AVIATION WEEK

A McGRAW-HILL PUBLICATION

AUG. 11, 1952

50 CENTS

Aviation Week

ABP Member ABC

Volume 57 August 11, 1952 Number 6

42,946 copies of this issue printed

August 11, 1952 AVIATION WEEK Vol. 57—No. 6
Member ABC and ABP

Published weekly by McGraw-Hill Publishing Company, Inc., 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, Publication Division; Ralph B. Smith, 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 50c. 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.

NEWS DIGEST

Domestic

Douglas RB-66 twin-jet sweptwing reconnaissance-bomber will be built for USAF Tactical Air Command at the company's Long Beach division. Since the three-place 600-700-mph. class plane stems from Navy carrier-based A3D, Long Beach first will re-engineer the design to USAF requirements.

Jet plane utilization mark was set by USAF pilots flying a Lockheed T-33 trainer 400 hr. 30 min. during July, nearly double the previous U. S. record for single-engine jets of 202 hr. On the final day of the record, pilots kept the T-33 aloft for 23 hr. 22 min.

Melvin J. Maas, former Minnesota congressmen noted for his support of aviation, retired from U. S. Marine Corps as major general. World War II USMC pilot Maas has suffered blindness.

Civil aircraft shipments during May totaled 330 planes valued at $20.4 million and weighing 950,700 lb. airframe weight. During May 524 civilian engines valued at $3.6 million were shipped.

National Air Races for 1953 will be held at Dayton's Municipal Airport, Vandalia, Ohio, in connection with Dayton's observance of flying's golden anniversary. Date will be Sept. 5-7.

District court order restoring David L. Behncke to presidency of Air Line Pilots Assn. has been temporarily set aside in new ruling by Federal Appeals Court, Danville, Ill., which also renewed the appointment of a manager for the union's financial affairs.

Brig. Gen. Arthur E. Easterbrook (Ret.), was buried in Arlington Cemetery July 30. He was the only observer to win the rating of ace during World War I.

Stuart Symington, first Secretary of USAF, then head of Reconstruction Finance Corp., registered a landslide victory in Missouri Democratic primary race for nomination as senator over his opponent, Missouri Attorney General J. E. Taylor, President Truman's candidate.

Maj. Gen. Follet Bradley, USAF, (Ret.), 62, died Aug. 4 in Mineola, N. Y. He had been assistant to the president of Sperry Gyroscope Co., since retirement from USAF in 1942. Bradley's flying experience dated back to 1912.

MERGER AGREEMENT joining Braniff International Airways and Mid-Continent Airlines is signed by T. E. Braniff (right), with J. W. Miller, MCA president, looking on. Approved by CAB, recently passed by majorities of both carriers' stockholders, the merger becomes legally effective this week. The merger move by the carriers more than doubles Braniff's domestic route mileage.

Financial

Boeing Airplane Co., Seattle, Wash., reports net earnings of $5,877,875 for the six months ending June 30 on sales and other income of $309,761,374. Unfilled orders total approximately $1.2 billion, not including contracts under negotiation.

Republic Aviation Corp., Farmingdale, N. Y., had net income of $2,626,225 for the first half of 1952 after provision for taxes. Sales for the period, ended June 30, totaled $134,256,855. Republic's backlog is estimated at $933,384,786.

Bell Aircraft Corp., Buffalo, N. Y., reports $894,184 profit after taxes on sales of $58,536,145 for the first half of 1952. In comparable period last year, Bell's profit was $762,561. Backlog at June was $420 million.

Ryan Aeronautical Co., San Diego, has declared a regular quarterly dividend of 10 cents per common share payable Sept. 12 to holders of record on Aug. 22.

Continental Air Lines' net income for first six months of this year was $88,940 on total operating revenues of $4,900,252.

Consolidated Vultee Aircraft Corp., San Diego, Calif., notes net income of $4,012,196 for the first half of 1952 after provision for federal taxes. Total sales during this period were $183,835,795. Convair's unfilled orders are estimated at more than $1 billion.

Mid-Continent Airlines has declared a 25-cent dividend payable Aug. 11 to stockholders of record Aug. 1.

North American Aviation, Inc., Inglewood, Calif., reports net income of $5.2 million for the nine months ended June 30 on sales and other income totaling $204,229,069. NAA's backlog is estimated at more than $741 million.

Curtiss-Wright Corp., and subsidiaries, report net profit of $3,335,108 for the six months ended June 30. Total net sales for the period came to $146,549,561. As of June 30, C-W's unfilled orders exceeded $1,050,000,000.

Northwest Airlines reports June passenger revenues of $4,245,118, a monthly record for the company.

Grumman Aircraft Engineering Corp., Bethpage, N. Y., had a net income of $2,168,329 after taxes for the six months ending June 30.

International

Japan Air Lines reportedly has ordered two DH Comet series II (Rolls-Royce Avons) at cost of $3.1 million.

Sabena Belgian Airlines has ordered two Douglas DC-6A Liftmaster freighters for delivery by August, 1954. Powerplants will be the P&W R2800-CB17s.

AVIATION CALENDAR

Aug. 19-30—National Soaring Contest, Grand Prairie, Tex.

Aug. 27-29—IRE Western Electronic Show & Convention, Municipal Auditorium, Long Beach, Calif.

Aug. 27-30—National Flying Farmers convention, Alabama Polytechnic Institute, Auburn, Ala.

Aug. 30-Sept. 1—International Aviation Exposition, sponsored by Aero Club of Michigan; including Continental Motors Trophy Race; Wayne Major Airport, Detroit.

Sept. 1-7—Society of British Aircraft Constructors annual display. Farnborough, England.

Sept. 4—Centennial of Engineering banquet, Hotel Knickerbocker, Chicago.

Sept. 4-5—Eighth National Conference on Industrial Hydraulics. Sherman Hotel, Chicago.

Sept. 5-7—Preconference instrument maintenance clinic, Instrument Society of America national instrument conference, Case Institute of Technology, Cleveland. Send advance registrations to P. V. Jones, Instrument Society of America, Pittsburgh 33.

Sept. 8-12—Instrument Society of America seventh national instrument conference and exhibit, Cleveland.

Sept. 14-23—Aeronautical Fair, Forlamini Airport, Milan, Italy.

Sept. 15-19—International Air Transport Assn., eighth annual general meeting, Geneva, Switzerland.

Sept. 26-28—Aero Medical Assn. interim meeting, Paris, France.

Sept. 29-Oct. 1—National Electronics Conference, Sherman Hotel, Chicago.

Sept. 30-Oct. 2—Aircraft Spark Plug and Ignition Conference, sponsored by Champion Spark Plug Co., Toledo.

Oct. 1-4—Society of Automotive Engineers national aeronautic meeting, aircraft engineering display and aircraft production forum, Hotel Statler, Los Angeles.

Oct. 9-10—Airport management operations conference, Oklahoma University, Norman, Okla.

Oct. 11-18—Fourth annual All-Texas Air Tour; information available from Texas Aeronautics Commission, Austin.

Oct. 25-Nov. 2—International aviation and travel exposition, Navy Pier, Chicago.

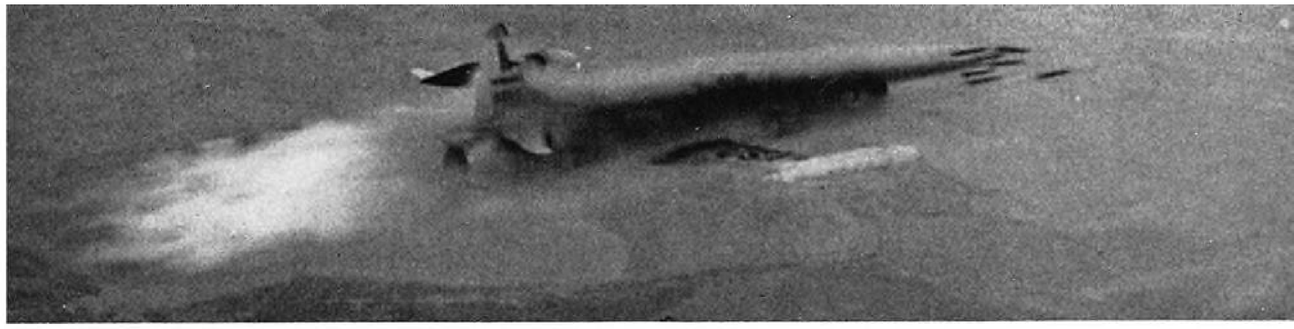
Oct. 28-29—Transport Aircraft Hyrdaulics System Conference, sponsored by Vickers, Inc., Hotel Park Shearton, Detroit.

Nov. 6-7—National fuels and lubricants meeting, Society of Automotive Engineers, The Mayo, Tulsa, Okla.

Dec. 2—Symposium on light metal heavy-forgings and extrusions for modern aircraft, Society of Automotive Engineers, Hotel Statler, N. Y.

PICTURE CREDITS

9—(top) Lockheed; (center) Northrop Aircraft; (bottom, left) North American; (bottom, right) Keystone; 14—McGraw-Hill World News; 17, 18—Wide World; 21, 22—Consolidated Vultee; 31—Boeing Airplane Co.; 34—Temco; 48—Allison div. GM.



Fire Drill . . .

Military aircraft armament has developed into a dynamic, highly specialized field which relies on the weapons system concept, embracing not only the actual weapon but also intricate and costly electronics and other devices to utilize its maximum potentials.

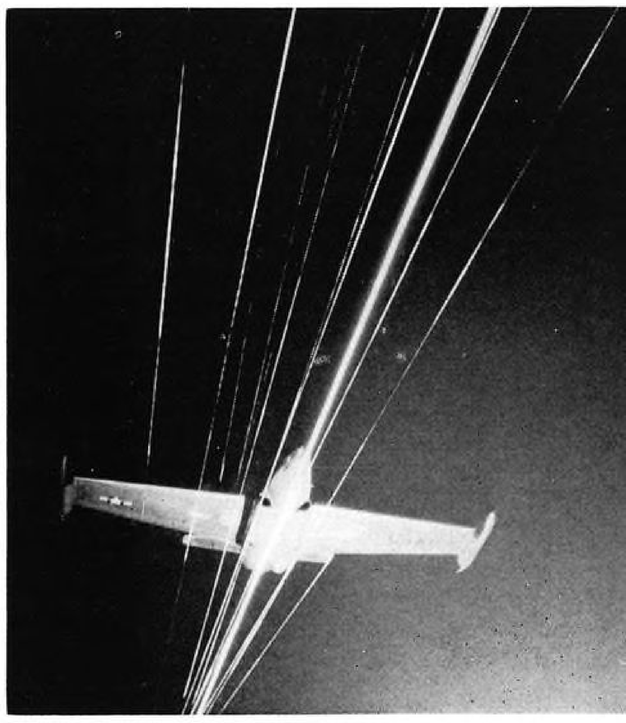
The pictures on this page show several current types of fighter plane firepower undergoing tests: The all-rocket-armed Lockheed F-94C Starfire (top), the cannon-armed Northrop F-89 Scorpion (right) and the North American F-86 Sabre, packing high velocity aircraft rockets in addition to its six .50-cal machine guns.

The F-94C reputedly packs the brainiest system of the lot, having its radar, autopilot and firing system interconnected to bring the plane onto the target and fire rockets without need for crew to see the adversary.

The photo shows the Starfire disgorging some of its 24 2.75-in. Aerojet Aeromite missiles over the California desert. Flame and smoke almost enshroud the plane.

The unusual in-flight night photo of the F-89 firing its six 20-mm. cannon was made using a stroboscopic flash lamp, freezing the action.

Over Nevada, an F-86 looses a "ripple" of deadly 5-in. HVARs, designed for use against surface targets.



WHO'S WHERE

In the Front Office

George B. Shaw has been made vice president-procurement of Glenn L. Martin Co., Baltimore, Md., and **Daniel W. Siemon** has been appointed vice president-industrial relations. Shaw joined the firm in 1947, during the war served with AAF on the Eastern District Price Adjustment Board. Siemon has been with Martin for 23 years, since 1951 has been industry representative of the Airframe Committee in an advisory capacity to WSB.

E. Swain Russey has been made president of Warner Gear division of Borg-Warner Corp., Muncie, Ind., succeeding **A. P. Emmert** who retired from active management of the division after 25 years of service, the last eight as president. Four new Warner Gear division vice presidents are: **T. J. Ault, William H. Cortwright, John C. Oesterle** and **Andrew W. Rose.**

Burt C. Monesmith, manufacturing manager at Lockheed's California division since 1950, has been named vice president-manufacturing manager for the firm. He joined Lockheed in 1946, previously was with Douglas Aircraft Co. for 12 years.

Douglass F. Johnson has been named president of the newly reorganized Talon Trading Corp., Trans Ocean Airlines' subsidiary, in a move to activate a number of special projects and coordinate various offices. Other appointments by Talon: **Orvis M. Nelson,** chairman of the board; **R. H. Derr** executive vice president; **Allan A. Barrier,** Eastern vice president; **Michael J. Meier,** European vice president; and **Francis Jones,** secretary-treasurer.

Joseph A. Ferris, one-time public relations director for Northwest Airlines, has been designated vice president of Doughboy Industries, Inc., New Richmond, Wisc., and Fairfield, Ia., maker of plastic products and machines and engaged in printing and publishing. He will be in charge of the firm's public relations programs.

Changes

Joe Mashman has been designated assistant director of contracts for sales in Bell Aircraft Corp.'s Helicopter division, Ft. Worth, Tex., and **R. G. Ervin** has been made assistant director of contracts, administration. **S. Gottlieb** has been promoted to supervisor of military contracts. **Tom Bean** is now contract administrator for domestic sales and **Jack Bean** has been made contract administrator for export sales. **Frank Kelley** has been named supervisor of commercial sales. **John Perry** has been appointed contract administrator for sales engineering and **Robert Kaufman,** contract administrator for military contractors.

Claude D. Adams has been named public relations director in charge of advertising for Doman Helicopters, Inc., Danbury, Conn.

Robert H. Dolbear has been named sales engineer for Instrument division, Allen B. DuMont Laboratories, Inc., Clifton, N. J.,

(*Continued on page 18*)

INDUSTRY OBSERVER

► Latest Munitions Board aircraft schedule indicates that powerplant of the F-84F switches from Wright J65 to General Electric J73 and Douglas B-66 (A3D) engine installation switches from Westinghouse J40 to Allison J71, Northrop F-89F also includes J71 installation in place of the Allison J35 current powerplant of the F-89D. Both the J71 and J73 are rated at 10,500 lb. thrust.

► **Boeing proposal for immediate stepup of the B-52 eight-jet engine bomber production, currently scheduled for three per month, to 12 per month has been turned down by USAF as "too costly." Apparently, Pentagon sources report, USAF will not program B-52 production very heavily until detailed engineering studies of two supersonic bomber proposals are thoroughly evaluated.**

► Military sources forecast cutback in the near future of jet engines developing less than 7,500 lb. thrust. Current aircraft engine schedules indicate follow-on production only of engines having an unaugmented thrust of 7,500 lb. and over. All of these, it is reported, are going to get even more power with afterburner.

► **Lockheed Aircraft is under consideration as a second source supplier of the Convair automatic-piloted F-102 interceptor. Plane will be powered by Pratt & Whitney J57, with electronic control system furnished by Hughes Aircraft. Originally nicknamed "54 interceptor," difficulties in automatic pilot system development has forced renaming program "56 interceptor" (Aviation Week Nov. 5, p. 11).**

► According to engineering schedules, Republic Aviation's supersonic interceptor XF-103 will not be ready for flight test until late 1954. Designed for much the same mission as the Convair F-102, considerable experience of F-103 components is being gained in test flights of the Republic XF-91 now under way at Edwards AFB, Calif. F-91 incorporates, among other design innovations, inverse taper wings, and composite powerplant installations with both jet engine and rocket motors.

► **Bids were received in Washington last week for 243 tandem light trainers for use by the nine USAF civilian contractor pilot training schools. Specifications for the new trainer which were prepared by USAF include utilization of a 90-hp. piston engine (presumably limiting engine to Continental Motors). Decision as to winner for the contract will be left to representatives of the nine schools. Air Force sources report that specifications generally are comparable to the Taylorcraft 18, developed in 1950. Contract will total approximately $750,000.**

► Federation Aeronautique Internationale has confirmed new world record for Category II aircraft (1,002-2,204 lb.) established by Max Conrad flying a stock Piper Pacer powered by a Lycoming 125-hp. engine. Conrad flew a distance of 2,462 statute miles between Los Angeles and New York during a 24:38-hr. nonstop flight, May 1. The plane carried a total of 158 gal. of fuel. Average speed was 99.254 mph.

► **One problem reported for the Lockheed F-94 interceptor series is an extreme yawing condition. Pilots report considerable difficulty in holding plane on course in radar tracking before and after target lock-on.**

► Ford Aircraft Engine division, Chicago, has disclosed that the first Convair RB-36H, powered by six Ford-built R4360-53 Pratt & Whitney-designed engines plus the usual four General Electric J47 turbojets, has been test flown successfully to a 40,000-ft. altitude from Ft. Worth.

► **Helicopter manufacturers can supply more commercial customers after 1954, Washington sources report, due to quantity buying of rotary, winged aircraft by all three military services. Industry sources predict an upsurge of helicopter feederline promotion on the part of major airlines as a result of the military decision to release helicopter production to civil users.**

Washington Roundup

The Platforms

The heated campaigning of Presidential aspirants for an all-powerful air arm never reached the printed text of either the Democratic or Republican party platforms adopted at Chicago.

• **The Republican plank** called for "the quickest possible development of appropriate and completely adequate air power. . . ." It then went on to embrace sea and ground forces on co-equal status. Adequate defense, the platform reads, requires "the simultaneous readiness of coordinated air, land, and sea forces, with all necessary installations, bases, supplies and munitions, including atomic energy weapons in abundance."

• "**Air power**" was not even mentioned in the Democratic platform. The only aspect of "defense" singled out for specific endorsement and support was agriculture. The Democratic plank entitled "Defense Needs" pledged: "We will continue to recognize agriculture as an essential defense industry, and to assist in providing all the necessary tools, machinery, fertilizer, and manpower needed by farmers in meeting production goals."

Significance of the platforms from the defense view is the different emphasis:

• **The Democrats stressed** "collective security" consolidating the military strengths of non-Communist nations and involving military aid to allies;

• **The Republicans put** emphasis on strong U. S. armed forces.

The Candidates

Gen. Dwight Eisenhower, top Air Force officers report, is one of the few Army men who grasped the possibilities of air power back during its struggling days, and still retains that grasp.

But Eisenhower backed ex-Defense Secretary Louis Johnson's general thesis, in the fall of 1949, that U. S. military strength should be subordinated to the country's economic health. However, after Johnson spelled out his thesis in a $13-billion budget for the military services that went to Congress early in 1950, Eisenhower protested that the weakening was going too far, particularly in air power. The result: Eisenhower and Johnson agreed on $300 million more for aircraft procurement, which Congress granted.

Gov. Adlai Stevenson's knowledge of military defense is world-wide.

During World War II, he studied defenses and strategy in both theaters, first as special assistant to the late Secretary of the Navy Frank Knox, and then as a member of the War Department mission that went to Europe in 1944.

Sen. Richard Nixon's four years service with Naval Aviation during World War II included: Aviation indoctrination at Quonset Point; command of the South Pacific Combat Air Transport Command at Guadalcanal, later at Green Island; general representative for BuAer's Eastern District with headquarters at Philadelphia.

Sen. John Sparkman is a friend of the nonskeds, he's pushed for more competition in air transportation and has bucked the scheduled segment of the industry on airmail subsidy separation legislation.

A friend of the Air Force, Sparkman voted for the 70-group program back in 1949, when only nine Senators did.

Seaplane Bomber?

The Navy again is considering the possibilities of the seaplane as a bomber.

Its advantage over a carrier-type "attack plane" is long range.

The industry has engineering designs of a seaplane comparable to the B-47, programmed to become the backbone of USAF's long-range strategic arm, and will be ready to implement them by 1953 if the Navy nods.

Assistant Secretary of Navy for Air, John Floberg comments: "We are looking into all seaplane possibilities with an interested eye. They would be an additional capability, not a substitute capability for carrier aviation. . . .

"The seaplane force wouldn't have the mobility of the carrier force, but it would have more mobility than land-based air."

Navy's seaplane fighter—the Convair F2Y—will mark the entry of the seaplane into Naval air's striking arm. It will make its first flight, probably, this fall.

Cutback in Spares?

Watch for a major cutback in Air Force's program for parts, equipment, and engine spares.

Congress already has indicated that if USAF doesn't reduce the percentage of aircraft money that goes into extras, it will be withheld in the future. Senate Appropriations Committee voted to slash $600 million off this year's money earmarked for spares. It was later restored—to give USAF time to work out a new policy.

Sixty-four percent of the money for each USAF plane goes into spares.

Sen. Homer Ferguson, a member of the Appropriations Committee, observed: "This means that for every 100 new airplanes turned over to the Air Force and placed on an air field, the equivalent of 64 planes is stored in the form of spare parts."

USAF's Undersecretary Roswell Gilpatric concurred: "We have to cut that. I do not see how, over a long period of time, we can sustain a force like this and have that much of our money going into just spares."

