for use with the unit.

EAL's pilot procedure, which has CAA approval, calls for making a customary procedure turn into the localizer beam before the CAT is turned on. When the vertical needle begins to move toward center, the pilot flips a panel switch putting the device into position.

When the unit is turned on, the vertical needle will be deflected from the center if the plane heading is not the same as the ILS runway heading, or if the plane is slightly off localizer beam center. As with conventional ILS, the pilot flies the plane to "chase" the vertical needle and return it to center.

In the installation arrangement used by EAL and recommended by Wilcox the tracker is connected only to captain's ILS indicator; the first officer's indicator shows the normal localizer and glide slope signals. This enables the first officer to monitor the CAT's performance. Another interesting feature which has CAA type certification is a pushbutton on the captain's wheel which, when pushed, momentarily disconnects the CAT and displays pure ILS on the captain's instrument.

▶**Demonstration Flight**—Wilcox recently flew its CAT-equipped Beech D-18S east for demonstration to several major airlines. AVIATION WEEK accompanied one demonstration flight when three regular American Airlines cap-



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tains took turns at the controls during ILS approaches at MacArthur Field, Long Island.

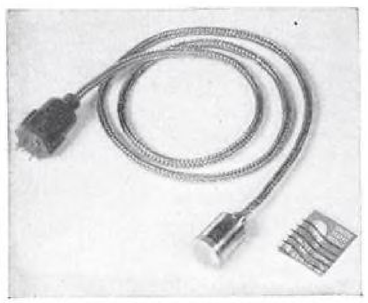
Despite a gusty spring afternoon, and a cross wind that required a five-to-seven-degree crab angle, each of the AA captains made successful CAT approaches without previous CAT experience. This was not a severe test of the equipment, as Wilcox representatives pointed out, because of the extreme responsiveness of the Beech D-18S, compared to large, more sluggish airliners.

Nevertheless, all three AA captains were favorably impressed with the CAT's performance, although none of them had flown a Sperry Zero Reader, Collins IFS, or a Bendix Omni-Mag to provide a basis of comparison with other flight directors.

▶ **Compromise With Complexity**—Wilcox and Eastern view the unit as a reasonable compromise with complexity. If an airplane has a conventional ILS and omnirange installation and a flux-gate compass or gyro-compass, only a two-tube (each a dual type) amplifier, a couple of switches, and one more synchro (inside the OBS) need be added for a total weight of about eight pounds.

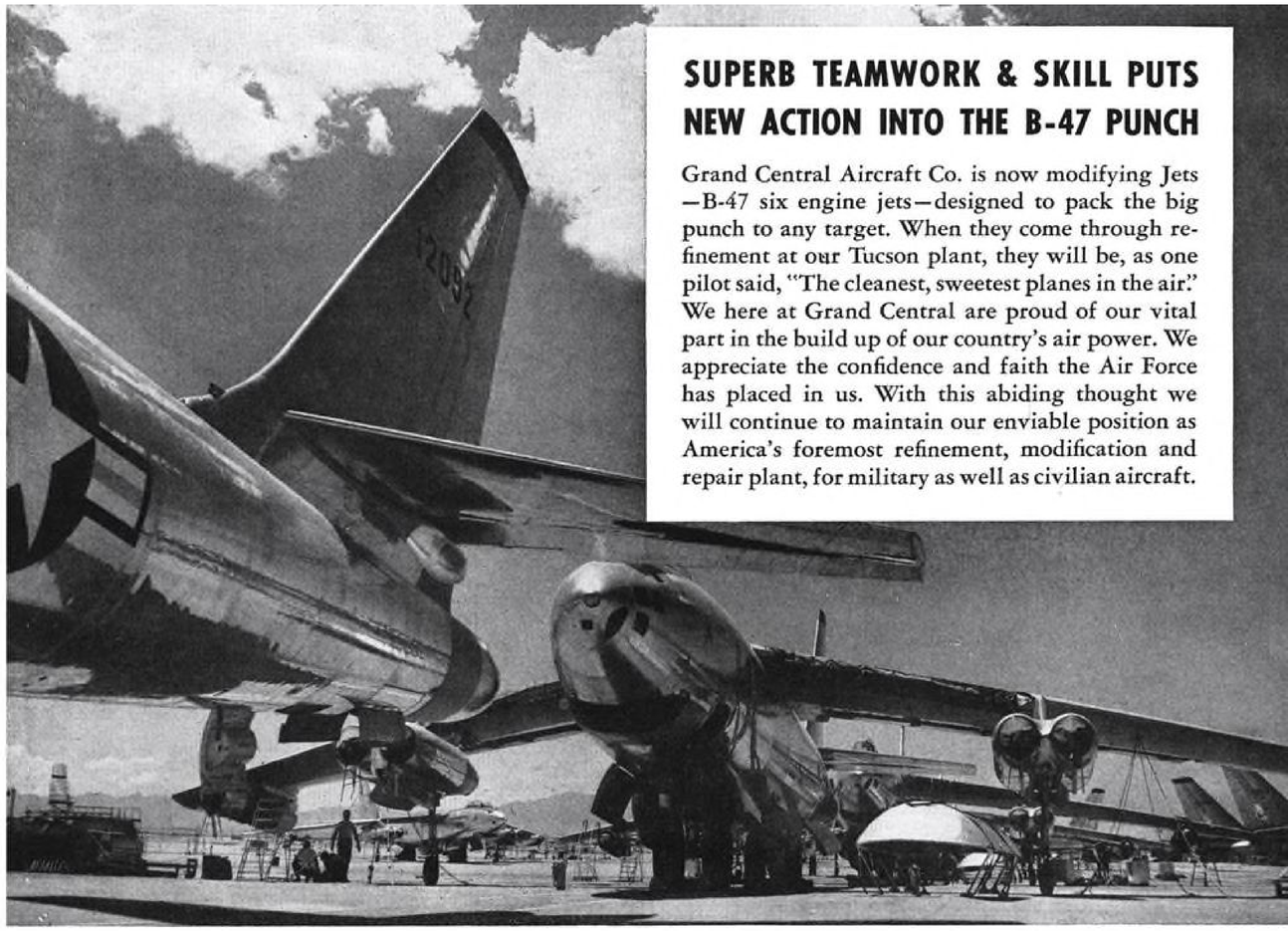
Wilcox says a complete installation can be made in a few hours while normal maintenance is being performed.

▶ **Inside the CAT**—The small synchro, which must be added to the OBS, is electrically connected to the magnetic heading synchro in a flux-gate compass indicator or in a gyro-compass. When the ILS runway heading has been set into the OBS, its synchro produces an "error signal" proportional to the dif-



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ference between airplane and ILS runway headings.

Within the CAT amplifier, the localizer receiver output signal is first "chopped" into an a.c. signal, amplified and then combined in a phase-sensitive rectifier circuit with the heading error signal. Flight tests on each type of airplane have been used to determine the optimum localizer-signal-to-heading-signal combination ratio.

The ratio selected will determine the amount of airplane downwind beam offset under cross wind conditions. EAL has selected a sensitivity ratio which enables its planes to align on a 150-ft. runway with a seven-degree crab angle crosswind. When stronger crosswinds exist, the pilot can make suitable compensation by setting in a slightly different ILS runway heading into the OBS.

The CAT uses no rate or anticipatory circuits, nor does airplane bank angle enter into its operation, as with the Collins and Sperry flight directors.

By combining heading and localizer signals, however, Wilcox does achieve what might be called a form of anticipation of airplane deviation from the beam. If the vertical needle is centered, any momentary change of heading will show up on the needle before the airplane has actually begun to deviate from the localizer beam. The pilot can then take immediate corrective action before the plane has deviated appreciably.

► **CAT Checker**—All EAL installations include provisions for checking the operation of the CAT on the ramp before takeoff or in flight prior to an ILS approach. A three-position toggle switch at the extreme left of the captain's panel can be used to introduce a synthetic ILS signal into the CAT which should cause equal left and right displacements of the vertical needle if the equipment is functioning properly.

To check the heading function, the localizer receiver is tuned to a channel on which there is no signal and the airplane's existing magnetic heading is set into the OBS. The vertical needle should then be centered. Introducing slight airplane heading changes in flight (or changing the OBS setting on the ramp) should cause appropriate deflections of the vertical needle.

Malfunctioning of the localizer or glide slope receivers causes the flag alarms to drop into position on the panel indicator in customary fashion.

During the past year and a half, EAL has had no unscheduled removals of a CAT unit for failure of any kind, a Wilcox spokesman says. He attributes this performance to the use of RCA Red Seal 10,000-hour vacuum tubes and to the CAT's simplicity.

► **Airline Interest**—Evidence of airline interest in the Wilcox CAT is the report that both Pan American Airways and Trans-Canada Air Lines have requested the loan of a CAT for evaluation tests in the carriers' own DC-3 transports.

Wilcox is currently readying the two equipments for PAA and TCA.

Electronic Meeting To Talk of Missiles

The 1953 Electronic Components Symposium in Pasadena, Calif., will include a classified technical session on Reliability of Electronic Components in Guided Missiles.

A total of 30 papers will be given in the six regular technical sessions. Subjects of the sessions will be:

- Environment and Packaging.
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- Resistors, Capacitors and Dielectrics.
- Devices and Materials.

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FILTER CENTER

► **Navy Buys New GE Regulators**—The Bureau of Aeronautics has ordered 1,300 additional General Electric magnetic amplifier voltage regulators (Aviation Week Aug. 11, 1952, p. 36) raising its total on order to 1,800. Convair reportedly also has ordered the device for use on its new F2Y (Sea Dart) under new Navy policy which makes aircraft power generation and distribution systems contractor-furished (Aviation Week Feb. 23, p. 50).

► **Predicting ILS Localizer Bends**—An analytical technique for predicting the location, amplitude, and direction of bends in ILS localizer beams caused by nearby buildings or other reflecting surfaces, has been developed by Airborne Instruments Laboratory, Mineola, N. Y., for the Air Navigation Development of a similar technique for ILS glide slope beams is currently under way at AIL.

► **Eclipse-Pioneer Buys UAL DC-3**—Eclipse-Pioneer Division of Bendix Aviation has purchased one of United Air Lines' DC-3s to be outfitted for sales and engineering demonstrations of E-P's avionics equipment.

► **New Miniature Rate Gyro**—Lear, Inc., has developed a tiny rate gyro weighing only 5 oz. for possible missile use. The new gyro, mounted in a plug-in case measuring 1½ x 1½ x 2 in., has a reported natural frequency of 60 cps. and uses an E-I signal pick-off. The gyro has no gimbal bearings, a technique which Lear first applied to the rate gyro used in its yaw damper (Aviation Week Feb. 16, p. 59). —PK



EXPLOSION-PROOF

Explosion-proof containers, such as this, to house rotary solenoid-operated Ledex remote circuit selectors have been designed by G. H. Leland, Inc. Containers meet the requirements of MIL-E-5272, Leland says. (123 Webster St., Dayton 2, Ohio.)

EQUIPMENT

Small Bearing Carries Big Load

New roller-type aircraft units have capacity more than double the old-type ball bearings, Fafnir says.

By George L. Christian

New Britain, Conn.—A new aircraft bearing has been developed by Fafnir Bearing Co. with a capacity about 2½ times that of previous types. This means that a smaller, lighter bearing than formerly required can be used to carry a given load.

► **Barrel Rollers**—The new DSRP (double-row width, self-aligning, roller-type, Plya-seal) aircraft bearing is the first made by Fafnir to incorporate barrel-shaped rollers and Fafnir-patented Plya-seals, according to F. Leister, the company's vice president in charge of engineering.

The added capacity of the new bearings despite their smaller size and weight is ascribed by Fafnir to the larger roller-to-race contact on both inner and outer races. In addition, the close-fitting inner ring side flanges keep the barrel-shaped rollers in precise alignment.

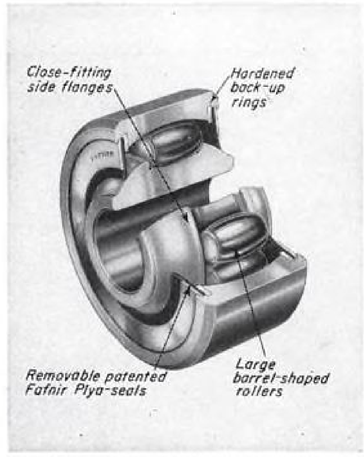
► **Big Independent**—Fafnir is the largest independent manufacturer of ball bearings in the United States. Identified with aircraft bearings for more than 25 years, the company now makes about 80% of all ball bearings used in aircraft control systems, company officials say.

They add that the firm is now concentrating on the problems of precision instrument and jet engine bearings, and "satisfactory progress is being made in the improvement of techniques in these fields. The increasingly exacting requirements of the military services, particularly the Air Force and its prime contractors, constitute our greatest challenge and opportunity . . . to advance the art. Fafnir is in the forefront of these developments."

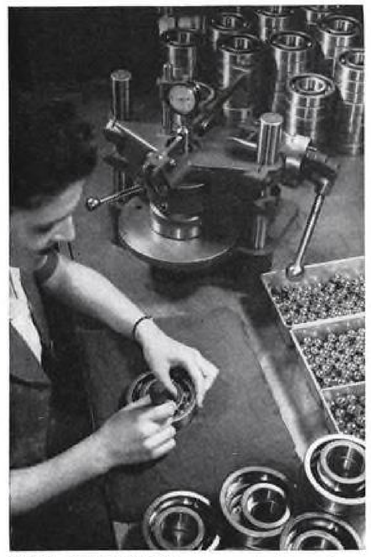
DSRP bearings, which have been available for about three months, are dimensionally interchangeable with the older-type DSP series, except for the DSRP4. They will be available as rod end bearings as soon as rod shank dimensions have been decided upon.

