AVIATION WEEK

A McGRAW-HILL PUBLICATION

FEB. 8, 1954

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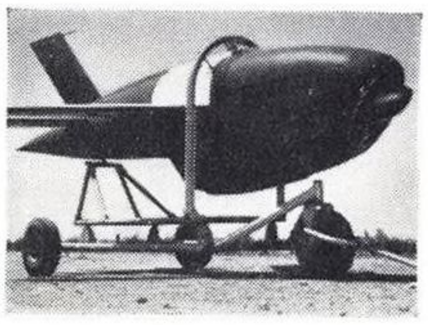
TARGET FOR THE JET AGE



The jet-powered target you see here is the Ryan Firebee.

It's half the size of a jet fighter, and is used to simulate jet plane maneuvers in training anti-aircraft gunners and interceptor pilots.

After a run the pilotless drone is lowered by parachute—to be in condition to fly another day. The Firebee is a joint development of the Air Force, Army and Navy.

An important reason behind the drone's success is her autopilot. Made up of components of the famous Honeywell E-6, the Firebee's special autopilot flies her at the command of a radio operator who's often far out of sight on the ground.

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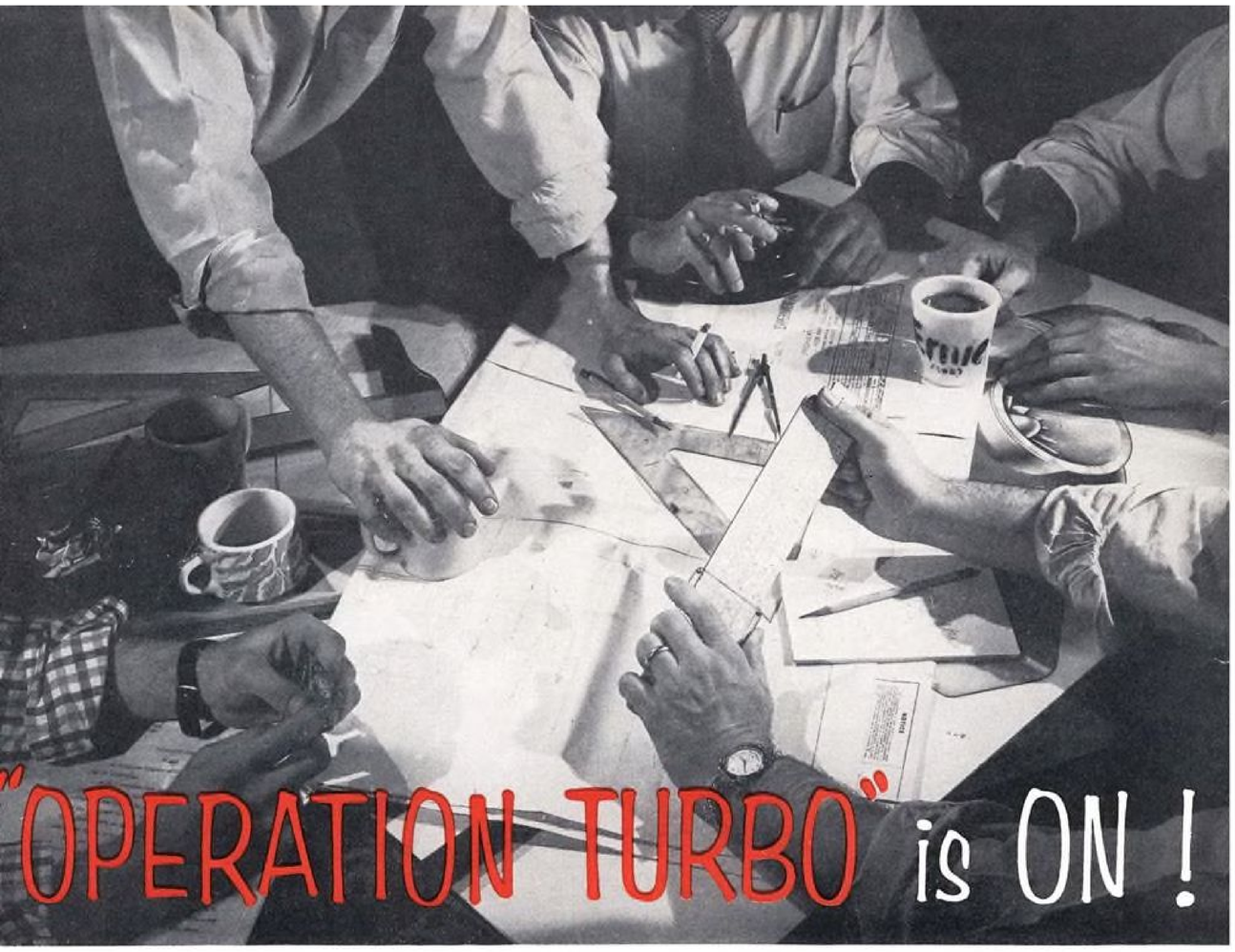

An intensive program of Turbo-Machinery development is under way at Hydro-Aire.

As in a war-time Task Force, the organization has been planned, personnel selected, equipment procured on the basis of maximum efficiency for the job to be done. The organization is new, the equipment the very latest that can be obtained. In contrast, the men themselves provide an accumulation of experience that goes back many years before Hydro-Aire came into being.

These men represent decades of research, development and practical operation in the field. One or another has held a key position with every leading turbine manufacturer in the country. Among the things that have attracted them to Hydro-Aire is the scope offered by this young, dynamic company. Perhaps for the first time in their careers they are free to give their abilities full rein . . . to realize their full potential.

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Aviation Week

February 8, 1954 Vol. 60, No. 6

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NEWS DIGEST

Domestic

First C-124B, turboprop version of the Douglas Globemaster, completed its initial flight last week, taking off from Long Beach, Calif., and landing at Edwards AFB for start of test programs. The C-124B is powered by four Pratt & Whitney Aircraft YT34-P-1s, capable of developing equivalent of 5,500 hp. each on takeoff and giving the transport 60% more power than the conventional Globemaster.

Third super aircraft carrier will be built for Navy by Newport News Shipbuilding & Dry Dock Co. of Virginia, awarded the contract last week on a fixed-price bid of $117,750,000. Estimated total cost of the 60,000-ton ship: $182 million. This compares with $218 million for the Forrestal and $212.5 million for the Saratoga.

Flying Tiger Line pilots, represented by ALPA, and Slick Airways Pilots Assn. have signed an agreement for integration of their seniority lists, clearing the way for CAB-approved merger of FTL and Slick and ending a four-week dispute between the two unions (Aviation Week Feb. 1, p. 73).

Jet-powered P2V-7 is in full production at Lockheed Aircraft Corp.'s Burbank (Calif.) plant under a new Navy contract. Prototype submarine killer has two Westinghouse J34s mounted in wing pods (see p. 9), supplementing two Wright Turbo Compound powerplants.

Pan American World Airways has become the first airline to put Selcal (selective radio calling system) into operational use. The new system—developed by Motorola and tested by PAA for 21 months—enables ground station to flash a light in individual aircraft cockpits to contact transports, freeing plane crews from continuous radio monitoring.

Robert L. Henry, former chief of National Bureau of Standards' Project Tinkertoy (automatic factory), shortly will join American Car & Foundry's new Electronics Division. The appointment is further evidence of ACF's interest in setting up a Tinkertoy-type plant (Aviation Week Feb. 1, p. 11).

Lt. Cmdr. George W. Fey is new technical information officer for Navy's Bureau of Aeronautics, replacing Lt. Cmdr. Frederic M. Lloyd, who is leaving after two and a half years in the post to attend the Armed Forces Staff College at Norfolk, Va.

Latest Portrait of U.S. Research Family

Seven Air Force, Navy and NACA research planes present a variety of configurations in this group picture taken at the USAF Flight Test Center, Edwards AFB, Calif., where the craft are being flown to gather data for future designs. In center is needle-nosed, jet-powered Douglas X-3, designed for sustained flight at high speeds. Beginning at the left, clockwise: Bell X-1A rocket plane, which has flown more than 1,600 mph.; jet-powered Douglas D-558-I Skystreak transonic researcher; jet Convair XF-92A for delta-wing experiments; jet Bell X-5 with variable-sweep wings; rocket-powered Douglas D-558-II Skyrocket (which has climbed to more than 80,000 ft., and the little twin-jet Northrop X-4, which explores stability and flight characteristics of sweptwing configuration at transonic speeds.

Crash hearings will be held by CAB at Shreveport, La., Feb. 10 in an effort to determine why a Grumman Mallard plunged into a lake shore near that town Jan. 10, killing Braniff Airways president Thomas E. Braniff and 11 other persons (Aviation Week Jan. 18, p. 20).

Forty-five Boeing B-47s of Strategic Air Command's 301st Medium Bombardment Wing will fly nonstop this month from Barksdale AFB, La., to a forward Fifth Air Division base in French Morocco for 60 days of operations training. The Stratojets will refuel in flight from Boeing KC-97 tankers.

Charles C. Hubbard, Jr., 43, vice president-traffic of Air Transport Assn., died last week at Bethesda, Md.
stop 11.6

Financial

Grumman Aircraft Engineering Corp., Bethpage, N. Y., reports record postwar net earnings of $7,129,341, compared with $5,348,341 in 1952 and the wartime peak of $9,550,000 in 1944. Sales and other income totaled $241,034,150, an increase of $20,364,479 over last year.

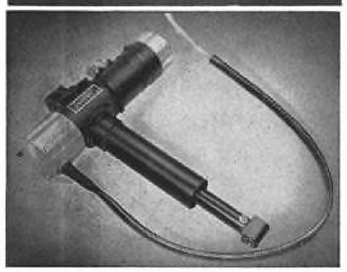
International

De Havilland Comet 2 has flown from Khartoum, Sudan, to Johannesburg, South Africa, in 6 hr. 17 min., averaging 460 mph. on the 2,913-mi. route. Company officials say assessment of the jet transport's last tropical test and the London-Khartoum flight last month (Aviation Week Feb. 1, p. 16) "verifies our appraisal of 2,200 mi. as the typical stage length with a capacity payload of 13,500 lb., with usual allowance for headwinds." The Series 2 completed the London-Khartoum flight with sufficient fuel in its tanks for a 400-mi. diversion and a 30-min. holding at an alternate stop.

Japan Air Lines has inaugurated twice-weekly, 29-hr. scheduled DC-6B passenger service Tokyo-San Francisco, hopes to start Comet 2 flights simultaneously Tokyo-London and Tokyo-San Francisco early next summer.

ELEVATOR FEEL TRIM

Airborne Actuated on Navy's F2H-3



The elevator feel trim system in this McDonnell jet is actuated by Airborne's Model R-144M12-1 LINEATOR®. A ball bearing jackscrew enables this actuator to operate at 11 inches per minute with an 800 lb. load in either tension or compression.

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The Aviation Week

February 8, 1954

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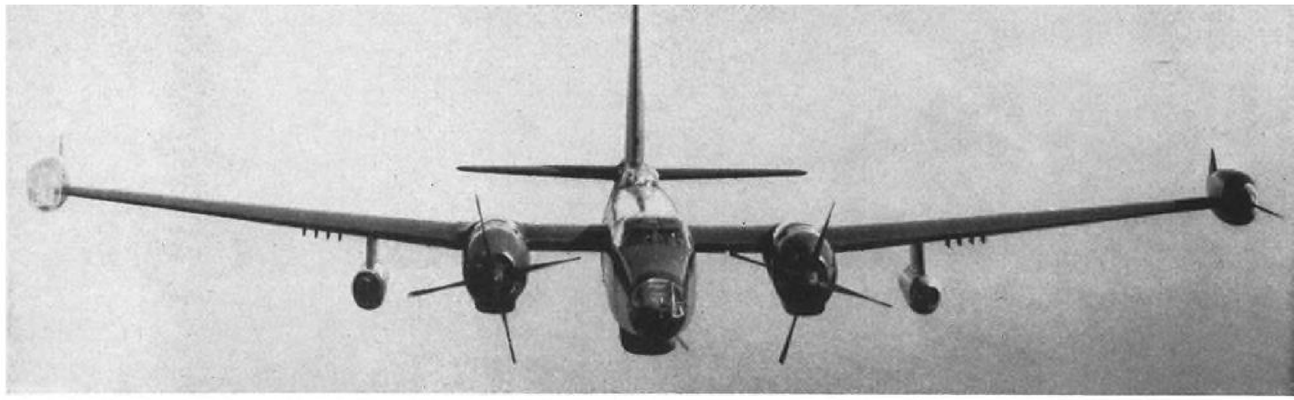
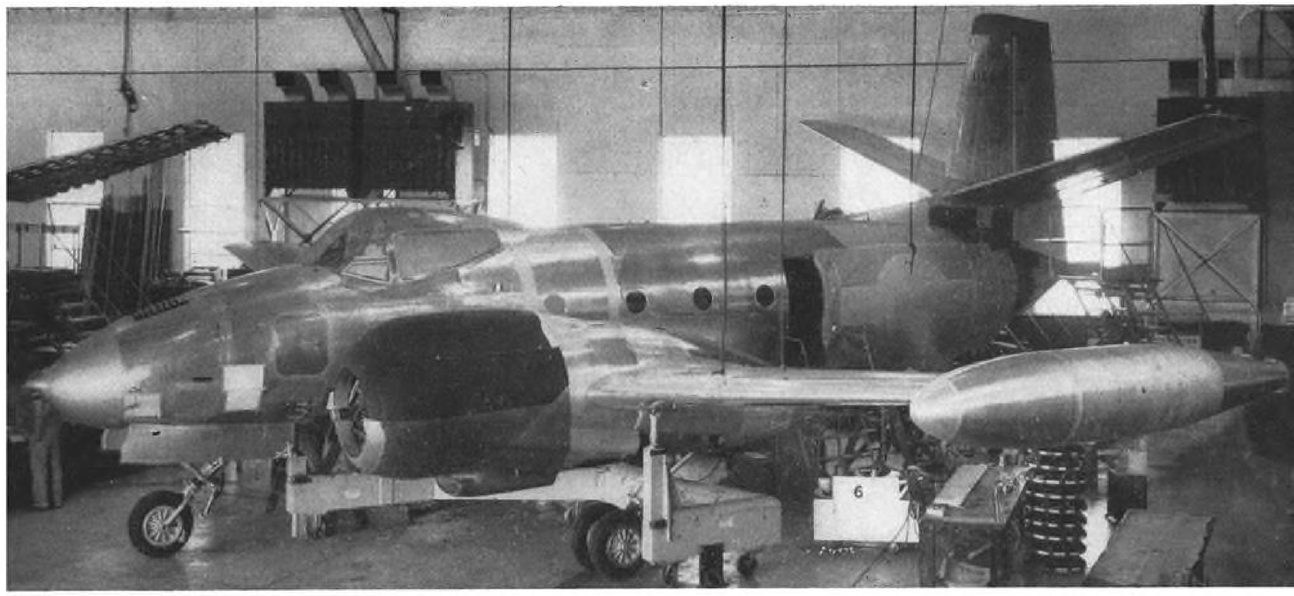