Ferguson's challenge to USAF: The 143-wing force could be achieved by the Joint Chiefs of Staff's target date of mid-1954 (instead of the "stretchout" date of mid-1955), if some of the $4 billion marked for spares this year were used for complete aircraft.

Pressure to cut back the spares program was set off by testimony that phasing out of six types over the next two years will leave USAF with surplus spares in storage costing over $126 million.

Army Aviation: A New Sponsor

Army aviation will be aggressively pushed when it is unshackled from the Ordnance Corps and turned over to the Transportation Corps. The shift, now underway, will be completed around the first of the year.

Up to now, Ordnance has served as an indifferent middle-man between operational Army commands, determining plane requirements, and Air Force doing the actual procurement.

Transportation Corps wants to exploit both the helicopter and fixed wing for its operational function.

It wants to deal with contractors directly, with USAF eliminated as a go-between. **—Katherine Johnsen**

AVIATION WEEK VOL. 57, NO. 6 AUGUST 11, 1952

Douglas Ready to Build Jet Transport

- **Plans now firm; mockup being shown to airlines.**
- **Company to invest up to $40 million.**

Douglas DC-8

(Tentative Specifications)

Span	127 ft.
Sweepback	35 deg.
Length	134 ft.
Fuselage diameter	130-150 in.
Gross weight (long-range)	220,000 lb.
Gross weight (domestic)	180,000 lb.
Cruising speed (40,000 ft.)	560 mph.
Still-air range (domestic)	2,500 mi.
Passengers	70-120
Crew	5
Powerplants	4 P&W J57
Thrust, each	15,000 lb.
Cost (production model)	$3 million
Cost (prototype)	$30-$40 million
First flight (production model)	1958

Douglas Aircraft Co. has sprung to an early lead in the race to build and sell an American commercial jet transport.

Douglas is now exhibiting a full-scale fuselage mockup of the four-jet DC-8 in Santa Monica to prospective airline customers. Top executives have made a firm policy decision to move full speed ahead with a privately financed program aimed at capturing and dominating the jet transport market in the same manner that Douglas has led the piston-powered transport field since the days of the first DC-3.

▶ **Private Venture**—Sources close to the Douglas project estimate that from $30 to $40 million may be required to launch adequately the DC-8. Douglas directors have made the decision to support the program without any government financing. They will treat the venture as a purely commercial project aimed primarily at world-wide airline sales.

Basic design philosophy of the DC-8 is that it must be an economical, relatively simple transport that will enable airlines to operate it at a profit. This contrasts sharply with the approach of some Douglas competitors in converting a basic military jet aircraft design to commercial use.

Although Douglas officials are frank to admit that there will be minor configuration changes in the DC-8 until production begins, the basic design calls for a low-wing monoplane with a sweepback of about 35 deg.

Powerplants will be four advanced versions of the Pratt & Whitney Aircraft J57 Turbo-Wasp with ratings in the 15,000-lb.-thrust class. The extremely low fuel consumption of these split-compressor turbojets make them extremely attractive for commercial operation. Each engine will be mounted in an individual pod slung under and forward of the wing similar to the double pod mountings of the Boeing B-47 and B-52.

▶ **Specifications**—Wing span is about 127 ft. with a fuselage length of about 134 ft. A single fin empennage also incorporates 35 deg. sweepback.

Two versions of the DC-8 are planned. One will gross about 180,000 lb. for domestic airline operations and the other will have a 220,000-lb. gross aimed at long-range overseas operations. The domestic version is expected to have a still-air range of 2,500 mi. plus fuel reserves for 300 mi. additional and one hour of holding at 15,000 ft.

A cruising speed of 560 mph. at 40,000 ft. is expected. The international version will have its range extended by two wingtip tanks of approximately 600 gal. capacity each.

Two seating arrangements will be available—a 70-90 seat interior for first class service and 120 seats for high-density coach operations. Fuselage diameter of the DC-8 is still under debate with 130- and 150-in. versions under consideration. The larger diameter would permit six abreast seating in the cabin.

The cockpit configuration has not been finalized but provisions will probably be made for a flight engineer in addition to pilot, co-pilot, radio operator and navigator. Landing gear is a four-wheel bogie type located inboard from the engine pods. It will fold inward into the fuselage and wing root.

▶ **Clear Lead**—Douglas decision to take the gamble of a privately financed commercial jet transport project has given it a clear-cut lead over its traditional competitors in the commercial market, Lockheed and Boeing. Lockheed has recently abandoned preliminary designs of a four-jet transport based on the general configuration of the F-90 sweptwing penetration fighter and is working on a new design approach to the problem.

One major revision in prospect in the Lockheed design is relocating the engines. The four jets were clustered in the aft section of the fuselage in the earlier Lockheed design, primarily to keep the passengers forward of all engine noise.

Boeing has not yet gone beyond preliminary design work on a number of jet transport proposals.

The DC-8 is expected by Douglas to be the standard jet transport for the next decade since it will have an extremely high subsonic design speed (Mach .88). Power requirements to push transports into the transonic range are not likely to be available commercially for at least 10 years.

Cost of production models of the DC-8 is estimated at about $3 million apiece. First production model is scheduled to fly in 1958.

In addition to visits of leading U. S. airlines management and operations executives to Santa Monica, Douglas sales engineers have been touring Europe plugging the DC-8 among foreign airlines.

Meanwhile a large backlog and a continuing flow of orders for piston-powered Douglas and Lockheed transports from both domestic and foreign airlines is interpreted by Douglas as an indication that the large-scale, profitable world airline market for jet equipment will be ripe about the same time the DC-8 becomes available.

MacCREADY'S SCHWEIZER made best U. S. score in meet—sixth—but that was all.

U. S. Gliders: No Support, No Wins

England and Spain won top honors in the biennial World Gliding Championships at Madrid last month, with the U. S. taking sixth place in a field of a dozen nations entered.

Great Britain's Phillips A. Wills was first in the single-seat matches and Spain's Juez Luis won the two-place.

Richard Johnson, top U. S. glider ace and world's distance record holder, placed 24th in the singles. Yet his laminar-flow wing sailplane RJ-5 is considered by many pilots as today's best glider.

► **Best Scores**—Best U. S. score in the singles—sixth place—went to Paul MacCready in a Schweizer all-metal 1-23C. Two years ago MacCready won second place in the championships in Sweden.

The U. S. team did a little better in the two-place competition, with Capt. Shelley Charles, Eastern Airlines pilot, and William Deuby winning 4th place in a rented German Kranich.

Paul Schweizer, glider manufacturer and president of the American Soaring Society, Elmira, N. Y., flew one of his company's all-metal 1-23s, placed 18th in the singles.

Stanley Smith, project engineer on Bell Aircraft's X-1 and X-2 research rocket planes, placed last in the singles.

► **What Counted**—The U. S. entered five sailplanes, as did Britain. Fifty-two pilots competed. Winners were those holding highest total score after six days' competition. Three tests were included in this year's competition: soaring distance, flights to points pre-established by pilots and dash-speed to one point pre-established by the jury.

Reason for poor U. S. showing was lack of ground facilities. With no backing from government or industries, the team was without towing vehicles, radios and repair facilities and had no meteorologist. Most other nations were backed heavily by their governments and some teams were military units.

The majority of European-designed sailplanes were types entered in previous postwar meets. Most countries used the Weihe in the single-seater category and the Kranich III in the two-place events. The British, as well as several entries from Argentina and Holland, were equipped with British-built Sky 34 single-seaters.

► **New Designs**—Most advanced European design was the French Arsenal. Another French single-seater, CM-8, is almost identical to turbojet aircraft used by the French air force and can easily be transformed into a powered plane.

The German team was equipped with newly designed Condor two-seaters, basically a prewar design. Their pilots, including veteran ace Hanna Reitsch, showed an evident lack of training after seven years of no flying.

An interesting new sailplane was the Argentine Horten XV, built in Buenos Aires by German engineers. It is a tail-less flying wing stemming from a long line of motorless and powered German aircraft.

Munitions Board Gets More Power

Munitions Board Chairman John D. Small has been given more positive control over all military procurement and industrial programs under a new directive by Defense Secretary Robert A. Lovett.

The new powers are outlined in a revision of the original charter of Nov. 3, 1949 which established the Munitions Board as an office of the Secretary of Defense.

Generally, the new charter broadens board jurisdiction in matters relating to production, procurement, distribution, real property and construction.

Specifically, the new directive gives Small authority to: 1. Take action on any matters which, because of time, do not permit formal board action; and 2. Make decisions upon all matters falling within the jurisdiction of the board.

For example: The directive does not give Small detailed control of Air Force and Navy aircraft programs but does permit him to make decisions in the event of conflict between the two services.

Martin Stockholders Rally to Money Plan

Stockholders with conversion rights in the Glenn L. Martin Co. have subscribed to approximately three-fourths of the company's new stock offering, financial sources disclose.

This means that 71% of the $6 million in subordinate notes issued in the company's refinancing program (AVIATION WEEK Apr. 14, p. 17) will be called. The 4% notes were issued to a small group of investors to obtain new capital pending subscription to the stock offering by stockholders privileged to do so.

The arrangement is part of a plan conceived by Smith, Barney & Co. The banking firm received an immediate fee of $150,000 for its work and has been appointed financial adviser to Martin at $25,000 annually for four years. William B. Harding, a Smith, Barney partner, has been elected a Martin director.

Navy's Score In Korea

Navy's share of the air blitz in Korea has cost it and the Marine Corps 864 aircraft, of which 386 were downed in combat and the remainder were victims of operational mishaps, a recent study of operations covering the period June 25, 1950-June 25, 1952, shows.

Navy and Marine Corps planes have flown some 160,000 sorties during this period including air support, interdiction, attack, reconnaissance, air defense and anti-sub work. They have dropped approximately 523,000 bombs totaling 110,000 tons, and fired 324,000 rockets, both figures exceeding these service's activities in World War II. Machine gun ammunition expended thus far in Korea totals 43 million rounds and 40,000 napalm tanks have been splashed on North Korean targets.

As a result, claims have been entered for 86 enemy aircraft destroyed and a similar number damaged. Bridges destroyed total (as of June 25) 1,843; all types of buildings, 48,599; troops killed, 97,000; vehicles knocked out, 15,980.

Slowed by Steel

- **Aftermath of strike to linger for months.**
- **Engine companies feel it now; airframe later.**

U. S. aircraft engine and airframe builders will continue to feel the effects of the steel strike for weeks and months to come in material shortages and production delays, industry representatives forecast last week.

Aircraft Industries Assn.'s specialist on materials, William Smith says that current aircraft schedules could be met "if they give us the steel they promised," referring to defense materials allocations.

However, recent NPA action may tighten the supply of aircraft quality steel available for engines and planes. At the request of the Army and the Munitions Board, NPA has permitted warehouses handling such steel to sell it for use in military catapults, aircraft arresting gear, tanks, weapons, and electronic and communications equipment—in addition to engines and aircraft.

Meanwhile the Munitions Board issued a directive calling for extraordinary measures to make up the losses in military production. An NPA policy was announced to provide preferences for military orders for steel to get deliveries by Dec. 31 on all second, third, and fourth quarter controlled materials orders with military authorization.

Aircraft Production Resources Agency at Wright-Patterson AFB, Ohio, stated that contractors are being requested to refrain from contacting NPA in Washington on steel shortages up to Nov. 30.

In this period manufacturers are expected to exhaust all available means to solve their own steel shortage problems. Failing to solve their problems they are asked to bring their remaining problems "immediately to the attention of the appropriate service and/or APRA" for necessary action.

A canvass of some principal engine manufacturers last week brought the consensus that if schedules could be met it wasn't going to be easy.

For example:

• **Pratt & Whitney Aircraft** estimated that it had already lost the equivalent of six weeks' production as the result of production slowdown. Pratt & Whitney plants will go on a four-day week in most machinery departments as a result of the shortages when the engine maker opens after its current vacation period ends Aug. 11.

• **Allison division** of General Motors predicted that, barring some unusual incident, the company would "make it through to the end of this month," on present schedule, but beyond that the materials situation was not clear.

• **General Electric** estimated earlier that the steel strike would cost about two weeks' production in its jet engines. Manufacture of component parts by many of the thousands of subcontractors and suppliers was slowed down.

In some cases production came to a complete standstill for components for certain engine models.

► **From Engine to Airframe**—While the powerplant manufacturers were most directly hit by the short supply of steel, the engine shortage obviously would directly affect the principal U. S. aircraft manufacturers. Several of these were expressing concern about future schedules.

Engine company spokesmen pointed out that some of the effects of the strike would not be fully apparent for some time, when subcontractors and manufacturers of various components might be expected to come up with shortages.

Smith said that one run of high alloy steels by the steel mills on a priority basis would take care of them on immediate problems as far as aircraft steels are concerned. The industry uses a great percentage of the high alloy steels but a very small percentage of the overall steel output, he pointed out.

► **The Limit**—A limitation of 5,000 lb. a month to a customer on warehouse aircraft steel distribution is being supported by AIA, Smith said, and a plan to remove it has been opposed in order to insure spreading of the available materials from the warehouses.

Pinch is being felt in special sizes of aircraft steel stocks wanted for experimental and development work. However, this is being solved in some cases by machining down more standard sizes for the special work.

Airlines Expand

(*McGraw-Hill World News*)

Rome—Two Italian carriers may soon announce plans to purchase eight Douglas DC-6Bs, four each, following grant of credits by Export-Import Bank through the Instituto Mobiliare Italiano. The airlines are Linee Aeree Italiane and Aereolinee Italiane Internazionali.

LAI reportedly also is planning to get some twin-engine transports of the Convair 340 or Martin 4-0-4 type. It would use insurance payments received from loss of a DC-6 and money received from sale of all its DC-3s to finance new planes.

Flight Rules Set In Event of War

Departments of Defense and Commerce have laid out working details governing control of civilian and military flying during a national emergency.

Under the new plan, three warning conditions—white, yellow, and red—will govern civilian and military non-tactical flying:

► **Warning White**—During white conditions, in effect immediately upon declaration of military emergency, the CAA regional administrator, basing his decision upon requirements of the regional USAF air division commander, may impose any or all of the following:

• All point-to-point flights entering, departing or within an air defense identification zone (ADIZ) regardless of altitude, shall conduct either an instrument flight rule or defense visual flight rule operation.

• All aircraft must be equipped with two-way radio and shall maintain constant watch on appropriate frequency to insure reception of security control instructions.

• Traffic will be limited by CAA region to capacity of the defense system to identify all traffic and a priority system to regulate amount of traffic.

• All traffic entering or departing ADIZ's may be confined to corridors and position reports to appropriate CAA facilities will be required.

• All local non-military traffic may be restricted to designated local flying areas and to an altitude below 2,000 ft. above the terrain.

• All traffic entering continental U. S. through boundary or coastal ADIZ's may be required to land first at a clearing point outside U. S. where pilots will be briefed, assigned authentication codes and identification and approach procedures before takeoff on the entry flight.

► **Warning Red**—During red conditions:

• All traffic will be grounded by CAA regionals except flights coordinated with the proper military commanders.

• All traffic in or approaching affected areas of air defense sectors, whether in an ADIZ or not, will land at the nearest airport if possible, or will be diverted by the CAA regional away from the route or point of attack.

• Most navigation aids will be shut down in accordance with an established plan. Certain key aids will be kept on the air long enough for friendly aircraft to make safe landings.

► **Warning Yellow**—During warning yellow, CAA regionals may impose any or all of the restrictions listed for warnings white and red depending upon the local conditions and degree of security control deemed necessary by the air division commander.

GUNS AND BUTTER—Military and business planes on Cessna line at Wichita.

'Businessliner' Means Business

Cessna turns out eight small commercial planes a day to show that this travel is on the upgrade.

Wichita—Eight "Businessliners" a day are coming off Cessna Aircraft Corp. production lines here, a sign that business travel in small single-engine airplanes is definitely on the upgrade.

"Businessliner" is the name for Cessna's five-place series 190 and its four-place series 170 all-metal highwing monoplanes being aggressively merchandised to American and foreign business firms, strictly on a utilitarian basis.

"We are aiming our entire sales program in one direction only," says Don Flower, Cessna sales manager, "business use. Will a man make more money a year with our plane than without it? That is the question we ask before we start to sell."

A quick tour through the Cessna main plant plus a 15-minute local air hop in the latest model Cessna 195, complete with Lear autopilot, to look at Cessna's Prospect plant in another part of Wichita reveal that Cessna still is maintaining a wide diversion of manufacturing activity. Military aircraft and farm hydraulic equipment play important roles in overall production.

▶ **Case Histories**—But there seems to be a feeling of new confidence in the future of commercial small plane sales at Cessna, founded on a basis of thousands of reports from Cessna business plane users. Mention almost any type of business and Don Flower can pull out a case history of a happy Cessna Businessliner owner to match.

Interchangeability of Cessna military and civilian models, assemblies and parts, has been a big help in achieving production economies in the all-metal airplanes. You see it in the plant when a single line moves Cessna L-19 Army liaison planes, and model 170B civil four-placers toward completion and rollout. Wings, tails, flaps and landing gear are interchangeable, and fuselages are near enough the same size to fit into the line without difficulty. A second line turns out one of the 190 series each day.

▶ **Price Tags**—Cessna now quotes a fly-away Wichita price of $7,245 for the standard four-place model 170B powered with a 145-hp. Continental C-145 engine, and $21,750 for the standard model 195 with 300-hp. Jacobs R-775A engine, with the model 190, powered with Continental W-670-23 engine of 240 hp. tagged at $16,500.

The civil airplanes look much like they did a couple of years ago, but close examination shows a lot of refinements which make for convenience and comfort and improved efficiency. And the refinements are still continuing.

▶ **Crosswind Gear**—For example, crosswind swiveling Goodyear wheels are now standard equipment on the model 190 series, and Cessna is about to put into effect a change in the famous springsteel landing gear, which will mean a considerable weight saving and added payload of 36 lb. per airplane. It amounts to redesigning the wheel end of the leaf gear to a thinner configuration, because tests have shown the gear is over-beefed at this end and virtually all the loads on the gear are transmitted to the top end where it attaches to the fuselage.

Part that the springsteel gear has played in Cessna's excellent trouble-free record can hardly be overestimated. Cessna's complete records show only nine failures out of 11,500 sets of landing gears in service.

▶ **New Developments**—Cessna has some new airplanes coming along to fill out its military and commercial lines. Just over the horizon, but not ready for detailed announcement are such planes as:

- **A twin-engine** Cessna model 180 powered with two Continental E-225 engines, probably ready for production next year.
- **A gas-turbine-powered** version of the L-19 liaison planes, using the little Boeing 502 turbine, with a McCauley fixed pitch propeller.
- **A larger liaison** plane version, model 310.
- **A production version** of the Cessna Seibel helicopter, which will be in the small copter class like the military Seibel prototypes.

Example of the Wichita firm's confidence in its future sales is the fact that it has asked for a stepup of 170B materials from CAA's Office of Aviation Requirements for the last two quarters of this year. Their requirements now call for materials for 624 model 170B planes, an increase of 92 units over the original schedule.

Under direction of President Dwane L. Wallace, nephew of the company's founder, Clyde Cessna, the Cessna organization has a rather unique record among aircraft companies of having paid a dividend out of earnings every year for the last 12. Yet Cessna had virtually no postwar military business until the L-19 was ordered into production at the Korean outbreak.

A plant tour shows unusually complete machine tool equipment, which makes it possible for the manufacturer to subcontract Boeing B-47 Stratojet tail assemblies and components for Lockheed T-33 and F-94 jets.

Cessna's non-aviation business now consists primarily of hydraulic controls for farm implements for most of the leading manufacturers in this field.

Watch the Wake

If you are a lightplane pilot, keep a sharp lookout along the civil airways for large transports and maintain at least 1,000 ft. difference in altitude behind them even if the big ships are barely visible. This tip comes from Civil Aeronautics Administration, which estimates that transports traveling at 300 mph. may leave a dangerous turbulence in their wake extending ten or fifteen miles. Lightplanes are believed to have been flipped over by turbulence from large aircraft which passed the spot about a minute previous.

Boeing Awards Stock to Allen

Award of 1,198 common shares of Boeing Airplane Co. stock to William M. Allen, president, making a total holding of 3,302 shares, is reported in the latest Securities and Exchange Commission report. Also reported is award of 57 common shares and purchase of 55 common shares by Clif Barron, officer, making a total holding of 226 shares; A. F. Logan, officer, purchase of 50 common shares, total holding 122 shares; W. G. Reed, director, purchase of 100 common shares, total holding, and J. O. Yeasting, officer, award of 144 common shares and purchase of 45 shares for a total holding of 475 shares.

Consolidated Vultee Aircraft Corp. reports sale of 2,100 common shares by LaMotte T. Cohu, director, leaving a total holding of 5,466 shares.