Cost of the DSRP is currently higher than the DSP, but this should diminish as production quantities increase, the company says.

► **Fifty Firsts**—Fafnir has developed some 50 "firsts" in the past 30 years, company spokesmen say. Among those applicable to aviation are rod end and bell crank bearings and the patented Plya-seal-type bearing.



ROLLER BEARINGS carry more than . . .



BALL BEARINGS of equal dimensions.

Plya-seal bearings incorporate a patented, flexible, diaphragm-type seal, made of synthetic rubber-impregnated fabric. Sealing washer is held in place by a stainless steel split retaining ring. Both are easily removable.

The seal rides on the side of the bearing's inner ring, constant contact being assured by pressure of split ring on the seal, plus the natural tendency of the impregnated fabric to remain flat.

The seal effectively keeps out dirt and grit, which would damage bearing, and solvents used in washing, which might remove bearing lubricant; it keeps in lubricant to protect bearing's moving parts.

► **Fafnir Features**—Here are other features Fafnir cites for its DSRP line of aircraft bearings:

- **Self-aligning bearings** permit a misalignment of 10 deg. in either direction.
- **Hardened back-up rings** act as positive stops at point of maximum misalignment.
- **Extended length of inner ring,** beyond outer ring face, eliminates need for spacers.
- **Bearings are compact,** light in weight and easy to install.
- **SAE 52100 alloy steel** is used for inner and outer rings. (Exceptions are rod ends and bell cranks.)
- **Corrosion resistance** is assured by having all exposed surfaces made of stainless steel or being cadmium plated.

► **Bearing Problems**—Engineers developing better, more durable bearings for producing tomorrow's aircraft of metals that will withstand increased operating temperatures face numerous problems, Leister says. They include matters of bearing lubrication and ability of metals to maintain very accurate forms. In their continuing research to improve bearings used for jet engine rotors and accessory sections, Fafnir engineers are pursuing these and many other problems.

► **Better Yardstick**—A completely new approach to the problem of rating aircraft control bearings for any particular application is described in a pamphlet entitled "Selection of Anti-Friction Bearings for Airframe Control Positions," recently put out by Fafnir. The new rating system is said to simulate more closely actual operating conditions than the method that had been used previously.

The publication points out that prior to the establishment of the new ratings contained in the paper, a control bearing was selected on the basis of what is called a "non-brinell" value, which, according to the pamphlet, does not realistically reflect airframe applications.

It had been thought that below the "non-brinnell" load, no "brinelling," or deformation, occurred, because it was not easily seen by the naked eye. But more careful observation has shown that there is definite deformation even at so-called "non-brinnell" loads.

"In developing this new method of selecting bearings for airframe use, it was determined that static loading considerably in excess of the old 'non-brinell' loads could be applied without

Bearing Load and Weight Comparison

Bearing Number	Radial Limit Load (lb.)		Weight (lb., approx)	
	DSRP	DSP	DSRP	DSP
4	3,025	1,300	.06	.06
5	7,350	2,600	.16	.16
6	9,600	3,600	.24	.24
8	12,500	5,000	.36	.36
10	17,700	6,300	.55	.53
12	26,900*	.....	...	...

* *Will be made as demand justifies tooling, Fafnir says.*

affecting the smooth operation or life endurance under normal loads and oscillatory motion encountered in airframe applications," Fafnir's publication points out. "The old 'non-brinell' system completely ignored the important factor of bearing life under normal operating loads. This life is generally expressed as the number of complete oscillatory cycles which the bearing will encounter on the airplane in service."

Life requirements vary greatly in different airplanes and in different positions in any one airplane, the pamphlet points out. The old system made no distinction among the variety of applications for a particular bearing. In many instances this resulted in added weight and expense since the available capacity or life of these bearings was seldom fully utilized.

The new system incorporates "load-life" data which is said to permit selection of the smallest bearing which will operate under the normal loading for a desired life. This data is contained in the pamphlet.

The new ratings were developed as the result of three years of intensive research and careful testing through a joint effort by the Bureau of Aeronautics, United States Air Force, the National Aircraft Standards Committee and the Anti-Friction Bearing Manufacturers Assn. Labeled NASC-P363GA, the project was under the chairmanship of W. D. Craig, Jr., of Grumman Aircraft Engineering Corp.

The new system does not pretend to provide all the answers to all questions concerning bearings applications in aircraft, but, Fafnir believes, it does cover most situations and is a considerable improvement over the previous system.

These new ratings have already been used on some current fighter designs with the permission of the Air Force and BuAer, according to the Fafnir pamphlet.

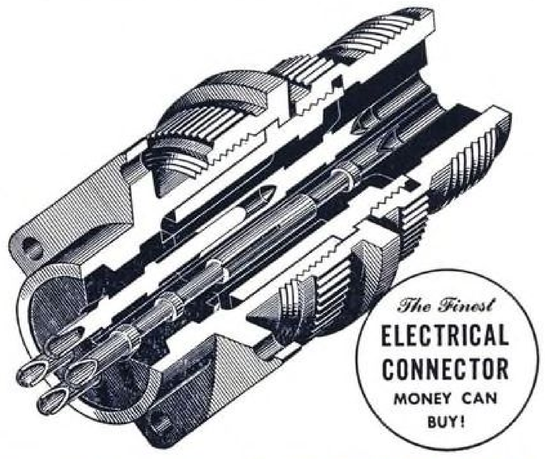
► **Company Growth**—Starting in 1911 with a staff of seven men, Fafnir's capacity was geared to turn out a total of 150 bearings daily. World War II's peak capacity was over 100 bearings a minute.

Fafnir spokesmen say the company produces the most complete line of industrial as well as aircraft ball bearings in the country. Its bearings range in size from units having the outside diameter of a pencil, mounting balls the size of a pin head, to bearings so large the ball size is equivalent to tennis balls. In Fafnir's super-precision division, bearings have been produced that can operate successfully at 200,000 rpm.

The company currently occupies nearly 22 acres of floor space and employs some 4,000 persons. Last year Fafnir showed a net profit of more than $3 million after taxes and other charges. Taxes were more than $8 million.

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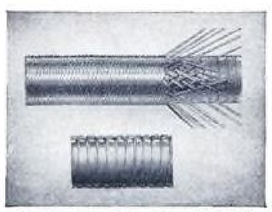
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IN NEW **CONVAIRS,** TOO



Power plant section of Convair 340, one of several Convair types that use Breeze Conduit.

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Breeze Stainless Steel Conduit, showing interlocked and braided construction.

Like so many types and makes of military and commercial aircraft, latest CONVAIRS rely on BREEZE Conduit and Fittings, particularly in the *power plant sections.* In such applications high heat resistance is a critical safety requirement, and BREEZE heat-resistant, stainless steel conduit meets the most exacting specifications in this respect. BREEZE 198 Series Conduit is FIREPROOF — withstands temperatures up to 2000° F. for 5 minutes in accordance with CAA safety regulations, Release No. 259. Breeze Conduit and Fittings for ignition circuits or high tension applications is a production item, readily available in a wide range of sizes. Flexible conduit assemblies are made to specifications for any use.

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OFF THE LINE

Newly installed carburetor flow bench makes it possible for Airponents, Inc., to overhaul and calibrate all types of Bendix Stromberg carburetors up to the PR 100 installed on P&WA R4360 engines, according to the firm's general manager. Unit will also handle master controls used on Wright R3350 engine. Airponents' address: Route 17, Henry St., Hasbrouck Heights, N. J.

A high-ranking official of Civil Air Transport, Formosa, estimates that, in operations over mountainous terrain (such as "The Hump"), the hauling power of one C-46 is the equivalent of 500 2½-ton trucks over a range of 500 miles.

Losing aircraft instrument panel clocks has been a minor airline headache for years. CAT thinks it has the problem licked. Clocks, mounted to fittings, are issued from the instrument shop to pilots, whose responsibility it is to return clocks when no longer needed. The fitting allows pilot to attach the clock to his plane's instrument panel when he takes a flight out.

Aviation Corp. of America recently was appointed official purchasing agent for Japan Air Lines. Another A.C.A. customer, Rutas Areas Nacionales, S. A. (RANSA) of Venezuela, has purchased three Curtiss C-46s, a DC-3 and a large supply of spares for more than $500,000. A.C.A. says it has oragnized a world-wide aircraft buying system, modeled after baseball scouting methods.



COMPASS INDICATOR

Dual radio compass indicator being used in scheduled transport operations and in executive craft sells for $250, said to make it one of the most economical azimuth indicators on the market. It can be used with R5/ARN7 CAA-approved receivers and similar sets, weighs 1 lb. 7 oz. Aviation Accessories Inc., P. O. Box 4178, Fort Worth 6, Tex.

NEW AVIATION PRODUCTS



Vibration Pick-Up

A vibration-measuring pick-up, said to be one of the smallest of its kind, has been developed by the Consolidated Engineering Corp. for high-temperature work in jet engines, rocket motors, superchargers and other aircraft equipment. It is capable of continuous operation at 300F or for intermittent periods at temperatures as high as 500F, according to the manufacturer.

Operating as a generator, the instrument—measuring 1x1 in. and weighing 1.3 oz.—sends out electrical signals whose strength varies in proportion to the velocity of the object to which it is attached. The signals can be read on meters, oscillographs or permanently recorded. Damping effect is said to be negligible, compared to larger, heavier instruments.

In the device, a high-flux magnet is rigidly attached to the base and housing; a coil and seismic mass travel freely on a center shaft. The magnet follows movements of the test structure while the mass and coil tend to remain at rest. The relative movement between the two cuts the magnetic lines of force, generating a voltage directly and instantaneously proportional to the vibratory velocity of the test structure.

Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 8, Calif.

New Arc Cuts Rock

A new self-energizing arc rod that heats at its tip to 8,000F and easily pierces granite, has been unwrapped by Eutectic Welding Alloys Corp. The company claims this is the first rod to be used on non-conductive material and without a ground.

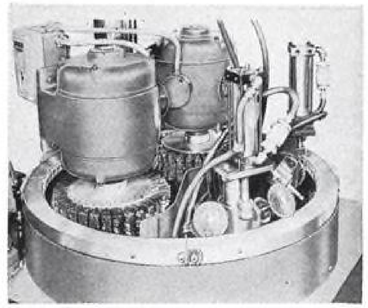
Eutectic is exploring applications of this torch in the aviation and other fields. The fact that the rod itself can withstand temperatures of 8,000F without immediately disintegrating is alone interesting in an industry where there is a continual search for high-temperature products.

While the rod, called a "Dyna-Trode," differs fundamentally in operation from other arc rods and electrodes, it can be used with conventional welding machines. The probe can arc in mid-air.

Some uses already suggested include making holes for machine tool installation, removal of slag from furnaces, cutting holes for electrical conduit and cutting pipe.

The probe melts down at a controlled rate from the tip and must be replaced periodically. The rod can be interchanged with conventional electrodes in the same holder, increasing the versatility of the welding machine. Equipment of 200-amp. capacity is sufficient for much of the work it performs. Dynatrodes are to be produced in various sizes, up to a foot or more.

Chemotec Division, Eutectic Welding Alloys Corp., 40-40 172 St., Flushing, N. Y.



Removes Burrs

The job of deburring jet engine stator rings and similar parts has been reduced from hours to minutes with a new automatic deburring machine put out by Grinding & Polishing Machinery Corp.

One engine manufacturer, the company reports, has cut time for deburring 24 aluminum rings from eight hours to 12 minutes by switching from hand methods to the machine, called the TT-261.

The deburrer mounts parts on a turntable. Ring sections of various sizes are held in place by interchangeable jaws which keep them to close tolerances during the operation. Two brush polishing heads driven by vertical spindles and rotating in opposite directions deburr slot edges on the flat inner periphery of the rings. Provisions can be incorporated to tilt these brushes to polish off-angle ring surfaces.

A pair of smaller brushes are mounted angularly to deburr slot cut-outs at the

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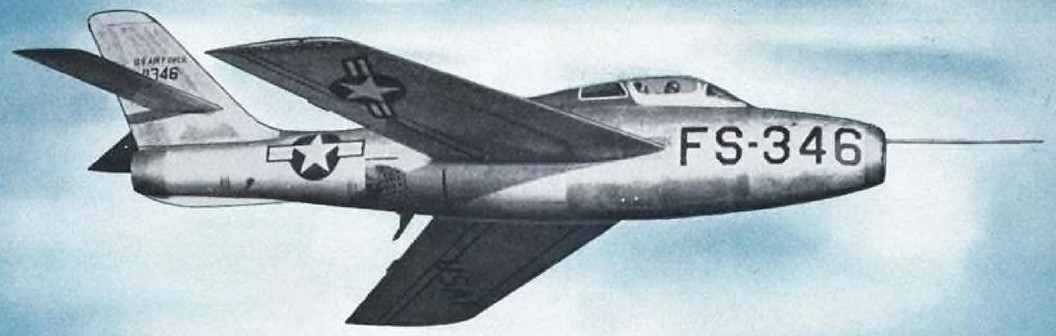
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(Tangential—
with one-piece
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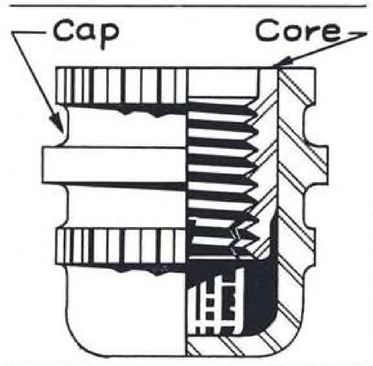
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4405

top of the ring, while another pair work the bottom surface. Rotation can be reversed to prevent set in the wire bristles and the brushes can be adjusted to allow for wear.

Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Ind.



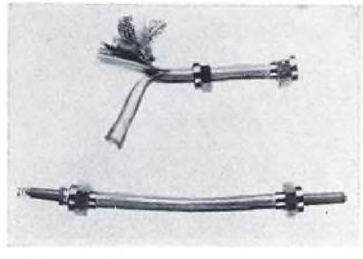
Thread Insert

A new steel thread insert that will hold AN bolts in soft casting metals or plastics under extreme load conditions has been announced by Rosan, Inc.

The low-cost insert held under a 6,500-lb. load test that stripped aluminum material holding a steel cap into which the new unit was brazed, the company says. In another test, AN10-32 bolts broke under a 3,750-lb. tensile strength load, but the insert stayed in place.

Rosan's inserts are made in 10-32 and 1/4-28 thread sizes, with or without locking provisions. The cap accommodating the insert has two knurled flanges to resist torque loads and a larger, smooth-surfaced flange to withstand axial loads. The insert can be replaced.

Rosan, Inc., Newport Beach, Calif.



High-Tension Lead

An improved high-tension lead wire carrying high voltage from transformer coils to spark plugs of aircraft engines has been developed by Scintilla Magneto Division of Bendix Aviation Corp. It is lighter and lasts longer than previous types.

The new leads are being used on American Airline Convairs, 36 to each engine.

The new design uses Geon vinyl paste resin sandwiched between multiple layers of nickel braid, in place of braid covered by rubber. Old-type rubber-covered lead wires deteriorated quickly from contact with one formed by electrical discharges and from the hot exhaust manifold of the engine.

This type also required a flexible metal tubing insert to provide water- and moisture-protection. The insert is not needed in the new design, reducing weight.

Scintilla Magneto Division, Bendix Aviation Corp., Sidney, N. Y.

Recorder Amplifier

New portable model R3 two-channel amplifier has been developed by Goodyear Aircraft Co. for galvanometer-type recorders used in flight testing or with analog computers.

Goodyear says amplifier response is essentially flat from 0 to 100 cps. and input impedance is 2.5 megohms or higher, depending upon sensitivity selected. Amplifier contains limiting circuits to protect galvanometer movements from overloads, as well as its own built-in power supply and voltage regulator.

Goodyear Aircraft Co., Akron.

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Sizes: *All standard sizes 6-32 through 3/8-24.*

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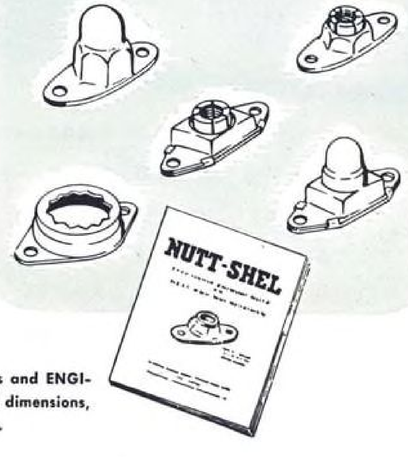
Write on your letterhead for samples and ENGINEERING MANUAL. Manual contains dimensions, tolerances and material specifications.

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ALSO ON THE MARKET

Thread broach taps high-heat-treated chrome-moly alloys and other hard steels at high speed. Finding widening use in aircraft industry, maker says it's accomplishing jobs previously impossible.—Shearcut Tool Co., 7045 Darby Ave., Reseda, Calif.

Special slide rule and calculating chart help select proper bellows for particular application, rapidly calculate expected life, permissible stroke and pressures.—Clifford Mfg. Co., 123 Grove St., Waltham, Mass.

Console with Speedomax indicators and switch panels permits reading up to 200 thermocouple temperatures off the same board; mounted atop conventional office desk which provides working space for viewer.—Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44.

Automatic shut-off valve can be used in place of manual petcocks to give improved leak-proof protection. Opened manually against spring-loading, it allows rapid escape of air from liquid or pneumatic systems.—James-Pond-Clark, 2181 E. Foothill Blvd., Pasadena 8, Calif.

Soldering iron heating elements can be replaced faster with quick-change terminal recently developed which releases simply by depressing spring detent, avoiding the need of fishing for lead wires.—Hexacon Electric Co., 102 W. Clay Ave., Roselle Park, N. J.

Prefabricated cells for shielding test components from radio interference have solid copper panels making them easy to assemble and suitable for outdoor use; attenuation equals conventional copper-screened cells.—RFI Shielded Enclosures, Inc., 3634 N. Lawrence St., Philadelphia 40, Pa.

Conrad sealed ball bearings, claimed smallest of type on market, have deep-groove inner and outer raceways and are lubricated by capillary oil film that keeps out dirt and moisture. Bearing measures 0.1969 in. o.d., has .0591-in. bore.—Landis & Gyr, Inc., 45 W. 45th St., New York 36, N. Y.

Terminals in AN connectors can be soldered faster by low-cost machine capable of penetrating tiny areas not accessible to regular irons. They are also suitable for printed circuit work. Maker says they are used by Sperry, Bendix and other aviation firms.—Joyal Products, Inc., 56 Belmont Ave., Newark 3, N. J.

Quicker washing and inspection of machined parts is provided by plunger-type parts cleaning can of two-gallon capacity, which has a dasher plate that submerges parts in solution and returns them free of fluid for inspection—Protectoseal Co., 1920 S. Western Ave., Chicago 8, Ill.

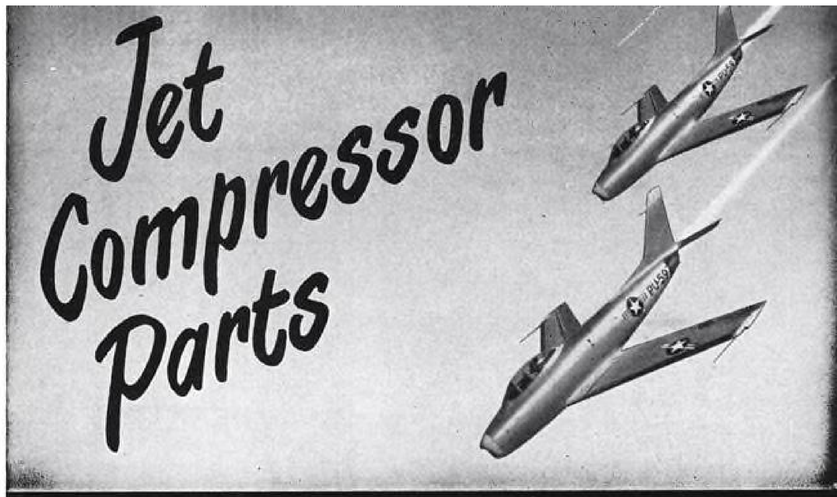
Molub-Alloy uses petroleum as a vehicle for self-lubricating metallic solids, including molybdenum disulphide. It provides improved heat, pressure and temperature resistance—reducing equipment wear and down-time; supplied as grease or oil.—Imperial Oil & Grease Co., Inc., 6399 Wilshire Blvd., Los Angeles 48.

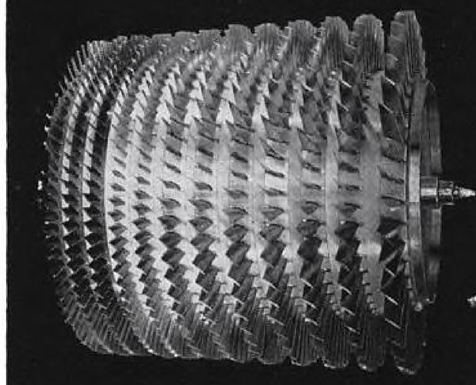
Precision Pak for highspeed rocket threading and aircraft work is fully automatic machine with direct precision lead, rapid tool spindle return and variable speeds; can be mounted in almost any position. — Sheffield Corp., Dayton 1, Ohio.

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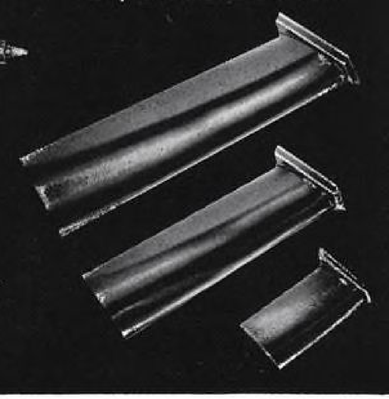
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Above: **Complete rotor assembly for turbojet engine, manufactured by the Robbins Engineering Company.**

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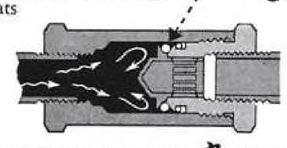
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LETTERS

Irate Pilots Jump on Capt. Robson

Capt. R. C. Robson's Cockpit Viewpoint column of Feb. 23 ("Pilots and Those AF Crashes") touched off a flood of mail—that has not yet ebbed—from readers defending the ability of military pilots. It was the contention of Robson, an American Airlines' pilot, that Air Force transport-type operations call for pilot experience approximately equivalent to what the commercial carriers require. "Command of an airplane like the C-124, carrying more than a hundred lives, is a major occupation," said Robson. His reference to the necessarily limited experience of the so-called "weekend warriors" of the military air reserves drew a number of angry answers. We might mention that a careful rereading of Robson's column will show that some correspondents have attributed to him sentiments that he does not hold. Capt. Robson is studying our readers' comments and we look forward to his reply soon.

Purveyor of Myths?

Amateur scientist Robson, heretofore your missionary to benighted (and we confess) bemused pilots, has cast himself in a new role: purveyor of legends, a startling reversal of form. In stating only the gilded fraternity of airline pilots can fly, he revives an old myth that since World War II even most of his aged cockpit cohorts believe calumny. What evidence has he to support his slanderous outcry against the peons who push military aircraft about? Has he dared ride with these carefree (and worst of all, young) men? Or does he watch them from sky, runway or apron?

Your researchers should verify a suspicion I retain from the two years General Ryan charged me with supervision of trans-Pacific ferrying (1944-45) conducted at the side of airlines when striplings with only the best training our government could give them, splendid physique, good discipline, a fine tradition, the best of ground support in all forms, and often well under a thousand (more nearly 500) hours ferried over 6,000 ships in combat conformation over the world's longest overwater route and equalled or (if my memory serves me) exceeded the airlines' safety record.

Could it be that the ear is trickier than the eye, and a study, properly focused and properly weighted on similar departments of airline and military flying, might modify the conclusions of the torch carrier for the last of the glamour boys? So many of his fellow citizens, perforce, (including the President of these United States and others of his ilk) will be flying behind military pilots it seems almost national suicide not to study the facts unless Robson is wrong.

ALFRED L. WOLF
Wolf, Block, Schorr and Solis-Cohen
Packard Building
Philadelphia 2, Pa.

Other Viewpoint

The subject discussed in Cockpit Viewpoint by Capt. R. C. Robson Feb. 23 is an unjustified criticism of all Air Force pilots. Most of the previous subjects presented by Capt. Robson were very interesting and factual. However, the one in question considers statistics alone, and these can be bent to the individual's desire.

Having just completed another active duty tour as a military pilot, it is my opinion that all Air Force pilots are classified by the errors of a few.

Capt. Robson placed tactical and support flying in the same category but did not consider agriculture aviation (dusters and seeders) as a part of the airline picture. He did not make a comparison of like functions, such as airline operation vs. Military Air Transport Service.

He stated that many airline pilots have averages of 12,000 hours with 15,000 and 20,000 hours not uncommon but failed to elaborate that this time includes the entire piston era and not for a single model (DC-6 or C-46) as he implies. Model for model, pilots assigned to MATS and SAC have an experience level as high as the contract carrier personnel flying a parallel route.

Capt. Robson did not submit any statistics on which models of aircraft were involved in the Air Force accidents and how the airlines equipment had most of the "bugs" worked out of them by the military services. In fact, the aircraft manufacturers are behind the British industry in producing turboprop and jet transports because the services would not sponsor such a project.

The statistics which would have contributed to the understanding of the problem are pay differentials, seniority rights and domicile privileges that airline pilots enjoy, compared to fringe benefits allowed military pilots.

In addition, a comparison of the latest insurance underwriters ratings concerning the risks of airline and military pilots would be very enlightening.

Insurance companies will not write policies for military pilots without a prohibitive premium. These factors influence the fly-safe attitudes and mental conditioning that is necessary for exceptional pilot performance. The airline pilot has been successful in keeping his pay structure abreast of inflation through the ALPA. However, the military pilot's pay has been constantly undermined and placed in jeopardy by members of Congress with no avenue for redress allowed him. Once the glamor of being

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8	3"	10S8	37SR8
9	3"	10S9	37SR9
10	3"	10S10	37SR10
12	3"	10S12	37SR12
16	3"	10S16	37SR16
18	3"	10S18	37SR18
20	3"	10S20	37SR20
24	4"	27S24B2	38SR24
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a "Flyboy" has worn thin, military pilots are competing for the same necessities and luxuries of life that affect the airline pilot.

Having been a flight safety officer during my last tour, I hope you will present the "other viewpoint."

CAPT ARTHUR KENDALL
USAFR
249 Tivoli Way
Sacramento, Calif.