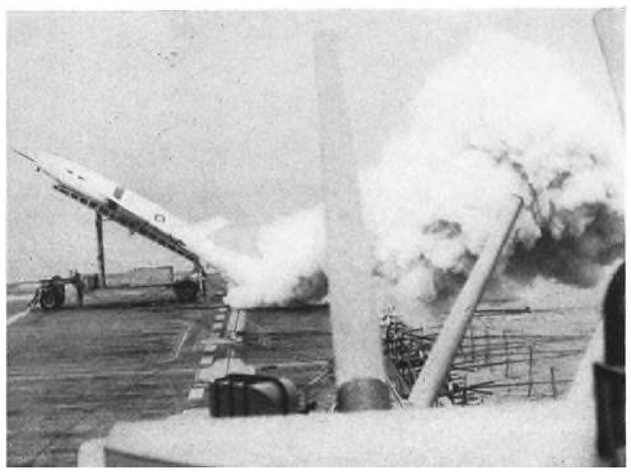
NEPTUNE DOES 200 MPH. WITH PROPS FEATHERED—Striking view of Lockheed P2V-5, with an auxiliary 3,400-lb.-thrust Westinghouse J34 under each wing, flying at 200-mph. indicated airspeed on jets with props of Wright Turbo Compounds feathered.

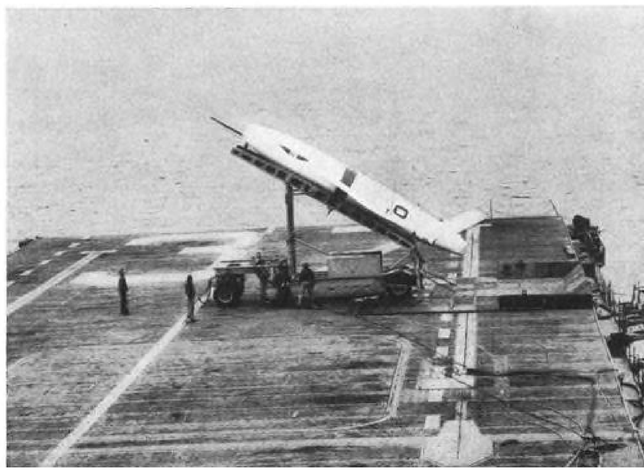
New U.S. Aircraft and Missile Developments



NO FUTURE FOR T-36—Despite reports that Canadair is studying the market for a commercial version of the Beech T-36A, shown in exclusive first photo at Wichita, industry observers say the plane never will be produced. Picture shows first T-36A immediately after USAF last year canceled Beech and Canadair contracts for a large number of the planes.

CARRIER LAUNCHES REGULUS MISSILE—Chance Vought Regulus surface-to-surface missile takes off from the deck of USS Princeton (below left) with aid of rocket boosters. Launching setup for missile is detailed (below right) prior to firing.





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WHO'S WHERE

In the Front Office

Harry A. Bruno has been elected president of H. A. Bruno & Associates, newly incorporated public relations firm in New York. **Russell D. Gudgeon** is executive vice president and **Hudson Phillips** and **Theon Wright** are vice presidents.

Walter Balderston and **Hanson Grubb**, founders of Pacific Scientific Co., have retired from active duties with the Los Angeles organization. Other changes: **Howard O. Rose**, treasurer; **Edgar E. Clark**, secretary.

Curt W. Bohman and **Joseph J. Musil** have established Tech-Pacific Corp. at Newport Beach, Calif., as distributor of U. S. and Swedish precision machine tools in 11 western states.

Raul H. Frye has been appointed vice president-engineering of National Co., Malden, Mass.

Edward J. Pratt has been elected first vice president and **John S. Gorski** is new second vice president of Amco Gage Co., Detroit.

Robert W. Prescott, president of Flying Tiger Line, has been elected a director of Southwest Bank of Inglewood, Calif.

Changes

Dr. G. B. Schubauer, former chief of the aerodynamics section of National Bureau of Standards, has been named chief of the new fluid mechanics section.

Brig. Gen. Frederic B. Butler (USA Ret.) has been appointed manager of San Francisco Airport, succeeding **George M. Dixon**, who resigned to enter private industry.

Allan Chilton is new chief engineer for Westinghouse Electric Corp.'s Aviation Gas Turbine Division, Philadelphia.

Martin V. Kiebert, Jr., onetime chief of Navy Bureau of Aeronautics guided missile branch, is new chief engineer of the Tuner Division of P. R. Mallory & Co., Indianapolis.

Vincent J. Cushing has been promoted to assistant manager of the propulsion and structural research department at Armour Research Foundation of Illinois Institute of Technology, Chicago. **Francis B. Porzel** has been appointed senior research engineer.

Col. Paul H. Kemmer (USAF Ret.) has become chief designer in Ryan Aeronautical Co.'s Engineer Division at San Diego.

Honors and Elections

James H. Kindelberger, board chairman of North American Aviation, has received Italy's highest civilian award, the Order of Al Merito della Repubblica Italiana, for "his outstanding achievements in the aeronautical field."

Arthur F. Merewether, meteorology supervisor for American Airlines, is new president of the American Meteorological Society.

G. D. Bradley, personnel manager at AiResearch Manufacturing Co., has been installed as president of the Personnel and Industrial Relations Assn. of Los Angeles.

INDUSTRY OBSERVER

► While other airlines have been expressing interest in buying 35-passenger Sikorsky S-56 twin-engine helicopters, National Airlines has slipped in with an option for the first commercial delivery. Los Angeles Airways and Sabena Belgian National Airlines also are negotiating for the S-56.

► **Trans-Caribbean Airlines is interested in buying three Vickers Viscount turboprops, says president O. Roy Chalk, who visited Britain recently.**

► Professor Ernst Heinkel's first postwar aircraft, a trainer, is ready to be built as soon as the law permits. Heinkel also is preparing to do work on supplying aircraft parts for USAF planes operating from Germany.

► **Vickers has come up with a new advanced version of the Viscount that will supersede its earlier plans for the Model 800. The new Model 802 will have a 65,000-lb. gross, 66-to 82-passenger capacity and a range up to 900 mi. Rolls-Royce Dart turboprops for the 802 are scheduled to provide a 350-mph. cruising speed with a 10% fuel reduction over earlier types.**

► Sikorsky Aircraft Division has more than 20 hr. ground and flight test time on an S-52 four-place helicopter powered by a French-built Turbomeca Artouste 2 gas turbine. Powerplant is mounted on top of fuselage at base of rotor head, weighs about the same as the rotor transmission and develops 400 hp. for takeoff. A new four-blade rotor replaces the original three-blade unit.

► **Sikorsky engineers have developed small hydraulic motors to drive the individual wheels of their big HR2S Marine copter for easier deck handling. Unit is quickly detachable, operates from main hydraulic system driven by auxiliary power supply.**

► Highly flexible steel rotors have been developed for roto chute devices used in cargo drops or missile recovery. Rotors are rolled in spanwise direction into 14-in.-diameter cylinders to save space, and unwind on release from carrier aircraft.

► **New graphic display for showing aircraft traffic flow, aimed at eliminating oft-criticized flight progress strips used by air route traffic controllers, has resulted from an Air Transport Assn. study. ATA's Sam Saint, who disclosed the idea before the Institute of the Aeronautical Sciences' recent convention, says it will be submitted to Air Coordinating Committee for further study, emphasizes that plan is not an official ATA proposal. New display technique involves use of a fixed-block system instead of present moving block, which some observers feel is an obstacle to its adoption.**

► Chance Vought's new Navy day fighter will be designated the F8U, according to H. M. Horner, chairman of the board of the newly organized Chance Vought Aircraft, Inc. This is the carrier-based fighter with a variable-incidence wing with which Vought won a Navy competition last summer when it was still a division of United Aircraft Corp.

► **British Overseas Airways Comets are not scheduled to return to regular service in the immediate future. Investigation of the Comet crash over Elba has not uncovered any promising leads yet. Possibility of an explosion in the fuselage fuel tank has been ruled out as a possible cause of the Comet crash near Calcutta. The fuselage cell-type fuel tank was recovered intact from the Calcutta wreckage.**

► Douglas engineer Carlos Wood, chief of preliminary design, recently confirmed AVIATION WEEK report (Oct. 19, p. 11) that Douglas has engineered a thin-wing, faster version of its DC-7 transport but has not yet made a decision to build a prototype.

► **McDonnell Demon (F3H-1N) all-weather, carrier-based interceptor carries a high percentage of its fuel internally. Armament consists of 20 cannon and externally slung rockets. Demon has an all-movable "slab" tail for control at the high Mach numbers of its operational speed range.**

Washington Roundup

USAF Reshuffle

A major reshuffle of top USAF commanders is under way in the Pentagon, but no public announcement of the changes is expected until spring.

Biggest shift probably will see Gen. Curtis E. LeMay, Strategic Air Command boss since 1948, move to Tokyo as head of the Far East Air Command. Gen. Otto Weyland, now FEAF commander, is slated to go to Tactical Air Command and Lt. Gen. Earl (Pat) Partridge will move from his present post as Deputy USAF Chief of Staff for Operations to command SAC.

Lt. Gen. Orval Cook, now Deputy USAF Chief of Staff for Materiel, is slated for a European assignment and Gen. Lauris Norstad is expected to return from Europe to the Pentagon. Successor to Gen. Cook as materiel czar is still uncertain but current Pentagon odds favor Lt. Gen. Edward Rawlings to move in from Air Materiel Command with Lt. Gen. Charles B. Stone III, now USAF comptroller, scheduled to take over in Dayton.

Reshuffle was stimulated by scheduled retirement of Gen. Joseph Cannon this spring which will create a four-star vacancy that will probably go to Gen. Partridge when he takes over SAC.

Report Screening

Two top secret military reports are being screened for material that can be released publicly. One is the evaluation of the guided missile program recently completed by a group headed by Trevor Gardner, USAF research expert. The Gardner group's report is being screened by Donald Quarles, Assistant Secretary for Defense in charge of research and development.

Second report is by Robert Sprague, Massachusetts electronics manufacturer, on the air defense system for the North American continent. Sprague's report was made to a subcommittee of the Senate Armed Services Committee in a secret Sunday session recently. Subcommittee consisted of Sens. Leverett Saltonstall, Styles Bridges and Richard Russell. Saltonstall said the report was "very sensitive."

Ryan to NACA

Appointment of Oswald Ryan, vice chairman of Civil Aeronautics Board, to the National Advisory Committee for Aeronautics was made primarily as a public political endorsement of Ryan by the Eisenhower Administration.

Opportunity for Ryan's Presidential appointment was created by the resignation of Commerce Undersecretary Robert Murray from NACA. CAB member Joseph Adams continues as an NACA member, making it the first time that two CAB members have served on the committee. Legal authorization for the NACA membership still uses the outdated language "two members from the Civil Aeronautics Authority."

CAA, CAB Reorganization

The Commission on Government Operations, headed by former President Herbert Hoover, has no plans for a reshuffling of government agencies which would affect CAA or CAB. The commission has set up two task forces, whose findings will affect the two aviation agencies:

• **The task force on personnel,** headed by president Harold Dodds of Princeton University, is expected to establish which jobs should be taken out of Civil Service and made policy appointments. Robert Ramspeck, vice president of Eastern Air Lines and formerly chairman of the Civil Service Commission, is a member of the group.

• **The task force on legal procedures,** headed by Judge James Douglas, formerly of the Missouri Supreme Court, is aiming to streamline CAB and other government proceedings. James Landis, former CAB chairman, is a member of the group.

Airline Subsidies: Early Test

Funds for airline subsidies face their toughest test in Congress when the economy-bent House Appropriations Committee votes on them soon. After brief consideration, the Commerce subcommittee has completed hearings on the fiscal 1955 budgets for Civil Aeronautics Administration and Civil Aeronautics Board. The subcommittee's chairman, Rep. Cliff Clevenger, expects to have them ready for House consideration before the end of the month.

Clevenger's position is that the appropriations group has no authority to turn down funds for airline subsidies "unless they are inconsistent with the law" authorizing them. His comment: "We are not a legislative committee and cannot legislate on whether there should or shouldn't be subsidies."

Uneasy Air Truce

Recent destruction of a MiG-15 by Sabres over the Yellow Sea off Northern Korea is an indication of the uneasy air truce hanging over that battle-torn peninsula. Both the Sabre formation escorting an RB-45 four-jet photo-reconnaissance plane and the MiG-15 formation sweeping out from North Korea were over international waters.

Incident was triggered by a single MiG-15 leaving his formation to make a pass at the RB-45. The attacker was promptly "splashed" by the Sabres before any damage was inflicted on the RB-45. USAF plans to avoid diplomatic complications over the incident and will remain satisfied with its military victory.