Other transactions reported recently by the SEC were:

- **Air Associates, Inc.**—Gilbert Colgate, director, purchase of 15,248 common shares by conversion, making a total holding of 26,696 shares.
- **All American Airways, Inc.**—Hamilton O. Hale, director, sale of 200 common shares, leaving a total holding of 1,300 shares.
- **Alaska Airlines, Inc.**—Richard L. Hamack, officer, sale of 5 common shares, total holding.
- **American Airlines, Inc.**—R. E. S. Deichler, officer, exercise of rights to purchase 100 common shares, making a total holding of 350 shares; Stanley G. King, officer, exercise of rights to purchase 200 common shares, making a total holding of 1,800 shares.
- **Aro Equipment Corp.**—Ralph E. McConnell, director, purchase of 300 common shares, making a total holding of 5,400 shares.
- **Avco Mfg. Corp.**—C. Coburn Darling, director, sale of 4,000 common shares, leaving a total holding of 6,000 shares; A. C. Wedemeyer, director, purchase of 500 common shares, total holding.
- **Bell Aircraft Corp.**—Frederick F. Robinson, director, sale of 100 common shares, total holding; in trust by Page Hufty, director, purchase of 300 common shares, making a total holding of 600 shares.
- **Blaw-Knox Co.**—W. Cordes Snyder, director, purchase of 500 common shares, making a total holding of 1,500 shares; Charles W. Pearson, director, sale of 300 common shares, leaving a total holding of 1,964 shares.
- **Capital Airlines, Inc.**—J. H. Carmichael, officer, sale of 100 common shares, leaving a total of 3,237 shares; William V. Couchman, director, purchase of 200 common shares, total holding; C. Bedell Monro, director, sale of 225 common shares, leaving a total holding of 900 shares; Raymond G. Lochiel, officer, purchase of 100 common shares, making a total holding of 3,115 shares; George R. Hann, director, purchase of 200 common shares, making a total holding of 40,672 shares.
- **Cessna Aircraft Co.**—Getto McDonald, director, purchase of 200 common shares, making a total holding of 7,700 shares.
- **Chicago and Southern Air Lines, Inc.**—Sidney A. Stewart, officer, purchase of 1,000 common shares, making a total holding of 1,900 shares.
- **Colonial Airlines, Inc.**—L. Orville Cameron, officer, purchase of 500 common shares, total holding; R. H. Hernstein, officer, purchase of 50 capital shares, total holding; John J. Murphy, director, purchase of 200 capital shares and sale of 300 capital shares, total holding.
- **Curtiss-Wright Corp.**—Levin H. Campbell, Jr., purchase of 100 common shares, total holding.
- **Eastern Air Lines**—Everett R. Cook, director, purchase of 2,900 common shares, disposal of 125 common shares as gift, sale of 1,875 common shares to Cook Company, leaving a total holding of 1,400 shares; total holding of Cook Company now 3,275 shares; Paul E. Reinhold, purchase of 2,300 common shares for Shadowlawn Farms, Inc., making a total holding of 5,300 shares; George B. Howell, director, sale of 1,500 common shares, leaving a total holding of 500 shares; Stuyvesant Peabody, Jr., director, sale of 300 common shares, leaving a total holding of 1,200 shares.
- **Fairchild Camera and Instrument Corp.**—C. A. Harrison, officer, sale of 340 common shares, total holding.
- **Fairchild Engine and Airplane Corp.**—Floyd S. Bennett, Jr., officer, purchase of 100 common shares, making a total holding of 200 shares.
- **Grumman Aircraft Engineering Corp.**—Albert P. Loening, director, sale of 4,000 capital shares, leaving a total holding of 35,000 shares.
- **Northrop Aircraft Inc.**—Oliver P. Echols, director, purchase of 700 common shares, making a total holding of 3,500 shares.
- **Pan American World Airways, Inc.**—John C. Leslie, director, sale of 851 common shares, leaving a total holding of 326 shares; Henry H. Berke, officer, receipt of 217 common shares as compensation and sale of 200 common shares, leaving a total holding of 435 shares.
- **Sperry Corp.**—George C. Delp, officer, purchase of 850 common shares, making a total holding of 1,852 shares.
- **Thompson Products, Inc.**—R. S. Livingstone, officer, sale of 600 common shares, leaving a total holding of 1,200 shares.
- **Trans World Airlines, Inc.**—Albert V. Leslie, director, sale of 300 common shares, total holding.
- **United Air Lines, Inc.**—Martin C. Ansorge, director, purchase of 79 common shares, making a total holding of 501 shares; Gardner Cowles, director, sale of 100 common shares, total holding in name of Register and Tribune Co., purchase of 500 common shares, making a total holding of 5,600 shares; Eric A. Johnston, director, purchase of 500 common shares, making a total holding of 1,000 shares; Ray W. Ireland, officer, sale of 1,000 common shares, leaving a total holding of 1,045 shares; Otis E. Kline, officer, purchase of 200 common shares, making a total holding of 7,700 shares; Gardner Cowles, director, sale of 100 4½% cumulative conv. preferred, total holding; C. H. Blanchar, officer, purchase of 5 4½% cum conv. preferred, total holding; Curtis Barkes, officer, purchase of 41 4½% cum conv. preferred, total holding.
- **United Aircraft Products**—Robert K. Hart, director, purchase of 100 common shares, making a total holding of 400 shares.
- **Western Airlines, Inc.**—Charles J. J. Cox, officer, exercise of rights to purchase 21 common shares and purchase of 59 common shares, making a total holding of 150 shares; Robert E. Driscoll, director, exercise of rights to purchase 45 common shares and purchase of 155 common shares, making a total holding of 200 shares; L. Welch Pogue, director, exercise of rights to purchase 150 common shares, making a total holding of 650 shares; Stanley R. Shatto, officer, purchase of 1,200 common shares and sale of 500 common shares, making a total holding of 1,000 shares; Paul E. Sullivan, officer, exercise of rights to purchase 1,250 common shares, making a total holding of 5,000 shares; Sidney F. Woodbury, director, purchase of 30 common shares, making a total holding of 130 shares; I. W. Burnham II, director, sale of 100 capital shares, leaving a total holding of 200 shares; Terrell C. Drinkwater, director, exercise of rights to purchase 60 capital shares and purchase of 40 capital shares, making a total holding of 300 shares; J. J. Taylor, officer, exercise of rights to purchase 100 capital shares, making a total holding of 150 shares.

COPTERS COMPLETE ATLANTIC CROSSING

Two USAF Sikorsky H-19s come in for a landing at Prestwick airport, Scotland, July 31, marking completion of the first flight of the Atlantic by helicopter. The leisurely trip took 17 days and 42.5 hr. flying time. Takeoff was from Westover AFB, Mass., and stops were made at Labrador, Greenland and Iceland. Longest lap, 940 mi. from Iceland to Prestwick, was flown in 10 hr. 5 min. The craft are destined to be based eventually at Wiesbaden, Germany for air rescue work.

NAA-UAW Dispute Tests Wage Board

North American Aviation's dispute with the CIO United Automobile Workers probably will give the Wage Stabilization Board its first chance to apply what little dispute-settling authority Congress left the board in amending the controls act last month.

Arbitration hearings in the dispute between the sole producer of the Air Force's F-86 Sabre and the UAW-CIO over a general wage increase start Aug. 15 at Santa Monica, Cal.

Both sides have stipuated that the three-man arbitration panel must, before giving its decision, clear it with WSB or the Economic Stabilization Agency, if that is necessary. This is to assure that whatever increase is recommended can be put into effect. Both sides want to avoid a situation in which the arbitrators' decision might be cut

down by government stabilization agencies if found to be excessive.

North American and UAW-CIO agreed July 10 to voluntary arbitration, thus averting a strike of the company's 28,000 employes at plants in Inglewood, Downey and Fresno, Calif., and Columbus, O. The union insisted, as a condition of arbitration, that the Fresno plant wages be covered by the national agreement. UAW-CIO recently won bargaining rights at Frisco.

Both sides agreed that 12 cents of a 13-cent cost-of-living bonus will be put into the basic hourly wage rates, thus raising the escalator floor by 12 cents. The arbitration panel will decide only the question of a general, across-the-board wage increase. UAW-CIO has demanded an increase of 17 cents an hour. The company has offered five cents.

F-86H Production Due at Columbus

Despite recommendation by Aircraft Production Board Acting Chairman W. L. Campbell (AVIATION WEEK July 28, p. 12) to pass over the North American F-86H Sabre fighter in favor of the later North American development, the XF-100 Sabre 45, production will start at Columbus on the F-86H late this year. Indications are the XF-100 will not be ready for production for some time to come.

North American announced that the first two models of the H series were being built at Los Angeles, but that subsequent production would go to the Columbus North American plant. It will supersede the earlier F-86F now being produced there.

The F-86H will be slightly larger than earlier Sabres, and is powered with a General Electric J47-GE-29 engine, more powerful than those used in earlier F-86s.

Other improvements include: a new suspension and release mechanism for carrying wing tanks in conjunction with bombs or rockets; clamshell type canopy similar to F-86D, an improved cockpit to give pilot more room and vision; improved pilot ejection seat mechanism; larger horizontal tail surface, minus dihedral found in earlier models; beefed-up landing gear. Like other late model Sabres, F-86H will have power boost controls on its entire horizontal tail surface.

USAF on Lookout For Irregularities

The tremendous jump in AMC procurement personnel—from 4,000 pre-Korea to 12,000 shortly after Korea—and the considerable discretion allowed buying and contracting employes, offer the possibility of purchase irregularities, Air Force realizes.

Six cases of irregularities, ranging from direct bribery to use of improper influence, were reported by USAF at a recent congressional hearing.

The total face value of the contracts involved in the six cases was $14,265,000—about one-tenth of one percent of all procurement initiated in fiscal 1951. A large part of the dollar losses involved are expected to be recovered, leaving a maximum loss to the government of $876,143. No delivery of substandard materiel was made nor was any needed materiel critically delayed as a result of the irregularities reported, AF stated.

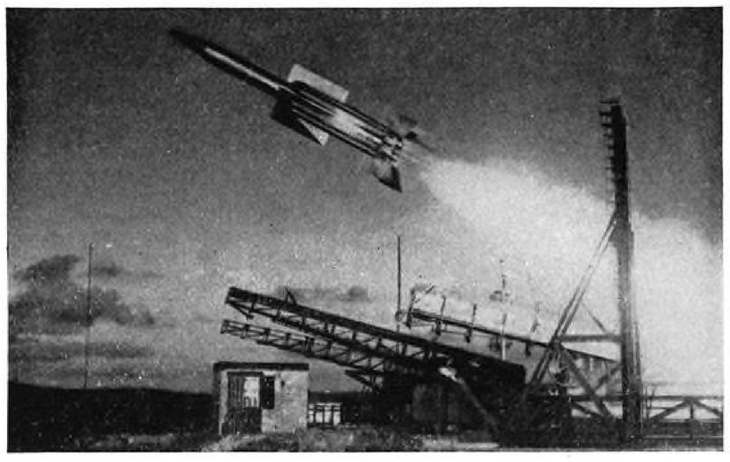
While disclaiming complacency regarding irregularities, Air Force told the congressional group it "knows that neither the best organization, nor the best regulations, nor the soundest procedures, nor all of these together, will totally eliminate irregularities."

But AF hopes that by setting up "proper organization, policies, procedures and practices," it will be able to keep such cases to an irreducible minimum.

Junkers Returns

(*McGraw-Hill World News*)

Frankfurt—Typical of resurging German aviation is formation of Junkers Flugzeug-und-Motorenwerke GmbH in Kassel with an initial capitalization of 20,000 deutsche marks ($4,761). One of the company's business managers is Kurt Adenauer, a nephew of Germany's Chancellor. Plant location has been chosen in Lohfelden, near Kassel. The firm plans to work on development, production and sales and repairs of planes, engines, parts and aviation machine tools within framework of existing regulations.



BRITISH MISSILE BLASTS OFF

At an experimental station "somewhere in England," glare of booster rockets lights up a British guided missile as it leaves its launching platform. The boosters, which surround the missile, will fall away later and the sustainer motor will cut in.

WHO'S WHERE

(*continued from p. 11*)

and **Morton G. Scheraga** has been promoted to assistant technical sales manager of the firm.

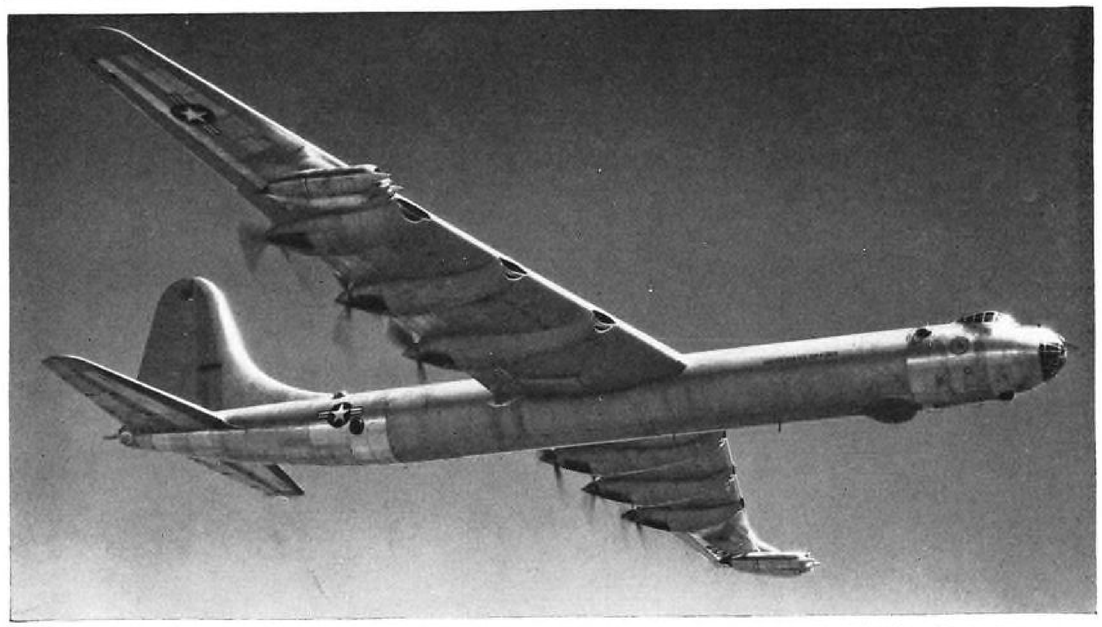
D. Marshall Klein has been appointed manager of commercial aircraft sales for G. M. Giannini & Co., Pasadena, Calif., maker of precision instruments and controls for guided missiles and military planes.

Dr. C. J. Breitwieser has been promoted to director of engineering for P. R. Mallory & Co., Indianapolis, Ind. He is known for his work on guided missile and aircraft component and control systems.

Robert C. Sellers, formerly general manager-sales and service for Oerlikon Tool & Arms Corp., has joined Simmonds Aerocessories, Tarrytown, N. Y., as staff assistant to the executive vice president, where he will handle long range liaison activities on new aviation developments.

John S. Jacox has been named manager of purchasing for Aviation Gas Turbine division of Westinghouse Electric Corp., Philadelphia, Pa. **Wilbur C. Wilson** has been named purchasing agent for the South Philadelphia plant and **George A. Fadler** now is purchasing agent for the Kansas City plant. **E. R. Nary** has been made assistant to the manager of the Westinghouse's Baltimore divisions, and will be responsible for uniform manufacturing policies between the Electronics, Air-Arm and X-Ray divisions.

Robert Strong, formerly sales manager for Slick Airways' Dallas, Tex., office, has become public relations and advertising manager for the airfreighter, with headquarters in Burbank.



B-36 PRESSURIZATION and air conditioning meet challenge of 200-deg. temperature change and 40,000-ft. altitude change.

What High-Flying B-36 Taught Convair

High-altitude safety and comfort are interrelated; they must be integrated at the design level.

With military planes destined to fly even higher than their present reaches and the commercial jet transport just at the beginning of its high-altitude flight, cabin pressurization and air conditioning take on greater significance.

As usual, the military vehicles have been the provers for high-altitude factors such as these, but little information has been made available.

▶**B-36 Experience**—Recently, however, an insight to the engineering and operational aspects of pressurization and air conditioning of today's high-flying planes was revealed by W. C. Dietz of Consolidated Vultee Aircraft Corp.'s Ft. Worth staff. In his paper, "High Altitude B-36 Cabin Pressurization Operating Experiences," presented before the Society of Automotive Engineers' National Aeronautic Meeting in New York, Dietz pinpoints what designers are up against.

Cabin pressurization and air conditioning are so related that successful operation of either system depends on a complete integration at the design level, says Dietz. The air source must not only be adequate to maintain pressurization, but must provide sufficient air for ventilation, heating and cooling. From a design standpoint a large portion of the engineering field is encompassed.

▶**Military vs. Commercial**—Solutions to problems with the B-36 are not necessarily acceptable solutions for a commercial airplane. There is, however, a common objective—safe and comfortable altitude operation.

In the case of the B-36, the primary reasons for flying at high altitudes are tactical. In commercial aircraft operation, high-altitude flight is primarily for improved passenger comfort and increased speed.

There are, however, a number of problems associated with commercial operation at altitudes above those now commonly flown. Major problem is that of safety if cabin pressure is lost.

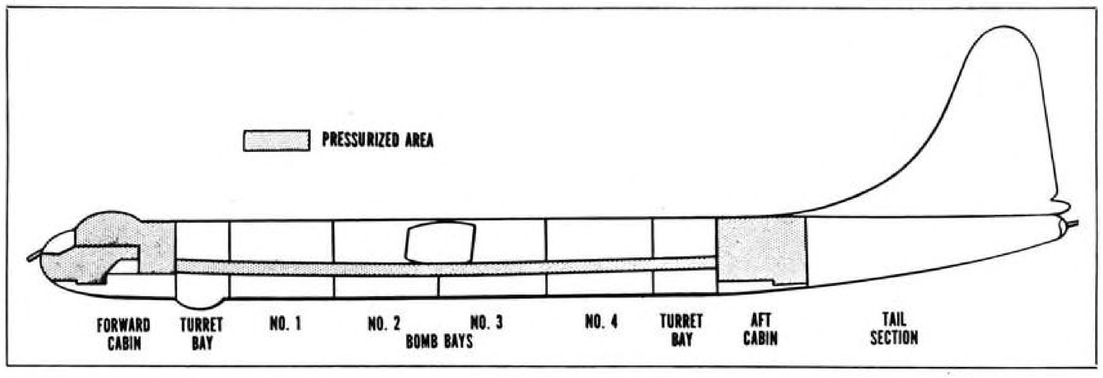
For a trained and practiced crew in good physical condition, as in the military service, and with adequate oxygen provisions, this danger is minimized. In the case of commercial operation, involving children, aged people, and those with physical impairments, loss of cabin pressure can be exceedingly dangerous—possibly fatal, Dietz explains.

▶**Temperature Variations**—Flight in the high-altitude range has presented a number of new problems in addition to those directly associated with the increased pressure and the physiological factors involved in an explosive decompression. Among these are temperature extremes encountered.

In several instances a B-36 flight was started on the ground with an ambient temperature of 100F, but at altitudes of 40,000 ft., −100F was encountered. This extreme variation requires the utmost from the cooling and heating system, along with a control system adaptable, and with adequate response, to this extreme range of operation, Dietz contends.

To add further complication to the demands on the heating and cooling system, the effects of heating by solar radiation are quite marked at high altitudes.

▶**Comfort Considerations**—Yet another consideration is the necessity for providing adequate crew and passenger



PRESSURIZED AREAS of the Convair B-36 bomber are the forward and aft cabins and the long tunnel connecting them.

comfort facilities. The comfort factor is a more important one due to the longer range and consequent longer duration flights that will be flown with operation at higher altitudes.

Providing adequate passenger comfort has, of course, always been an important factor in commercial aircraft design, and much progress has been made along this line. However, in military tactical aircraft, comfort has in the past been of somewhat secondary importance. Experience with the B-36 has pointed out the vital necessity for improving crew comfort in the elimination of fatigue for more efficient utilization of the flight crew's talent, Dietz says.

► **Oxygen Details**—From an engineering viewpoint it is necessary to understand the reaction of the human body to the most important factors which affect the safety of passengers and crew in the event of an explosive decompression. These are the two primary problems, says Dietz: anoxia and danger of close proximity to an area of structural failure.

It would appear impractical at the present state of development of oxygen equipment to instruct passengers properly in the use of this equipment to eliminate danger from anoxia, he says—the only solution that would appear feasible at this time being a rapid descent to about 10,000 ft. Estimates are that this would have to be accomplished in 4 to 5 min.

While some physical injury due to the rapid increase in pressure with decrease in altitude might occur, it would be considerably less dangerous than a rate of descent slow enough to eliminate this trouble, Dietz says. The possibility of incurring "bends" or aeroembolism is not great because a descent rate rapid enough to prevent anoxia will also minimize this danger.

► **Proximity Aspects**—The second problem—passengers or crew being in close proximity to areas of failure—obviously cannot be overcome by location of the passengers and crew if efficient space utilization is to be realized, because a structural failure could conceivably occur at any point, Dietz says.

However, if consideration is given in the structural design to prevent progressive type structural failures, the problem can be confined to the most probable items of failure, such as windows and doors which, if failure should occur, would cause physical injury by collision with the surrounding structure or ejection from the airplane due to the rapid flow of air through the opening.

After a window was lost in the B-36 and a crew member was ejected, several methods were considered to prevent a recurrence of the accident, Dietz relates. The possibilities investigated were the use of safety harnesses, nets and a secondary pressure barrier.

Safety harnesses have proven satisfactory in some installations, but they present a restriction to normal crew movement and are not considered as good as a secondary pressure barrier.