Experience Isn't All

The column by Capt. R. C. Robson Feb. 23 is a typical example of his smug, biased opinions on subjects that he has only hearsay knowledge of among his very select circle of airline captains. Although he refers to the USAF and its pilots in his column, I do not take offense on this part wholly. I do particularly resent his opinion that a pilot with 2,500 hours . . . "deserves an award" for being able to fly a four-engine plane about without cracking it up, "But he shouldn't be allowed to try it again."

I have no personal knowledge of Robson but imagine that he's a 10-year veteran of the Boston-New York rut, or Chicago-NY grind. But I know that he speaks with all the false sincerity of the pompous, overrated union-protected airline captain who openly scorns his lowly first officers and pointedly ignores any advice from someone of less lofty stature than himself.

But I've flown too often along airways and talked with pilots and air traffic controllers to entertain any illusions about an infallible pilot, be he of 2,500-hour experience or partly deaf and wearing glasses (after he gets into the cockpit, of course) with 11,000 hours.

The rut that airline captains fall into when on a steady route diet year in and year out is never more pronounced than upon their recall to military flying with its multi-route flying. It is widely recognized by the military and every effort is made to insure that such men are assigned to the same type of plane that they flew in the airline. To attempt to convert a DC-4 jockey to a C-124 would be catastrophic; even the ground process would be difficult because of his loss of mental flexibility by such a steady diet of smaller planes. The veteran 1-2,000,000 miler deserves a world of credit, but he's old by years, not by hours. An airline pilot that has passed 45 should no longer fly the line.

The aura that years of experience is supposed to place about an airline captain's brow has been too often exploded by the boners one hears about. One such specimen spattered his passengers all over a Texas airport when he feathered the wrong engine on his final. He was, I believe, about 53 and had oodles of hours aloft. Another veteran burned up his passengers at La-Guardia when he took his DC-4 off with the gust lock and strap, right in front of him, on.

No, experience isn't the answer—in my opinion, the answer lies more in the physical condition and age of the pilot. Actually records show that a pilot with loads of experience is apt as not to become incautious because of this very fact.

Familiarity breeds contempt—and this



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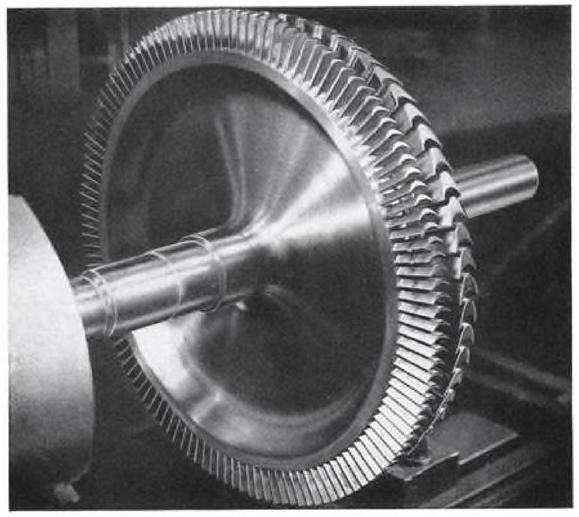


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exists in every case where an airline captain has been on the same route several years and with the same experience. There is a definite point where a pilot ceases to become more experienced, and instead, just becomes older. Nothing shocks me more than to see a grizzled airline captain of nearly 50 stumble off an airliner. Only the timely appearance of the youthful co-pilot in his thirties and inexperienced 5,000 hours resuscitates me.

That experience gag is strictly for job protection as any first pilot will tell you. Only by selling this angle to the insurance companies can an airline captain survive his physicals. Ask any airline about its figures on such oldsters dying of heart attack at home, or as one Convair captain did, falling over with a busted ticker right in the middle of LaGuardia terminal just as he was slated to take a load of humanity to Boston.

Sort of makes one wonder why the CAA doesn't arbitrarily demote all such pilots of 45 or more for the passengers' protection. Since airlines depend on records of safe, economical operation, a pilot upon reaching this age is not unlike a major league ball player. He has all the experience in the world, but lacks the youth and physical reflexes to capitalize on it.

In the majors, there isn't any union to protect him. The game only pays off on winning combinations. But the airlines are caught by a tough union and get stuck. For all his physical ailments—deafness, cardiac disturbances, far-sightedness—plus a high salary coupled with ironclad seniority complexes, they're stuck with him. Not only that, but when the new equipment comes along, equipment that needs a younger, defter touch, he still heads the list.

Robson missed the boat here in this column and revealed the narrowness of his views on this bitterest of most bitter airline-pilot problems. I have no access to many figures and facts, but it is my earnest opinion that a pilot under 40 and 5-6,000 hours of diversified flying has reached his peak in flying proficiency. A thousand hours in any type of plane should wholly qualify you as a veteran of that type—provided that you fly it under varying conditions and localities. This would certainly prove true with any present day four-engine plane, and could be relatively less for a smaller type.

In passing, to complete the cycle, I do agree with him that military flying should always be a full time job for the airplane commander. This fact is readily recognized by all military air arms, particularly MATS, and administrative desk pilots must be content to climb into the right seat. That's where I belong while making MATS flights with the 35th ATS here in Bermuda.

CAPT. W. C. BAKER
1604th ABS, Box 36
APO 856, c/o Postmaster
New York, N. Y.

ANG Pilot Angry

I trust that a few more columns such as R. C. Robson's (Feb. 23, 1953) will reduce your circulation considerably.

First of all, as an Air National Guard



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pilot who flies for the most part on week ends, let me say that I bitterly resent his slurring reference to the "week-end warrior." This is quite a tribute to those of us who devote a large portion of our spare time and give up our vacations to go to camp in order to make a contribution to the national defense which we feel is so necessary.

We recognize that our individual proficiency levels would be higher by flying full-time. Nevertheless, quite a few of us can make an instrument approach in an unstable F-51, and I wonder if Robson, with all his hours, can? I wonder if Robson can hold his position in a tight turn in a four-ship echelon at night? I wonder if he can stay on the tail of a single kid out of our entire squadron? If he can't, it's understandable because his mission has been different.

For that reason I suggest that Capt. Robson confine his comments to the scope of his qualifications.

It is not for me to explain the Air Force mission. However, in a nutshell, the Air Force must train their crews to fly anywhere, anytime, as compared to commercial crews flying the same route day in and day out.

I have the greatest respect for the airline crews. They do their jobs well. I question, though, whether it's because of their captains' 10,000 hours. It is common knowledge, you know, that the ALPA seniority system is so rigid that no one advances to captain until every guy who was hired the day before him has made the grade—whether he can fly or not!

That would indicate that in seven or eight years as a co-pilot a chap might log 5,000 hours—and how much does that really count? I would assume that it would count a great deal or not so much, depending upon the individual and the captains with whom he rode. After all, my boss has logged 2,000 hours (as a passenger) and he doesn't know the difference between an aileron and a hose clamp.

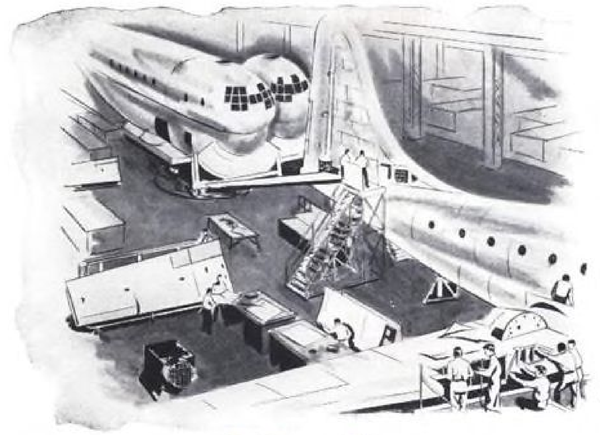
RALPH C. COKELEY
637 South Park Road
Ruthfred Acres
Bridgeville, Pa.

Prejudiced

I have been a subscriber of your magazine for the past several years. Up until the present time I have considered it an excellent publication. However, the Feb. 23 column by Capt. Robson concerning the 2,500-hour military pilot was one of the poorest and most prejudiced I have ever read. It is typical of the attitude of so many airline pilots who, after they get a considerable amount of time, not only think they own the sky they fly in but also believe that they invented the airplane.

Please cancel my subscription as of the present time.

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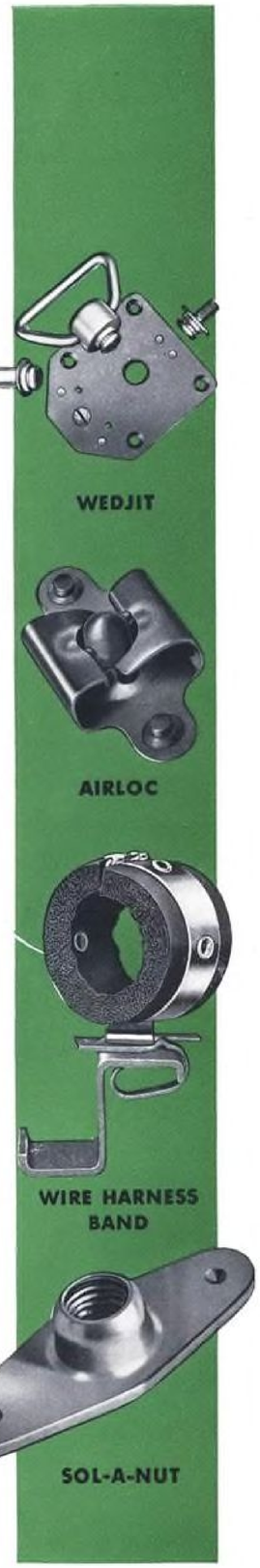
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Airline 1953 Forecast: Record Revenues

- **CAB predicts 15% climb in carrier business.**
- **But boom may depend on a prolonged cold war.**

Airline business this spring is booming, and company and Civil Aeronautics Board officials predict total 1953 volume will climb another 15% over 1952 records.

Airline economists stress two "ifs" in their rosy predictions: if the cold war stays warm, and if general business continues good.

The upsurge in airline travel is boosting revenues of large and small airlines alike, judging by early 1953 reports and the experience of 1952, when the domestic revenue totals of the Big Four and the 10 smaller trunks gained 19% over the previous year.

▶ **Big and Small**—Revenues of the Big Four—American, Eastern, TWA and United—are three-fourths of the total for the entire domestic airline industry. All four predict a good year in 1953. Capital Airlines, leader among the more marginal regional carriers, predicts the same, with 1953 earnings perhaps topping its all-time 1951 record.

▶ **First Report**—Complete 1951-52 costs-earnings trend comparison of domestic trunk airlines is published here for the first time, immediately following filing of all annual reports with CAB. The reports, when viewed together, are especially significant because 1951-1952 is the first period of completely non-subsidized operation (on final mail rates) in the industry's history.

• **Domestic.** Final reports reveal that domestic trunklines' net profits jumped 20% in 1952, despite a slack first half and despite a 10% drop in operating profit. Clue to this paradox was that non-operating profit on sale of obsolescent equipment largely offset increased depreciation charges on new fleets acquired in 1952.

The airlines report total non-operating profit of about $12 million on sale of flight equipment replaced by more modern planes. Non-operating profit on flight equipment sale in 1952 is reported as follows: Braniff, $753,000; Capital, $151,000; Continental, $335,000; Delta, $3,773,000 (resulting in net after taxes considerably higher than pretax operating profit); Eastern, $1,873,000; National, $1,973,000; Northeast, $259,000; Northwest, $1,579,000; TWA, $685,000.

• **International.** Most airlines' international profits and losses still defy final analysis because they are subject to retroactive change with CAB decisions on new temporary and/or final mail rates.

▶ **Revenues Up**—Domestic revenues of American, Eastern, TWA and United totaled $572 million; combined revenues of the 10 other domestic trunk lines was $222 million. Net profits of American, Eastern and United together totaled $31.7 million, a 20% increase over 1951. TWA's earnings are clouded by the question of unsettled international mail rates.

Revenues of every major airline increased substantially, averaging a 19% gain over 1951.

▶ **Costs Steady**—Most major carriers kept costs in line with the previous year despite:

• **Inflation.**

• **Depreciation** charges on large new fleets.

• **Capacity increase** at a greater rate than traffic volume.

True index of unit costs alone is the available ton-mile statistic, which did not change for the Big Four airlines. While American's cost per ton-mile of payload capacity flown inched up from 29 to 30 cents, United reports a drop from 28 to 26 cents; Eastern remained steady at 22 cents and TWA at 31

Airlines' Profit and Loss

(in $ millions)

	Revenues*		Operating Profit**		Net Profit	
	1952	1951	1952	1951	1952	1951
Domestic Operations						
American (s)	$187.3	$162.8	$26.4	$29.9	$12.5	$10.5
Eastern (s)	118.6	98.3	15.9	20.2	8.5	7.2
TWA	112.2	96 7	13.9	13.5	(a)	(a)
United (s)	153.9	121.2	24.3	18.5	10.7	8.6
Braniff	22.8	17.8	1.3	2.4	(b)	1.6
Capital	40.4	38.7	2.0	3.7	1.4	1.8
C & S	14.2	11.8	1.4	.9	.8	.6
Delta	28.1	25.3	3.8	4.6	4.4	1.9
National (s)	28.9	28.1	3.2	5.0	3.2	2.6
Northwest	36.5	32.6	.8	2.2	(c)	(c)
Western	18.2	12.5	2.9	2.3	1.2	1.3
Colonial	5.6	4.8	(−.2)	(−.2)	(−.2)	(−.2)
Continental	10.2	8.1	.8	.7	.6	.4
Northeast	7.1	7.4	(−.3)	.4	0	.2
International Operation						
Braniff	8.8	7.6	(−$1.3)	(−$.1)	(b)	(−$.2)
Northwest	19.2	16.6	2.3	.9	(c)	(c)
TWA	48.3	48.1	.8	5.1	(a)	(a)
Panagra	17.3	16.1	1.6	1.7	1.0	1.0
C & S	4.6	4.4	1.1	.9	.6	.5
Colonial	1.7	1.9	0	.3	0	.3

* Revenues

** Net operating income (before other adjustments and income taxes).

(a) TWA consolidated foreign and domestic net profit reported originally $8.5 million 1951 and $7.7 million 1952, but 1951 revised to $7.7 million by retroactive temporary mail cut, and both 1952 and 1951 still subject to further revision.