Hughes in the News

Washington observers are puzzling over two recently published versions of Howard Hughes and his aeronautical operations with Hughes Aircraft Co. One is a blistering account of Hughes' difficulties with his top scientists and management of the Hughes Aircraft Co. that threatened to disrupt production of USAF missile systems and electronic fire control systems for the Convair F-102 and other supersonic interceptors.

It appeared in the February issue of Fortune, written by Charles J. V. Murphy, who recently served a hitch as a USAF non-flying colonel and speech writer for Gen. Hoyt S. Vandenberg. Murphy's article concludes: "And again, to say the least, the question arises: Is there room in national defense work for a Howard Hughes?"

The other is a serialized biography of Hughes in Look magazine, describing him as "an engineer whose ideas are embodied in every modern plane." Look also says: "The aviation world ungrudgingly labels him (Hughes) as a genius in aircraft design."

—Washington staff

AVIATION WEEK VOL. 60, NO. 6 FEBRUARY 8, 1954

Supreme Court Jolts CAB Subsidy Policies

- **Tribunal rules that a carrier's domestic profits must be offset against its international pay requirement.**
- **Profits from route sale also must be considered as 'other revenue' in fixing airline compensation rates.**

By Frank Shea, Jr.

A pair of precedent-shattering Supreme Court decisions against Civil Aeronautics Board and two airlines last week dealt heavy blows to combined domestic-international airline operations and future mergers and route sales.

The court ruled unanimously that:

• **Excess profits** accrued from domestic operations of an airline must be offset against its international subsidy requirements. This decision came in denying Delta-Chicago & Southern Airlines claim to $654,000 back mail pay.

• **Western Airlines'** estimated $1-million profit for sale to United Air Lines of its certificate for operations on Route 68 between Los Angeles and Denver must be treated as "all other revenues" in determining carrier's mail pay.

► **First CAB Loss**—Both decisions hit at basic CAB policies and mark the first time the Board has lost a case in the Supreme Court. The rulings uphold those made by the U. S. Court of Appeals last year.

In the Delta-C&S case, the court held that an airline's subsidy must be measured by the "entirety of its operation," that international and domestic operations cannot be considered as separate entities.

CAB believes the decision could result in:

• **Necessity of reorganization** of the entire international route system.

• **Dropping of international routes** by domestic airlines.

► **Mail Pay**—The $654,000 Delta-C&S claim involved subsidy mail pay for foreign operations of Chicago & Southern Airlines from 1946 to 1950, prior to merger with Delta.

In 1948, CAB, on applications made by C&S in 1944 and 1945, fixed a prospective annual subsidy for the airline's domestic operations beginning Jan. 1, 1948, which the Board estimated would yield a net return after taxes of 7.4% on that part of its investment allocable to those operations.

In the following three years, however, rates in operation produced a subsidy of more than $654,000 in excess of a 7.4% return.

► **Retroactive Order**—In 1946, C&S applied for subsidy mail pay on its Latin American routes. CAB issued its order in October 1951, fixing rates retroactively from Nov. 1, 1946 to Dec. 16, 1950. The subsidy awarded was designed to give the carrier a 7% return on property allocable to foreign operations, after taxes for the past period, and 10% for the future.

Supreme Court held that in fixing subsidy for the past period, CAB refused to offset against the airline's need for foreign operations the excess earnings on its domestic flights, and said the Board gave two "considerations of economic policy" for that position:

• It would put an "unjustifiable strain" on domestic operations if the latter were required to carry the international operations.

• Regulatory ends would be served better by maintaining "the comparative status between those domestic operators which have foreign routes as against those which do not have foreign routes."

Supreme Court pointed out that on the Postmaster General's petition CAB was reversed by the Court of Appeals. The decision added that under the Civil Aeronautics Act, CAB is directed to "fix fair and reasonable rates of compensation for transportation of mail by aircraft."

► **Act Poses Question**—The court cited Section 406 (B) of the act, which provides that in determining those rates the Board "shall take into consideration . . . the need of each such carrier for compensation for transportation of mail sufficient to insure performance of such service, and, together with all other revenue of the carrier, to enable such carrier . . . to maintain and continue development of air transportation to the extent . . . character and quality required for the commerce of the U. S., the postal service and the national defense."

The mandate, the court found, is that the Board "shall take into consideration" what the need of the carrier is, but that the act poses the initial question of whether the financial condition of the carrier is such that it needs a subsidy or has no need for one.

The decision emphasized that CAB did not find that Delta had need for an additional $654,000. The court said the Board merely concluded that excess domestic profits should not "as a matter of economic policy" be taken into account in computing subsidy for international operations.

"In that posture, the decision of the Board seems not in conformity with the law," said the court, holding that ". . . The wording of the act precludes measuring the need of the carrier by any other unit than the carrier as an entity."

► **Revision Unlikely**—Only recourse from the Supreme Court decision appears to be congressional revision of the act to permit treatment of domestic and international operations as separate entities. Such action is doubtful, however, observers said.

Just how far-reaching will be the effect on operations of other airlines running both domestic and international service cannot be estimated yet. At present, in addition to Delta-C&S, other lines having split operations include Braniff International Airways, Trans World Airlines and Northwest Orient Airlines.

► **Western Case**—In ruling that Western Air Lines profit from sale of Route 68 be treated as "all other revenue," the court pointed out that the controversy again turns on these words in Section 406 (B) of the act: "the need of each such air carrier" and "all other revenue of the carrier."

Western originally petitioned for a rate order in April 1944. In 1951, CAB finally determined the rate applicable between May 1, 1944, and Dec. 31, 1948. During this open-rate period, Western realized some $88,000 in profits from operation of concessions at airport terminals.

CAB held that this was "other revenue," available to reduce mail pay. During the open-rate period, Western sold Route 68 to United, and CAB treated the profit derived from the sale of tangible assets (approximately $650,000) as "other revenue," and reduced mail compensation by that amount.

► **No Reduction**—But the Board declined to reduce mail pay allowance by amount of profit realized from sale of the "intangible value" of the route. It

AF Cuts J65s to Buy F-100s

USAF has shifted procurement funds from aircraft powered by the Wright J65 turbojet to buy a fighter-bomber version of the supersonic North American F-100 Super Sabre.

Cancelations involved:

- **Martin B-57A "Canberra."** Total of 33 of these aircraft were cut from the schedule.
- **Republic F-84F Thunderstreak** fighter-bomber. Several hundred of these aircraft were canceled from production scheduled for General Motors' Buick-Pontiac-Oldsmobile dual-purpose plant at Kansas City, Mo.
- **Wright J65 turbojets** scheduled to power the canceled B-57s and F-84s. Curtiss-Wright Engine Division and its licensee, Buick, will split the J65 cutback.

Selection of a fighter-bomber version of the F-100 Super Sabre, powered by a Pratt & Whitney J57 turbojet, confirmed an earlier report in AVIATION WEEK (Sept. 7, p. 11) that USAF was considering this switch.

►**GM Phaseout**—USAF says GM's Kansas City plant will be phased out of F-84F production in the fall of 1955 as originally planned.

No employment changes are contemplated at the General Motors plant as a result of the procurement switch. USAF is studying possible future aircraft production plans for this plant after it completes the F-84F run.

There is no change in the quantity of F-84Fs scheduled to be produced at Republic Aviation's Farmingdale, N. Y., plant.

concluded that the amount should not be used in offset, because CAB wanted "to encourage improvement of the air route pattern through voluntary route transfers by other air carriers."

Western challenged the inclusion in "other revenue" of amounts received from concessions and profit from sale of tangible assets. Post Office challenged exclusion from the offsets of the profit Western made on the sale of intangibles.

Court of Appeals sustained the Board in Western's petition, reversed it in the other petition and remanded the case to CAB for the fixing of a new rate after deducting the entire profit from the sale of the route.

►**Profit Concern**—In its ruling, Supreme Court points out that "we are here concerned with a subsidy rate . . . which was fixed so as to produce a 7% return on investment after taxes for the period in question. . . . The end problem concerns not the amount of money provided for operation and development but the amount of profit over and above all such sums.

"We read the act as meaning that 'the need' of the carrier . . . is 'the need' of the carirer as a whole. . . . If the carrier's treasury is lush, the need for subsidy decreases whether the opulence is due to transportation activities or to activities incidental thereto. . . .

"The difficulty here is that the Board, in concluding that part of the profits from the sale to United should not be used as an offset, forsook the standard of 'need' and adopted a different one. The Board wanted to 'safeguard the incentive for voluntary route transfers.' It thought it could not keep this incentive alive unless the profit were allowed in addition to the subsidy. . . .

"The act, however, speaks of 'the need' of the carrier for the subsidy," the court concludes, "not the effect of a policy on carriers in general."

Both opinions were written by Justice William O. Douglas.

ANDB Holds First Policy-Level Meeting

Air Navigation Development Board has held its first organizational meeting since the decision to elevate membership to policy level (AVIATION WEEK Jan. 18, p. 20).

The new ANDB chairman is Donald Quarles, Assistant Secretary of Defense for Research and Development. Other members: Robert Murray, Undersecretary of Commerce for Transportation; James Davis, special assistant on research and development to the Undersecretary of the Army; James J. Smith, Assistant Secretary of the Navy for Air; Trevor Gardner, special assistant for research and development to the Secretary of the Air Force.

Alternates: Henry Randall, executive secretary of the Coordinating Committee on Electronics, Office of the Assistant Secretary of Defense for Research and Development; F. B. Lee, Civil Aeronautics Administrator; Brig. Gen. W. P. Corderman, office of the Chief Signal Officer of the Army; Vice Adm. R. A. Ofstie, Deputy Chief of Naval Operations for Air; Maj. Gen. D. N. Yates, director of research and development, USAF.

3,788 Lightplanes Shipped

Lightplane shipments during 1953 totaled 3,788 aircraft valued at $34,458,000 Aircraft Industries Assn. reports. Deliveries in December were 224 one- to 10-place utility and executive planes at $2,600,000, compared with 247 aircraft at $2,539,000, during November.

CAA Weighs Godfrey Version of Takeoff

Civil Aeronautics Administration's recommendations in the Arthur Godfrey case (AVIATION WEEK Feb. 1, p. 13) were being prepared in New York last week by S. W. Bobskill, attorney for Region 1, following Godfrey's waiver of a Civil Aeronautics Board hearing.

CAA must obtain more detailed evidence for the Board because Godfrey has filed an answer to the original complaint that he buzzed the Teterboro, N. J., airport tower in "careless" operation of his DC-3. CAA has called for suspension of the radio and television star's pilot certificate.

►**'Safe Thing'**—Godfrey wrote CAB he did not conform to the traffic pattern as he took off on a flight to Miami, Fla., Jan. 7 because at the moment "it seemed to be the only safe thing to do."

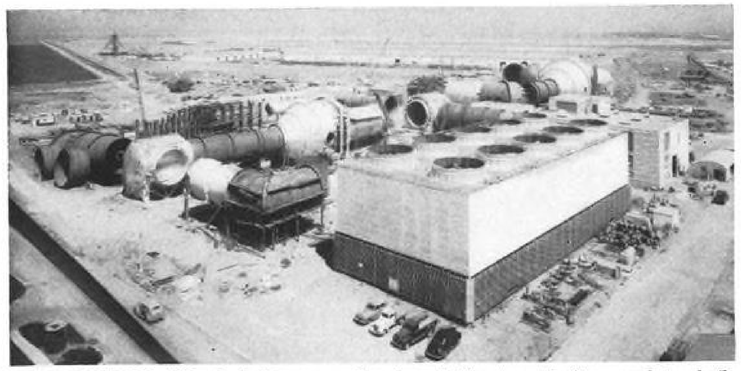
He explained: "Upon being cleared for takeoff by the tower, even with advanced left throttle, full left aileron and full right rudder, respondent (Godfrey) had not advanced more than 500 ft. when the ship yawed badly to the left, forcing him to use the right brake to straighten out the ship.

"From that point, advancing both throttles, full left aileron and full right rudder, respondent proceeded further down the runway to a point where IAS was 60 to 65 mph. when another very strong gust tended to cause the ship to weathercock again abruptly to the left."

►**Describes Choices**—"At the moment the ship became airborne, it left the runway at a 40- to 50-deg. angle to the left. . . . Respondent held the nose down to achieve a single engine speed as quickly as possible . . . had choice of turning away from upwind obstructions, which would have caused him to lose sight of them, or to turn towards them in order to keep them in sight." Godfrey said he elected the latter course. His only thought at the time was to avoid a collision.

Having cleared all obstructions, he had a choice of resuming the normal flight pattern, which would have taken him over "the very areas the tower cautions every pilot to avoid or make a steep left turn which would keep the ship within the boundaries of the airport."

The TV entertainer said he decided on the latter and believes his instinct to avoid a downwind turn to the right at low altitude and at a low speed under gusty conditions "is sound." He told CAB he regrets it became necessary to fly a pattern other than prescribed.



AIR INDUSTRY will be invited to use modern tunnels like Ames facility, now being built.

New Tunnels Open to Industry

By Robert Hotz

The aircraft industry will be offered an opportunity next year to do private proprietary research in the new supersonic windtunnels now being completed by National Advisory Committee for Aeronautics under the unitary plan.

Dr. Hugh L. Dryden, NACA director, told AVIATION WEEK that these supersonic research facilities covering speeds up to Mach 5 would begin to be available for industry use about the middle of 1955. He said NACA and Defense Department are formulating a uniform policy for their use by industry for both military and private research.

►**Unitary Survivors**—The new NACA tunnels and two supersonic test facilities being built by the Air Force at Arnold Engineering Development Center, Tullahoma, Tenn., are the survivors of the original $2-billion unitary plan aimed at providing adequate supersonic windtunnels for U. S. aircraft and missile development.

The NACA facilities include:

- **Langley Laboratory, Va.,** a missile test facility comprising a centrifugal compressor driven by 83,000 hp. to supply air for two 4-by-4-ft. supersonic test sections. One test circuit would cover a speed range from Mach 1.5 to 2.8, while the other loop would range from Mach 2.5 to 5. A valving arrangement in the tunnel circuit can divert air from one test section to the other.