In this case an inner safety-glass panel was installed, capable of withstanding the cabin pressure, but not completely pressure-tight. This design, while it will not prevent depressurization of the cabin, will increase the time for decompression and eliminate the possibility of ejection.

► **Body Gases**—The possibility of incurring physical injury as a result of the expansion of internal body gases during decompression in aircraft of the B-36 or commercial type is not probable. The openings, such as the windows and doors which are the most probable cause of failure, are sufficiently small in relation to the cabin volume that the time elements of decompression are long enough to preclude any danger from this source, Dietz states.

As a typical example, applying Air Force Aero Medical Laboratory formulas to the forward cabin of the B-36, the damage which could be sustained without exceeding the safe limits of relative gas expansion is approximately an opening of 35 sq. ft. A structural failure which would result in this much of an opening would be of a major nature, and extremely unlikely.

► **Margins of Safety**—Paramount to the safety of high-altitude pressurized operation is an adequate structural design of the pressurized compartments.

For military tactical aircraft flown by experienced crews, the dangers of a decompression are minimized.

• **Sufficient oxygen provisions** are provided for the possibility of damage to the pressurized compartments by ground or interceptor fire.

• **Because of the safety provided** by oxygen equipment and crew training, the structural margins of safety for a tactical aircraft design are not as critical as commercial aircraft requirements, and some compromises can be made to save weight—extremely important in long-range aircraft design.

► **Progressive Failure**—In addition to providing ample margins of safety in the primary structural components, an important factor is the prevention of progressive type failures.

Because the pressure loads are not immediately reduced in cases of minor structural failures, there are possibilities of progressive failures due to overloading of the adjacent structures. Dietz says there is very little data available on the stress level at which structural elements, such as fuselage plating, can be safely operated in relation to the size of damaged areas without a progressive type failure and resulting explosive decompression.

Magnesium alloy, used extensively in primary structural applications on the B-36, was not considered acceptable for use in the pressurized cabins due to its lower ductility and high notch sensitivity and, therefore, its questionable ability to withstand battle damage. For this reason, aluminum alloy is used for all pressure structural components.

► **Decompression Data**—Experiences

with explosive decompression—one while on the ground during a test program, another while in the air—have indicated the necessity for elimination of progressive type failures.

• In the failure during the test program, a pressure beam on a flat-type pressure bulkhead had insufficient stabilization of the compression flange. This resulted in a complete failure in bending of the bulkhead stiffeners and web, and the entire bulkhead was destroyed.

• In the second instance, a hemispherical type bulkhead in the aft cabin blew out in flight while slightly under maximum pressurization loads. Analysis of the failure, Dietz says, indicated that some damage had possibly occurred in the bulkhead web, which resulted in a complete loss of the bulkhead. In this case, the bulkhead was operating at a stress level of approximately 30,000 psi.

While hemispherical bulkheads carrying pressure loads in hoop tension are considerably lighter, they are not particularly adaptable for shear redistribution such as is required in the B-36 where, due to the bomb bay, continuity of the monocoque structure is not possible.

They also present problems where space is at a premium, therefore cannot be used in all applications. It is believed, however, that hemispherical type construction can be made safer from the standpoint of progressive type failures if the bulkhead webs are operated at a sufficiently low stress level.

Dietz reports that no physical injury was suffered by the crew members who occupied the cabin at the time the previously mentioned accident occurred, even though one member was seated within three feet of the face of the bulkhead—the rate of decompression was somewhat cushioned by expansion of the air into the tailcone area and, also, the opening was so large that the velocity of escaping air was relatively low.

► **Small Item Analysis**—Another danger is present in major failures of the type described. That is the possibility of damage to primary structure or vital installations, such as the control system, from flying debris and expansion of air into areas which are not capable of taking even low internal pressures.

Necessity for adequate structural pressure-proof testing has been demonstrated in the test programs that have been run on the B-36. The experience gained from these tests has shown that the primary problems in producing an adequate structural design are not basic structural considerations, but are small items of the detail design which can escape analysis.

The production test procedures on the B-36, Dietz relates, are to test each airplane to the maximum normal operating pressure and periodically to check individual airplanes to a pressure load just under the design limit pressure. The first production airplane in which any significant change is made which could affect the structural integrity is also checked at these higher pressures.

Complacency toward the pressure cabin design is difficult to avoid as long as no troubles are experienced, and the tremendous captive energy in compressed air is not fully realized until the effects are witnessed.

► **Transparent Sections**—Dietz holds that most important by far, from the standpoint of possible failures, are those items of a secondary structural nature, such as windows and doors.

The B-36 uses laminated plate glass throughout the enclosures, laminated plastic for the sighting blisters, and optical plate glass for camera windows. The glass used in the enclosures is semi-tempered, of the extended vinyl-metal insert-type construction. This design has proven very adaptable from the mounting standpoint, since small variations in contour can be tolerated. It also provides sufficient flexibility in the mounting to accommodate the relative coefficients of expansion of the metal framework and the glass.

While there have been no difficulties of a serious nature with this method of retaining the glass, there have been several problems involved. The main difficulty is that, due to the metal insert carrying the entire pressure loads from the glass into the supporting framework, a prying action is set up which tends toward delamination. This has been a source of trouble primarily in the glass panels which are heated for enclosure anti-icing.

► **Delamination Data**—No known failures have occurred directly as a result of delamination; however, the investigation of a glass failure which occurred in pressurized flight disclosed a problem which had not been anticipated. It was found, after exhaustive laboratory tests, that a failure can occur in a panel which is delaminated and is subsequently subjected to cold temperatures.

This type failure is attributed to the contraction of the vinyl plastic at a rate approximately five times that of the glass, which sets up shearing forces between the vinyl and the glass. These forces are of sufficient magnitude, if the delamination is extensive enough, to fracture the surface of the glass. If the glass is of semi-temper, this then destroys the equilibrium of the glass plate and results in the failure of an entire panel.

To prevent delamination, it was found that external retaining means were required on those glass panels which were subjected to heat along with pressure.

An improvement over the extended vinyl-metal insert-type construction, Dietz says, is an extended vinyl-metal insert stepped-edge design. The inner glass lamination in this type extends past the edge of the outer lamination to give direct bearing support for the inner glass on the enclosure structure. There is, therefore, no prying action. This is considered essential if sea level pressurization is used, and the enclosure glass can get very warm from solar radiation.

A considerable decrease in glass strength occurs with increase in temperature as the plasticity of the vinyl interlayer increases and the glass laminations carry pressure loads as individual elements rather than as a homogeneous material.

Unfortunately, stepped-edge glass does present some installation problems, because closer tolerance between the glass and the structure is required.

Probably the most undesirable characteristic of glass is the wide variation in strength, which requires high margins of safety and a consequent weight penalty. Another difficulty is extreme notch sensitivity, particularly in tempered glass, which makes inspection extremely difficult, because a small scratch

SNOWED-IN SCORPION

This Northrop F-89C Scorpion gets serviced during cold-weather operational suitability tests conducted by the Air Force at Ladd AFB, Fairbanks, Alaska. All systems were checked and operation and maintenance tests were made. Radar missions flown by the craft proved out equipment under the extremes of cold, and air-to-air gunnery trials were reported as satisfactory. It is powered by Allison turbojets with afterburners. In 600-mph. class, it is operational with fighter-interceptor squadrons.

or nick can reduce strength materially.

►**Plastic Quality**—The plastic sighting blisters are of laminated construction and consist of outer laminations of methyl methacrylate with an inner lamination of polyvinyl butyral. The mounting consists of rubber extrusions bonded to the base of the dome which, in turn, are clamp-mounted to the structure.

The laminated plastic material, Dietz says, has many excellent qualities, among the most important being good optical properties, light weight, resiliency and formability.

The undesirable features are its poor abrasion-resistance and rather low strength. The material's poor abrasion resistance and its reaction to some chemicals used in aircraft maintenance present a problem.

Even in view of its objectionable features, the plastic material has proven excellent in service from a pressurization standpoint and there have been no known instances of a blister being lost, he reports.

No service difficulties have been experienced with the optical plate glass corner windows. These have minimum margins of safety of 500%, required because of the inconsistent strength properties.

►**Door Practice**—All doors, both external and internal, are designed to open inwardly. This is contrary to current design trends; but it is felt that inward-opening doors, in which pressure can be carried around the entire framework of the opening, offer sufficient advantage over outward-opening doors, where pressure loads are carried at a few concentrated points, that consideration should be given to this type design, Dietz says.

A compromise solution to the door problem might possibly be the use of inward-opening doors on those main entrances which are frequently used and outward-opening doors for emergency escape in which the latching mechanism can be adequately safetied to prevent inadvertent unlatching.

An associated problem that occurred on the B-36 doors was the providing of adequate door seals that would retain their flexibility and not crack at low temperature. It was found that the usual rubber compounds were not adequate and silicone-type rubber was used to eliminate leakage.

B-36 experience has not indicated that there are any unusual problems in sealing of structural seams for high-altitude operation. Presently available commercial sealing compounds are adequate for the temperatures and pressures encountered. Cabin sealing is accomplished by Thiokol-type liquid sealant throughout in the B-36.

►**Heating**—There have been no major operational problems in the pressure system, and it is practically identical to the original installation. Biggest problems have been providing adequate heat under extreme low temperature conditions and proper distribution throughout the cabins.

The heat distribution problem is complicated in the B-36, says Dietz, because of the large size of the cabins and the fact that the crew stations are at various levels within these compartments. Cabin heating and pressurized air is used for the enclosure and blister defrosting, and this limits the temperature to a value which will not cause overheating.

To solve the problem of providing adequate heat and to improve the distribution, Convair-designed electric heaters are used at those locations where spot-heating is required.

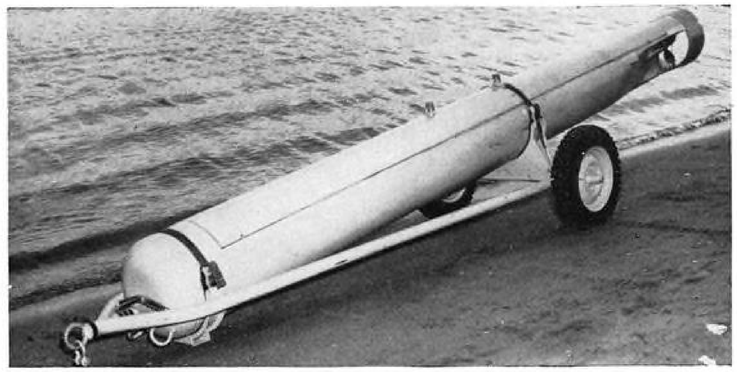
Effects of solar radiation also exaggerate the heat distribution problem. The large-bubble pilot's canopy, the highest point in the forward cabin, is provided with a separate circulating duct system which takes cooler air from a lower compartment level.

Necessity for adequate defrosting provisions of transparent areas was established during the flight test phases of the airplane. Dessicant-type double-glazed panels were tried but did not prove entirely satisfactory. The present airplane employs hot air defrosting of all transparent areas to remain clear.

►**Air Source**—Dietz points out that, while flight at high altitudes has presented a number of new problems and aggravated others, there are some features of the pressure system which will be simplified in future aircraft designed for high-altitude operation. An example of this is the availability of a cabin air source such as the turbosuperchargers on the B-36, thus eliminating separate mechanical-driven compressors.

Future aircraft which employ turbine-type powerplants will not only provide a source of pressurized air, but will also provide heat, eliminating the necessity for separate heaters. A high-pressure air source, such as is available from turbine bleed air, also permits utilization of the air cycle expansion turbine for low-altitude cabin cooling.

An example of this type system was employed in a special camera installation in the reconnaissance airplane, where precise temperature control was required. Air was taken from the last compressor stage of the J-47 turbojets and ducted to two 15-cfm. expansion turbines. A modulating bypass valve was provided around the expansion turbines to permit mixing of the hot compressed



ALUMINUM CYLINDER holds radio-controlled life raft before launching.

Rubber Raft Can Cruise 300 Mi.

A radio-controlled life raft developed by Douglas Aircraft Co.'s Long Beach division, in conjunction with the Air Materiel Command, starts out as a 20-ft.-long by 21-in.-diameter aluminum cylinder and ends up as a 22-ft.-long by 8-ft.-wide rubber floater.

This transformation begins to take place within two minutes after launching, when the cylinder begins to open under pressure of carbon dioxide. Continued expansion inflates the cylinder-housed rubber raft to its full shape. Short ladders suspended from the raised gunwales enable survivors of a sea accident to climb aboard.

Equipment includes a four-cylinder inboard engine and fuel for 300 mi. of cruising. There's a remote control radio system, two-way radio communication set, heating system, automatic pilot and food and survival gear to carry eight occupants for a five-day stretch.

The plane (or vessel) launching the raft will, by radio control, be able to start or stop the engine, steer the boat to survivors or set it on a desired compass course.

First tests successfully proved the unit's operation phases.

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

There are torture chambers at the Wm. R. Whittaker Co., Ltd. — strange rigs of coils and tubes and dials, of flame and dry ice, of rushing air blasts and gargantuan hydraulic pressures.

They are a most important part of the Southern California valve concern, for they test the performance of every new valve design under a variety of simulated operating conditions.

No valve is better than its performance, regardless of its use or cost. To assure perfection, Whittaker tests its valves to limits far beyond those set by customers. They're tested to exhaustion, to destruction.

Rough, yes...because the aircraft in which these valves function must be ready for action with a minimum of delay, whether they be in desert, jungle or Arctic areas. Within the space of a few hours, a plane may meet varying conditions of broiling heat, sub-zero cold, low and high humidity, corrosive atmospheres, rain, snow, hail, sleet, ice, sand, dust and fungus.

And if its valves don't perform, it won't perform.

"At present, Whittaker test labs are running qualification trials on 40 different units," says J. W. Globig, Vice-President in charge of Engineering. "Some involve a half dozen different environmental tests. In addition, we're putting 80 development valves through the torture chambers."

Thirty-five Whittaker scientists and engineers operate nearly $200,000 worth of test equipment in these laboratories, evolve many of the special procedures and calibrations required, rig up the complex apparatus, follow the tests, transcribe the results and write the reports.

Half of these extensive lab facilities were installed within the last year to meet increasing demands. Even so, Whittaker's test men cannot stay abreast of the work load. Three thousand dollars a month in overload work is assigned to approved commercial test labs.

"Testing is a tricky business," explained Frank McCord, Chief Test Engineer. "Design development has long since passed the standard data stage. Book information is antiquated and useless.

"When you subject the dissimilar metals in a single unit to a wide range of temperatures, who can predict the results of different coefficients of expansion and friction? Who knows when brittleness will occur, how grain structures will change, what the yield point will be?

"We must determine these factors exactly. With more stringent requirements constantly bringing new problems, we must continually keep up in technical preparation.

"Temperatures in the various studies range from minus 85 degrees Fahrenheit to plus 1000 degrees, the cold induced by dry ice and alcohol, the heat by gas and electric heaters. One three-day cold test, involving a flow of 50 gallons per minute, 500 PSI pressure, at minus 65 degrees, required nine tons of dry ice!"

Through use of power-driven, variable-flow pumps, Whittaker achieves the extreme hydraulic and hot air pressures encountered in jet flight, and the valves click and whir through gruelling life-cycle tests with monotonous regularity.

The search is ever-increasing. In one section of the lab, a delicate and costly electronic gadget is vibrating a unit from 10 to 20 million times at varying speeds of from two to thousands of cycles a second. In another section, men study the conducted and radiated valve noise as it might relate to radio and radar interference.

In yet another test, sand or dust is swirled across a valve at 2300 feet per minute for 24 hours to test the valve's future efficiency at a wind-swept desert base.

Another valve may be sweating it out for 15 days in a humidity chamber to test for corrosion and malfunction. Still others, cloaked with ice and frost in a high altitude chamber, are watched as they function in stratospheric conditions. And all the while, intricate timers and multi-channel oscillographs, many of them company developed, are following the tests for complete details of performance.

It's hard to believe that valves can stand up under the tortuous inquisition of the test lab — but they do at Whittaker! I saw them!

air from the supply and the cooled air from the turbine discharge. Duct was 2-in. aluminum tubing, considerably easier to fabricate and install than the larger tubing necessary in the low-pressure system.

Future systems, Dietz says, will present new problems, among them being the need for providing ducting material, such as titanium and stainless steel, capable of taking high-pressure and high-temperature air, and the necessity of providing for duct thermal expansion.

▶ **Pressure Demand Oxygen**—Current production B-36s have D-1 oxygen regulators. These are pressure demand type and will supply 100% oxygen at 30-mm. Hg at 50,000 ft. While this equipment is effective in accidental decompression at altitude, considerable indoctrination is required in its use, says Dietz. Pressure breathing requires considerable physical effort and can be continued only for about 10 min. This length of time, however, is sufficient to allow a letdown to safe altitude where the normal demand oxygen system can be used.

Adequacy of the pressure demand system was proven in an accidental decompression during a test flight above 40,000 ft. on a B-36. While no one was injured, the need for rigid training and operational procedures was brought out.

Present standard operational procedures require that the oxygen equipment be in a ready position when at an altitude of 20,000 ft. and be on oxygen above 40,000 ft.—IS

Stress Rule Aids High-Temp Research

A new approach for determining high-temperature-material data has been worked out by two General Electric Co. metallurgical research engineers. The key is a stress formula which relates strength with time and temperature. Report is that application of the formula, which has been embodied in calculator form similar to a sliderule, can save as much as a vear of test time.

GE says that with data obtained on short-time acceptance tests and the calculator, long-time strength of metals under high temperatures may be obtained.

Other advantages reported include getting of data at intermediate temperatures without cross plotting, and representation by a single curve of complete rupture characteristics of an alloy to facilitate comparison with other materials.

The formula was developed by James Miller and Frank R. Larsen of GE's Thompson Laboratory.

Photos Give Clues to B-52

By David A. Anderton

One of the more unconventional systems on Boeing's big YB-52 bomber handles lateral control of the craft. As yet Boeing and the Air Force are not talking about how the airplane is rolled or banked. But there have been enough photos of the plane in various attitudes to give some indication of how the job is done.

From those photographs comes this speculation about the lateral control system of the B-52.

There apparently are two separate sets of control surfaces which could affect the lateral motion of the big bomber.

Here is what they look like:

• **Surface One** looks like a spoiler. Mounted on the upper surface of the wing in the region of the outboard engine nacelle, it is made of three sections.

It is possible each section operates independently. An upward deflection of about 60 degrees is shown in one picture.

• **Surface Two** resembles no other conventional surface. It is located just outboard of the inboard nacelle at the wing trailing edge. It has a short span, and fits between the two segments of flap. Deflections shown in the pictures are moderate and differential, like aileron deflections.

► **What They Are**—So much for what the surfaces look like. Now let us try to imagine Boeing's reasons for this unusual layout.

First of all, in the B-52 the wing is extremely flexible. The airplane is a highspeed job. Those two factors spell complexities in the use of conventional ailerons at the wingtips. Aileron buzz or reversal are only two of the observed effects on highly swept wings operating at high speed.

The physical dimension of the deflection means a tough job in transmitting control motions from cockpit to ailerons at the wingtip, adding a third complexity to the list above.

So all things considered, it's reasonable to believe that the B-52 control system works like this:

• **Surface One.** This is apparently nothing more than the spoiler it looks like. The only picture that shows it deflected has the B-52 taxiing on the ground. All flight shots so far have been taken from below the airplane and have not shown the upper surface of the wing at all.

• **Surface Two** is most likely an aileron. This conclusion is reached because of the differential deflection of the surfaces shown in a picture of the B-52 in a banked attitude. There is also a trim or servo tab clearly visible on the trailing edge of the starboard aileron, and spoilers or flaps do not have tabs.

Furthermore, the semi-span location of these surfaces puts them where the wing is relatively free from both twist and bending, which simplifies aerodynamic and mechanical problems.

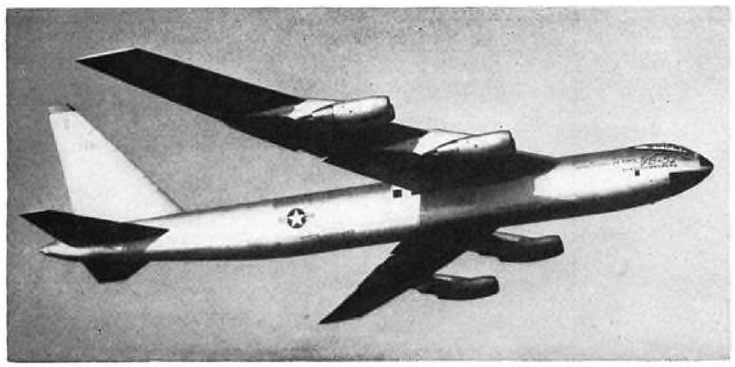
Putting all this together, it seems as if the B-52 has a lateral control system composed of spoilers and ailerons. The spoilers are on the upper surface of the wing located at about the midspan point.

Ailerons are also positioned at the midspan point.

► **Mixed System**—Reason for this mixed system is also a matter of speculation, but it does seem possible that the ailerons alone would not give enough rolling moment, for evasive action for example. They probably would suffice for steady flight or long stretches on autopilot. In the event of a fight, the B-52 spoilers would probably add their forces to the system.