(b) Braniff's consolidated 1952 net profit reported at $265,000 will be increased to something approaching $1 million (after taxes) by the temporary CAB international mail pay increase of $1,642,000 this month, all to be credited to 1952 revenues, and this is subject to further revision in Braniff's pending final mail rate case.

(c) Northwest reports consolidated net profit of about $1.8 million for both 1951 and 1952, but 1951 international mail rate is not finalized, and allocation of 1952 costs and earnings between foreign and domestic operation may also change.

(s) System: International or territorial "stub-end" routes consolidated with domestic.

Source of all tables: Airline Form 41 reports to CAB.

Airlines' Unit Costs

(Domestic operation)

Operating Expense Per:	Available Ton-Mile		Revenue Ton-Mile	
	1952	1951	1952	1951
American (s)	30 cents	29 cents	45 cents	43 cents
Eastern (s)	22	22	45	42
TWA	31	31	46	46
United (s)	26	28	44	44
Braniff	31	28	57	51
Capital	26	26	55	51
C & S	32	33	57	59
Delta	29	27	48	45
National (s)	27	28	45	45
Northwest	34	32	57	57
Western	31	29	49	44
Colonial	39	39	78	77
Continental	33	34	63	62
Northeast	49	48	90	81

(s)—System consolidated.

Airlines' Financial Status

(in $ millions)

Domestic and International, Dec. 31:

	Assets*		Debt**		Net Worth***	
	1952	1951	1952	1951	1952	1951
Big Four:						
American	$158.2	$143.7	$30.0	$30.0	$84.3	$76.3
Eastern	122.3	104.3	38.0	27.5	46.5	38.1
TWA	150.3	121.8	45.2	39.8	51.6	34.1
United	153.4	112.7	20.1	15.3	86.9	57.3
Regional:						
Braniff	27.9	16.0	9.8	1.0	11.4	9.0
Capital	20.9	19.5	4 0	3.4	9.3	7.9
C & S	11.7	11.4	....	.5	7.8	6.9
Delta	23.3	17.4	....	.7	15.3	9.2
National	31.3	18.1	12.0	....	13.3	9.5
Northwest	41.5	47.2	5.1	10.1	23.4	22.0
Western	19.6	13.7	2.9	1.9	9.4	6.1
Small:						
Colonial	3.3	3.5	....	....	1.9	2.1
Continental	7.4	5.0	1.1	.6	3.6	2.6
Northeast	4.9	4.9	....	....	4.0	4.0
Foreign Only:						
Panagra	15.8	20.8	....	.2	8.6	10.6

* Total assets, depreciated.
** Long-term debt only.
*** Capital stock and surplus accounts.

cents, according to airline reports to CAB.

Meanwhile, cost per revenue ton-mile, which measures sales results in terms of overall costs, increased slightly because of higher capacity. Airlines prefer this to the 1951 situation of turning away customers. Average load factors of more than 70% cannot last indefinitely. Airlines continue ordering new equipment until load factors drop to where they can satisfy customer demands for space on popular flights.

▶ **Profit Squeeze**—Operating profit margins probably will continue dropping from the 1951 average of 10-18% to 1952's 7-16% to a probable 1953 average of near 10%.

But most companies forecast bigger overall revenues that should offset the squeeze on profit margins, upping nets after taxes to near the 1951 and 1952 records.

▶ **International Haze**—International airlines' outlook is not as clear as domestic, but revenue gains are expected. Pan American and TWA refused to give even general estimates of 1953 capacity and passenger mile increases in their Atlantic Divisions. Their earnings are not known for the back years 1952, 1951 and before because of reliance on subsidy mail rates not yet finalized by CAB.

▶ **The Reports**—The carrier statements:

• **Northwest.** The carrier's consolidated foreign and domestic net profit of $1,789,000 reported for 1952 is almost identical to 1951's $1,786,000. But the 1951 figure is subject to revision in the pending final mail rate case for Northwest's Pacific Division. Cost allocation between foreign and domestic is a bone of contention between the carrier and CAB mail rate officials.

• **Panagra.** Reported earnings held at about $1 million for both 1951 and 1952. Earned surplus dropped $2.8 million in 1952 because of CAB's final mail rate order cutting Panagra's mail pay Jan. 1947, to Oct. 1951 by that amount. But the 1951 and 1952 earnings comparison is not changed materially, a CAB official says. The reduction hit 1952 working capital only, and the company already had prepared for this by building up $15 million in current assets by Dec. 31, 1951 (and appropriate reserves and short-term loan on the liability side).

Significant changes in assets during 1952 were reduction of marketable securities by $4.8 million and current receivables by $2.3 million, while undepreciated value of flight equipment increased $2.7 million.

• **Braniff.** Reported earnings of $265,000 for 1952 consolidated foreign and domestic operations may change later to a profit of at least $750,000 because of a CAB temporary international mail pay increase of $1,642,000 granted this month. Effect is to wipe out Braniff's previously reported $1,331,000 loss on international operations; the CAB order said the whole retroactive grant could be credited to the four quarters of 1952.

Braniff does not yet know what the final 1952 earnings adjustment will be because of prior-year tax adjustments; but a company spokesman says if 1952 operations are artificially isolated and the new CAB rate increase applied—less an approximate 50% federal income tax—1952 earnings should total nearly $1 million. This still is temporary, because Braniff has a final international mail rate case pending that would boost earnings to around $1 million.

• **TWA.** Consolidated foreign and domestic net profit originally was reported at $8.5 million for 1951 and $7.7 million for 1952. A retroactive cut in international mail pay last year changed

Operating Profit Margins

(Domestic)

(Before income taxes and other adj.)

	1952	1951
American (s)	14%	18%
Eastern (s)	13	21
TWA	12	14
United (s)	16	15
Braniff	6	13
Capital	5	10
C & S	10	8
Delta	14	18
National (s)	11	18
Northwest	2	7
Western	16	18
Colonial	(—3)	(—4)
Continental	7	9
Northeast	(—4)	3

(s)—System consolidated.

Subsidy Reliance on Int'l Operations

	Mail pay as % of total revenues	
	1952	1951
Braniff	23%	27%
Northwest	27	23
TWA	7	19*
Panagra	14	13
C & S	31	42
Colonial	4	9

*TWA mail pay for 1951 substantially reduced by retroactive CAB mail pay cut.

1951 reported earnings to $7.7 million. But both 1951 and 1952 are subject to further revision this summer when CAB plans to issue a final order in the pending trans-Atlantic final mail rate case.

Pending decision at CAB, TWA has asked a temporary rate boost of about $6 million annually, effective from last July 1 forward. The carrier's current temporary international rate is set to yield about $3,268,000 a year.

• **Pan American.** Annual financial reports are withheld until the end of April each year. Operating statistics show substantial revenue gains on all divisions, but load factor generally declined because of heavy additions of new planes—a total of nearly 50 Super DC-6Bs.

Rundown of 1952-51 ton-mile figures for PAA: Alaska Division revenue ton-miles gained 9% to 13.8 million, while overall load factor (revenue ton-miles as percentage of available ton-miles capacity flown) dropped from 61% to 59%. Atlantic Division revenue ton-miles gained 16% to 88.3 million, and load factor dropped from 74% to 66%. Latin American Division revenue ton-miles gained 5% to 104.3 million; load factor increased from 62% to 63%. Pacific Division revenue ton-miles gained 19% to 50.3 million, while load factor dropped from 64% to 59%.

▶ **Stub-End Routes**—American, Eastern, National and United have non-subsidy mail rates on their international and territorial route extensions—now considered an integral part of their domestic systems.

Problems involved in cost allocation make profit-and-loss determination on these routes largely subjective, but here is how the airlines report their 1952 international and territorial routes fared:

• **Eastern** figures its New York-Puerto Rico route returned a net profit of $917,000.

• **American** reports $215,000 loss on its Mexico City operation.

• **National** says $422,000 was lost on its Cuba route.

• **United** claims a loss of $1,735,000 (before taxes) on its Stratocruiser service to Honolulu.

Hellenic Airline

- **Transocean may operate Greek-U. S. carrier.**
- **First flights expected to start this summer.**

Transocean Air Lines may operate a Greek trans-Atlantic airline—Hellenic Overseas Airways. Hellenic has a franchise from the Greek government and is owned by A. S. Onassis, shipowner who has figured in the current controversy over U. S. war-surplus ships trading with Red China.

AVIATION WEEK sources in Athens report the proposed operating rights are under study by the Minister of Communications and outlook is for final government approval soon.

The Greek air attache in Washington, Group Captain Spyros Diamantopoulos, says the Hellenic Overseas franchise already is finalized, and he understands Onassis plans to start operations by mid-summer using two Constellations.

The air attache said it is rumored that Group Captain Costas Kriemades, prominent ex-pilot of the Greek air force, will be named president of the new carrier by Onassis. He also believes Greek pilots experienced in Athens-London service may fly on the trans-Atlantic service.

▶ **Taloa Deal**—Transocean has an operating agreement with Eleftherios C. Babounis, who represents Onassis. At least some Transocean officials active in last year's negotiations with Babounis did not know what interests he represented, but they did know his financial backing came from wealthy shipping interests.

The Civil Aeronautics Act and regulations prevent grant of air carrier permits to U. S.-controlled foreign airlines, but do not prevent contract operation.

Transocean negotiations with Babounis ran through three phases. In his first two proposals, the shipowner's agent sought Transocean capital as well as operation. The airline rejected this and finally came to an understanding that Transocean would stand ready to operate the Greek trans-Atlantic route if and when Babounis won franchise, financing and flight equipment to go ahead.

Babounis wired Transocean president Orvis Nelson in Oakland two weeks ago, asking if he still were interested in operating under terms of their contract. Nelson replied in the affirmative.

The shipowner's agent recently indicated to Transocean vice president Edward W. Ringo in New York that Hellenic planned to obtain three Douglas DC-6Bs and had almost all the capital necessary to launch the venture and begin operation of the franchise.

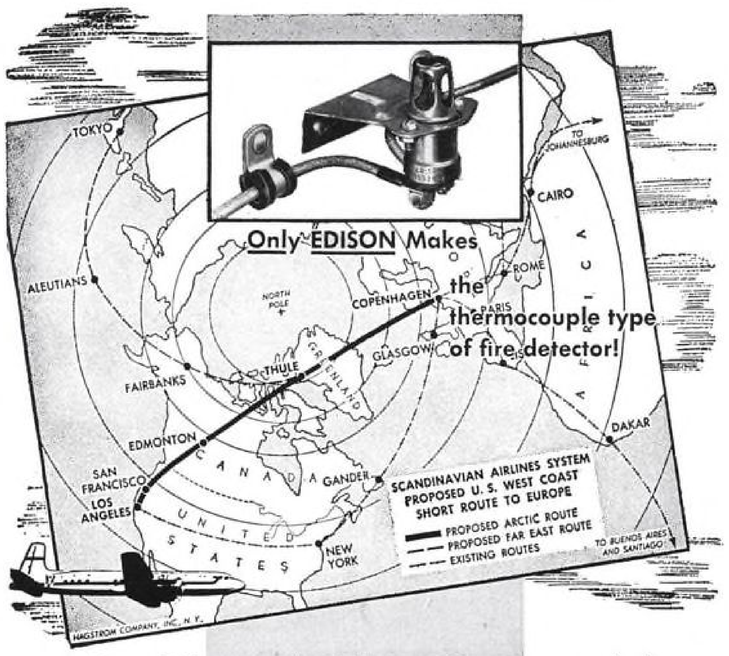
▶ **Babounis Franchise**—Transocean has a photostatic copy of the English translation of Babounis franchise, signed by the Greek Minister of National Defense, Finance, and Coordination, and certified by the American vice consul at Athens.

Terms of the permit provide that it "covers exclusively the operation of the air route between Greece-U.S.A."

The franchise also provides that Hellenic can serve points in Europe en route to the U. S., but competition with the inter-Europe Greek airline (TAE National Greek Airlines) is ruled out.

Protection of TAE's routes is noted in the Babounis franchise as follows: "Exceptionally the contracting corporations may also engage in the operation of inter-European air routes with the exclusion, however, of domestic routes and of international air routes in general having a different direction to that from Greece to the U. S. A. . . . so long as such air routes are not covered by a franchise in favor of a Greek air company or alternatively such franchise is not under exploitation (operations)."

Transocean is as much a trading corporation as a contract air carrier. It negotiates air carrier proposals, broom-factory purchases, crop-dusting contracts and the like around the world as demand and opportunity for such transactions arise.