The lower speed section of the missile tunnel will be completed this summer and ready for operations by next October. The higher-speed section is scheduled to be available May 1955.

- **Ames Laboratory, Calif.** Three new highspeed facilities will be provided here, one in the transonic range and two covering supersonic ranges. They will be devoted primarily to aircraft research. The Ames facility will use a single axial-flow compressor driven by 200,000 hp. to service two tunnel loops.

The transonic facility will be a single loop with an 11-ft.-sq. test section covering a range from Mach .75 to 1.5. The supersonic loop will have two circuits separated by a valving arrangement similar to the Langley tunnel. One circuit will have a 7-by-9-ft. test section operating between Mach 1.4 and 2.7. The other will use a 7-by-8-ft. test section covering Mach 2.4 to 3.6.

The supersonic loops will be ready for research work in the spring of 1955, with the transonic leg open for business by August 1955.

- **Lewis Laboratory, Ohio.** The new Lewis tunnel is designed primarily for research on installed jet engines. It will use a 250,000-hp. drive to operate a 10-ft.-sq. test section at speeds between Mach 2 to 3.5. It is expected to be ready for research operations by next January.

The three NACA facilities and the two USAF installations at Tullahoma were designed to cover the transonic and supersonic research range for aircraft, missiles and engines. Generally, the NACA facilities are planned for basic research, while USAF facilities are earmarked for development testing of equipment already built by industry.

►**Equal Cost**—The $20-million annual operating cost of these five unitary research and development test facilities is about equal to the annual cost of operating all of the other government and privately owned windtunnels now in the United States.

The original unitary plan was originated in 1946 by a joint military-industry group headed by Arthur Raymond, vice president of Douglas Aircraft. It recognized the high cost of supersonic research facilities would make it virtually impossible for them to be financed by private industry. The plan called for government financing of the research facilities and making them available to private contractors.

NACA policy always has provided for the use of its facilities by private industry for non-military work, but the heavy pressure of military priorities has made it impossible to allot any private time on non-military projects during the past 10 years.

►**Funds Trimmed**—The original $2-billion plan was subsequently scaled down to about half by another NACA special committee on supersonic facilities, headed by Dr. Jerome C. Hunsaker.

This plan included: 16 small tunnels with 2-ft.-sq. test sections to be built at universities, new supersonic tunnels at NACA and Navy installations, the new USAF development facility now under construction at Tullahoma and creation of a new NACA supersonic research center. This program again was pared by the joint Research and Development Board of the Defense Department to a $600-million total.

When the unitary plan finally was submitted as a legislative proposal to Congress in 1949, a total authorization of $253 million was approved for the following projects:

- **$10 million** for university windtunnels. This portion of the program has been abandoned, primarily because some universities were able to build their own tunnels using surplus government equipment.
- **$136 million** for six NACA tunnels. This has been modified to the program now under construction, and the plan for a special supersonic research center has been abandoned due to its high cost.
- **$7 million** for a Navy tunnel. This also has been abandoned.
- **$100 million** for the USAF Air Engineering Development Center.

Of this program, $75 million for the NACA tunnels now under construction and $170 million for the AEDC at Tullahoma have been appropriated.

P&WA Work Force Hits 35,000 Goal

Pratt and Whitney Aircraft employment has reached the company's goal of 35,000, and more than half the engine power produced during 1953 was in jets, general manager William P. Gwinn reports.

A large part of the company's jet output was in the axial-flow J57, which first went into production in February 1953. Other engines included: J48 turbojet T34 turboprop and R4360 and the R2800 piston powerplants.

During the last year, P&WA increased its employment total an average of 500 each month. In June 1950, the firm's employes totaled 15,161. Present peak represents an increase of 130%.

Gwinn says P&WA now is in a position to reduce manufacturing costs by cutting overtime.

Air Industry Leaders Optimistic

UAC predicts continuing strong demand for military aircraft, while TWA forecasts new aircoach buildup.

Two top aviation industry leaders predict a continuing strong demand for military aircraft and major expansion of coach services by the airlines:

• **H. M. Horner,** president of United Aircraft Corp., says a 20% rate of attrition and modernization of the 40,000 military aircraft called for by President Eisenhower (AVIATION WEEK Jan. 25, p. 13) would require replacement of 8,000 planes a year. This means $5 billion in new business annually, he notes.

• **Ralph S. Damon,** Trans World Airlines president, reports air transportation has not expanded yet to point equal to potential demand and says the big buildup anticipated will be in aircoach.

Both men spoke last week in New York before an industry forum of the National Federation of Financial Analysts.

▶ **Importance of Quality**—Of the President's 40,000-plane program, Horner observes: "Now this does not, and should not, mean that every design and manufacturing outfit is guaranteed a living. Because of the overriding importance of quality, those companies developing the top-performance articles should get the orders, and conversely those which do not develop top-performance articles should not get orders.

"If there are some that fail to survive, it's too bad; but that is our system. It has proved it gets results, and let's remember that many more aviation concerns have gone out of business than are now active."

▶ **UAC Future**—The spare parts business for commercial aviation also has become very important. Horner says sales of commercial spares by Pratt & Whitney Division of United Aircraft last year were approximately $50 million.

A highly optimistic future is painted for the future of all UAC divisions by its president.

Pratt & Whitney's J57 engine is cited as being widely used in Air Force and Naval Aviation aircraft. "Pratt & Whitney is also still very much in the piston engine business and, of course, isn't stopping its jet development with the J57," Horner reports.

Further, the ". . . Hamilton Standard Division is still the leading propeller company in the world and has made a tremendous leap into the general aircraft accessory field.

"Don't count them out because of the approaching fall-off of propeller volume with the wider use of jets. They are still building many propellers, and in the accessories field—just as one instance—their fuel control and starter for our J57 jet represent more sale dollars per engine than the propeller on a DC-6."

Lindbergh Attends IAS Honors Night Dinner

Rarely photographed, Charles A. Lindbergh (upper right) and his wife, Anne (lower left) are shown at the Institute of the Aeronautical Sciences recent annual Honors Night Dinner in New York City attended by scores of aviation notables. Well-known aviation figures shown in this photo, which is a portion of the only picture taken, include, top, left to right: Adm. D. C. Ramsey (USN, Ret.), president of the Aircraft Industries Assn.; Dr. Hugh L. Dryden, director, National Advisory Committee for Aeronautics; Dr. Edward Warner, council president, International Civil Aviation Organizations; Lt. Gen. L. G. Craigie, USAF, Deputy Chief of Staff, Development; Harry F. Guggenheim, donor of the Daniel Guggenheim Medal, which was presented to Lindbergh at the aeronautical dinner, and Lindbergh.

▶ **Copter Expansion**—The Sikorsky Division is accorded a very favorable future in view of the $15- to $20-million expansion program now underway in building a second plant for helicopter production.

In commercial public transportation, Horner says ". . . the helicopter may do some pretty extraordinary things in the next 20 years, I believe. In fact, a commercial adaptation of the recently announced 35-passenger S-56 might stir something important up in the not too distant future (AVIATION WEEK Jan. 25, p. 18). In fact, this S-56 just might be the DC-3 of vertical-lift airframes."

▶ **Aircoach Expansion**—TWA's Damon says 30% of all domestic airline passengers now fly by coach.

The airline president expects "that within three to five years the industry will show 80% of its passenger revenues as derived from mass, as contrasted with the class, service; and by the end of this decade the total dollar revenues will be more than doubled.

"Before that time, what we now call air tourist service will even change its name and become standard class with the present first-class category labeled luxury service."

▶ **Element of Strength**—Damon anticipates for 1954 a "10% increase in passenger miles, 7% in revenue, yielding a 3% decrease in average revenue per ton-mile; expense per available ton-mile approximately the same, and a payload factor of about 55%.

"These figures all add up to nearly the same operating income as during 1953, for an increased gross business. A unique element of strength, even though the operating margin is by no means outstanding, is that non-cash charges to expense will be about another $100 million—a most important cushion should business be less than I expect to see."

▶ **Corrective Adjustment**—In a review of the transformation of TWA from a losing and weak airline to a profitable and stronger property during the past five years, Damon lists some of the measures taken to effect the corrective adjustment:

• **Substantial capital** expenditure program amounting to $105 million and represented by the addition of 46 Lockheed Constellations and 52 Martin planes.

• **Major new ground facilities** in Chicago, Los Angeles, New York, and St. Louis.

• **Sale at a profit of** the fleet of DC-3s and prewar Boeing Stratoliners.

Moreover, the sales organization was elevated to "proper status," centering the efforts of the whole organization to aiding the promotion of sales as the most important preoccupation—in schedule making, service to the passenger, expansion of sales outlets and inauguration of advertising programs.

Further, the airline chief says concerted efforts were directed toward improving employe morale throughout the company. An employe pension plan was installed. Active management clubs were fostered, personnel merit recognized and rewarded.

▶ **Qualified Future**—Damon says TWA's outlook this year is clouded by a disparity in mail compensation received on its trans-Atlantic route. The airline has a temporary rate equivalent to around $3 million a year but believes it is entitled to a permanent rate giving it $10 million annually. He spoke before the Supreme Court's two mail pay decisions last week (p. 13).

Without regard to the mail pay settlement TWA expects combined domestic and international revenues to increase 10% over 1953, with a 13% boost in passenger-miles.

In keeping with lower operating cost trends within the industry, Trans World hopes to get 8% more plane-miles out of its 1953 fleet but keep direct costs at last year's level. Overhead is expected to hold close to the 1953 total.

Airpower Contracts

The following firms are among those whose high military contract volume includes work in the aviation field. Like those published earlier (AVIATION WEEK Jan. 25, p. 15), these are included in the Defense Department's recent list of the 100 top U.S. defense contractors.

Rating	Firm	Volume of contracts (millions of dollars)	% of total military contracts
22	Radio Corp. of America	$664.7	0.7
26	E. I. du Pont de Nemours & Co.	586.4	0.6
34	Firestone Tire & Rubber Co.	424.6	0.4
40	Philco Corp.	338.8	0.4
41	Collins Radio Co.	332.2	0.3
42	Raytheon Mfg. Co.	318.6	0.3
45	U. S. Rubber Co.	289.0	0.3
49	Standard Oil Co. (N. J.)	255.5	0.3
53	U. S. Steel Corp.	224.2	0.2
59	Standard Oil Co. (Calif.)	204.2	0.2
66	American Bosch Corp.	167.4	0.2
69	Hazeltine Corp.	159.6	0.2
72	Minneapolis-Honeywell Co.	157.7	0.2
74	Sylvania Electric Products, Inc.	149.5	0.2
80	B. F. Goodrich Co.	133.2	0.1
89	Borg-Warner Corp.	123.3	0.1
90	Sinclair Oil Corp.	123.3	0.1
96	American Machine & Foundry Co.	115.7	0.1

Titanium Plans

• Curtiss-Wright proposes 6,000-ton-a-year plant.

• Industry continues effort to increase production.

Curtiss-Wright Corp. is seeking Air Force assistance to develop a 6,000-ton-a-year titanium fabricating facility at its Buffalo, N. Y., plant during the next two and a half years.

The proposal was disclosed by the firm's board chairman, Roy T. Hurley, at a session of the Senate Subcommittee on Strategic Metals and Minerals. Entire output would be used for Curtiss-Wright's currently programmed military engine requirements.

The proposal is pending before Air Materiel Command's Production Resources Division, headed by Brig. Gen. Kern Metzger. The facility would be developed gradually, with establishment of a pilot plant as the first step.

▶ **Cost Pattern**—"I am an engine builder going out to root out the basic metal I need to do my job," Hurley told the subcommittee, "and in a sense it looks as though maybe I am a little out of character in doing that. But I think that is the thing to do. . . . There is no question about the economics of it, even at today's costs. The metal will pay for itself."

Hurley has estimated that if titanium were freely available, his company would use 36,000 tons annually by 1956 in commercial and military engines.

Metzger predicts that titanium, with an ingot cost of $5 a pound and a metal cost of $15 a pound, will follow the same cost pattern as other metals. Magnesium ingot, he points out, was reduced from $5 a pound to $1.60 over a five-year period in the 1920s, and aluminum ingot has dropped during the period of its development from $5.45 a pound to 19 cents.

▶ **Determined Effort** — The Curtiss-Wright move is one of several developments in a determined effort by government and industry to increase titanium production sharply (AVIATION WEEK Dec. 7, p. 14; Nov. 23, p. 22; Oct. 26, p. 14). Other developments:

• **General Services Administration** announced an agreement under which E. I. du Pont de Nemours Co. would increase ingot capacity by 8,000 tons a year. This would boost the total programmed capacity of 13,200 tons by 1956 to 21,200 tons.

The firm would spend approximately $600,000 of its own funds on studies and drawings. If these were successful, du Pont would construct a plant, probably in Tennessee, costing from $30 to $35 million. If they were not successful, the government would reimburse the company for its cost.

• **Arthur S. Flemming,** director of the Office of Defense Mobilization, announced that a subcommittee to draw up a five-year program of titanium ingot expansion—headed by Herbert H. Kellogg of the Columbia University School of Engineering—would start working immediately.

Assistant Secretary of Interior Felix Wormser, in charge of the Bureau of Mines, is the second member. A third will be appointed soon. Gen. Metzger and Col. Benjamin Mesick, commanding officer of Army's Watertown, Mass., arsenal, are serving as consultants.

• **Assistant Secretary of Defense** for Supply and Logistics Charles S. Thomas, reported a survey to establish "realistic" defense requirements for titanium will be completed in about two months.

Two years ago a requirement of 35,000 tons of ingot a year was set by Defense Department. This was reduced first to 22,500 by ODM, and then increased to 25,000. It has been estimated that the military services alone could utilize 150,000 tons annually.

• **Administrator Edmund Mansure** of GSA reported negotiations are underway with six firms to increase capacity. With ODM approval, GSA now has authority to contract for capacity beyond the 25,000-ton goal, almost reached with the new du Pont agreement.