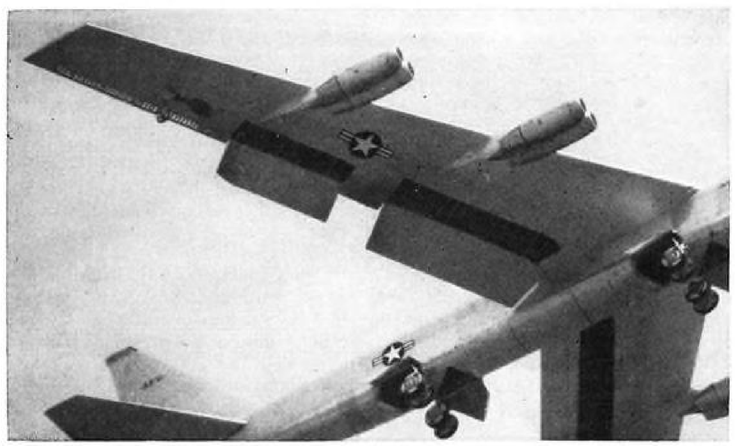
That's what it looks like from the photographs. As with any other judgment based on incomplete knowledge, these paragraphs must be speculative. But to the writer, the speculation seems logical and possible.

Lateral Control System



AILERONS of the B-52 show in this light shot of the giant bomber. Note differential deflection of the surfaces, the short span and the unconventional location near the midspan point, probably chosen because of large wing deflections at tip.

SPOILERS break the clean lines of the Boeing B-52's swept wing. These surfaces, made up of three sections probably capable of independent operation, form part of the lateral control system. Spoilers replace adverse yaw characteristics with favorable ones.



LIGHT SHOWS THROUGH the wingtip of the Boeing B-52. Complexities of mechanical linkages and aerodynamic problems have eliminated this surface as an aileron and forced its use as a fiber glass flush antenna housing.

How Saab Builds the J-29 Flying Barrel

The Saab-29 highlights Sweden's ingenuity in highspeed aircraft design and production. This jet fighter, fabricated by Saab (Svenska Aeroplan Aktiebolaget) in a modern production facility at Linkoeping, is considered a first-rate plane.

Though dubbed the Flying Barrel because of its somewhat bulky body, the J-29 is a clean and compact configuration. It is a "home-grown" product that typifies the country's industrial independence—even the plane's de Havilland Ghost engine is built in Sweden, by Svenska Flygmotor Aktiebolaget.

► **Outside-In**—The plane incorporates thick sheet, heavy sections and complicated shaping. To maintain accurate contour on components, Saab employs a fabrication scheme working from outside-in. The outer skin surface is controlled by exterior pickup points in an assembly jig and the supporting structure is built in to fit the skin's inside contour.

England's Fairey Aviation Co. used a similar production method for its Fairey 17 (AVIATION WEEK Jan. 30, 1950, p. 27).

Riveting on small subassembly components is accomplished at work stations along either side of a conveyor belt operated from an inspection station at the end of the line. Completed subassemblies go to a production store until ready for the next operation.

Each large stationary assembly jig carries a serial number and is painted in an individual color. The number helps the planning department follow the work and the color is used to avoid mixing location fittings from different jigs. Large boards are positioned alongside each jig, with places to hang each fitting.

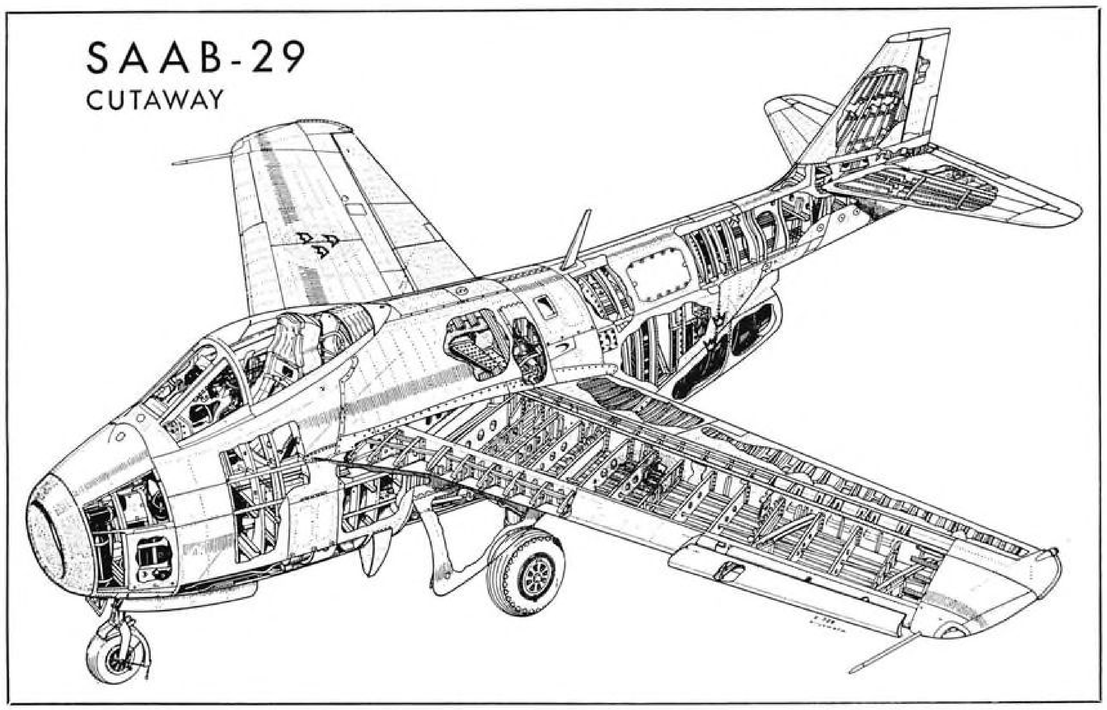
After the three fuselage sections—nose, center and rear—are brought together in the mating jig, the completed assembly is put on a trolley. This carries it through the shop until it is ready for flight test.

► **Plane Data**—Production J-29s are fitted with a 5,000-lb.-thrust Ghost engine, and are designed for a top speed of about 650 mph., although this speed has been exceeded.

Fuselage accommodates such equipment as landing gear, fuel tanks and armament. Length of the body is 33 ft. 2½ in., height is 12 ft. 3½ in. Wings are conventional two-spar structures with 25 deg. sweep. Span is 36 ft. 1 in. Wing leading edge is fitted with automatic slats to improve stalling properties on landing and at low flying speeds.

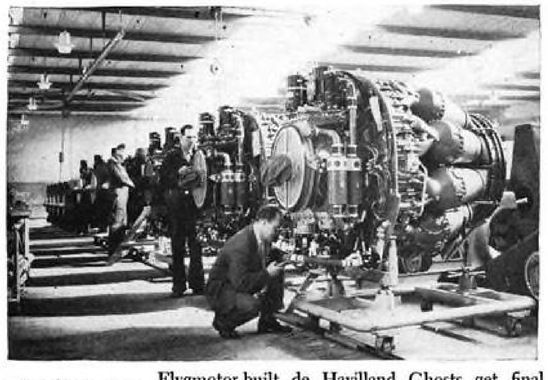
Stabilizer, mounted high on the tail is electrically adjustable in flight.

First versions of the Saab-29 have air brakes fitted to the wing behind the rear spar, but later models are designed for fuselage-mounted brakes.

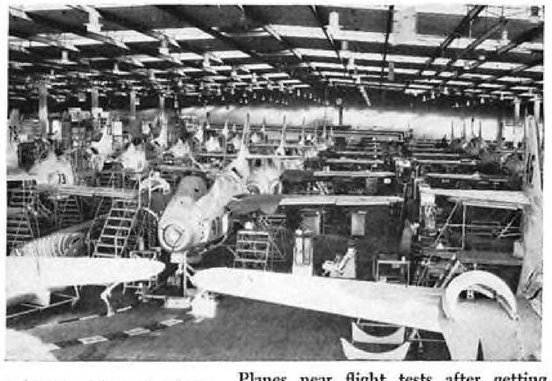


MATING Nose, center and tail are put together here. Fuselage then rides trolley for remainder of line.

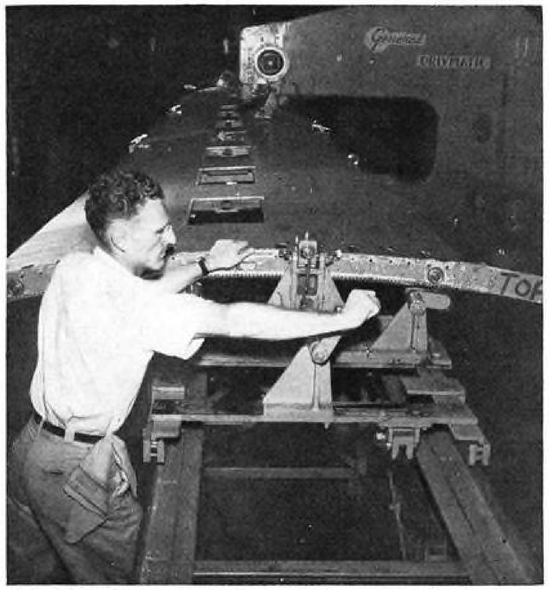
INSPECTION J-29s get thorough inspection here before proceeding down the line.



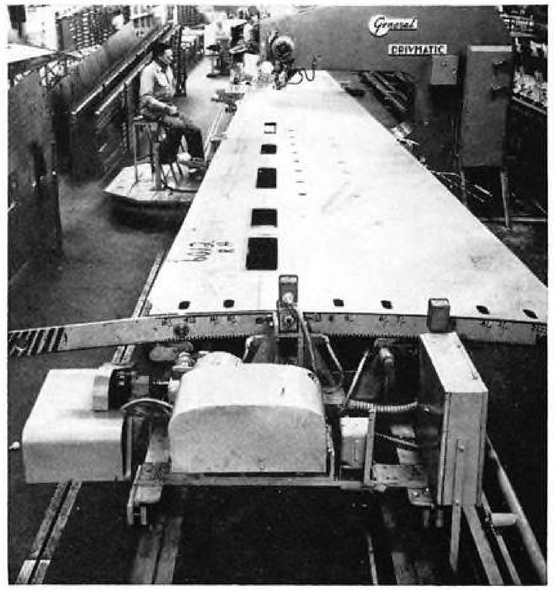
ENGINES Flygmotor-built de Havilland Ghosts get final touches on make-ready line before going to planes.



END OF LINE Planes near flight tests after getting wings, stabilizers and landing gear.



BEFORE: Operator had to loosen tension rollers with handscrew, then crank panel to position for new rivet row.



AFTER: With new remote control lateral shifting (foreground), operator stays put. Result: faster production.

Mechanical Table Speeds Temco Riveting

Riveting speed is being pushed up at Temco Aircraft Corp., Dallas, Tex. The company has fitted a wing-support table, used in conjunction with the fast General Drivmatic Riveter, with a new push-button-controlled lateral shifter that is saving 4 to 8 hr. on each P2V-5 wing panel it is fabricating for Lockheed Aircraft Corp.

▶ **Before and After**—The Lockheed-designed table which was furnished to Temco for the wing job had provisions for remote control longitudinal shifting for driving a row of rivets, but lateral shifting was a manual operation (AVIATION WEEK Dec. 24, 1951, p. 34). This required the operator, after a line of rivets was completed, to go first to one end of the table then to the other in order to loosen clamps, shift the panel with a crank, and again tighten the clamps. This was time-consuming and fatiguing during the day's run.

With the new Temco lateral shifter, the operator doesn't have to leave his seat to move the panel. That means faster operation and less fatigue. Other advantages the company reports include greater accuracy and practicality of pressing short rows. The Drivmatic also drills out and replaces tack rivets.

▶ **Components**—In addition to the lateral shifting mechanism, the new installation includes a tension mechanism (releases tension on the contour bars to which panels are bolted and restores tension after the shift), a solenoid clamp to maintain tension on the indexing bar except during lateral shift, a group of electrical and mechanical safety provisions to prevent damage to table, carriage or panel as a result of operator error, and the actual control mechanism.

▶ **Simple Changeover**—The installation is mounted directly on the Lockheed table and involved only minor modification—principal ones being in the carriage where motors and solenoid clamps replace handcrank and mechanical clamps. Only major addition is a 66-ft. length of trolley track carrying the remote-control cable on rollers.

Total cost of the lateral shifting installation ran just over $1,800 for material, labor and purchased parts. Cost of work for another table modification scheduled on a second Drivmatic will be considerably less than that figure, Temco says.

Complete changeover on the first job was accomplished with only six hours of machine down-time.

USAF CONTRACTS

Following is a list of recent USAF contracts announced by Air Materiel Command.

• **Aero Instrument Co.**, 5105 Denison Ave., Cleveland, tube, 6,833 ea., $83,362.
• **Ainsworth Mfg. Corp.**, 2200 Franklin St., Detroit, bomb rack, $656,978.
• **AiResearch Mfg. Co.**, division of The Garrett Corp., 9851 Sepulveda Blvd., Los Angeles, valve assembly, $26,592; valve assemblies, $87,583.
• **Alamo Mfg. Co., Inc.**, New York 18, parachute assembly, 5,000, $3,176,650.
• **Ampro Corp.**, 2857 N. Western Ave., Chicago, projector parts, $36,160.
• **Armour & Co.**, Alliance, Ohio, commercial hardware, $86,401.
• **Bachman Wholesale Co.**, P. O. Box 237, Rochester, N. Y., aircraft parts & equipment, $56,332; gun turret, $25,606.
• **Bell Aircraft Corp.**, Bell Helicopter div., Fort Worth, kits, $31,717.
• **Bell Aircraft Corp.**, Niagara Falls, N. Y., miscellaneous spares, $300,000.
• **Bliss, E. W., Co.**, Canton, Ohio, trim presses, 22 ea., $3,731,753.
• **Boeing Airplane Co.**, Seattle, handbook, $31,546.
Garwood Industries, Inc., Wayne, Mich., spares, $494,370.
General Electric Co., Schenectady, tachometer indicator, $222,461.
Haskins, R. G., Co., Chicago, grinders, $28,875.
K-D Lamp div., Noma Electric Corp., Cincinnati, lamp assemblies, $26,150.
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, brake assembly, $1,060,850.
Kollsman Instrument Corp., Elmhurst, N. Y., parts, $66,291.
Lewis Engineering Co., Naugatuck, Conn., indicator, 1,619 ea., $29,142.
Lindberg Engineering Co., 2450 W. Hubbard St., Chicago, furnace, 50 ea., $364,330.
Linear, Inc., State Rd. & Levick St., Philadelphia, V-rings, $72,766.
Lion Uniform Co., 44 Webb St., Dayton, jackets, 10,630 ea., $50,492.
Liquidometer Corp., Skillman Ave., Long Island City, N. Y., instrument parts, $77,974.
Lite Mfg. Co., Inc., 101 W. 21 St., New York, headsets, 5,402 ea., $35,938.
Magnavox Co., Fort Wayne, Ind., solenoid assembly, $45,264.
Marquette Metal Products Co., 1145 Galewood Drive, Cleveland, windshield wiper assembly, $30,360.

Old Voltage Problem Gets New Answer

- **Navy buys GE magnetic amplifier regulators.**
- **Will install the units in its new aircraft.**

By Philip Klass

Schenectady—Navy's BuAer is turning to magnetic amplifiers to solve one of the oldest problems in aviation—that of providing a rugged, reliable, long-lived device to maintain constant voltage output from aircraft generators.

The new voltage regulator, developed by General Electric, uses static magnetic amplifiers to replace the moving balanced armature of previous aircraft regulators. It is designed to regulate a.c. generators (alternators).

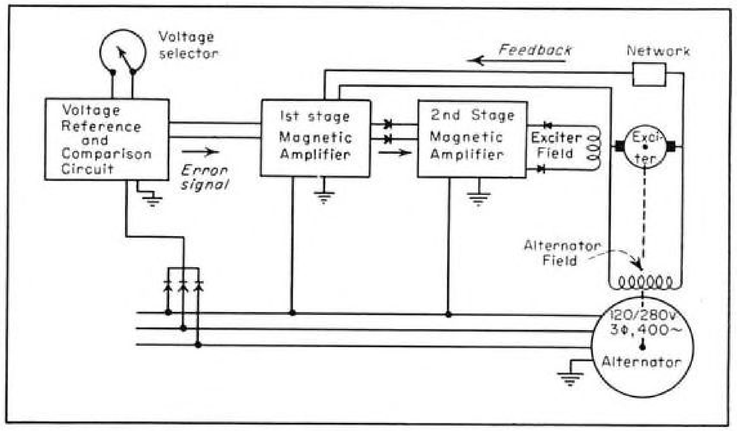
BuAer has ordered the new GE regulators for use on many of its newest aircraft, including the McDonnell F3H, Chance Vought F7U-3, Douglas A3D, and North American A2J. The Air Force is also reported eyeing the GE regulator.

► **GE Claims**—Based on experimental flight tests in a B-36, and extensive ground tests, GE says the device will:

- **Hold constant voltage** within ±2½% from no load to full load.
- **Hold voltage variation** to ±1% between temperatures of −67F and 160F (for constant load).
- **Return voltage** to 95% of normal voltage less than 0.1 second after application or removal of full load, for alternators up to approximately 60-kva. rating.
- **Be unaffected by accelerations** of 10G in any direction or by severe vibration.
- **Be long-lived,** with expected trouble-free life in excess of 5,000 hours.

The only hooker is that magnetic amplifiers need to operate from a.c. power which prevents their use as regulators in d.c. power systems. However, most new military aircraft are going to a.c. power systems.

► **No Moving Parts**—GE's regulator has no moving parts, unless one counts a single control relay which operates only once during a mission to permit initial buildup of alternator voltage. This, coupled with its other features, explains why BuAer is willing to accept a heavier 17-lb. regulator to replace the 12½-lb. unit previously used.

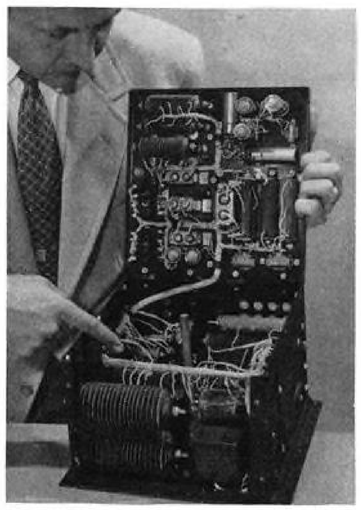


MAGNETIC AMPLIFIERS take place of moving armature in GE voltage regulator.

► **Troubled Past**—The moving armature which has been the heart of previous regulators was also the root of their troubles.

In previous aircraft voltage regulators, generator output voltage has been used to develop a magnetic force which works against a spring to position the regulator armature proportional to the generator voltage. To obtain "high gain," the armature was designed to have very small travel from a condition of low voltage to one of high voltage.

As a result, high G maneuvering loads or plane vibration could upset sensitive electromagnetic-spring balance to give erratic generator output voltage.



BUAER is putting these GE voltage regulators in many new Navy planes.

Until 1944, the regulator armature operated a series of tiny fingers which inserted or cut out increments of resistance in the generator field circuit to vary field current. In service, the fingers suffered from "tinker-itis" at the hands of inexperienced personnel. As a result the fingers became pitted, bent, and misaligned.

► **Better, But . . .**—By late 1944, the much-improved carbon-pile type regulator had begun to displace the finger-type. Here the armature movement controlled the pressure on a stack of carbon disks to change their overall resistance which in turn varied generator field current.

Finger alignment and pitting problems were eliminated, but aging and arcing of the carbon disks took their place. With its moving armature, the carbon-pile regulator was also susceptible to severe aircraft acceleration and vibration. Vibration mounts were used to partially reduce this effect.

When BuAer let contracts for development of a line of aircraft alternators several years ago, the contracts also called for a "basically new and improved voltage regulator." The new GE regulator was the result.

► **Operation**—The regulator is designed to operate with a three-phase, 120/208-v. delta or wye-connected alternator. The alternator voltages on all three phases are rectified and combined to give a single d.c. voltage (proportional to the average of the three voltages) which feeds the regulator. This d.c. voltage is compared with a constant-voltage reference in a bridge circuit which develops an "error signal" whenever the alternator voltage varies from selected value. (See diagram.)

The constant voltage reference is provided by a JAN-OB2 cold-cathode tube. It is considerably more rugged than a conventional vacuum tube, having no filament, grid, or heated cathode. However, any equipment which uses a single rugged voltage reference in a glass envelope is frequently "suspect."

GE has added a "backstop" in the form of a second JAN-OB2 tube which is connected in parallel with the first. As long as the first tube is functioning, the second simply "idles." However, it will instantly take over the voltage reference chores should anything happen to the first tube, according to H. W. Gayek of GE's Industry Control department.

► **Push-Pull Stage**—The first magnetic amplifier stage consists of two small saturable reactors, connected push-pull. Each has its control winding (functionally equivalent to a vacuum-tube grid) connected in series opposition to the voltage comparator bridge. Each winding controls the current flowing through the reactor's output winding from the alternator through the reactor's output winding.

When alternator output voltage is at the selected value, there is no error signal, and balanced output will flow from the two first-stage amplifiers.