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Qantas Orders Fleet Of Super Connies

(McGraw-Hill World News)

Melbourne—Qantas Empire Airways is spending $15 million on a fleet of seven Wright Turbo-Compound-powered Lockheed Super Constellations which may serve as a stopgap until the carrier is able to get Bristol Britannia turboprop transports for expanded air-coach operations. The government-owned carrier has had three Super Connies on order, but recently placed a contract for four more planes for delivery in 1955.

First Qantas Super Connie is expected to arrive here early next year. The carrier hopes to make up some of its dollar expenditures by selling its six earlier model Connies in the United States. In 1957 or 1958, when the Britannias become available, the carrier, according to observers here, will start selling the Super Connies to pay the sterling price of the newer planes.

There is still considerable pressure in this area to bring about a merger of all British carriers in the Pacific. A necessary requisite would be for all the airlines to operate British equipment.

It is possible British pressure may result in Qantas purchasing two de Havilland Comets although the carrier argues that this would be justified only on the basis of prestige since the Super Connies are better suited for the long Sydney-London route.

At present the Australian carrier plans to begin tourist service to London early in 1954 although it has not yet decided on seating arrangements. Darwin would probably be eliminated on the London route under the new schedules.

Atlantic Carriers Threaten Price War

Possibility of a price war loomed last week between competing airlines flying the North Atlantic air route.

Loftleidir Icelandic Air Lines is operating weekly DC-4 service between New York and Oslo, Norway, at $51 less than the rate prescribed by International Air Transport Assn.

IATA members competing with Loftleidir on the New York-Oslo route, Scandinavian Airlines System in particular, are protesting the cut rate and threaten to break away from IATA in order to compete successfully with the lower fares.

Loftleidir operates once-weekly service to Oslo via Reykjavik in a cooperative agreement with Braathen South American and Far Eastern Air Transport, an independent Norwegian line operating as far east as Hong Kong. Braathen, like Loftleidir, is not an IATA member and reportedly flies DC-4s on all its routes at a cut rate.

Every other week, a Braathen DC-4 makes the New York-Oslo roundtrip with an Icelandic crew. Flights on the other weeks are made with Loftleidir's DC-4. Braathen expects delivery of two Super Constellations this year, which may be used on the New York-Oslo run and on Braathen's eastern routes.

When the U. S.-Iceland air transport agreement was signed in 1945, no provision was made for price fixing. Therefore, Loftleidir, as a non-IATA airline, may set any price on its New York to Reykjavik, Iceland portion of the route. However, Iceland maintains an agreement with Norway and Denmark under which fares from Reykjavik to Scandinavia are governed by rates fixed by competing IATA-member airlines.

Thus the only part of the New York-Oslo fare lower than the IATA prescribed rate is that from New York to Reykjavik. IATA has fixed that fare at $215. Loftleidir advertises a price of $172. New York-to-Oslo rate under IATA is $313.10. Loftleidir charges $262.10.

SHORTLINES

► **Delta Air Lines** vacation package tour offering 8 days, 7 nights in Miami, plus air transport, is priced at $142.40 from Chicago.

► **Mohawk Airlines** has bought a DC-3 from Delta, making total Mohawk fleet of ten 24-passenger DC-3s. Company started in 1945 with two four-place Fairchilds, converted to five-seat Cessnas later in that year and bought four eight-seat twin-engine Beechcraft in 1946. DC-3 fleet started in 1947 with three planes.

► **North American Airlines** proposed to Defense Department and Civil Defense Administration that NAA act as the early-alert mobilization agent for communications and dispatch of heavy twin-engine transports of corporations and nonskeds. United's and American's 24-hour communications and dispatch services were programmed for early stages of scheduled airline mobilization. Defense and CDA have expressed interest in the plan, NAA says. Company has 25 sales offices and is the largest domestic nonsked airline operation.

► **North Central Airlines,** formerly Wisconsin Central, revenue passengers in 1952 were up 65% over 1951 to 25,-236,332. Company operates 10 DC-3s, which averaged 6½ hours' daily utilization.

► **Panagra** reports its Lima, Peru, instrument landing system is "the most modern . . . in Latin America and probably in the world." Weather minimum is 200-ft. ceiling and half-mile visibility.

► **Seaboard & Western Airlines** has contracted with the Berlin, Germany, senate to airlift 220 tons of freight weekly from Berlin to Hamburg, using DC-4s. This will increase the present service of British contract airfreighters by about 20%, the company says. . . . Seaboard says its trans-Atlantic freight capacity has been increased 14% to 33,000 lb. per roundtrip by a $350,000 engine modernization program, installing the 1,450-hp. Pratt & Whitney R2000-7M2 on its DC-4s.



CIVIL AERONAUTICS BOARD PORTRAIT

Here is the new Civil Aeronautics Board, including its latest member, Harmar D. Denny, Jr., 67, (extreme right) who is filling the unexpired term of Donald Nyrop, who resigned. From left to right, including date each member's term expires: Chan Gurney, 56, Dec. 31, 1958; Joseph A. Adams, 45, 1956; Josh Lee, 61, 1955; Oswald Ryan, 65, 1954 and Denny, whose term expires Dec. 31, 1953.

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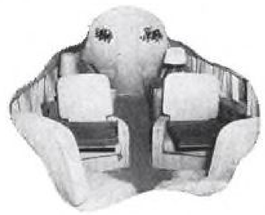
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744	D10044	Adel	Selector Valve
244	D10051	Adel	Selector Valve
814	74247 (TY. PH3)	Aero Supply	Valve
335	AN5830-1	Whittaker	Valve
74	AN5830-6	Whittaker	Valve
60	AN5831-1	Parker	Valve
130	612-4A	Eclipse	Valve
2200	37D6210 (AN4078-1)	United	Solenoid Valve
1888	K1593-6D	Kohler	Valve
500	NF3-5	Mallory	Noise Filter
20	TA-12B	Bendix Radio	Transmitter
35	RA10-DB	Bendix Radio	Receiver
2585	AN3096-4	Grimes	Dome Light
775	AN3096-5	Grimes	Dome Light
1365	AN3096-6	Grimes	Dome Light
6	610-2C	Eclipse	Vacuum Pump
550	PD12K10	Stromberg	Carburetor
236	PR48-A1	Stromberg	Carburetor
90	1685-HAR	Holley	Carburetor
19	1375F	Holley	Carburetor
407	SF9-LN-2	Scintilla	Magneto
185000	LS4-AD1	Aero	Spark Plug
1	R1820-52	Wright	Engine
16	R1820-54	Wright	Engine
4	R1820-60	Wright	Engine
1	R1830-43	P & W	Engine
166	1045A	P & W	Bearing
500	3506	P & W	Flange
130	8288	P & W	Follower Ass'y.
814	35814	P & W	Blower Ass'y.
53	48362	P & W	Shaft
75	48363	P & W	Shaft
56	48392	P & W	Sump
390	48461	P & W	Gear
78	76236	P & W	Gear
1178	84289	P & W	Bearing
113	84487	P & W	Housing
77	84591C	P & W	Nose Housing
200	48350-D	P & W	Crankcase Ass'y.
200	84083	P & W	Cylinder
100	84084	P & W	Cylinder
200	84085	P & W	Cylinder
281	CR2791-G100-K4	G.E.	Relay
626	CR2792F101-A3	G.E.	Relay
41	G34464	Guardian	Relay
350	G31502-A	Guardian	Relay
22	146102	Vickers	Brake Valve
9	557-5	Eclipse	Check Valve
107	D12296	Adel	Pump
67	19100-2-101B	Kenyon	Check Valve
88	3135-11C	Eclipse	Pressure Switch
32	3V-217-HC	Pesco	Separator
100	27314	Purolator	Oil Filter
128	3801-3B	Eclipse	Fuel Quan. Gauge
33	420313	Wright Aero	Pump Ass'y.
46	416421	Wright Aero	Drive Ass'y.
76	U635A (AN4000-2B)	U.A.P.	Fuel Strainer
12	U8416-MM	U.A.P.	Oil Cooler Assy.
25	26675	Airesearch	Motor
35	AA14002A	Vickers	Accumulato
21	FD65-5	Diehl	Motor
81	3616	Bendix Radio	Control
23	3620	Bendix Radio	Station Box
335	G1 (94-32376)	G.E.	Oxygen Pressure Signal Ass'y.
180	AW-CV-1-1	U. S. Gauge	Check Valve
740	1C-200	G.E.	Radio Noise Filter
15	1EAR-280BH	Pesco	Pump
7	SP-1-445-8	Parker	Selector Valve
8	1E621	Pesco	Pump
29	NEP-2	Eclipse	Auxiliary Power Unit
16	LER-30D	Lawrence	Auxiliary Power Unit
4	2CM46A2	G.E.	Generator
6	2P248EB	Pesco	Fuel Pump
21	2E258SA	Pesco	Pump
146	AW2-3/4-25K	U. S. Gauge	Manifold Press Gauge (Metric)
27363	CREB3N	Casco	Rod End
18	SA/3A	Kidd	Impact Switch
13	3GBD1A18A	G.E.	Regulator
18273	AN200-K3L2	Fafnir	Bearing
245	LMR-4	Micro	Switch
2094	PM-5	Spencer	Circuit Breaker
44	5BA25D-J4B	G.E.	Motor
31	5AM31JJ9A	G.E.	Amplidyne
111	5AM31NJ10	G.E.	Amplidyne
425	5BA40NJ1A	G.E.	Motor
189	5PD65-MB1	G.E.	Motor
25790	NR6L12	Torrington	Bearing
26	MS49A	Bendix Radio	Antenna Switch
45	D2060	C. P. Clare	Relay
298	727-TY37P	Weston	Air Temp. Ind.
2000	B909-K99	C. H.	Switch
2747	NAF310310-4B	Cannon	Plug
402	NAF310310-5B	Cannon	Plug
132	AN6209-B	Hydro Aire	Valve
50	AN6213-2	Bendix	Hyd. Valve
280	AN6220-4	Aeroquip	Couplings
27	AN6247-2	Adel	Hyd. Valve
14	UA8013-MM	United Aircraft Prod.	Oil Cooler
1175	RS-2	Mallory	Selector Box
172	A7012	Delco	Motor
6	8DJ13ABK	G.E.	Tachometer Indicator
200	2222-1F-2A	Eclipse	Tachometer Indicator
28	AN5770-2	Manning Maxwell Moore	Manifold Pressure Gauge
71	1003-4	Eclipse	Generator
427	NAF1016-1	Adams & Westlake	Light Ass'y.
616	NAF1016-2	Adams & Westlake	Light Ass'y.
1008	1222BF	Leach	Relay
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130	B1394T	Teleflex	Gear Box

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SO THEY TELL US

Life 'Unmasks' Red Designs

The editor of Aviation Week received this memo from our engineering editor:

Life magazine got into the Russian airplane act this week with a beautiful layout of sketches of purported hot new planes. You might be interested in these comments, sketch by sketch:

"LATEST MIG"—This is the so-called MiG-17, "discovered" by an air magazine some weeks back. Caption says it will fight at 50,000 ft. and climb at 6,000 fpm. This is under current MiG-15 performance. According to Korean reports, the -15s toot around at 50,000 ft. right now, and best information we get is that they climb at about 10,400 fpm. If that plane, with another engineer and obviously bigger than the -15 weighs only 15,000 lb., I'll eat it. The new ship is supposed to be in the 650-mph. class. The present -15 is capable of 672, according to our USAF evaluation.

"ATOMIC BOMBER"—This is the tired old artist's conception which originally was done for Air Trails, and which was the subject of the memo you ran Dec. 1, 1952, as part of your truth editorial. Incidentally, despite Life's contention otherwise, wing droop is to counter effects of sweepback, has nothing to do with fuel load and has absolutely no effect on range whatsoever.

"LIGHT BOMBER"—Life is away out of date on this one, because it's the IL-28, which two years back was thought to be the TU-10 design.

"NEXT STEP"—This little horror which rises vertically comes from that little British syndicate that had devised and revised so many drawings of "new" Russian planes and sold them to various U. S. air magazines. The HWK-509 engine was hopelessly outclassed by other contemporary rocket engines in Germany and its performance left much to be desired. Although Life says otherwise, the thin delta wing would contribute absolutely nothing to stability during vertical takeoff and landing because any aerodynamic surface, to be effective, has to have air flowing over it. At zero speeds, there is no airflow and hence no operation of the wing. That's why the V-2 and other successful rockets, which started from zero speed, used vanes working inside the jet stream from the rocket engine and steering the rocket by deflecting the jet.

"YAK-21"—This is the old German Junkers 8-263, production version of the ME-163, and first reported by AVIATION WEEK more than two years ago.

"MIKOYAN"—This one already has been reported by a couple of other U. S. air magazines. There may be such an animal, but there is almost nothing to substantiate it at this stage.