The companies: Electro-Met Co., a subsidiary of Union Carbide and Carbon Corp.; Dow Chemical Co.; Western Pyromet Corp.; Horizons, Inc.; Monsanto Chemical Co., and National Research Corp., which have jointly developed a process.

FIRST PRODUCTION Twin-Bonanza available to business flyers has $69,950 price tag.

LATEST BONANZA seats four and sells for $18,990 or $19,990, depending on engine.

Beech Unveils 1954 Plane Stable

Beech Aircraft Corp. dealers and distributors have taken a preview look at the new "Super 18" Twin Beech, which incorporates a number of engineering changes aimed at extending the life of the Model 18 business plane series, during a million-dollar "Plane-o-Rama" in Wichita, Kan.

At the conclusion of the showing, dealers placed firm orders for 15 of the new planes, valued at approximately $1.5 million, and an additional $1 million in contracts for 1954 single-engine Bonanza and Twin-Bonanzas.

First deliveries of the new Super 18, officially known as the E18S, are expected in June. Price: $98,975.

▶ **Increased Performance**—Important improvements in performance as a result of the many changes are noted by Beech, particularly increased cruising speed to 215 mph. and range to 1,455 mi. Top speed is 234 mph.

The plane's gross weight has been increased 550 lb. to a total of 9,300 lb. Empty weight with residual fuel and average radio equipment is 6,150 lb.

The engines, two Pratt & Whitney Aircraft R985-AN-14Bs that deliver 450 takeoff horsepower at 2,300 rpm., have been fitted with exhaust augmentor stacks. Hamilton Standard propellers have paddle blades.

▶ **Larger Wings**—Externally one of the most noticeable changes from previous Model 18s are the square wingtinps. Wings have additional area and span. This change has boosted the plane's single-engine rate-of-climb and single-engine ceiling.

Landing and takeoff characteristics are improved, the company says, by lengthening the tailwheel strut and raising the level of the fuselage, giving the pilot added visibility while taxiing.

▶ **Deeper Fuselage**—The fuselage has been made deeper, providing approximately four inches more head room in the cabin. Number of windows in each side of the cabin has been increased from three to four, and each window has been deepened four inches—improving passenger visibility.

An important new feature is the combination door-passenger step that can be lowered to provide easy exit and entry without need for a separate ladder. Size of the door has been enlarged.

Other features include: an 80-gal. nose tank as standard equipment (previously optional), separate compartment in the nose for radio equipment and a new combustion-type heater for the cabin, providing separate control for temperature before flight and, as an optional feature, for preheating engines.

▶ **New Twin-Bonanza**—Second of the trio of business planes Beech is offering this year is the new B50 Twin-Bonanza, of which more than 100 will be delivered in 1954, with priority going to approximately 100 buyers who placed firm orders for the planes early in 1951.

Three have been delivered and six more will leave the plant this month. Price is $69,950, Wichita.

▶ **100 Changes**—Beech says more than 100 design and equipment changes mark the new B50 Twin-Bonanza.

The six-placer, powered by 260-hp. Lycoming GO-435-C2s, has a cruising speed of 192 mph. at 10,000 ft. at full gross load of 6,000 lb., 500 lb. heavier than the earlier version.

Cruising range has been increased 300 mi. for a maximum of 1,088 mi. with six passengers and baggage. Rate of climb is 1,450 fpm., and service ceiling is 20,000 ft.

Among the design and equipment changes: an additional rear cabin window on each side; new combustion-type 50,000-btu heater, which also has the optional engine-preheat feature available on the E18S; relocation of winglights, and fitting of a nose-mounted taxi light ($50 extra).

▶ **1954 Bonanza**—The new four-place E35 Bonanza, with the distinctive V-tail, this year is being offered with a choice of two engines: E185-11 Continental of 205 hp., which has been the standard powerplant on previous models, or the E225-8 Continental of 225 hp.

Top speed with the former is 190 mph. With the latter it is 194 mph.

Price of the 205-hp. E35 is $18,990. The 225-hp. version is $1,000 higher.

ACC Asks Comments On Production Study

Air Coordinating Committee has asked for comments from the aircraft manufacturing industry on the production agenda added to its air policy study (AVIATION WEEK Jan. 4, p. 12).

Deadline for the written comments is Feb. 10, but individuals who wish to make personal presentations can do so later by special arrangement with ACC. The following points will be covered:

- **Research and development.**
- **Procurement policy,** including: maintenance of production base; distribution of procurement funds; widespread distribution vs. selected companies; subcontracting policies; secondary sources; administrative and contracting policies on aircraft procurement; development of standard mobilization plan and contractual framework prior to emergency; long-term contractual planning; time limits on appropriations and authorization; overlap of production contracts; profit margin allowable on government contracts; patent rights; production financing under procurement contracts; government assistance; standby facilities, including reserve plants and machine tools reserve.
- **Resources requirements,** including; manpower allocation between military services and manufacturing industry and strategic materials availability.
- **Other sources of support** for industry, including: production and sale of civil aircraft and equipment; and export sales of military aircraft and equipment.
- **Security factors,** including dispersal of aircraft manufacturing facilities.

EEMCO technical bulletin

a New PILOT SEAT ACTUATOR

...that can be made to your exact specifications in

1. Length of stroke
2. Speed of stroke
3. Spread between jacks
4. Operating load
5. Mounting dimensions

Another new product from the design department at EEMCO is this pilot seat adjustment actuator that can be made to your exact specifications as listed above. With a weight of only 7 pounds, it will handle an operational load of 350 pounds and more. The compact control box, only 2¾" x 4¾" x 6¼" in size, contains the small and powerful EEMCO motor for driving the two jacks, as well as the clutch, brake, limit travel switches and radio noise filter. The two jacks are coupled for synchronized movement. The actuator illustrated has the following specifications:

Operating load: 350 pounds
Voltage required: 26 DC **Amperes:** 8.5
Stroke: 4.625" **Speed of stroke:** .75" per second
Ultimate static tension load: 6600 pounds
Ultimate static compression load: 1800 pounds

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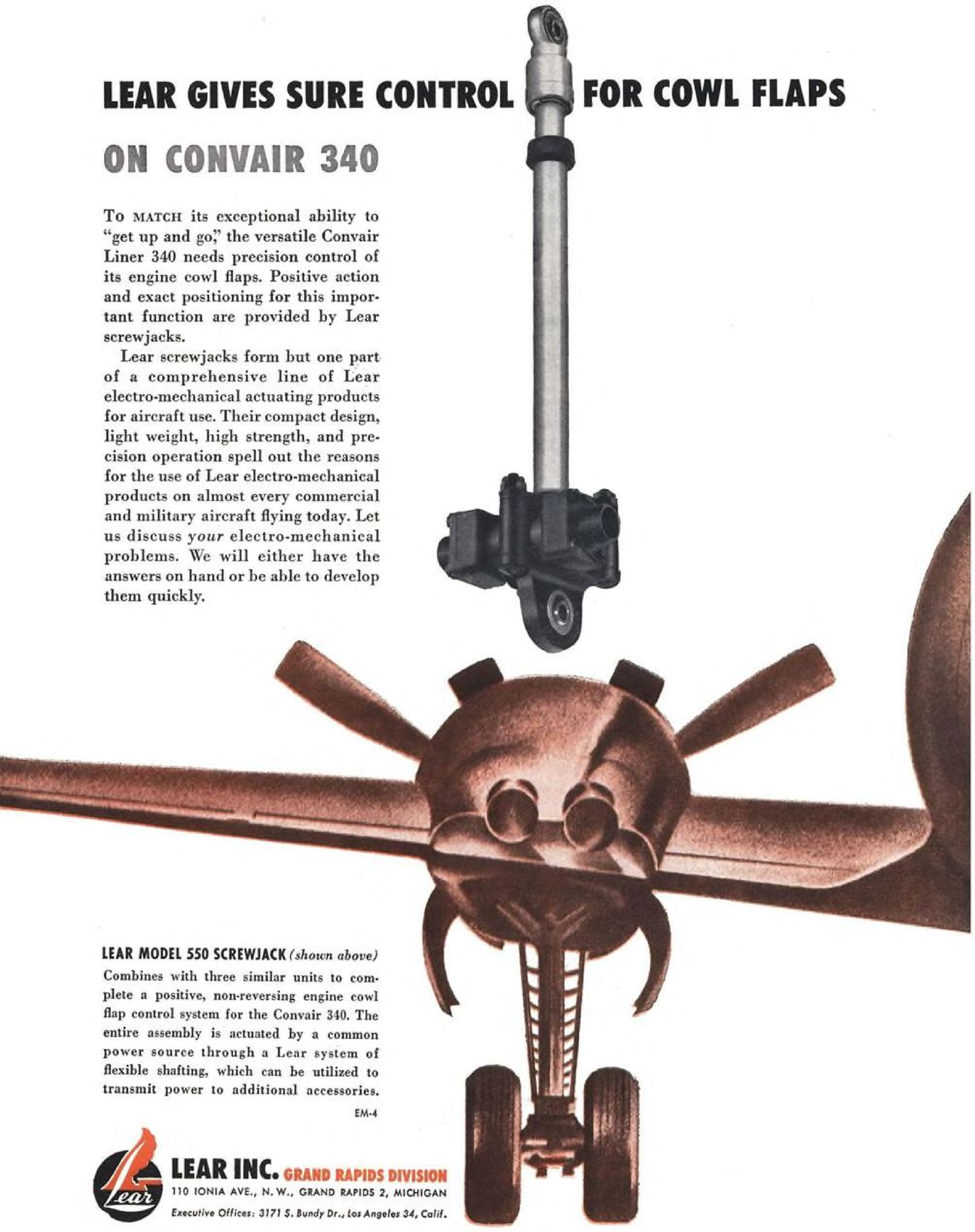
3-521

LEAR GIVES SURE CONTROL FOR COWL FLAPS ON CONVAIR 340

To MATCH its exceptional ability to "get up and go," the versatile Convair Liner 340 needs precision control of its engine cowl flaps. Positive action and exact positioning for this important function are provided by Lear screwjacks.

Lear screwjacks form but one part of a comprehensive line of Lear electro-mechanical actuating products for aircraft use. Their compact design, light weight, high strength, and precision operation spell out the reasons for the use of Lear electro-mechanical products on almost every commercial and military aircraft flying today. Let us discuss *your* electro-mechanical problems. We will either have the answers on hand or be able to develop them quickly.



LEAR MODEL 550 SCREWJACK *(shown above)*
Combines with three similar units to complete a positive, non-reversing engine cowl flap control system for the Convair 340. The entire assembly is actuated by a common power source through a Lear system of flexible shafting, which can be utilized to transmit power to additional accessories.

EM-4

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TAL Aims for Scheduled Service

Nonsked reports it could buy equipment, begin flights across both oceans one week after CAB approval.

Transocean Air Lines has completed financing arrangements to buy adequate equipment for start of scheduled passenger and cargo services across the Pacific and trans-Atlantic cargo flights—if Civil Aeronautics Board approves the two routes.

"We could start daily service across both oceans in a week, if demand warranted," Transocean president Orvis Nelson declares. . . . "All we need are those CAB franchises."

▶ **$1.3-Million Profit**—Nelson's disclosure of the financing arrangement follows a report that the parent company made a net gain of more than $1.3 million during the past fiscal year, despite an operating loss of some $860,000. Total profits estimated at $318,000 after taxes were reported for company subsidiaries.

Book value of company stock increased from the equivalent of $4.85 per share during the year to $8.75.

The net gain is shown on an auditor's statement for the year ended last May 31. A supplementary report says increased business and consolidations have improved the company's position since that time.

▶ **Husky Airline**—Nelson says his company is in healthy condition—"getting huskier ever year" with "a lot of our growing pains behind us."

Transocean subsidiaries had their best year in 1953, he reports. They all made money and now are almost entirely self sufficient, requiring little attention from the parent company.

Nelson notes that the subsidiaries have done a good job in carrying the parent company through the ups and downs of contract operation it has been forced to conduct in the seven-year fight for CAB certification.

As a "means to an end," the company's diversification has made the operation big enough so that it can overlap contracts, a necessity in a business that must take jobs as it finds them. It has made TAL largely self sufficient, able to service and maintain its equipment economically.

"If you're not a complete airline, you can't control your costs," Nelson says.

It has allowed Transocean to hold together its "know-how." The company was big enough, for example, so that when the subsidiary Aircraft Engineering & Maintenance Co.'s business dropped to nothing between the Berlin and Korean airlifts—with only half a dozen remaining on its official payroll—TAL was able to absorb some 150 key employes into other parts of the organization.

▶ **Continuing Effort**—TAL's operating loss, Nelson explains, was to considerable degree the result of the company's continuing effort to get CAB certification and its endeavor to maintain facilities and contacts in the Atlantic and European areas so that the airline will be in a position to operate if and when a franchise is awarded.

Transocean has kept up its base at Bradley Field, Conn., line stations at Gander, Newfoundland, and Shannon, Ireland, and offices in Frankfurt, Geneva and Rome.

▶ **Money Makers**—Biggest money makers

Chinese Nationalist Tests New Copter

This tandem-rotor, two-place, all-metal copter, designed and built by C. J. Chu, a major general in the Chinese Nationalist air force, has started its tie-down test program in Taiwan, Formosa. Designated the CJC-3, it is powered by a 190-hp. Lycoming, has a design top speed of 92 mph. and vertical climb of 696 fpm. Construction is steel tubing, metal covered. Rotor diameter is 25 ft. and gross weight is 2,050 lb. Maj. Gen. Chu's earlier CJC-1 and CJC-2 copters were coaxial types built on the Chinese mainland prior to evacuation. He was graduated from MIT in 1926.

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among the subsidiaries were the Transocean Engineering Corp., construction firm that made a profit after taxes of more than $100,000, and Aemco, which is getting under way on a $2-million contract for maintenance and repair of T-33 trainers—first in the jet field to be awarded to a company other than the manufacturer.

Aemco is working on 20 of the 500-odd trainers to be handled. When work reaches full scale, the subsidiary will have 150 planes on the maintenance line at a time.