This first-stage output is rectified and applied to the control windings of the second-stage saturable reactor. The output winding of one of the first stage amplifiers is connected to the "buck" control winding in the second stage; the other is connected to the "boost" control winding. If alternator voltage is "on the button," equal currents will flow from the first stage through the "boost" and "buck" windings of the second stage.

If alternator voltage varies from the selected value, the error signal applied to the first stage will cause it to increase the flow of current in the appropriate ("buck" or "boost") second-stage control winding. This in turn increases or decreases the output current from the second stage, which is then rectified and applied to the main field of the exciter.

► **The Exciter**—The exciter is a small d.c. generator which is built into the alternator and driven from the same shaft. It provides the relatively high-power level of excitation for the main field of the alternator. In a sense, the exciter is another stage of amplification to raise the power level of the output from the voltage regulator.

The polarity of the error signal from the bridge comparator is determined by whether the alternator voltage has risen above or fallen below the selected value. This signal determines whether the push-pull stage passes the greater current through the "boost" or the "buck" windings of the second stage. This in turn determines whether the exciter field current is increased or decreased, thus controlling alternator field excitation and hence its output voltage.

► **Feedback**—The voltage regulator is a "closed-loop" system in the sense that a regulator change in exciter field current causes a change in alternator voltage which will in turn cancel the initial error signal calling for the change in field current. However, within this closed loop GE has included a feedback circuit to increase system stability and limit voltage overshoot.

For competitive reasons GE is close-lipped about details of the feedback circuit except to say that it permits the regulator to "anticipate" the pending change in alternator output voltage.

► **Bias Winding**—The alternator exciter has an extra field winding (not shown in block diagram) which functions as a biasing device. It is excited from rectified alternator output and acts to partially "buck out" the main exciter field. This allows the second-stage reactor to supply sufficiently high currents to operate on the proper portion of its saturation curve.

Because of the special exciter bias field required, the GE static regulator

cannot be easily substituted for existing carbon-pile regulators in a.c. systems. However, the regulator can be modified to provide reasonably satisfactory operation on most alternators whose exciters have no bias field.

The experimental B-36 flight tests were conducted using Westinghouse alternators without bias fields. The results were very satisfactory, according to E. S. Gallagher, sales manager of GE's Aviation division.

▶**Proof of the Pudding**—Evidence of the new regulator's rapid response and stability was shown to the writer by K. W. Carlson of the Aviation division on a test setup which included an engine-driven alternator. Carlson placed a direct short across one alternator phase and then removed it. The voltage recovered, overshot about 25%, then returned to normal in slightly less than 0.1 second.

Carlson attributed the initial overshoot to the alternator's high synchronous reactance. It is purposely designed to be high so that short circuit current will be limited to about three times normal full-load current in order to "burn out" a short circuit. The overshoot lasts for only about 0.05 seconds, so it won't damage any electrical equipment on the line.

A look inside the GE regulator shows that most of the space in the unit is occupied by selenium rectifiers rather than by the magnetic amplifiers themselves. If and when the present 60C temperature limit of germanium rectifiers can be raised to permit them to replace the selenium rectifiers, the size and weight of the regulator could be reduced appreciably.

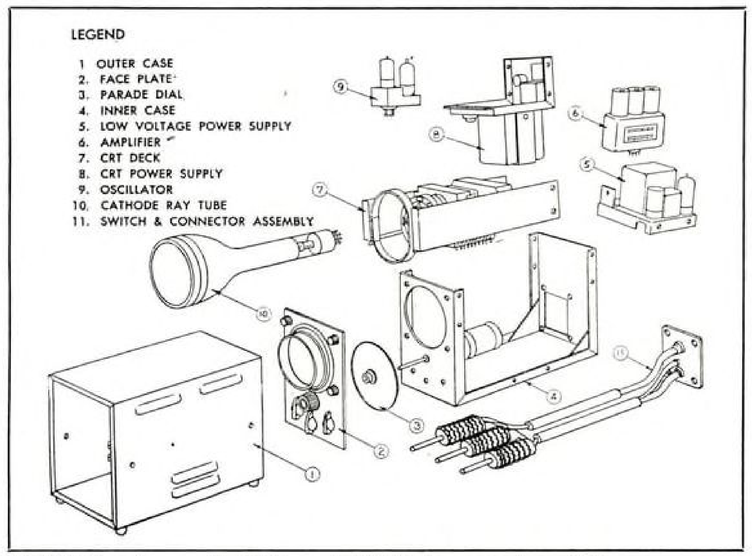
Because of the absence of moving parts and the ruggedness of its components, the regulator requires no shock or vibration mounts.

▶**Speed Ranges**—Aircraft alternators may be classified into two general types. One is driven through a constant-speed drive which maintains alternator frequency between 320 and 480 cps. The other is directly driven from the engine giving an alternator frequency range of 400 to 800 cps.

The response of magnetic amplifiers is affected by the frequency of their power source, in this case the alternator frequency. Consequently GE found it necessary to come up with two slightly different regulators, one for each type of alternator. The basic difference is the addition of a special frequency-compensating network in the wide-speed range regulator.

Ultimately, Gallagher says, it may be possible to design a single regulator capable of handling both types of alternators. Either regulator is presently capable of handling alternators of different kva. ratings, in its own particular speed range.

EQUIPMENT



LAND-AIR analyzer weighs 22 lb., costs $1,625 plus accessories and labor.

New Analyzer Interests Carriers

Bendix conference discusses Land-Air's lightweight unit; personnel training problems also evaluated.

By George L. Christian

Deposit, N. Y.—Latest entry in the electronic engine analyzer market, the Land-Air, aroused considerable interest at the recent Bendix-Scintilla sponsored Ignition and Analyzer Conference here. The Land-Air may be used as an airborne or a portable-airborne unit.

Highlights of conference pros and cons on the three basic types of analyzers—portable, airborne and portable-airborne—were reported in this section July 28.

The Land-Air instrument was developed by Loren Sackett, who, as chief engineer of Lindberg Instrument Co., was associated with the Sperry analyzer.

The Land-Air analyzer is in use by the Navy, has been evaluated by American Airlines, and is being tested by USAF, according to **Ben Puchaski, assistant to the president of California Eastern Airways.** (Land-Air is a subsidiary of CEA.)

▶**Land-Air Analysis—Paul Kovac, AA engineer,** reported his airline's experience with the Land-Air analyzer. His evaluation was limited, he said, because the analyzer was late and not perfected to point of acceptance when tested, nor was it being made in production quantities. But he did single out these good points of the Land-Air:

- **Weight is a low 22 lb.**
- **Size is 7¼ x 11 x 13 in.**
- **Simplicity is underlined.** The analyzer has only one dial to turn. The unit contains but six tubes (half the number of other analyzers) and the wiring is simple.
- **Synchronization** of instrument to engine is through a modified standard AN tachometer generator.
- **Determination of cylinder** you are looking at can be done quickly and accurately.
- **Dynamic timing** of an engine is possible with the instrument.
- **Vibration analysis,** as well as ignition analysis is possible with the instrument.
- **Same analyzer** may be portable-airborne or airborne.

Kovac concluded that the instrument was worth considering; it just was not ready in time for American.

▶**How it Works**—Trace patterns of one or both magnetoes may be viewed on the 5-in. cathode tube simultaneously. By rotating the large knob under the scope (parade dial) each cylinder's pattern may quickly be viewed. Any pattern may be left on the scope as long as required for interpretation.

Vibration pickups are available to install on one or more cylinders. The 4-oz. units are the magneto striction type and convert vibration into voltage signals.

The analyzer may be broken down into eight subassemblies which can be quickly taken down to speed servicing and maintenance. The instrument will operate on 95-135 v. a.c. at 350-1,600 cycles or on 60-400 cycles.

High-intensity cathode ray tube makes patterns clearly visible without shield at all times, according to the manufacturer.

Puchaski said that the analyzer had gone into production at a Chicago plant. He quoted the basic price at $1,625. Accessories may add up to another $500 plus labor for installation. Scintilla said $1,200 was the total cost of its analyzer including complete complement of equipment for Constellation installation, labor excluded.

▶**Training for Analyzers**—Training of personnel in the use of analyzers was discussed in some detail at the conference. **R. L. Besser of Bendix Aviation Corp.** stated that the analyzer is easy to use and all classes of maintenance personnel can use it if properly trained. Training is neither long nor difficult, he said, usually being a matter of a few days.

An interesting approach to introducing analyzers to a group of mechanics was expressed by **R. W. Farren, technical assistant to the director of engineering of TCA.**

The instrument should not be shoved down a mechanic's throat, he said. Mechanics need "softening up." Procedure is to allow them to watch experts operate analyzers, thus stimulate a natural interest. Soon they will feel that the instrument will do all the things claimed for it and develop confidence in the indications on the scope, Farren said. He stressed that he wanted simplicity of operation—one-dial control would be ideal.

Airlines differed concerning type of personnel that should use analyzer. Northeast uses engine mechanics, while Continental turns it over to electronics men. TCA agreed that it should be used by engine men, saying it could not afford to use electrical and radio men; that would be too much of a luxury.

PanAm, which probably has more experience with analyzers than any other commercial airline, talked of the need for training. The analyzer is easy to use and most classes of mechanics can use the instrument proficiently, but trainees should know something about engines in general and ignition systems in particular, PAA said. The carrier has established a two-day analyzer training course.

NEA commented that in its experience, training mechanics at the over-

Land-Air Engine Analyzer

haul base was unsatisfactory. Sending them to Scintilla for the 40-hour basic training course offered by the manufacturer did give gratifying results, however.

American outlined its training procedure. Instructors are given two days of training at Tulsa. They then give trainees a 12-hr. course, followed in 60-90 days by a 2-hr. refresher course. AA will also have air transportable training aid units incorporating a pressure bomb, to duplicate all sorts of engine malfunctions.

Scintilla noted that its training course, consisting of 25 hr. of classroom work and 5 hr. of practical application, had been used by over 350 men last year. They added that the 5-day training gives a man a good start in the right direction, but does not produce an expert.

In reply to an Air Force comment that Scintilla field representatives were not always available for consultation (and if you have the equipment you need field service representatives, says USAF) the manufacturer stated that it has an extensive program under way to take care of training needs for military and civilian users alike.

The need for training aids was stressed by airline analyzer users. Using test cells or aircraft for training is prohibitively expensive. The training aids should be bread-board types minus all unnecessary frills and gadgets.

Scintilla has two trainers available—a $4,995 job and a simpler unit costing $1,100. The latter was described as highly practical for airlines because they could install much surplus equipment on it, thereby saving money.

► **Analyzer Life**—General impression of analyzer users is that both the Scintilla and Sperry units are rugged and trouble-free.

Scintilla pointed out that, other than having a few small tubes go out occasionally, they had little trouble with their units.

They are testing a synchronizing breaker. It has operated 1,200 hr. without changing timing and should have good service life because the cam turns relatively slowly and current passing between the points is negligible.

PAA removal rates for the Sperry instrument are:

- **Amplifier**—1 per 2,000 hr.
- **Condition switch**—3-4,000 hr.
- **Cycle switch**—3-4,000 hr.
- **Sine wave generator**—1 per 1,000 engine hr.

The airline has experienced several cases of broken no. 26 wire in the generators, it being electrically but not mechanically adequate. Generally, Pan-Am found analyzer life has been quite good.

USAF and several airlines repaired their analyzers "on condition."

► **Pickup Problems**—Conference opinion concerning the worth of vibration pickups was divided. Consensus was that single point pickups were not practical because too many other cylinders could malfunction without giving indications on the analyzer.

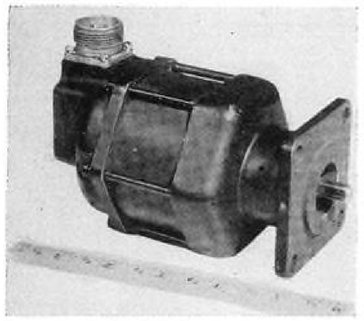
- **Wright Aero** was one of the firms heartily supporting this point of view.
- **PAA** said an all-cylinder setup was difficult to justify.
- **USAF**, agreeing that a single pickup was no good, suggested a reasonable compromise—several pickups on critical cylinders. This configuration would give better coverage than a single pickup, and would avoid much of the weight, complication and cumbersomeness of an all-cylinder harness.

Favorable comments for vibration analysis included remarks by Wright Aero that the system (used in their experimental department) was very satisfactory to determine detonation. The engine manufacturer said, however, that incipient failures were not easy to pick up.

AMC spoke favorably of pickups on the nose section of the engine. These can readily spot defects in the power section. The command is considering using ignition and vibration analysis on all overhauled engines in an effort to make them 100% full-run engines.

Vibration pickups do enable an operator to time an engine dynamically, check valve, valve guide and valve spring malfunctions. And the device permits an operator to run checks, as PAA's Pacific division does, to determine effects of spark advance (not detrimental to the engine) and lower grade fuels in engines.

Bendix spokesmen said vibration pickups add too much weight, cost and complication. However, Scintilla equipment is available for single-point vibration takeoffs and good vibration patterns have been obtained on their analyzers. Equipment can be adapted to multi-cylinder pickups if desired.



L-A Synchronizing Generator

L-A Vibration Pickup

► **Ignition Voltage Control**—The subject of voltage control, an exclusive feature of the Scintilla analyzer, was discussed by Ray Farren of TCA. Voltage control is a rheostat-like device which permits variation of the output of aircraft magnetoes.

He claimed the control is good for preventative maintenance, debatable as a trouble shooter. Its inclusion in the analyzer system is advantageous and can assist very much in borderline cases, he added.

By just using voltage control blindly, it is possible to put out a perfectly good spark plug (by reducing the plug's voltage to the point where it stops firing). Closed gap plugs work in reverse—voltage can be reduced to small quantities before they stop firing.

It is important to establish a standard to work to, Farren said. It is also important to establish limits and powers at which to use voltage control. (For instance, Wright Aero is not in favor of using voltage control at powers above normal mag check settings.)

As Farren put it, VC works like a charm with properly set, new plugs. Uniformity of performance is precise. With used components, uniformity diminishes, and limits within which plugs stop firing have to be set on the standard scale. He added that voltage control by itself is not necessarily a simple, easy way to troubleshoot. He was not sure that it was worth the added weight and complication.

► **Analyzer Records**—Movies are a good way to record analyzer patterns for training or permanent records. Camera is light, relatively small and has long recording time. But results cannot be "played back" immediately since film has to be developed.

Tape recording can be played back immediately, but it takes lots of room and is heavy, according to Scintilla.

► **Conclusion**—The Ignition and Engine Analyzer Conference was well managed. While there was considerable repetition for some who had been following the meetings for many years, newcomers found the details interesting. Many details and experiences with the instruments were revealed for the first time.

Probably the most unmistakable impression created by the meeting was the seriousness with which analyzers are taken. They are no longer in the Ouiji board category of a few years ago.

Robert Boyer, Jr., Scintilla senior engineer and chairman of the conference, kept the meetings on schedule.

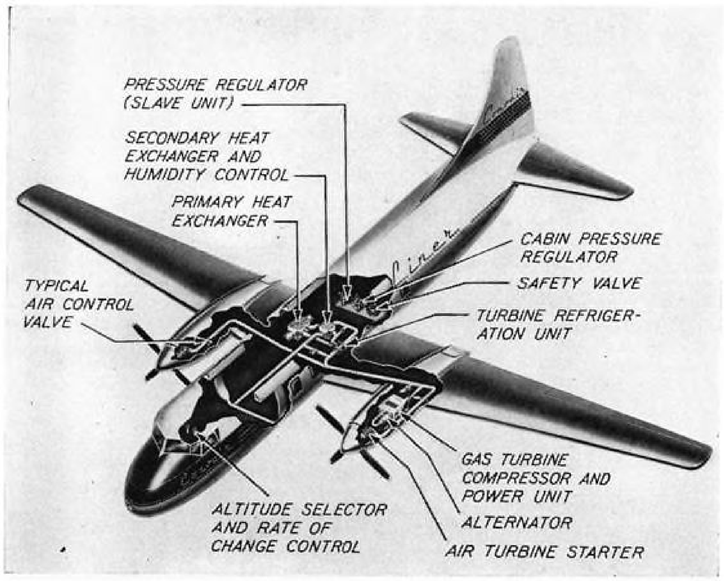
OFF THE LINE

One installation of Rosslyn Metal augmentor tubes on a Continental Air Lines' Convair 240 has accumulated 4,195 flying hours and is still going strong, says American Cladmetals Co. Best life obtained by the airline with standard metal tubes was quoted as 3,958 hr. The maker adds that he has received inquiry from Convair for material for 101 Model 340 Convairs.

United Air Lines is converting its entire domestic fleet of seven cargo DC-4s to H-2 non-flammable hydraulic fluid, according to R. M. Hollingshead Corp., manufacturer of H-2. The firm indicates that the decision was reached as a result of tests conducted for more than 1,000 hr. on one cargo DC-4. United's average brake removal rate is 2.2 per overhaul period (1,300 hr.) using 3580 fluid. With H-2 no brakes were removed during the entire overhaul period of the test aircraft. H-2 is standard fluid in most current Navy fighters and has been under test by Transocean Air Lines.

At least three components of the Ford automobile have found their way into modern aircraft. A Ford door latch is used in a seat being developed for a new transport aircraft. Ford distributor points are used in an airplane navigation light flashing mechanism produced by a large aircraft equipment manufacturer. And a part of the Borg Warner Fordomatic transmission has taken its place in an aircraft cabin supercharger drive mechanism.

A new 7-lb. ignition system to produce the hot spark required to start jet engines is being mass-produced by Scintilla Magneto division, Bendix Aviation Corp., the company just recently announced.



TOMORROW'S AUXILIARY POWER SYSTEM

Looking ahead to the need of tomorrow's jet and turboprop airliners for complete auxiliary power systems, AiResearch Mfg. Co., Los Angeles, has engineered several temperature and cabin pressure setups, one of which is illustrated above using the turboprop Convair-Liner as an installation example. For clarity the plane's turbine engines have been deleted and the components have been enlarged. A small gas turbine drives the plane's alternator to provide electrical power, powers a compressor to turn over the main powerplant starters, operates the refrigeration unit and heat exchangers.

NEW AVIATION PRODUCTS

Quick Release Catch

Patents for a new fastener, designed to allow quick release of access covers and similar sections on jet aircraft and missiles on the ground, yet provide maximum locking security against heavy stresses imposed on skin sections during highspeed flight, have been applied for by an engineer at Grumman Aircraft and Engineering Corp.

According to the inventor, Harold E. Koch, the fastener will not deflect under load and already has passed rigid vibration, cycling, tension and shear tests.

Outwardly, the fastener appears similar to other quick-release types long on the market, but its internal construction apparently is more detailed and sturdier, involving more parts.

The fastener is available with a countersunk or protruding head. Included is a pressure cap and O ring which seal it in the back so it can withstand high internal air and oil pressures. Installation adjustments to account for sheet tolerances can be made.

One quarter turn clockwise locks the fastener with $\frac{1}{8}$-in. sheet pullup, and $\frac{1}{4}$ turn counter-clockwise releases it. The same spring that locks the fastener stud also ejects it on release. Stud lengths vary, as desired.

Harold E. Koch, 158 Thirty-Second St., Lindenhurst, L. I., N. Y.

Sparkplug Terminal

A new sparkplug terminal with a tougher sleeve and spring designed to last longer and cut down maintenance bills has been placed on the market by J. E. Menaugh Co.

The terminal, a shielded type, is the first using a beryllium copper spring of volute construction and an "NB" (stands for non-breakable) sleeve, the maker says. Others have ceramic sleeves and coiled springs, generally. The new spring is sturdier and more rigid; and it telescopes, Menaugh says.

Design has been aimed particularly at providing accurate alignment and seating characteristics, to prevent flashovers. Beryllium copper was selected for the springs to give maximum corrosion resistance, high electrical conductivity and long life.

The sleeve is made of materials that resist impact and are unaffected by solvents, gasoline or acids, the firm says. The sleeve will not carbon track or chip and is superior to conventional ceramic types, the company claims.

J. E. Menaugh Co., 549 Washington Blvd., Chicago 6, Ill.

Industry Watches Tiger Financing

Cargo carrier has put out a 'sweetened' convertible debenture to help pay for new DC-6As and spares.

The airline industry is watching with interest a recent $2,750,000 debenture financing arranged by the Flying Tiger Line. The financing was necessary to pay for new equipment on order. Financing plans of other carriers which need additional funds will undoubtedly be influenced by the cargo operator's experience.

The new equipment of the Flying Tigers is seven DC-6A aircraft, estimated to cost $6,989,878 (subject to an escalator clause limited to 15%). In addition, the complement of spare parts is estimated not to exceed $1,200,000. The necessary funds to finance this minimum capital requirement of $8,189,000 will be financed by the $2,750,000 received from the debenture sale and a bank credit amounting to $5,500,000.

▶ **"Sweetened" Security**—To facilitate the financing, considerable "sweetening" was attached to the security sold. This took the form of a debenture issue carrying a 5½% interest rate and convertible into common stock at a price moderately higher than the current market for the junior equity. In effect, this security has a somewhat improved position in the capital structure of the company while having all of the characteristics of a common stock.

In other words, the debenture holder can participate in such earnings as accrue to the common stock, while receiving precedence in the form of income through interest before dividends can be paid to the stockholders. More importantly, the debenture holders have a claim ahead of the capital stock on the assets.