So the net effect of this article is to assemble some tired old sketches, dress them up, make a trick layout with half-true data and so-called performance, drop in an erroneous conjecture or two and pass it off as authoritative. It isn't. But I guess this is Life!—**Dave Anderton**

Industry

Only 10 years ago Frank Piasecki made his first flight in his own single-place helicopter. Today **Piasecki Helicopter Corp.** has more than 4,000 employes and is producing several models for Navy and Air Force, including the Model 16, world's largest helicopter which may be flying late this year. At an open house and flight show for employes, the Navy plant representative, Cmdr. Eric Lohmann, said the company is under the best management in its history. The new president, Don R. Berlin, has just completed a campaign slashing overhead expenses, which resulted in a reduction of about 400 indirect personnel, representing an annual payroll saving of about $2,250,000. Frank Piasecki, now board chairman, said 10 years from now today's copters would be "museum pieces" and added that "today we have machines on the drawing boards that will fly several hundred miles an hour." . . . C. Glenn Williamson has resigned as president of **Kellett Aircraft Co.**

Washington

There is responsible opinion in Washington that CAB members did not realize full implications of their sweeping **Pioneer Airlines decision** when they released it. . . . **Defense Secretary Wilson's order** shutting off all public demonstrations of "new weapons" brought hasty cancellation of an elaborate Army press junket to show off its Nike missile. . . . **CAA's Office of Aviation Safety** has been hit hard by another acute shortage of engineers. Despite numerous OAS resignations, most of the engineers on CAA's jet turbine committee were pulled out of OAS. . . . **Charles Willis,** White House administrative aide, tells friends he expects to wind up his duties before long, having accepted the position as assistant to Sherman Adams for the organizational period of the Eisenhower Administration. . . . **CAB** has cleared the way for a specialist on human survival to participate officially in future accident investigation to make special studies and recommendations from the survival standpoint. A. Howard Hasbrook, an expert on the staff of Cornell crash injury research, probably will direct this activity.

Transport

Air France took delivery of its first Vickers Viscount Mar. 20 and hopes to start it in service Apr. 20. . . . An official of **Scandinavian Airlines System**—which has a batch of DC-6Bs on order—doubts if the company will place any jet transport order for several years, awaiting decisions of other manufacturers and airlines and flight experience of new ships. . . . SAS is interested in developing not only a **trans-polar route** from Europe to the U. S. West Coast, a spokesman says, but also looks forward to a regular route from northern Europe across the ice to Tokyo via Alaska—probably Fairbanks—and the Aleutians. Bilateral discussions betwen the Scandinavian countries and Japan already have been held. Opening of the USAF base at Thule to commercial air traffic will be necessary before these arctic services can start. . . . **Capt. Eddie Rickenbacker** told financial writers the other night that straight jets are 6 to 8 years away on Eastern Air Lines. "We've got to lick the noise problem and we've got to learn how to stop 'em on the runway," besides all the other problems, he said. . . . **Pan American** is considering using a parachute brake on its jets for emergency purposes, an official says. . . . Although trans-Atlantic **air-freight traffic** grew from 12.1 million tons in 1947 to 45-48 million in 1952, the share of trans-Atlantic all-freight flights by U.S. certificated passenger carriers dropped to 30% last year, from 81% in 1949, due to foreign airline competition, says **Ray Norden,** president of Seaboard & Western Airlines. . . . **New York Airways** hopes to start helicopter passenger service later this year.

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Agency—The Shaw Company
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Agency—The McCarty Company
AERO DESIGN & ENG. COMPANY 45
Agency—Tom P. Gordon Company
AEROTEC CORPORATION, THE 44
Agency—Hening & Co., Inc.
AIRBORNE ACCESSORIES CORP. 4
Agency—Gray & Rogers Adv.
ALLEN AIRCRAFT PRODUCTS, INC. 21
Agency—The Fred Bock Adv. Co.
ANTI-CORROSIVE METAL PRODUCTS CO., INC. .. 93
Agency—Woodard & Voss, Inc.
ARO EQUIPMENT CORP. 78
Agency—Beeson-Reichert, Inc.
AUSTENAL LABORATORIES, INC. 26
Agency—Frank C. Nahser, Inc.
BERKELEY SCIENTIFIC DIV. BECKMAN INSTRUMENTS, INC. 34
Agency—George C. McNutt, Inc.
BOWSER, INC., REFRIGERATION DIV. 65
Agency—William Schaller Co.
BRAND & CO., INC., WM. 47
Agency—Corr Snow, Inc.
BREEZE CORP., INC. 64
Agency—Burke Dowling Adams, Inc.
BRUNSENE CO., THE, DIV. H. M. SAWYER & SON 69
Agency—McMillan & Marsden, Inc.
CAMLOC FASTENER CORP. 43
CANNON ELECTRIC DEVELOPMENT CO. 50
Agency—Hixson & Jorgensen, Inc.
CHAMBERSBURG ENG. CO. 23
Agency—Willard G. Myers Adv. Agency
CHAMPION SPARK PLUG CO. 20
Agency—McManus, John & Adams, Inc.
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Agency—Geare-Marston, Inc.
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Agency—Batten, Barton, Durstine & Osborn, Inc.
COLLINS RADIO CO. 36
Agency—W. D. Lyon Co., Inc.
CONSOLIDATED VULTEE AIRCRAFT CORP. 19
Agency—Buchanan & Co., Inc.
CO-OPERATIVE INDUSTRIES 53
Agency—Richard La Fond Adv., Inc.
CROUSE HINDS CO. 30
Agency—Barlow Adv. Agency, Inc.
DARNELL CORP., LTD. 25
Agency—Henry L. Rhea Adv.
ECLIPSE-PIONEER DIV. BENDIX AVIATION CORP. 35
Agency—McManus, John & Adams, Inc.
EDISON, INC., THOMAS A. 82
Agency—Gotham Adv. Co., Inc.
EX-CELL-O CORP. 69
Agency—Holden, Clifford, Flint, Inc.
FAFNIR BEARING CO. 39
Agency—Horton-Noyes Co.
FLYING TIGER LINE, INC. 22
Agency—Hixson & Jorgensen Adv., Inc.
GENERAL ELECTRIC CO. ..... Fourth Cover
Agency—G. M. Basford Co.
GOODRICH CO., B. F. 3
Agency—Batten, Barton, Durstine & Osborn, Inc.
GRAND CENTRAL AIRCRAFT CO. 57
Agency—Oscar Nordin Co.
GRUMMAN AIRCRAFT ENG. CORP. ..... Front Cover
Agency—Fuller & Smith & Ross, Inc.
GULF OIL CO. 27
Agency—Young & Rubicam, Inc.
HAYDON MFG. CO., INC. 54
Agency—Hugh H. Graham & Associates, Inc.
HUFFORD MACHINE WORKS ..... Third Cover
Agency—Clyde D. Graham Adv.
INTERNATIONAL NICKEL CO. 74
Agency—Marschalk & Pratt Co.
JAMES-POND-CLARK 70
Agency—Anderson-McConnell Adv. Agency
KAISER METAL PRODUCTS, INC. 93
Agency—B. K. Davis & Bro.
LAND-AIR, INC. 68
Agency—Symonds, MacKenzie & Co., Inc.
LEAR, INC. (LEAR-CAL DIVISION) 24
Agency—Buchanan & Co.
LEBANON STEEL FOUNDRY 75
Agency—Foltz-Wessinger, Inc.
LEWIS ENGINEERING CO. 72
LINK AVIATION, INC. 33
Agency—Buchanan & Co., Inc.
MACWHYTE CO. 10
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McGRAW-HILL BOOK CO. 54
MECHANEERS, INCORPORATED 93
MONADNOCK MILLS, UNITED CARR FASTENER CORP. 77
Agency—H. B. Humphrey, Alley & Richards, Inc.
MONSANTO CHEMICAL CO. 59
Agency—Gardner Advertising Co.
MYSTIK ADHESIVE PRODUCTS 56
Agency—George H. Hartman Co.
NATIONAL PNEUMATIC CO., INC. (HOLTZER-CABOT DIV.) 5
Agency—James Thomas Chirurg Co.
NORDEN INSTRUMENTS, INC. 37
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NORTH AMERICAN AVIATION CO. 46
Agency—Batten, Barton, Durstine & Osborn, Inc.
NUTT-SHEL COMPANY 67
Agency—Welsh-Hollander Adv.
PACIFIC SCIENTIFIC COMPANY 41
Agency—Darwin H. Clark Co.
PITTSBURGH PLATE GLASS CO. (FIBER GLASS DIV.) 32
Agency—Ketchum, MacLeod & Grove, Inc.
REPUBLIC AVIATION CORP. 71
Agency—De Garmo, Inc.
ROBINSON CO., RALPH C. 53
Agency—Chapin-Damm Advertising
SCINTILLA-MAGNETO DIV. BENDIX AVIATION CORP. 62
Agency—McManus, John & Adams, Inc.
SEARCHLIGHT SECTION 83, 84, 85, 86, 87, 88, 89, 90, 91
SERVICE STEEL DIV. VAN PELT CORP. 46
Agency—Claude E. Whipple Adv.
SPEEDWAY MFG. CO. 70
Agency—Ross Llewellyn, Inc.
STANDARD PRESSED STEEL CO. 52
Agency—Gray & Rogers Adv.
STEEL PRODUCTS ENG. CO. 73
Agency—Geyer Advertising, Inc.
STEWART-WARNER CORP. 42
Agency—MacFarland, Aveyard Co.
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Agency—Howard H. Monk & Associates
UNIVERSAL METAL PRODUCTS 58
Agency—Byron H. Brown & Staff
VICKERS ARMSTRONGS COMPANY, LTD. 76
Agency—Intam Limited
VOI-SHAN MFG. CO., INC. 31
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WEBER AIRCRAFT CORP. 63
Agency—Ruthrauff & Ryan, Inc.
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LETTERS

Navigators & Crashes

AVIATION WEEK is performing a helpful service to aviation safety by publishing from time to time the official CAB accident investigation reports.

On May 26, 1952, an accident occurred to a BOAC Hermes aircraft in the Sahara Desert. It made the headlines here because of "a colossal navigation error of over 1,300 miles."

The official report concerning the accident has now been published, and I am enclosing a copy.

Generally, the report speaks for itself. However, some further data in connection therewith is important to a proper analysis of the accident.

It is true that a navigation error caused the aircraft to be so far off track. This is not surprising when one considers that there was no crew member on board with any current navigational qualifications whatsoever. The 2nd class navigator's license held by the captain of the aircraft was discontinued as a navigation qualification in April, 1949, when the flight navigator's license was instituted, and superseded the 1st class, wartime class and 2nd class navigator's licenses. The flight navigator's license remains the only navigation qualification recognized by the Ministry of Civil Aviation in the United Kingdom.

Most press reports and official releases indicated that a "navigating officer" of BOAC was to blame. There are approximately 200 navigation officers under contract to BOAC, all of whom hold the flight navigator's license. Not one of these men was on board the aircraft. The person referred to as the navigating officer of the aircraft was a pilot. He had made four unsuccessful attempts to pass the navigator's license (2nd class) examination during 1947-48. At the time of the accident he held only a navigating officer's certificate issued by BOAC. He was operating under a pilot's contract. He performed the navigation duties on this flight because of the stated BOAC policy of pilots taking over all navigational duties, to the exclusion of specialist navigation officers.

The specialist navigating officers of BOAC, in a letter addressed to their management on May 19, 1952, had warned the corporation of the dangerous inadequacy of their navigation policy.

The same corporation policy is still being pursued wherever possible. On the Comet (jet) operations, one of the two pilots leaves his seat at the controls, after reaching level-off position and goes aft to navigate until time for descent. There is no British regulation, such as Part 41:62 of the U. S. Civil Air Regulations, which requires two pilots to remain at the controls at all times! Such contradiction of regulations should be standardized by ICAO.

In attempting to ascertain the reasons for the accident, perhaps subsequent actions on the part of BOAC and the Ministry of Civil Aviation will give a clue. BOAC now requires specialist navigating officers to be carried on the Hermes aircraft over the route in question. The Ministry of Civil Aviation is now revising the very regulation which permitted the Hermes aircraft to operate from Tripoli to Kano without a qualified navigator aboard.

An unqualified navigator can so easily, through his work, place an aircraft in jeopardy in such a way that the hazard may not be recognized until too late for remedial action. Safety, efficiency, and economy are inherent in a navigator's work if the work is done properly.

Is it still necessary to have accidents in order to learn obvious facts? Will the Hermes accident or the Bermuda Sky Queen accident awaken the aviation industry to the necessity for specialists in each field, not only in the all important interest of safety, but also in the attainment of a more economical operation?

JOHN D. NICHOLAS, CHAIRMAN
International Air Line Navigators Council
209-06 Hillside Avenue
Queens Village, N. Y.

Who's Blind?

Have just read in your Feb. 23 issue about AOPA's Max Karant trying to pin a lot of the blame for air collisions on the airline pilots.

I don't know the extent of Mr. Karant's flying experience or what type aircraft he has flown. It strikes me, from the way he writes, that his time in large multi-engine aircraft has been very limited. I admit that my experience in light aircraft is rather slight—a mere 200 hours.

However, it doesn't take much experience to see that a lot of the light, high-wing monoplanes are blind as a bat when they go into a turn. Now in comparison to the airliner, the lightplane is very maneuverable. Accordingly, the lightplane pilot does a lot of banking, climbing, etc. With the flick of the wrist he is going at a 90-degree angle from his previous path. The lightplane pilot's experience may be 50 to several thousand hours. The airline captain's experience at the very least is 5,000 and up. So we have the situation of airplanes with blind spots, and in many cases manned by extremely inexperienced pilots, flying in areas loaded with all kinds of military and airline traffic.

Look at the difference in size of the small plane and the large silver airliner. Quite a job of eye-straining to spot a small airplane against the vari-colored landscape.

Let's take a typical DC-6 approach to a landing. First the pilot has to get his 75,000 pounds of airplane slowed down from 300 mph. to 150-160 mph. Brother, those big babies like to keep coasting.