▶ **Airlift Operations**—Flight work the parent company is handling includes a three-month contract for 90 roundtrip flights in the Korea airlift, won when TAL bid low under the Air Materiel Command's new policy of awarding contracts in open competition.

Transocean was a pioneer in the airlift and has flown some 16.5 million miles in the operation, about 11% of the total for commercial carriers.

The company is especially proud of its aircraft utilization figures for the airlift, averaging 13.7 hours daily.

"We're getting utilization far beyond our fondest dreams," Nelson says, "and with fewer man hours of maintenance work per flying hour. We get 30% more utilization now than we did in 1950—and with half the number of mechanics. And our planes are in better condition. We've cut failures until they practically don't happen."

▶ **Flight Contracts**—TAL last month started on a contract with the Intergovernmental Committee for European Migration for transport of 792 migrants from European cities to the New York

Checkup

Dr. Melvin A. Casberg (left), Assistant Secretary for Defense, health and medical, squeezes into rear cockpit of a Lockheed F-94C all-weather fighter during a recent visit to Wright Air Development Center, Dayton, Ohio. The visit to WADC was part of a tour of USAF, Navy and Army centers during which Casberg gathered first-hand information on military activities.

PRECISION... born of skill and experience!

Flying a modern jet with its mighty power, lightning speed and high maneuverability is no job for a layman! Such precision flying requires a skilled hand and hundreds of hours of experience. But the skill and experience go deeper! Today's jet aircraft require precision parts—like bearings—to stand tremendous speeds and high temperatures. ☆ Bower aircraft bearings—first choice of leading jet engine manufacturers—are built to stand turbine speeds as high as 15,000 RPM and temperatures as high as 600° F. with a minimum of lubrication. Bower's many years' experience, matchless skill and consistent emphasis on quality give the aircraft industry bearings held to tolerances measured in millionths of an inch. ☆ An experienced Bower engineer will be glad to show you how Bower bearings can improve your product's performance. Get in touch with Bower soon.

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A COMPLETE LINE OF TAPERED, STRAIGHT AND JOURNAL ROLLER BEARINGS

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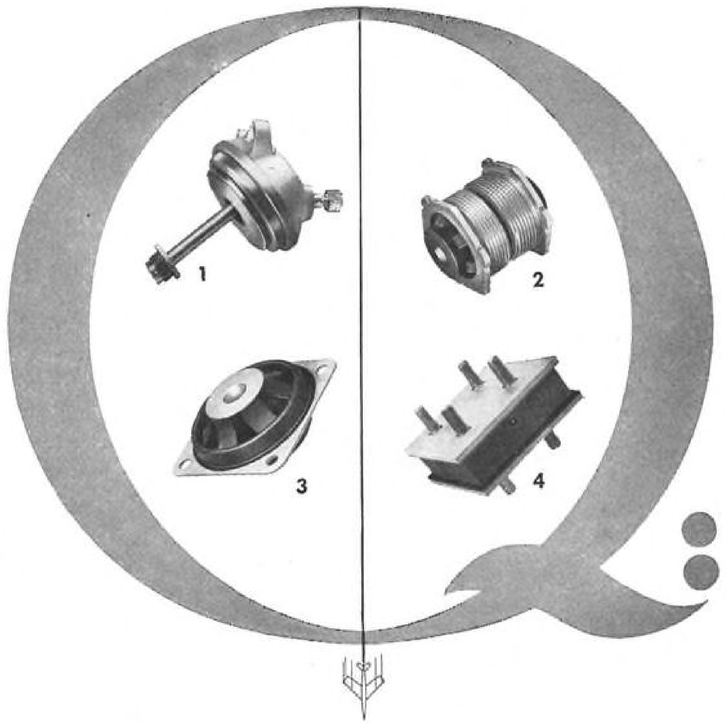

recognize what function these products have in common?

A: You're right if you say vibration control. But there's more to it than just that. Each has answered a *special* vibration problem encountered in the aviation industry:

(1) **Isolating engines** from airframes, MB Engine Mounts have a 15-year record of outstanding service. Newest all-aluminum development shown weighs 24.7 lbs as against 40 lbs of former type.

(2) **Airborne radar antenna system** was enabled to function properly when vibration and shock problem was eliminated by this MB designed mounting.

(3) **To protect instruments** and equipment, this "AN" type isolator was designed with multi-directional vibration absorption.

(4) **Used with "canned" engines,** this special engine mount protects against vibration and shock in shipment.

When you're dealing with vibration, remember to contact MB for the cooperation of a vibration specialist.

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. . . TO EXCITE IT . . . TO MEASURE IT

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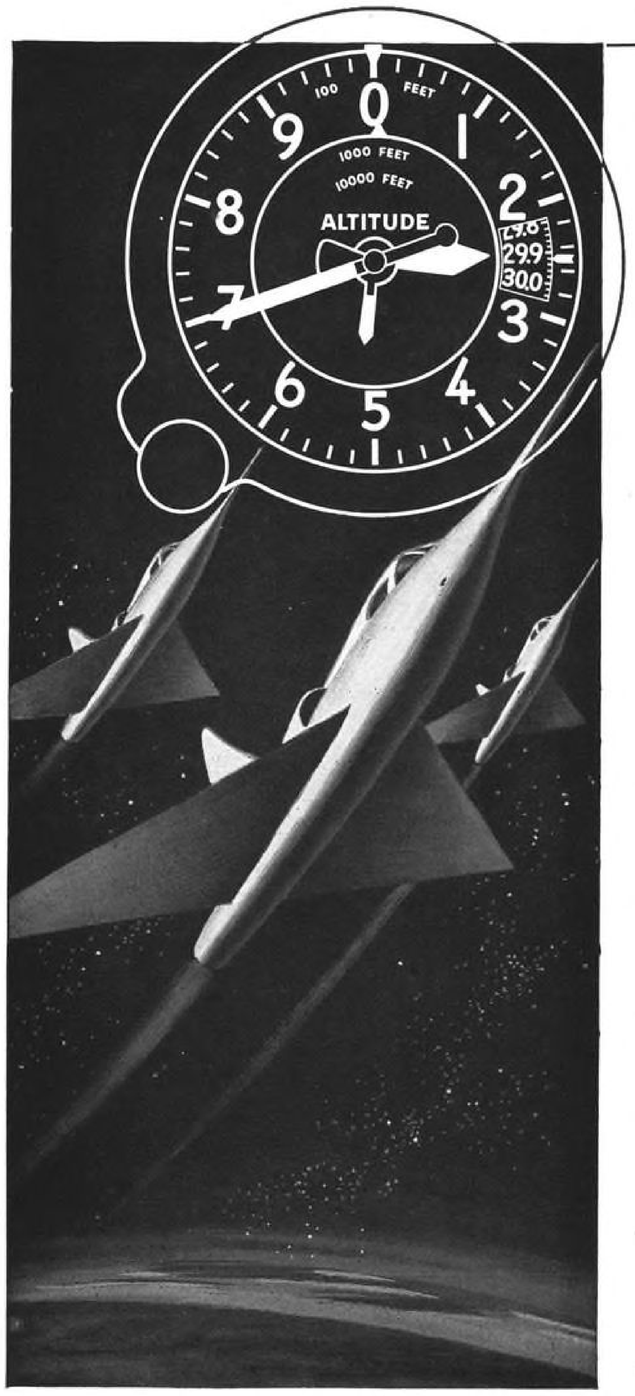

J&H now in production on two new 50,000-foot inverters. Models rated at 2500 va and at 1500 va.

Both use improved, longer life regulator—adaptable to similarly rated J&H Inverters now in the field.

High-altitude, 250-va model available soon.

Now in production at Jack & Heintz are two new inverters (motor-generators) approved for 50,000-foot operation. Model F147 delivers 2500 va at 50,000 feet and +20°C ambient temperature. Model F137 is rated at 1500 va under the same conditions. Both models are 115-volt, 400-cycle, single-phase rotary units (3-phase units are now undergoing qualification tests).

Improved electrical insulation, redesigned commutator and brush arrangements, new housing configuration for better air flow, and the new FRS speed and voltage regulator assembly represent the major advances effecting this high-altitude inverter performance.

A smaller but no less important inverter for 50,000-foot operation is slated for early production. Designated as J&H Model F17-1, it is a 250-va unit actually capable of operating up to 65,000 feet with some derating.

Our engineers will be glad to work with you in developing inverters or other *Rotomotive* equipment to meet your specialized needs. Write Jack & Heintz, Inc., 17635 Broadway, Cleveland 1, Ohio.

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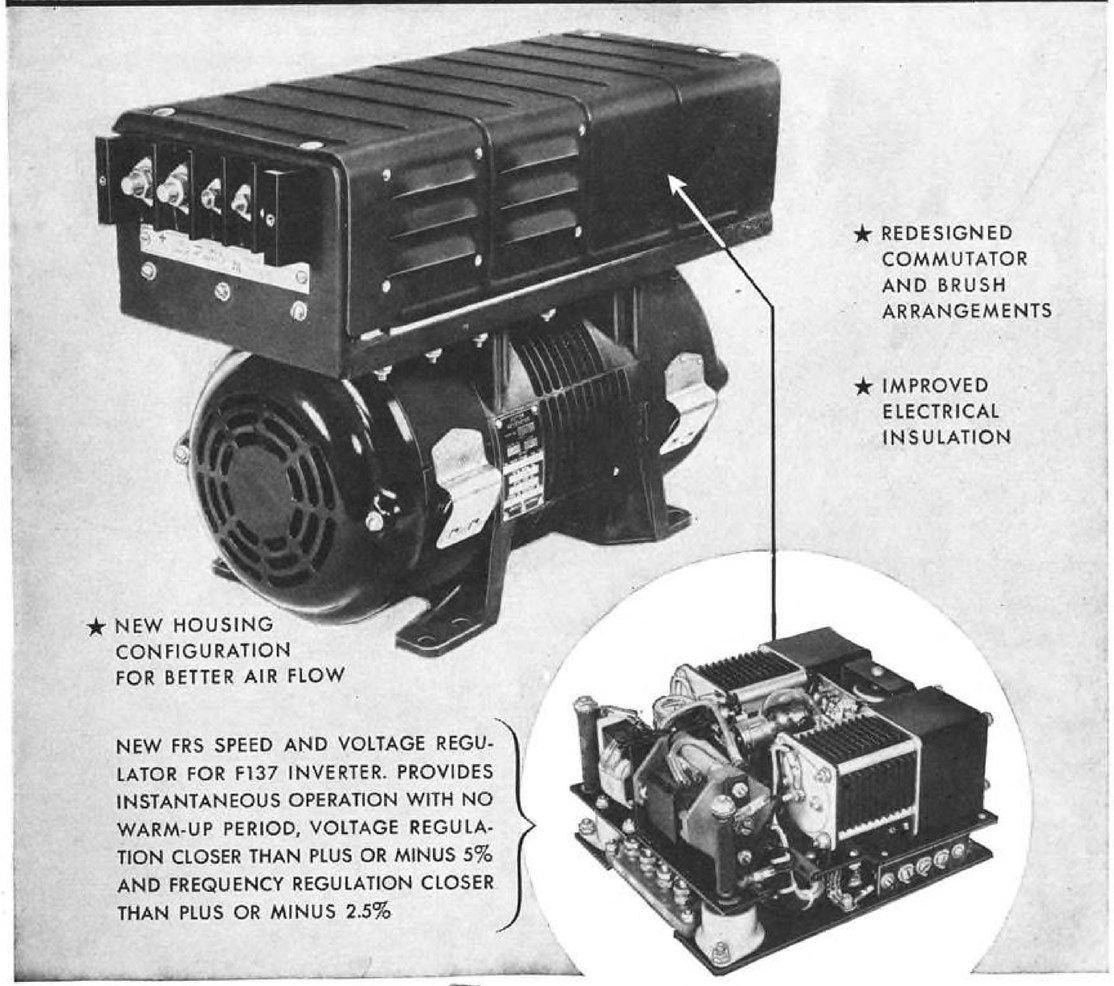
HIGH ALTITUDE INVERTERS

J&H 50,000-FT F137 AND F147 INVERTERS NOW IN PRODUCTION



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area between Jan. 1 and Mar. 31.

This contract followed completion of one with the Army during December for flying approximately 3,000 military dependents in 28 flights between the New York area and Burtenwood, England, and Frankfurt, Germany.

TAL also has a contract to serve the trust territory of Pacific islands, and makes weekly flights to island centers in the Marianas and the Marshalls, plus emergency flights as needed. Plans are under way to replace the fleet of PBYs presently used with Grumman Albatross amphibians.

The airline is flying irregular DC-4 tourist service to Honolulu from Oakland, and between Honolulu and Guam. TAL reports it carries 10% of the passengers flying in and out of Honolulu, making about 5% of the trips.

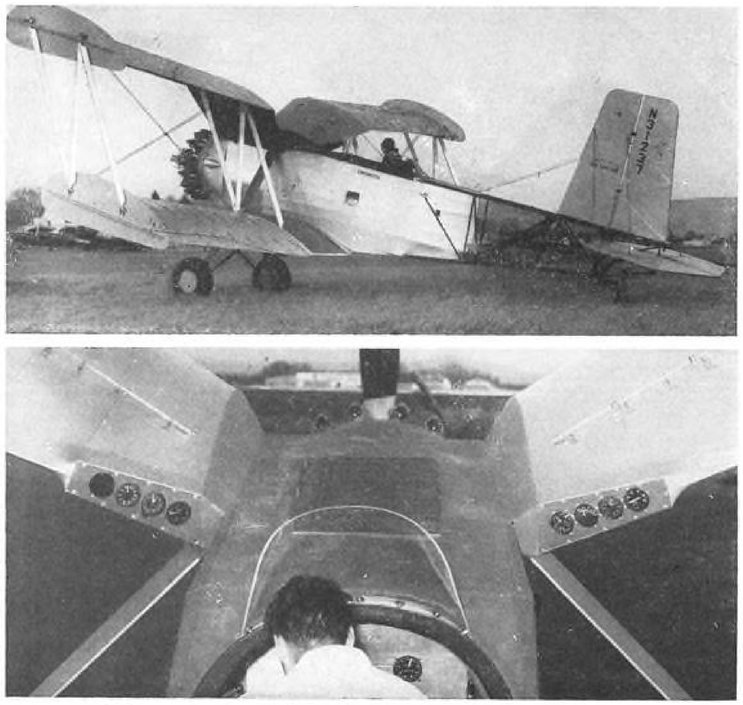
▷ **Global Program**—Transocean inaugurated a new airline service in Afghanistan last December providing weekly flights between Kabul and Cairo, a distance of 2,500 mi. Air Jordan, with which the U. S. line has a management agreement, is conducting the operation, using DC-3 transports.