Still outranking the debentures, however, will be the superior indebtedness represented by the amount of notes issued to finance the new aircraft. Initially they will be represented by a 5%, $5,500,000 term bank loan. This bank loan is covered by a loan agreement which, among other things, provides for security through a chattel mortgage on all of the company's aircraft, spare engines, and all spare propeller assemblies now owned, together with a supplemental chattel mortgage covering the DC-6As and such other spare engines and spare propeller assemblies to be acquired. Other protective provisions are also written into agreement covering the new bank loan.

▶ **Sinking Fund**—The subordinate debentures issued in the total amount of $2,750,000 have a maturity date of July 1, 1967, but will be convertible through July 1, 1962. A strong sinking fund is also provided but becomes effective on July 1, 1960, when $275,000 in principal amount of debentures are scheduled for retirement. This sinking fund operation is slated to continue through July 1, 1966 when 70% of the entire issue is expected to be retired in this manner.

It is probable, as with all convertible debenture issues of this type, that management is hopeful conversion into common stock will preclude the necessity of cash payments to effect retirements through the sinking fund or at maturity.

▶ **Firmer Footing**—This financing, in a broader sense, reflects the tremendous strides achieved by the Flying Tigers since its inception more than seven years ago as the National Skyway Freight Corp. The company obtained a firmer footing through its successful prosecution of its application for a Temporary Certificate of Public Convenience and Necessity from the Civil Aeronautics Board on July 29, 1949. This certificate, expiring on Aug. 12, 1954, gave the company legal status in actively engaging in the transportation of property along authorized routes across the United States.

More important to the company, however, have been the operations conducted through exemptions from CAB to its primary authorized air cargo activity in the United States. The management has shown considerable enterprise in undertaking charters for passenger and cargo activities, largely under contract for the military establishment throughout the world.

▶ **Military Business**—For the first full year of its operation ended June 30, 1946, the company's operating revenues totaled $480,000. For the year ended June 30, 1951, its operating revenues were $15,582,059, and for the nine months ended Mar. 31, 1952, $16,281,589.

Of all of the operating revenues of the company for the year ended June 30, 1951, and for the nine months ended Mar. 31, 1952, revenues from the Pacific military airlift—the largest single source of revenue of the corporation—amounted to $7,492,469 and $6,938,271, respectively.

Rentals, charters and service sales independent of the Pacific airlift have also bulked very large in the company's activities. For the year ended June 30, 1951, of the total $15,582,000 gross revenues generated from all sources, a total of 77% was derived from activities other than its "normal" common carriage of freight. For the nine months ended Mar. 31, 1952, of the total $16,282,000 in gross revenues generated, some 80% came from the same special sources.

▶ **Red to Black**—Reflecting the character of its special operations, the Flying Tigers converted its earlier deficits into profits. After a net loss of more than $1.1 million for the two years ended June 30, 1948, the company showed its first profit, $123,619 for the 1949 fiscal year. This net operating gain increased to $400,190 for 1950 and $1,024,950 for 1951, with $549,297 for the nine months ended Mar. 31, 1952.

The Flying Tiger debenture prospectus notes that: "Even though the Corporation's civilian business has growth potentialities, the revenues and earnings of the Corporation may be substantially reduced as and if military requirements diminish."

Considerable support to the company's operations could stem from any success in its application before CAB for authorization to carry air mail, including parcel post and air express. But this application promises to run into considerable opposition from the scheduled carriers now enjoying the mail carrying franchise.

—Selig Altschul

Delta Issues Stock To Buy New Planes

Delta Air Lines has floated a stock issue of 100,000 shares to help handle its aircraft purchase commitments. At current market levels, it appears that the sale will gross about $2,200,000, with $225,000 going for underwriting discounts. This additional stock will bring Delta's outstanding common to 600,000 shares.

The financing is a straight stock flotation. It will help Delta purchase ten Convair 340s and four DC-7s. The Convairs, together with spare parts, entail a total outlay of about $6,300,000.

The deliveries are scheduled to start in October, 1952, and continue through July, 1953, at the rate of one a month. The DC-7 commitment together with related spares will entail a capital outlay of about $7,000,000. This equipment will be delivered in the spring of 1954.

LETTERS

Voice of a Sourdough

On page 18 of the Feb. 4 AVIATION WEEK there appeared a letter from the News Bureau Manager for Pan American World Airways, Inc. As he is obviously misinformed, I thought it well to straighten him out on the subjects of Eskimos and Milk and also make a few comments on Pan American World Airways, Inc.

I have personally been engaged in various capacities in the aviation business in Alaska for over 20 years and can well remember when PanAm first entered the Alaskan scene.

As Mr. John Creedy states, they did put in their own radio and weather stations but there were companies operating before PanAm who had their own maintenance and refueling facilities. These smaller Alaskan companies, most of which are still operating today, had less elaborate but wholly adequate maintenance facilities and did a very good job.

Pan American's policy then as now seemed to be that any means justified the end and they were much more interested in running a dream airline with shiny airplanes and overdressed and overdecorated personnel. Their badges, buttons and fancy uniforms very soon won them the nickname "Pan American Novelty and Trinket Co.—We Also Fly." Our smaller Alaskan companies had neither the money nor the time to spend on high-priced lobbyists and lawyers in Washington so they just went ahead and took care of the flying needs of the people. . . .

As far as refueling facilities were concerned, PanAm did about the same as the rest of the operators. In Fairbanks they put in a gas pit for their own use. Others had the same arrangement, and in the other places they either shipped in barrel gas for their own use or bought it from the local stores or dealer. I have yet to see a Pan American sign on any gas truck in Alaska. Some of the smaller companies who are not so progressive have their own gas trucks.

Pan American had a first class record for holding rates up so high that until nonsked competition forced the issue, it was almost a major adventure to fly to the States. People just couldn't afford their prices and airfreight was an unheard of luxury.

As far as Northwest Airlines are concerned, we all wonder what they are doing in Alaska anyway! They were a little jerkwater outfit until World War II came along. They joined the right party and branched out as one of our largest, and largest money-losing, airlines in the business. I might add that their safety record has not been anything to brag about. We had and have local operators who were entitled to the routes awarded NWA to Alaska. Last summer two Alaskan companies were granted temporary certificates between the States and Alaska but they are not too good because NWA and PanAm are skimming off the cream. All in all I don't think either PanAm or NWA put the aviation business in Alaska on its feet.

Another statement of Mr. Creedy's that is a bit far fetched is the one about PanAm making anything available to anyone, much less without cost. When they did put out any service or anything else it was a cash-on-the-barrelhead proposition. I don't think that qualifies them as Santa Claus. I have yet to see a PanAm gas barrel used as a stove by an Eskimo, but then I haven't seen quite all of the Eskimos.

I think Mr. Creedy's statement that really takes the cake, however, . . . is the one—and I quote—"Possibly the most interesting untold story is Pan American's service to the Alaskan people on a consistently losing basis financially in the past 20 years." The Santa Claus who has kept PanAm going not only in Alaska but all over the world is and always will be good old Uncle Sam. When one is subsidized as heavily as Pan American always has been, it is impossible to lose money.

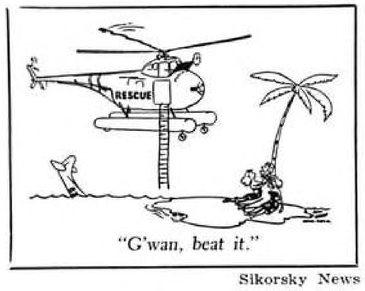
For the past five years I have been actively engaged in the nonsked business and have kept a close watch on the movement of freight and passengers between Alaska and the States.

I have many times seen freight piled up in PanAm's Seattle terminal that they couldn't or possibly wouldn't handle until it was convenient for them to do so.

As recent as last fall they were jacked up by the CAB and told to move the backlog. This applies to NWA also. They were so swamped that they wouldn't accept anything more until they were cleaned up. Yet both companies maintain that they can and do keep the cargo moving as fast as it comes in.

The cargo they do carry is hauled at such low rates that every flight is a losing one financially and they have to depend on their mail pay to cover the loss. During this winter, which has been relatively mild, PanAm left their cargo in Seattle and brought nothing but passengers and some mail many times because they didn't want to keep their planes on the ground here long enough to unload cargo.

Their excuse was that it was too cold and they would not be able to get the planes going again if they were on the ground too long. True perhaps, but it looked awfully funny that other carriers could load and unload and operate during this period.



"G'wan, beat it."

Sikorsky News

Mr. Creedy states that some liquor stores gave beer away by the case during a price war. That was true but the amount of beer given away was limited and it was distributed by the bottle, not the case. This type of merchandise comes up by surface transportation which is slow and cheaper and does not compete with air cargo.

Eskimos buy groceries like anyone else, it is true, when they have the money, but they are a notoriously poor people and they just cannot pay 60 cents a quart for milk in Fairbanks and 85 cents a quart as in Nome. It is not a matter of education or transportation, it's a matter of economics.

Bacon and whiskey come to Alaska principally by surface transportation. The Fairbanks store that had the one-cent sale did this as a sales promotion scheme and, incidentally, this store runs its own truck line from Valdez on the coast to Fairbanks in the interior. Their operation is not competitive to air transportation.

Mr. Creedy also stated that the nonskeds have never carried milk to Alaska and that during the past four years PanAm had been the only line bringing milk to Alaska. For the information of Mr. Creedy and Mr. Trippe let me set everyone right. The following listed nonscheduled carriers, including my own company, Sourdough Air Transport, have all carried large quantities of not only milk but ice cream, cottage cheese, fresh meats and fresh produce.

This is not hearsay, I have personally helped load it on a lot of the carriers' planes and have watched others being loaded.

Some of the listed carriers have gone out of business or like myself have temporarily suspended operations while waiting for the CAB to act on our various applications. Others are still operating and rendering a good and needed service to us, the residents of Alaska.

The non-scheduled companies referred to are: Air Transport Associates, Inc., Arctic Pacific, Inc., Golden North Airways, Inc., Trans Alaskan Airlines, Inc., Pierson Alaska Airways, Inc., Columbia Air Cargo, Lavery Airways, Inc., Mt. McKinley Airways, Inc., Sourdough Air Transport, Northern Airlines, Inc., Arnold Air Service, Inc., General Airways, Inc., and while they were operating on a non-scheduled basis, Alaska Airlines, Inc. All of these companies carried milk and everything else offered during the past four years and some of them are still doing it.

Pan American's disparaging reference to Amos Heacock and Air Transport Associates certainly makes one realize how small one so large can be. I would certainly appreciate your publishing this letter in one of the forthcoming issues of AVIATION WEEK. I am one of the many stanch admirers of your magazine and wish to thank you in advance for this service to the much abused nonskeds. We really aren't as bad as we are pictured by some of our competitors.

A. R. JOHANSEN
Partner and General Manager
Sourdough Air Transport
P. O. Box 1639
Fairbanks, Alaska

Brow-Wrinklers in Airworthiness Talks

PILOTS WANT:

better survival equipment
bigger navigation lights
better windshield visibility

CAB WANTS:

rearward-facing seats

INDUSTRY WANTS:

decision on cockpit standardization

CAA WANTS:

longer endurance test for engines.

Search for the Safest Plane

- **Industry-government conference explores the line between safety needs and business needs.**
- **Each group pushes its own plans and just about every shade of opinion is represented.**

By Alexander McSurely

The old shadow-line of where proper safety regulation stops and interference with business begins underscores technical talks started in Washington over proposed changes in airworthiness regulations.

This basic tug-of-war has dominated similar government industry conferences since the early thirties. And it's not expected that this two-week hassle, called by CAB, will be different.

Conferees at the third annual talks are engineers representing almost all the major aircraft and engine manufacturers and airlines, and technical staffs of the Aircraft Industries Assn., Air Transport Assn., Air Line Pilots Assn., and CAA and CAB.

► **Big Issues**—Most interesting and controversial subjects up for review:

• **Proposal to increase** the endurance test of aircraft piston engines from 150 to 200 hr. for type certification. Proposal is sponsored by CAA, but opposed by consensus of the aircraft industry's powerplant engineers. Industry contention is that mere extension of hours of testing at cruising power on the test stand are not as important as modernizing the nature of the test run, so that it will be run at varying speeds, more like military engine test requirements. Such a test at varying speeds would be more effective during the present 150 hr. duration than an extension to 200 hr. under present conditions, it's said.

• **Pilot compartment visibility.** This is sponsored primarily by Air Line Pilots Assn., which has requested establishment of definite minimum windshield visibility requirements as to sufficient area, as to elimination of distortion and fogging, and as to adequate de-icing and de-fogging provisions.

CAA Technical Development Center was expected to submit definite proposals at the review meetings, on the basis of studies it has made.

Aircraft industry spokesmen are opposing any more detailed regulations on this point than already exist. They note that several different groups currently are studying the problem of visibility (Flight Safety Foundation, military services, SAE and CAA). When better design data are available, the manufacturers will follow through with improved design features, and better visibility, they say, under less limitations than if detailed regulations are prescribed.

• **Cockpit standardization.** The aircraft industry recommends that CAB revise its regulation (Amendment 4B-2) to agree with SAE aeronautical standards on location and actuation of cockpit controls and instrument panel arrangement. SAE still is completing its instrument panel recommendation, however. It appears likely that this recommendation will be followed since no advance opposition from other conferees is evident.

• **Rearward-facing seats.** CAB has presented a strong recommendation for regulation requiring rearward-facing seats on future civil transports, on a basis of safety experience in Britain, and U.S. military transports. Manufacturing industry viewpoint is that present regulations do not prohibit use of rearward-facing seats by any aircraft operator, if he desires, and that engineering opinion on value of backward facing seats is divided.

A recent IATA engineering committee recommendation opposed the rearward facing seats as a requirement. More data on the subject should be accumulated before change in present regulations, it is contended.

• **Ditching provisions.** ALPA is taking the lead in recommendations for improved survival equipment for emergency water landings. Recommended are: Stowing life rafts in the beaver tail fairings aft of engine nacelles, thus permitting rafts to be launched from wings, or stowing rafts in compartments in fore and aft sections of fuselage, so as to be accessible from outside as well as inside the airplane.

Other recommendations are for emergency dry cell lights in planes with impact type switches, seat-type life preservers in all transport aircraft present and future and spring-loaded external stowage or rafts so they can be catapulted out and inflated, with a static line attached to the airplane. Aircraft industry spokesmen believe the objectives are sound, but expect airline operators and ALPA to initiate study on it, with manufacturers participating.

Adoption of definite regulations before such studies are completed is opposed. (It is understood that the U.S. Coast Guard, working with Pan American Airways, currently is running a test on improved survival equipment in connection with ditching.)

• **Navigation and anti-collision lights.** ALPA also is asking for larger diameter (1½ in.) navigation lights, with four times the intensity, and installation of a high-intensity red-flasher anti-collision light at the top of the vertical fin.

Other participants in the engineering review had not indicated their reaction to the lights proposal in advance of the meeting.

► **Other questions**—Some of the other technical transport questions scheduled for discussion in the session:

• Provisions for fuel-jettisoning requirements in relation to maximum takeoff and landing weights.

• Clarifying present requirements for the establishment of a demonstrated crosswind.

• Structural ground load requirements and various load factors required including forward, upward, downward and sideward factors.

• Proposal for incorporation of fire extinguishers in nacelle zone one of airplanes manufactured after Jan. 1, 1953; whether it should be made retroactive; incorporation of fireproof nacelle skin aft of accessory section; new type smoke detectors, means of de-energizing electrical circuits in fire zones;

• Proposal to establish a separate category for transport-type helicopters is not endorsed by industry spokesmen who contend that categories should be defined by operation limitations, rather than by airworthiness standards, and that fixing of design parameters at this stage in helicopter development will have the effect of stifling further development progress.

• Similarly, industry opposes a proposal to regulate quality control by the manufacturers, under a revision of the CAA inspection system. Industry analysts view this as an attempt by CAA to force manufacturers to attain production certificates, because CAA is not adequately staffed to conduct conformity-type inspections in the plants at the present time.

Long on Plans, Short on Funds

(*McGraw-Hill World News*)

Melbourne—Australia has big plans to expand its airports to meet the surging upcurve of traffic, but getting the estimated $35 million in funds to carry its ideas through is another story not quite so optimistic.

First stage of development of Mascot Airport (Sydney) alone will cost $20 million and cost of building up Essendon Airport (Melbourne) has not yet been calculated. Then there is a minimum outlay of $1.25 million seen for development of Bankstown Airport near Sydney.

South Australia is asking approximately $5 million to improve Adelaide Airport and Brisbane's Eagle Farm field is said to need extensions which would run $2 million. First stages of construction of a new terminal at Lanherne in Tasmania will cost $2.3 million.

USAF Interested

(*McGraw-Hill World News*)

Rome—The pneumatic, endless belt landing gear designed and built by Count Bonmartini and demonstrated by him throughout Europe, has attracted attention of USAF. The Italian designer has been invited by Air Force officials to demonstrate the landing gear at Wright-Patterson AFB, Dayton, Ohio.

Japanese Progress On Airline Plans

Japanese interest in setting up an international airline network is making progress.

Last month a three-man mission, representing Japan Air Lines, arrived in the U. S., reportedly armed with a $1.8-million credit from the Japanese government to aid them in buying airline equipment, including planes. The carrier already has crews training at CAA headquarters in Oklahoma City.

Japan Air Lines and its rival, Japan International World Airways, which recently signed a ten-year assistance contract with California Eastern Airways (AVIATION WEEK July 21, p. 85) are backed by leading prewar Japanese shipping interests. Both carriers expect to begin operations using DC-4s, hope to get more luxurious types later. They plan to fly through Hawaii to San Francisco and to Sao Paulo, Brazil. Japan Air Lines also would like to serve London.

A draft of a Japanese-U. S. air agreement, paving the way for these routes, was concluded in Tokyo only recently, will be submitted for ratification to the Japanese and U. S. governments. In return for privileges granted Japanese carriers, U. S. airlines will get reciprocal rights.

PanAm Asks Bids On Big Hangar

Pan American World Airways is taking bids until Aug. 12 for construction of a $600,000 administration, maintenance and service building at Tacoma-Seattle International Airport, near Seattle, Wash. The hangar will be capable of housing two DC-4s or DC-6s or one Stratocruiser.

PanAm presently uses Boeing Field for its Seattle operations, but is following United, Northwest and Western to Seattle-Tacoma. Boeing Field then will be left principally to the nonskeds and feeder lines.

ALLISON TURBOLINER that accidentally decoupled prop-engines last month, taxis in . . .

AND DRAWS A CROWD. Trouble is fixed and plane will take routine test flights.

Turboliner Nears Service Tests

The first U. S. turboprop-powered transport, the Allison Turboliner, is now reliable enough for routine transport service-test flights, say Allison and Aeroproducts divisions of General Motors.

However, an incident that occurred last month on its maiden "routine" cross-country flight from California to Indianapolis illustrates problems.

Its new-developed prop-engine decouplers decoupled simultaneously when a gust struck the idling props during landing approach at El Paso. But test pilot Verne Ford set the powerless, flapless plane down on the airport, cross-wind, with no more damage than burnt-out brakes and tires. (Flaps were inoperative because of power failure.)

Cause of the trouble: The decouplers, set to disengage the turbines from the props in case of power failure, were adjusted too fine.

Solution: increase in the spring tension so no gust can trigger the decoupling; but the more severe negative force of a power failure will.

The Allison Turboliner prototype does not have a device installed to recouple engine and prop once they decouple, but future installations will incorporate such a device, Allison indicates. Automatic decoupling is necessary because in case of power failure a windmilling turbine-prop combination works like reverse thrust, could be fatal on takeoff.

Except for the decoupling incident, the three-stage flight from California to Indianapolis was "completely uneventful," Allison says.

Now the Turboliner is at Weir Cook Airport, Indianapolis. This makes it available for more efficient advance development because the Allison plant is at nearby Dayton, Ohio.

Aer Lingus' Profit Climbs Sharply

The Irish air carrier, Aer Lingus, rang up impressive financial gains for its fiscal year ended Mar. 31. Profit for the period was $258,104 against $41,008 for the previous year. Gross revenue for the current fiscal year was $4,535,077.

Aer Lingus flew 3,474,178 mi., an increase of nearly a half-million miles more than the year before and maintained a seat load factor of 74%. The carrier's off-peak night services continued to show gains, up some 4,800 passengers to a total of 13,295. Aer Lingus' overall total for the fiscal year was more than 269,000 passengers.

Cargo traffic increased considerably—33% more than the previous year to a total of 4,000 tons of all types of freight. In addition, Aer Lingus carried 1,410 tons of mail, six times the previous year's total.

In view of the expected continued traffic gains, the carrier has placed orders for four Vickers Viscount turboprop transports and four Bristol Wayfarers in order to bolster its present equipment.

BOAC Piles Up Hours on Comets

(*McGraw-Hill World News*)

London—British Overseas Airways Corp.'s six de Havilland Comet jet airliners had flown more than 1,300,000 mi. and 2,865 hr. to July 10. The Comets flew 815 hr. on BOAC's London-Johannesburg run, remainder on training, development and providing.

Delivery of a seventh Comet is expected shortly. BOAC has on order nine Ghost-powered Series I and 11 later Avon-powered Series II Comets.