Just to make it interesting let me point out the various duties to be done on descent. Check engine fire detection system, set pressurization controls for descent, turn on windshield air and/or heat to prevent fogging or icing, richen mixtures as necessary, maintain traffic watch when not in clouds, check oxygen system off, switch engine blowers to low, seat belt sign on, figure estimated landing weight and V2 in case of go around. Pitot and wing heaters off or as required, check cabin pressure differential, check fuel quantity, switch to main tanks on all four engines, set and check both altimeters, check both airspeeds, mixtures auto rich, hydraulic system on check pressure, carburetor heat cold or as required, set props to 2,300 rpm., flaps to 20 degrees, landing gear down, check for three green lights, pressure up, fluid level O.K. and check brakes, check reverse pitch override light out—flag down.

This may give one the impression that the airline pilot is a busy man approaching the airport of destination. You're 100% correct! At the same time he must watch out for airplanes of every size and description. What does the lightplane pilot have to do? Work the throttle and keep his eyes open. If I were flying the little jobs, I'd stay the hell out of the way of the big babies. With all that maneuverability, I wouldn't worry a teeny bit. Keep the eyes open, a 75,000-pound airliner isn't so hard to see. And at 20 feet—my god!

I'll see you in the control area.

WILLIAM E. IRVING, AIRLINE CO-PILOT
444 East Avenue
LaGrange, Illinois

Report on Ramjets

This letter comes to you filled with appreciation for the extremely well-covered article on the future of ramjets appearing in your Dec. 15 issue. The article, "Ramjet Favored for Mach 2-4 Range," was based upon a paper prepared by Malcolm Harned, chief designer of Marquardt Aircraft Company and, I believe, translated for your book by Dave Anderton. He did a bang-up job.

Roy Marquardt and our entire management staff feel that it has done a great deal, not only for the company but for the ramjet engine itself. As a matter of fact, at a recent top management meeting, cognizance was made of the article to the extent that it was included in the minutes of the meeting.

JACK ANDERSON
Public Relations Manager
Marquardt Aircraft Co.
7801 Hayvenhurst Ave.
Van Nuys, Calif.

Praise

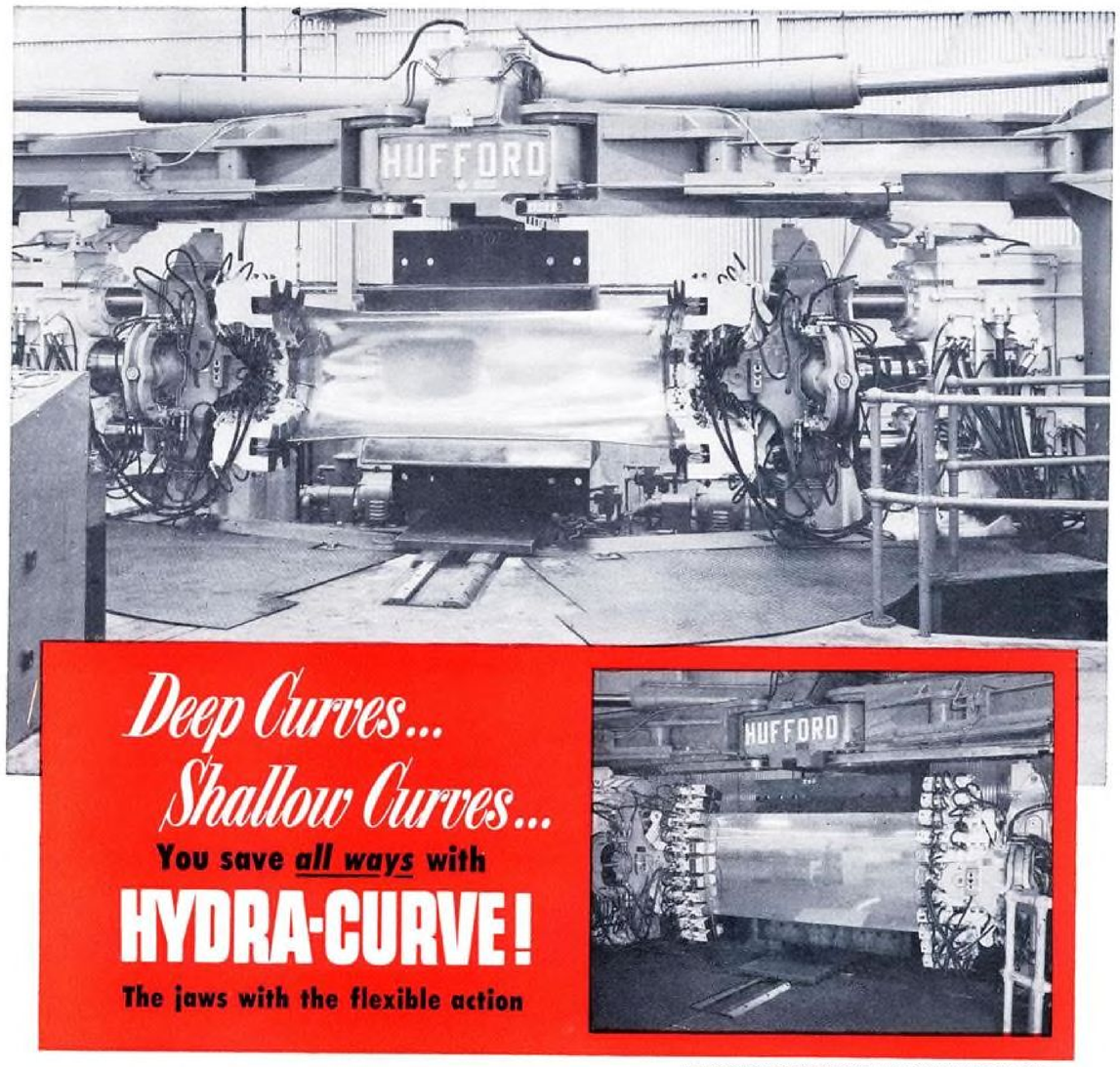
On behalf of all of us in Aeroquip Corporation, we want to congratulate you on the story in AVIATION WEEK, covering the Air Transport Operators Conference at our Jackson plant.

The thoroughness of your report is highly commendable.

J. HENRY REISNER
Aeroquip Corporation
Jackson, Michigan

May we have permission to reprint 1,000 copies of the article "Sperry Cutoff Monitors A-12 Autopilot" which appeared recently in AVIATION WEEK?

P. W. BIGELOW
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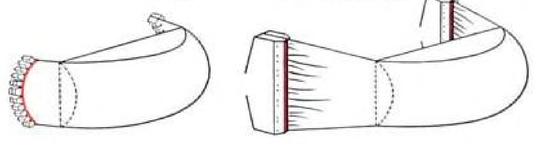
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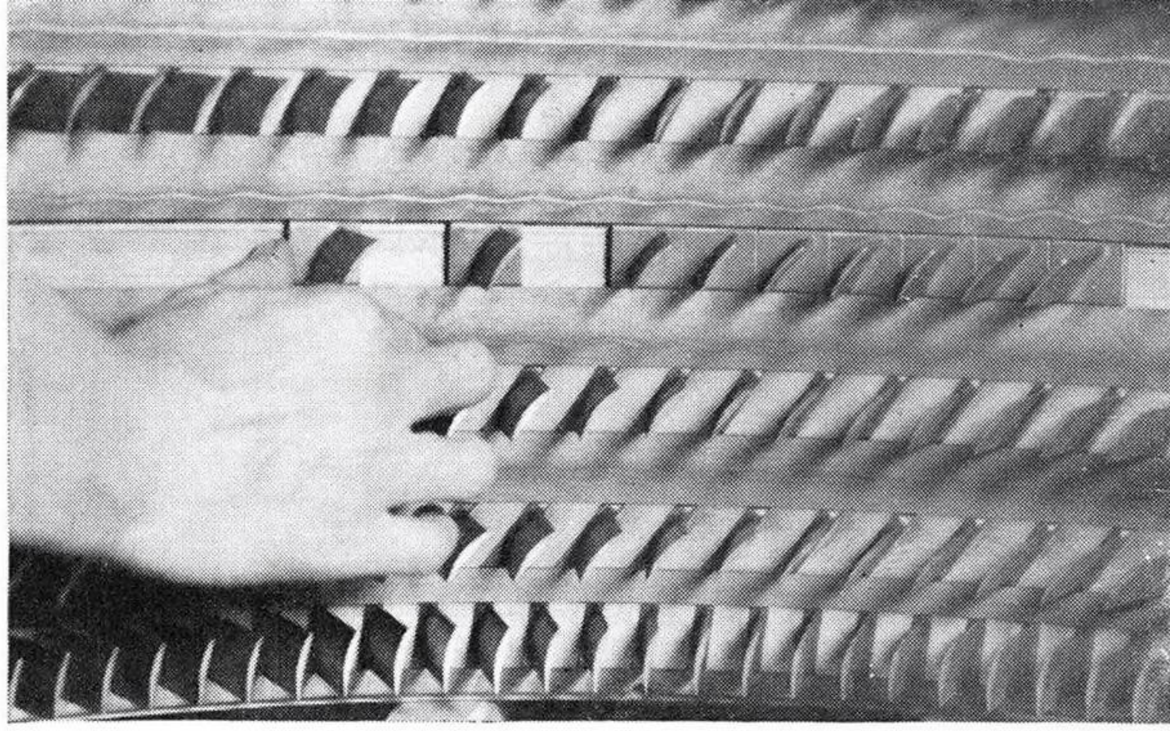
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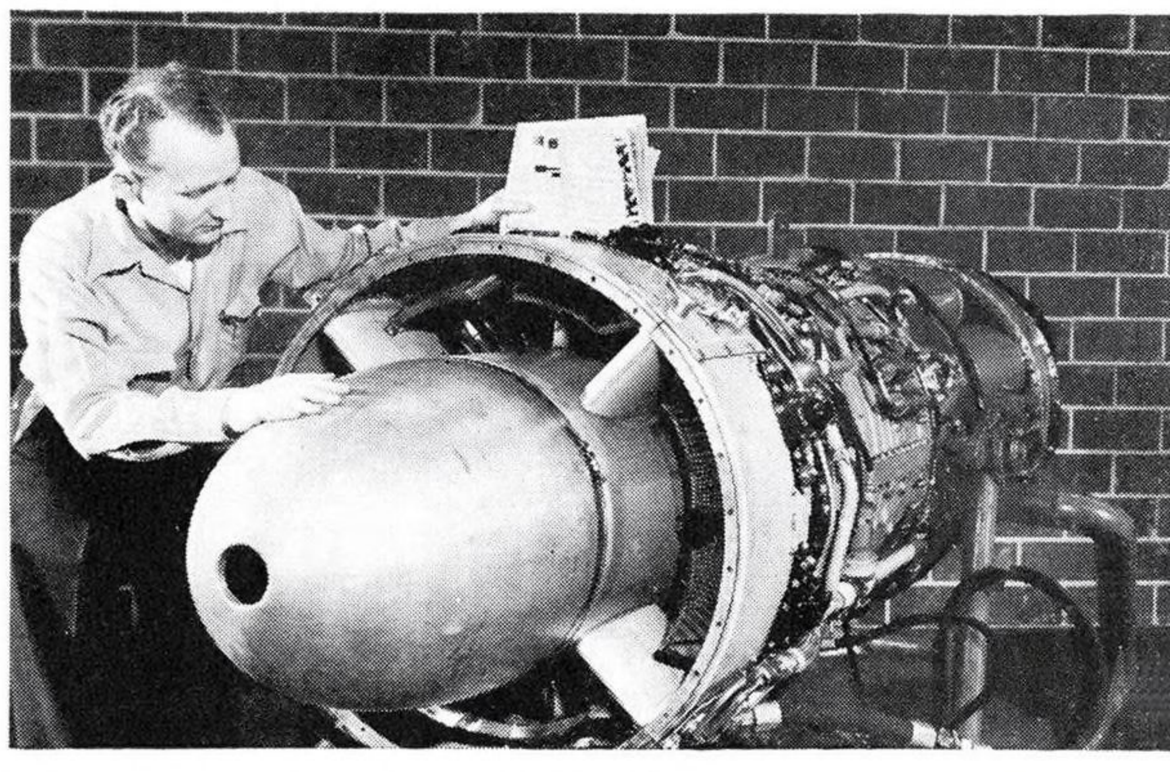
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POWERFUL USAF FIGHTER, the North American F-86 has compiled an imposing record. New engine improvements give Sabre Jet greater speed, more range.



FABRICATED STATOR BLADES are inserted into compressor casing. This development reduces cost with no efficiency-loss.



J47 "HOT NOSE" is warmed by air bled from compressor. Retractable screens help eliminate icing problems.

CONTINUING DEVELOPMENT ON G-E J47 HELPS IMPROVE SABRE JET PERFORMANCE

North American F-86 Flys Faster, Farther

EVER-CHANGING NEEDS of air combat have been met by important refinements and improved performance in the General Electric J47 turbojet—powerplant of the North American F-86 Sabre Jet. A glance at the MIG-alley scoreboard attests to the F-86's past success; but now even better J47 engines are powering improved Sabre Jets in combat against the MIG.

MORE SPEED . . . MORE RANGE were necessary to keep the Sabre Jet's present superiority intact. So G-E engineers designed more efficient compressors, water/alcohol injection, and a total of 3000 design improvements. Result? Greater thrust, lower specific fuel consumption at higher rpm—with *no increase* in engine frame size or weight.

CONTINUING IMPROVEMENTS have made the J47 America's number one production turbojet. Yet no G-E engine design is static. Even now, General Electric's vast jet engine facilities are using every means possible to make G-E jets more powerful, more reliable, and more economical than currently-produced engines. Progress is General Electric's most important product. *General Electric Co., Schenectady, N. Y.*

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