TAL is providing pilots and dispatchers for Japan Air Lines, scheduled to begin Tokyo-San Francisco service this month, as well as mechanics for the Japanese Aircraft Maintenance Co., which will handle JAL maintenance in Japan.

Under a technical training program, the airline is providing flight instructors to train Japanese flyers and expects to have all JAL co-pilots on domestic runs by June 1. The company also expects to complete a maintenance training program for Jamco mechanics by July 15.

TAL has a small interest in Jamco, but does not expect to exercise its option for purchase of more stock when capitalization is increased in the near future.

A flight operation based at Fargo, N. D., is engaged in crop dusting in that area and is on its third year of a contract with the State Department for locust control in 10 countries in the Middle East. The contract calls for spraying of infested areas, along with



Closeups of New Agricultural Plane

Interesting details of new Central-Lamson Air Tractor spray/dust plane, are revealed in these new photos of craft which recently began its flight test program (Aviation Week Jan. 18, p. 7). Top picture shows how fuselage fairs together behind pilot with bare framework extending to tail. This feature is said to permit easy cleaning of structure after use of corrosive farm chemicals. Note large end plates on wingtips. Closeup view of Air Tractor shows instruments mounted externally in gull portion of upper wings so pilot can view them and at same time watch the ground and obstructions while flying low. Powered by a 450-hp. P&WA Wasp Jr., the plane can carry a load in excess of 2,500 lb. Central-Lamson Corp. is located in Yakima, Was.

Fafnir, DSRP Series, Airframe Control Bearings . . . high capacity, self-aligning.

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

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

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

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

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

1933
Aircraft types
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Aircraft Rod Ends
Bell Cranks, Double Rows

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

1945
Plya-Seals in
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training of nationals in locust control techniques.

▶**DC-4E Project**—One of the accomplishments of TAL's maintenance department last year was the construction "from the ground up" of a four-engine plane, the equivalent of a DC-4E.

The project started when one of TAL's executives heard that a hull and center wing section of a Douglas transport was in storage in Buenos Aires. These parts were brought back to San Francisco headquarters and combined with factory parts to complete the plane.

Only two months after the basic parts were received the new aircraft passed its flight test, and federal certification followed shortly thereafter. It is now in service on the Korea airlift.

▶**The Future**—"There are so many unexplored opportunities in aviation that we don't worry about there not being enough business," Nelson says. "We've had a lot of experience in flying and a lot of experience in getting business, and we know that the people with the sharpest pencils will survive."

He notes that the company had been devoting special attention to sharpening its pencils in the last year. It has upgraded its accounting department management for tighter cost control and put almost all of its procedures under IBM control. It is including inventory control in the system.

Transocean may go into Atlantic cargo flights on a subcontract basis for European carriers, Nelson says, offering equipment, crew and maintenance on a "wet lease" basis.

There is a big unexploited field in corporation charter flying, he suggests, not only for movement of sales and management forces, but for the use of planes as "flying display rooms."

Construction

- **Committee gives nod to $156 million AF projects.**
- **Defense Command Gets $25.6 million for radar.**

Air Force has been given approval by House Appropriations Committee to move forward with $156 million in new construction.

This year's Defense Appropriation Act requires committee clearance on all military construction works.

▶**Refuse Navy Request**—The major new USAF projects approved: Air Defense Command, $25.6 million for radar network; Military Air Transport Service, $16 million for Dover AFB; Research and Development Command, $10 million for Arnold Engineering Development Center; Strategic Air Command, $10 million for Little Rock AFB, Ark.

The committee turned down all of Navy's requests for jet engine test cells because: "There is a major discrepancy between the present Navy and Air Force test cells equipment. It is the desire of the committee that a study be made of the jet cells of the Navy and the Air Force with a view toward development of a standard test cell."

▶**The Projects**—Here are USAF projects approved:

- **Air Defense Command:** $5,567,000—Burlington Municipal Airport, Vt., $37,000; Duluth Municipal Airport, Minn., $171,000; Geiger Field, Wash., $174,000; Grandview AFB, Mo., $213,000; Greater Pittsburgh Airport, Pa., $75,000; Hamilton AFB, Calif., $162,000; Kinross AFB, Mich., $106,000; McChord AFB, Wash., $37,000; McGhee-Tyson AFB, Tenn., $146,000; Minneapolis-St. Paul Airport, Minn., $162,000; New Castle County Airport, Del., $205,000; Niagara Falls Municipal Airport, N. Y., $47,000; O'Hare International Airport, Ill., $37,000; Oxnard AFB, Calif., $216,000; Paine Field, Wash., $162,000; Portland International Airport, Ore., $162,000; Presque Isle AFB, Maine, $37,000; Selfridge AFB, Mich., $43,000; Sioux City Municipal Airport, Iowa, $61,000; Suffolk County AFB, N. Y., $37,000; Trumax Field, Wisc., $648,000; Wurtsmith AFB, Mich., $162,000; Youngstown Municipal Airport, Ohio, $182,000; Yuma County Airport, Ariz., $2,285,000.
- **Radar net:** $25,614,000.
- **Air Materiel Command:** $1,404,000—Brookley AFB, Ala., $367,000; Wright-Patterson AFB, Ohio, $1,067,000.
- **Air Proving Command:** $3,760,000—Eglin AFB Aux. 3, Fla., $139,000; Eglin AFB, Fla. $3,621,000.
- **Air Training Command:** $17,696,000—Bryan AFB, Tex., $42,000; Craig AFB, Ala., $1,576,000; Ellington AFB, Tex., $1,671,000; Goodfellow AFB, Tex., $149,000; Greenville AFB, Miss., $1,844,000; Harlingen AFB, Tex., $122,000; James Connally AFB, Tex., $43,000; Laredo AFB, Tex., $9,000; Laughlin AFB, Tex., $81,000; Luke AFB, Ariz., $1,005,000; Mather AFB, Calif., $1,520,000; Moody AFB, Ga., $606,000; Nellis AFB, Nev., $635,000; Perrin AFB, Tex., $1,070,000; Randolph AFB, Tex., $837,000; Scott AFB, Ill., $234,000; Tyndall AFB, Fla., $850,000; Vance AFB, Okla., $1,623,000; Webb AFB, Tex., $573,000; Wichita Municipal Airport, Kan., $3,206,000.
- **Research and Development:** $18,395,000-Arnold Engineering and Development Center, Tenn., $10,000,000; Edwards AFB, Calif., $278,000; Griffis AFB, N. Y., $452,000; Holloman AFB, N. M., $2,420,000; Kirtland AFB, N. M., $33,000; Laur G. Hanscom Field, Mass., $37,000; Patrick AFB, Fla., $5,286,000.
- **Strategic Air Command:** $53,557,000—Barksdale AFB, La., $4,479,000; Bergstrom AFB, Tex., $1,437,000; Castle AFB, Calif., $1,439,000; Davis-Monthan AFB, Ariz., $1,376,000; Dow AFB, Me., $1,749,000; Ellsworth AFB, S. D., $1,268,000; Forbes AFB, Kan., $4,180,000; Great Falls AFB, Mont., $430,000; Lake Charles AFB, La., $265,000; Limestone AFB, Me., $181,000; Lincoln AFB, Neb., $7,278,000; Little Rock AFB, Ark., $10,035,000; March AFB, Calif., $831,000; Mountain Home AFB, Ida., $763,000; Offutt AFB, Neb., $6,656,000; Pinecastle AFB, Fla., $1,106,000; Plattsburg Barracks, N. Y., $400,000; Sedalia AFB, Mo., $4,642,000; Smoky Hill AFB, Kan., $4,714,000; Travis AFB, Calif., $37,000; Turner AFB, Ga., $221,000; Walker AFB, N. M., $33,000; Westover AFB, Mass., $37,000.
- **Tactical Air Command:** $8,423,000—Clovis AFB, N. M., $1,756,000; Eglin AFB Aux. Field 9, Fla., $2,564,000; Foster AFB, Tex., $70,000; George AFB, Calif., $1,478,000; Langley AFB, Va., $252,000; Larson AFB, Wash., $61,000.
- **Alaskan Air Command:** $2,000,000.
- **Far East Air Forces:** $242,000.

Piedmont Starts New Commuter Service

Piedmont Airline is showing "tangible results" from its new cut-rate commuter excursion service in North Carolina and Virginia, reports president Thomas H. Davis.

The airline began its new service Jan. 18 on a less-than-four-cents-a-mile basis. First-class rates are six cents a mile. Called the PEP plan (Piedmont Economy Plan) by the local service airline, the cut rate is good only on round-trip, 24-hr. basis.

Davis says the move is an experi-

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Dallas, Texas

ment to increase load factors on certain East Coast sections of Piedmont's routes where business is low the first few months of the year. The airline has applied to Civil Aeronautics Board for the new tariff to expire Apr. 1. Should the experiment prove successful, Davis says his company will undoubtedly apply for an extension of the time limit.

Piedmont operates 15 DC-3s over routes in North Carolina, South Carolina, Virginia, Kentucky, Tennessee, West Virginia and Ohio. The new cut rates are in effect only between the cities of Charlotte, Fayetteville, Wilmington, Kinston, Raleigh, New Bern, Wilson, N. C., and Newport New, Richmond and Norfolk, Va.

CAB May Speed Up Nonsked Investigation

A speedup of the nonsked air carrier investigation is indicated by a new Civil Aeronautics Board order restricting any further extension of the case to matters of public interest, convenience and necessity.

Individual applicants who have not been heard will be given an opportunity at "the earliest feasible time," the Board has ruled. But all public interest matters are to be decided before the Board will hear further evidence of the qualification of individual applicants in the investigation.

▶**30 To Be Heard**—CAB's order defers further hearing or acceptance of additional evidence relating to an applicant's identity, mode of operations, violations and other qualification aspects in nonsked air transport.

The nonsked investigation has been continuing since September 1952. General presentations relating to public interest questions were made at the beginning of the hearing by 25 "interveners and interested persons."

Evidence on 30 different applicants has been heard so far. There are 30 still to be heard.

▶**Majority Challenged**—CAB members Josh Lee and Joseph P. Adams have dissented, claiming separation of the "general public interest question from the issues regarding qualification and selection of carriers" will not necessarily expedite disposition of the proceedings.

"On the contrary," Lee and Adams contend, "the present action of the majority (of Board members) will actually require additional time for final decision to be reached unless the majority finds that there is no place for irregular air carriers in air transportation and therefore dismisses all of the applications on the ground that such services are not required. Only if this result is reached by the majority will the proceeding be expedited."

If the Board finds there is a place for irregular carriers in air transportation, the dissenters say, it will be necessary for the remaining 30 applicants in the case to present their viewpoints, not only with respect to the question of fitness and ability but also with respect to the public interest issue as well.

With the attendant procedural details, the nonsked proceeding could be delayed "for at least a year," Lee and Adams claim.

▶**Time Factor Cited**—The majority argues that "evidence on their mode of operation and other aspects of fitness, willingness, and ability has been heard with respect to a sufficient number of the applicants to present to the Board a representative cross section of the irregular air carrier industry insofar as needed to determine the public interest questions related to the air transportation role, if any, to be assigned the irregular air carriers."

Without changing the procedure in the case, "the hearings yet to be held will consume a substantial amount of time and the age of a large part of the earlier record may seriously impair its value and considerable rehearing may be needed," the majority of the Board has decided.

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AMS 5510.....	Sheets.....	Type 321.....	2D Finish
AMS 5521....	Sheets.....	Type 310.....	2D Finish
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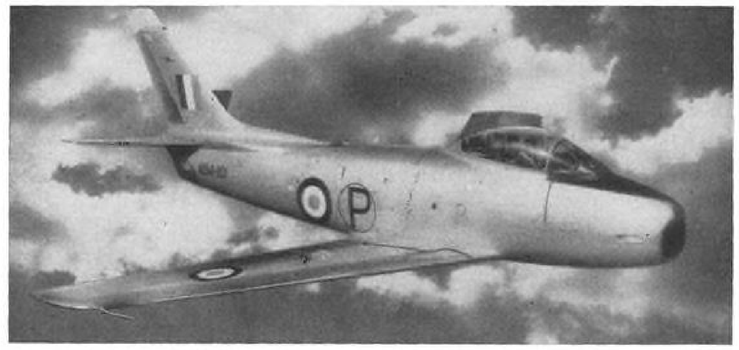
Australians Revamp F-86 to Take Avons

• Commonwealth version of sabre has 60% new fuselage to take bigger engine, heavier guns.

(McGraw-Hill World News)



AUSTRALIAN SABRE has deeper forward fuselage, more powerful guns than . . .

U. S. SABRE, which is powered by GE J47. Australian F-86 has R-R Avon engine.

Melbourne—Australia's version of the F-86 Sabre, built by Commonwealth Aircraft Corp. Pty. Ltd., appears very little different from the F-86 produced in the U.S. by North American Aviation, Inc.

But substitution of the higher-thrust Rolls-Royce Avon for the General Electric J47 used in the U.S. jet, and the replacement of the .50-cal. machine guns by cannon of heavier caliber, have required so many internal changes that only about 40% of the original fuselage structure has been retained.

► **Intake Modifications**—As the larger Avon engine consumes some 25% more air than its smaller GE counterpart, it was necessary to increase the size of the intake duct correspondingly.