Airport Aid For Fiscal 1953

A total of 168 airport construction or development projects involving expenditures of $19,055,855 is programmed by Civil Aeronautics Administration during fiscal 1953. Local and state project sponsors are to assume $9,078,605 of the cost of the projects, none of which concerns new airport construction, only improvement of existing facilities. Remainder of the funds will be contributed by the federal government.

On June 30, 1952, the end of the sixth year of the Federal Aid Airport Program, a total of $183,145,451 in federal funds had been programmed.

The projects include 20 intercontinental airports; 15 continental; 24 express airports; 53 trunk; 43 feeder, and 14 secondary airports.

Intercontinental projects:

Oakland, Calif., Municipal Airport, $166,144; San Francisco, $540,585; Denver, $89,561; Miami International, $150,944; Atlanta Municipal, $330,910; Chicago O'Hare Airport, $620,000; New Orleans Moisant Airport, $90,788; Baltimore Friendship International, $132,000; Boston, $500,000; Detroit, $340,000; Minneapolis-St. Paul, $415,000; St. Louis Lambert Airport, $562,312; New York International, $400,000; Portland, Ore., International, $292,733; Philadelphia International, $400,000; Ft. Worth International, $93,320; Houston Municipal, $200,000; Seattle Boeing, $280,000; Seattle-Tacoma International, $104,000; San Juan, Puerto Rico, International, $640,000.

Seek Pay Raises

(*McGraw-Hill World News*)

Melbourne—Australian airline pilots are shaping their strategy to get higher pay. For the first time, the pilots intend to bypass direct negotiations with the airlines and instead will utilize official government court conciliation machinery. Present annual salaries range from $4,400 for a Grade 1 captain down to $1,700 for a probationary first officer.

United Sells Lamsa To Mexican Firm

(*McGraw-Hill World News*)

Mexico City—United Air Lines has sold its Mexican subsidiary, Lineas Aereas Mexicanas S.A. (Lamsa) after 18 years of operation. The line was purchased at an undisclosed price by Aeronaves De Mexico, S.A., which will combine its lucrative Mexico City-Acapulco route with Lamsa's services to central northwest Mexico.

Lamsa reportedly was near break-even

on its operations during the last year or so, but since it went only to El Paso, Tex., there was little chance United could make it a logical extension of its U. S. service. The Mexican subsidiary does not serve any especially large population centers, so there was little potential available to permit an expansion by United.

Aeronaves is changing its new affiliates's name to Lineas Asociadas Mexicanas S.A., retaining the initials, Lamsa, which have been associated with the carrier's good safety and operations records.

SHORTLINES

► **Air France** reports net earnings of $148,723 from a gross of $91.5 million in 1951, or five times the 1950 profit. Annual report shows airline has placed orders for 12 Breguet 763 four-engine transports, ten Super Constellations, 12 Vickers Viscounts and three Comets.

► **Air Transport Assn.** reports the scheduled domestic airline fatality rate for the 12 months ended last month is one of the lowest on record, with a rate of .79 (less than one) passenger death per 100 million passenger miles.

► **Bonanza Airlines, Inc.** has started service Los Angeles-Phoenix, Ariz., flying two roundtrips daily. Bonanza is ninth airline to serve Los Angeles.

► **British European Airways** passenger traffic was up 20,000 to 142,500 for June compared to the same month a year ago; 5,500 were Americans. Domestic traffic totaled 71,400 passengers, up 26% over a year ago, and international 71,100, up 7%.

► **British Overseas Airways Corp.** last month had completed 3,120 North Atlantic crossings with its ten Stratocruisers since they went into service in December, 1949. Average flying time for the crossings last year was 7 hr., 32 min.

► **Central Airlines** asks CAB for $247,125 more mail pay from September, 1949, through April, this year, because of its claimed shortage of working capital.

► **Flying Tiger Line** has asked RFC for a $7-million loan to buy seven Douglas DC-6As for delivery in 1953.

► **Hawaiian Airlines Ltd.** hired 28 mainland pilots to meet this summer's heavy traffic and to free regular pilots to fly the Convairs which will replace HAL's DC-3s later this year.

► **KLM Royal Dutch Airlines'** main base at Schiphol Airport now has a fuel storage capacity of 330,000 gal., following completion of two new sections totaling 200,000 gal. Average daily aviation fuel turnover at the field is 37,400 gal.

► **Northwest Airlines** load factor the first nine days July was 67%, compared with 77% for all July a year ago and 77% for last month . . . NWA has set Stratocruiser a trans-Pacific airline record of 18 hr., 11 min. Tokyo-Seattle carrying 43 passengers and ten crew, with one stop at Shemya.

► **Pan American World Airways** carried 400 passengers from New York to the Olympics in Helsinki in one day last month in five DC-6B Clippers, flew a total of more than 1,000 passengers to the Finnish capital during the week ended July 19. . . . Reports 28,757 passengers carried through Miami during June, an increase of 18% over June, 1951.

► **Philippine Air Lines** carried 20% more passengers the first six months of 1952 than a year ago.

► **Sabena Belgian Air Line** reports it carried more than a quarter million passengers last year for the first time. Total was 260,674, up 33% over 1950's 195,466. Airline flew 19 million kilometers, up 18.1% over the total for 1950.

► **Transocean Air Lines** has sold five DC-4s to Saudi Arabian Airlines for use in the Middle East. . . . Has inaugurated irregular DC-6B service California-Hawaii.

► **TPA Aloha Airlines** averaged more than 800 passengers daily in July and this month increased number of daily inter-island flight schedules from 38 to 44.

► **United Air Lines** June revenue passenger miles were 240,590,000, 20% over the previous all-time high set August a year ago and 20% over last month. United pilots were on strike during June a year ago, so no valid comparison can be made with the negligible traffic of that month.

► **Western Air Lines** has added four daily shuttle flights Los Angeles-Las Vegas to bring total on route to 14.

► **Three airlines,** Flying Tigers, California Eastern and Transocean are engaged in mass movement of some 1,100 dependents to Army personnel stationed in Japan. Return trips will carry servicemen coming home on rotation. Flights originate at Oakland Airport.

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75	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84289	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
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550	TFD 8600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H260-K & KA	Pesco	Hydraulic Pump
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
44	5BA25DJ4B	G. E.	DC Motor (½ HP)
50	RDB2220	Holtzer Cabot	DC Motor
115	P4CA2A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32226)	Nasco	Ignition Switch
687	RS-2	Mallory	Selector Box
90	JH950-R	Jack & Heinz	Starter Motor
492	S-841 (94-32253)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Separator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117-47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart-Warner	Heater
230	921-B	Stewart-Warner	Heater (200000 BTU)
85	12924-2	Adel	Lock Valve
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97	6041H-146A	Cutler Hammer	Relay (B-12)
22	0655-D	Aro	Oxygen Regulator
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SO THEY TELL US

Industry

Grumman's F9F-6 (Cougar) is slated to begin its carrier acceptance tests this month on the carrier Midway.

J. Earl Schaefer, vice president and manager of Boeing Wichita, is an old friend of Gen. Eisenhower.

Other West Coast aircraft executives are watching the North American arbitration panel with apprehension. Is it an opening wedge for similar union drives against other companies?

Industry and Navy Aviation people everywhere are puzzled as to why Westinghouse's top management—considering the company's excellent reputation in so many other lines—does not seem to be giving its aircraft gas turbine people full support necessary to tackle production and other problems. Just how boldly Westinghouse is committed to trying to remain in the forefront of American jet engine progress is being discussed widely in aviation circles.

Last summer the Navy was saying the Skyrocket had reached its speed limit, but now one authority says the ship has been modified so it will fly higher and faster.

On a recent mid-July day 80 F-86s were lined up at North American awaiting engines. At one time the number was 150. General Electric explains that strikes among subcontractors, and the recent GE strike, are responsible.

Seattle citizens don't even look up much any more when Boeing's gas turbine-powered truck goes by, although the twin exhausts of the turbine whistle like a junior-size Banshee taxiing, says one AVIATION WEEK staff member who had a ride in the vehicle. At that, the noise isn't much worse than exhaust of the big diesel truck trailers which roar over the western highways.

Northrop's acquisition of Radioplane, drone target plane firm, fits into Northrop's guided missile program. Firm has plans for eventual production of a short-range missile to supplement its long-range Snark program. Incidentally, production of F-89Cs is being retarded by engine shortage.

Convair officials will tell you they believe they're over the hump in selling the idea of water-based fighters to Navy and Air Force. 'Tis claimed the hassle in Europe over NATO fighter bases is influencing Defense Dept. thinking on the subject. Even when there is enough money, NATO people are bucking strenuous objections from local farmers to the use of much-needed farmland for fighter strips. Convair people claim water-based fighters will change air warfare radically.

The big publicity splash Lockheed got on its F-94C nettled some other aircraft companies, which complain among other things that the F-86D and not the F-94C was the first all-rocket interceptor, as claimed, and that the Starfire is nowhere near as automatic as reported. This view was given credence by Lockheed Chief Engineer Hall Hibbard, who admits the company publicity men got carried away on the automatic angle. These claims bother the beaming publicists not a bit. They note, "If the others had it first, why didn't they announce it?" One answer heard was that the Air Force sometimes plays favorites in clearing publicity releases.

Navy

High Navy officials are admitting frankly that they desperately need a high-performance, high-speed jet for carriers.

Airlines

A few airline pilots are giving study to possibility of anoxia hazards in cockpits of high-density versions of transports like the Constellation and DC-6, where passenger load has been upped beyond original ventilation demands. A pilot union official cited some cases of pilots operating at lower than scheduled altitudes because of this problem.

American Airlines isn't mentioning it above a whisper, but it is now carrying more coast-to-coast passengers on its coaches than on its first class services.

United Air Lines' President Patterson recently donated $15,000 to the Flight Safety Foundation, and industry circles say American, TWA and Eastern will follow suit. The number of industrial financial supporters of the foundation is still suprisingly small, however.

STRICTLY PERSONAL

If That Wire Fence Had Been Higher . . .

President Truman's reminiscences of his first flights were recounted recently at the Civil Air Patrol's annual Congressional dinner. **Hank Lefer** of our news desk ran across the text of these remarks, and since they didn't get much publicity, we're running some of them. It's Harry speaking:

"I am very much interested in the work the Civil Air Patrol is doing to interest young people in aviation. If we are going to keep up with our responsibilities in the world, we must have a country that is air-minded. We must have more and more young people all the time who go into the business of flying. Consequently, I have been disturbed at the fact that there seems to be less interest in learning to fly during the last few years. . . .

"I think one of the difficulties may be that a lot of the glamor has gone from flying. The kids that are growing up today have airplanes all around them, and they take them as a matter of course. They think it's just as natural for man to fly as it is for birds to fly. . . . They never will be able to appreciate the excitement and the wonder that an airplane creates in those of us who grew up when there was no such thing.

"All we heard about when I was a boy was that Greek mythology story about the fellow who made himself some wings out of eagle's feathers and flew close to the sun and the wax melted his wings and he killed himself. And we had heard about the flying machine, but they didn't believe that there would ever be a flying machine.

"Now I have flown thousands of miles and I still don't believe it can be done. . . .

"My first flight is something I will never forget. . . . After the First World War was over, I was a field artillery officer, and some smart person up at the top issued an order that field artillery officers, captains and lieutenants—and I was a captain in command of a battery—would go up with the pilot and learn how to observe.

"Well, I went back as ordered, and got in the plane with one of those pilots. He didn't want to take me up any worse than I wanted to go up. It was in one of the old Jennies, and he made it do barrel rolls and Immelmann turns and loop-the-loops and everything else. And I want to say to you that I left the last three meals all over France. It was a long, long time before I got over that experience. . . .

"When I got back home, I got into politics. . . . This was the first time I ever ran for elective office, and I went out to a little airfield that had a couple of runways about a hundred feet long, and got a fellow who had a two-seater, single-wing plane, and he put me in the front seat, and I took a double armload of handbills and flew all over the county and the towns in the county and dropped those handbills, on one side of the plane and on the other side. And when that fellow went to land he had to land in a pasture in a little town called Oak Grove, where I was going to make a speech. He just missed a barbed wire fence by that much. If that had happened, I wouldn't be in politics today. . . . RHW

ADVERTISERS INDEX

AVIATION WEEK

AUG. 11, 1952

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilty, Mgr.

EDITORIAL

Complexity, the Frankenstein

Are airplanes too complex?

Must the onward march toward ever more complexity (and cost) be stopped in its tracks?

Latest reports to AVIATION WEEK reveal that more and more influential aviation people are beginning to say yes.

The general subject of complexity is slowly rising to the top among urgent priority topics for discussions. The implications of continuing toward greater complexity at the furious pace of the past ten years are slowly dawning on more of the best thinkers.

Some reports we receive cannot be publicized at the present stage. However, AVIATION WEEK's West Coast editor, after canvassing several individuals concerning the confidential design meetings recently held by the Institute of the Aeronautical Sciences, says:

"Our aircraft designers definitely are thinking in terms of lighter, more simplified planes for the future. They are worried about the trend toward heavier and complicated aircraft. Future designs call for lighter bombers, as well as fighters."

This subject was competently publicized recently by E. H. Heinemann, chief engineer of the El Segundo division of Douglas Aircraft Co. His address was quoted on this page June 30.

Queried further by AVIATION WEEK, Mr. Heinemann reveals that he is no pessimist on the possibilities of slowing the onrushing flood of complexity. He writes further:

"With respect to what can be done to attack the problem of complexity, it is my personal opinion that the best progress can be made with an educational campaign.

"Toward this end we have been giving numerous presentations to operational, procurement, and engineering personnel of the services, and find they are all generally in agreement.

"Our strongest recommendation to the services is that every requirement be analyzed especially for the airplane involved, and that each requirement be made to stand upon its own feet whether or not there is a military requirement, general directive, or specification."

We asked Mr. Heinemann: "To your knowledge, is any intensive effort by anyone in top echelon industry or government circles being expended on this subject of aircraft complexity?"

Mr. Heinemann says:

"There is a great deal of concern in top echelon industry and government circles about this problem, but most top level personnel are not sufficiently acquainted with detail design problems to know how to integrate the many complicating requirements and to take corrective action. This again is where education, originating from the experienced engineers, is essential. The Aircraft Industries Assn. is also taking interest.

"I believe that most top industry and military officials feel the way I do, especially the older and more experienced ones; perhaps, however, not so strongly. In most cases, top management is so deeply involved in management problems that they have little time to devote to this subject."

Mr. Heinemann, at our invitation, told how he believes AVIATION WEEK (and the business press generally) can be of aid in promoting greater interest in the subject of complexity.

"I am sure you can be of great assistance, especially along the lines of educating all concerned with procurement. In this connection, while rather idealistic, perhaps one of the best ways would be to give praise for simplified efficient designs rather than being too critical of the less successful designs."

It is also Mr. Heinemann's belief that if the individuals concerned could be persuaded to think in terms of long-range planning, and obtaining an end result rather than permitting each activity to battle for its individual requirements, the situation could be improved.

"After all," he says, "an airplane is the most highly compromised mechanism most of us know about, and its success can only be measured in the end result."

The obstacles to any simplicity may seem insurmountable, and the reasons for more complexity are many and powerful. But if we permit this Frankenstein of complexity to continue work at its current plodding, insidious rate, it will slowly overwhelm us to impotency.

Spots Before Our Eyes

We don't know what "flying saucers" are.

For two years everyone on our staff has followed instructions to ask penetrating questions of the highest aviation officials in government and industry. We have failed to find a hint that any of them knew any more than we did.

We do believe President Truman and several defense officials were being truthful when they said these floating objects were no product of our defense industry.

It is the most baffling news story we have ever tried to nail down. And no theory we have read satisfies us.

The Air Force finally got around to having a full-dress press conference, dignifying the subject. That was a long step from its earlier attitude that people who asked about these silly things were not completely equipped in the belfry.

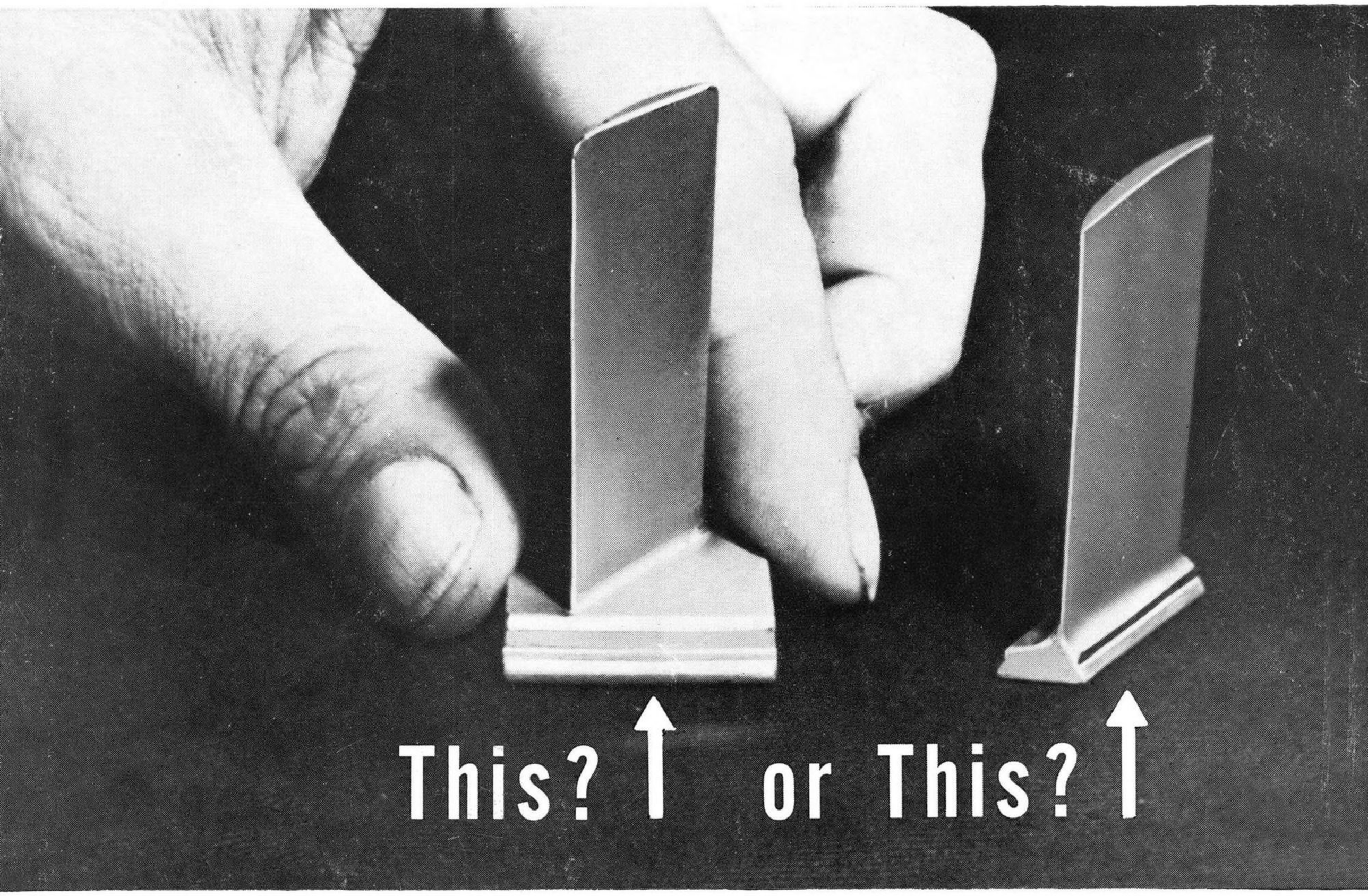
Despite all of the learned comments that were dispensed at the official press conference, it seems significant that these military intelligence experts and scientists broke down and admitted that all of their findings and research still leave 20% of the sightings unexplained.

So as far as solving the mystery, we are about where we were before the press was called in. The only progress that appears to be evident is that more people, and important people, are acting as though such things might exist after all.

This is all to the good. No one is curious about the sightings that can be explained. Let's discard these and get down to business on the elusive 20%.

—Robert H. Wood

Which One Will Save a Million Dollars?



Three years in the making, the fabricated jet engine compressor stator blade (left) promises to save the armed forces not just one million, but millions of dollars annually in jet engine costs, compared with the forged blade (right). This new G-E development will cut manufacturing cost in half and save over a third in critical materials. Military approval has been received for the use of fabricated blades in the General Electric J47-GE-23 which powers the Boeing B-47 Stratojet bomber. And G.E., through the United States Air Force, is sharing the process with other turbojet manufacturers.

The blades are rolled in long strips, contoured to the proper air foil, and cut to desired length. Each blade is then welded into a separate base which fills the same area as the "blade ring" used with forged blades. Thus the ring and an expensive manufacturing and assembly process have been eliminated.

Endurance tests on two engines equipped with the fabricated blades proved them just as efficient as forged blades. The base provides greater resistance to vibration due to uneven airflow through the compressor. Damage caused by foreign objects entering the compressor is minimized because the new blade is fastened much more strongly to the casing.

A product of G-E research at the Thomson Laboratory in Lynn, Mass., this new method of manufacturing stator blades is another of the many ways in which G.E.'s constant pioneering contributes to the advancement of aviation. General Electric, Schenectady 5, N.Y.

210-29

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