This appeared to present serious difficulties at first, but a simple solution was achieved. The front fuselage is split horizontally and a wedge of structure is inserted in the split, thus dropping the lower line of the fuselage some 3½ in. at the front.

In order to utilize as much of the original structure as possible in this change, extension pieces are let into the sides of most of the fuselage frames in the region of the nose—completely new frames were necessary only in special cases dictated by the change in the guns. The split in the duct is covered by a wedge-shaped strip of skin and the gap in the outer surface is covered by extensions to the skin panels.

This comparatively simple modification leaves undisturbed the complex cockpit arrangements and the nose wheel fittings in the lower half of the fuselage, thus saving hundreds of hours of engineering and tooling time.

► **Engine Moved Aft**—The Avon engine has much the same dimensions as the J47, but the mounting points are quite different and the weight much reduced. Consequently, it had to be positioned much farther aft in the fuselage in order to preserve the original center of gravity position.

In order to have the Avon engine completely supported within the forward portion of the fuselage, it was necessary to move the fuselage break joint rearwards to the new location of the engine mounting trunnions. Thus the rear portion of the fuselage is shortened by some 26 in. and the forward fuselage lengthened by a corresponding amount in order to preserve the original length of fuselage.

► **Cooling and Venting**—The Avon engine brought many problems of cooling and venting, as well as the mere physical problems of access and installation. Thus from the rear spar aft to the fuselage break joint, an entirely new structure (within the original lines) was required. Moreover, a gearbox separate from the engine was required, as provision had to be made for either electric or liquid combustion starting. This takes all the space within the engine nose fairing which is occupied, in the case of the J47, by the hydraulic pumps and generator.

In the train of this change followed changes in the shapes of the fuselage fuel tanks (and consequently in the fuel gaging system) and the repositioning of numerous services. Cooling and venting of the Avon engine for all flight and ground conditions was a major problem, as it was desired, in the interests of retaining maximum strength in the fuselage material, to limit all structural temperatures to a maximum of no more than 200F.

► **Forward of Firewall**—In the zone forward of the firewall there is no great source of heat as this portion of the engine is comparatively cool. However, it is necessary to ventilate the zone to remove all fuel and oil fumes that might accumulate to form an explosive or combustible mixture. Thus all drain lines from fuel pumps and filters have been led overboard and the zone is ventilated in flight by small NACA-type flush entries in the outer skin, exhausting through an opening on the top center line.

To cover the case of ground static conditions where no rammed air is available through the side entries, a cooling flow is induced by means of ejector

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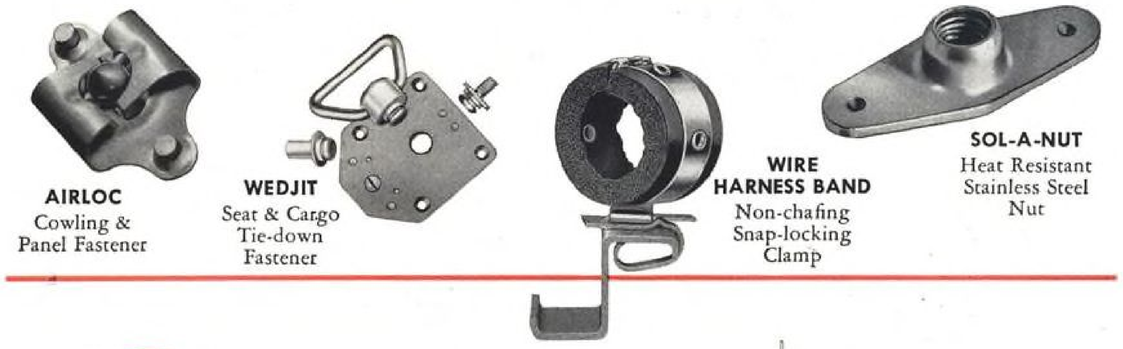

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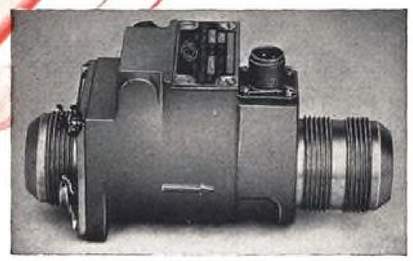

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exhaust through the exit opening on the top center line.

► **Aft of Firewall**—Aft of the firewall, there are great sources of heat in the combustion chambers, turbine shrouds, exhaust cone and tailpipe. Here, all important structural members such as longeron and major frames have been fabricated of corrosion-resistant steel. Skins and minor frames are fabricated of 75S aluminum alloy. All control cables and hydraulic services have been isolated in stainless steel tunnels carefully ventilated with cool air.

This zone is cooled by a flow of air between the engine-tailpipe combination and the fuselage structure, the airflow entering through three flush entries in the outer skin and exhausting through an annulus around the jet pipe nozzle.

In flight, the ram pressure recovery of the entries provides a sufficient cooling flow, but a light air pump has been designed to provide sufficient cooling airflow in the case of engine running at full thrust on the ground and during takeoff.

The air pump is simple in principle, consisting of a line bleeding air from a high-pressure stage of the axial-flow compressor and delivering this air to a tube bent into a circle and positioned in the cooling air exhaust annulus, coaxial with the jet pipe. A series of ⅛-in.-dia. holes in this tube project streams of high-pressure air rearwards, thus entraining sufficient air from the annulus to produce the necessary cooling airflow within the fuselage. This pumping action is necessary whenever the aircraft is stationary with engine running or at very low speeds. Thus it has been arranged that the bleed line is open only when the undercarriage is extended and consequently no valuable compressor air is wasted when maximum thrust is needed in flight.

► **Pretest in England**—As there were so many unknowns in the design of the cooling system, a dummy fuselage incorporating all cooling provisions was constructed and shipped to England and, with the cooperation of Rolls-Royce, was tested in a static rig with an Avon engine under all conditions of engine thrust.

Structure temperatures were measured and adjustments were made until completely satisfactory cooling arrangements were achieved.

► **No Cantilever**—The Avon engine differs from the J47 in not being able to support the tailpipe in cantilever fashion. Thus the shortened rear fuselage had to be redesigned to support the jet pipe in such a fashion that neither tailpipe inertial loads nor empennage flight loads are transferred to the engine.

Additionally, the jet-pipe supports had to provide for easy removal of the rear fuselage for inspection and adjust-

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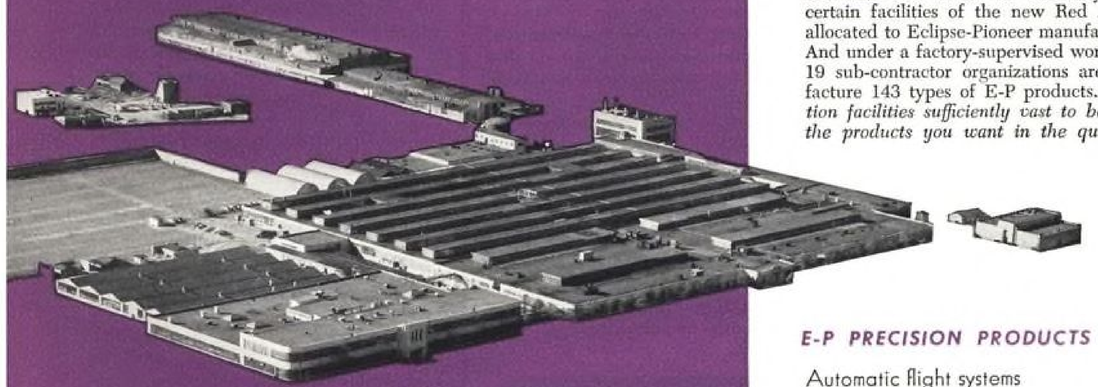

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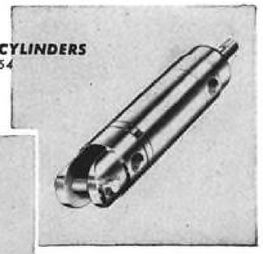

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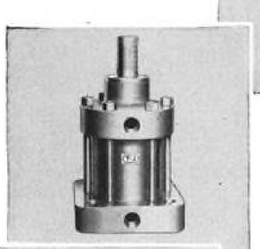

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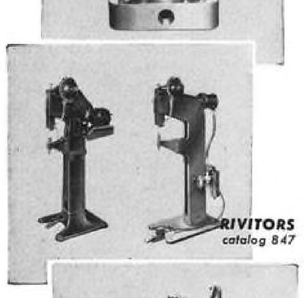

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For security reasons, little can be said about the armament changes, but great attention has been paid to servicing problems and an exceedingly low turnaround time, covering light servicing and re-arming, has been aimed at.

► **Mockups Helped**—Throughout the project the fullest possible use has been made of mockups and full-scale components for testing and space investigations.

Initially, mockups of both engine and armament installations in wood were made to fix the disposition of and access to the many units involved. This was followed by a metal structure, representing the skeleton of the fuselage. All structural members, except the skin, were accurately represented and actual components were mounted in their correct positions.

This served two purposes:

- **It confirmed the clearances** between equipment, engine, lines, etc., and the structure and access to these units.
- **It served as an assembly jig** for the first set of hydraulic, fuel and air lines, and electrical cables. Each line was tailored to fit and placed in its correct position, and as the rig was open, having no skin, many men were able to work simultaneously.

In this way, all pipes and cables for the prototype were assembled long before the fuselage structure was ready to receive them, and the usual difficulties and snags of prototype equipment installation were overcome while the structure was still being fabricated.

This rig has also acted as a training ground for the key assemblers who now form the backbone of the production final assembly line, and their knowledge and experience was gained with no interference with the structural assembly.

A complete fuselage was also fabricated and static-tested in a specially designed and erected loading machine. Loads corresponding to the worst that will be met in the air were applied to the structure by means of hydraulic rams, and strains and deflections measured by means of strain and dial gages.

Thus, before the prototype aircraft flew, a comprehensive knowledge of the actual strength of the aircraft had been obtained and it had been demonstrated that this strength was more than that required.

Hughes Sets Aircraft Plant Safety Record

The national safety record recently established at Hughes Aircraft Co.'s Culver City, Calif., plant for no lost-time accidents in industries associated with aircraft manufacturing, is attributed to a constant educational program and the work of 10 safety committees

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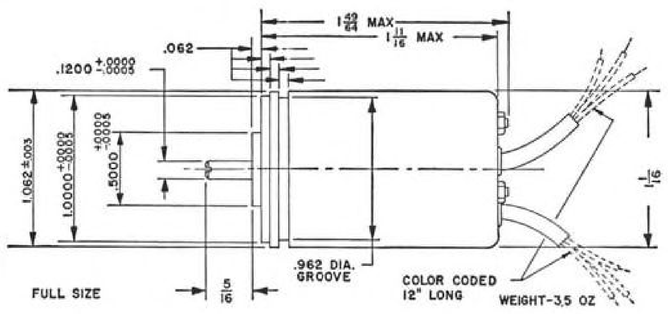
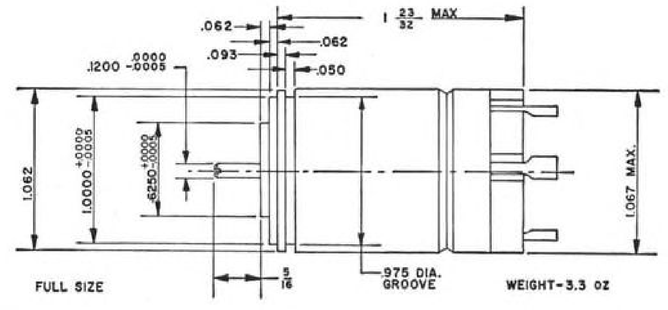
Kearfott developed Synchros ... *in production*



series R200 Control Transformers, Transmitters and Resolvers—maximum error spread 20 minutes of arc. Repeaters and Differentials—maximum error spread 30 minutes of arc. For 26 volt operation. Certain models for 115 volt and with variations in shaft dimensions also available.



series R500 Rugged, environmental-resistant unitized construction with guaranteed maximum error 7 minutes of arc from electrical zero. Average error spreads within 5 minutes. The accuracy of this series eliminates the need for complicated 2-speed Synchro systems in many applications. Advanced manufacturing techniques now make these performance advantages available at minimized cost.

Technical Data on other Synchro developments in various size ranges and for special applications available.

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comprising 300 persons to spot safety hazards.

The Hughes record—close to 6½ million man-hours when announced— exceeded the previous record of about 6.1 million man-hours, established about 11 years ago by Fisher Body Co.'s Detroit Aircraft Division of General Motors.

How to Predict Extreme Gust Loads

Extreme-value theory is being used by the National Bureau of Standards to aid in the solution of such problems as the effect of maximum gust velocities on aircraft structures.

It works something like this: You design an airplane structure for a given gust load, and you know that the structure will take that kind of a load in flight. What you would really like to know is how often that gust loading is likely to be exceeded. Extreme-value theory will give you the odds.

Or take the case of the tensile strength of a uniform bar of material. You would like to be able to predict its ultimate strength, but you can't by usual means. So you consider the bar to be made up of a large number of very tiny pieces and by means of the extreme-value theory, predict the strength of the weakest piece. That's the strength of the bar.

▶ **Origin**—Extreme-value theory is one of the statistical aids. It refers to an unconventional distribution of some phenomenon.

Normally, distribution of some occurrence—such as student grades in a test, to use a common example—is symmetrical about an average. This symmetry precludes the use of extreme-value theory.

But if the distribution curve is not bell-shaped, but distorted, and rises to a maximum on one side of the average, then the chances are greater that the larger values of the phenomenon will appear.

▶ **Flood Control**—This theory was first applied to the problem of flood controls. Currently it is being used to study gust effects.

Instead of measuring all the gusts which occur in a given test flight, a modified instrument records only the maximum value. Thus a single test flight gives only a single test point.

Data from a number of flights are collected and plotted and the graph shows the probability of exceeding the most violent gust in any other flight. In one example, the chances of encountering more-severe gusts than any which were measured during the flight-test program was about 5:1000.

The Bureau's program was originally sponsored by NACA.

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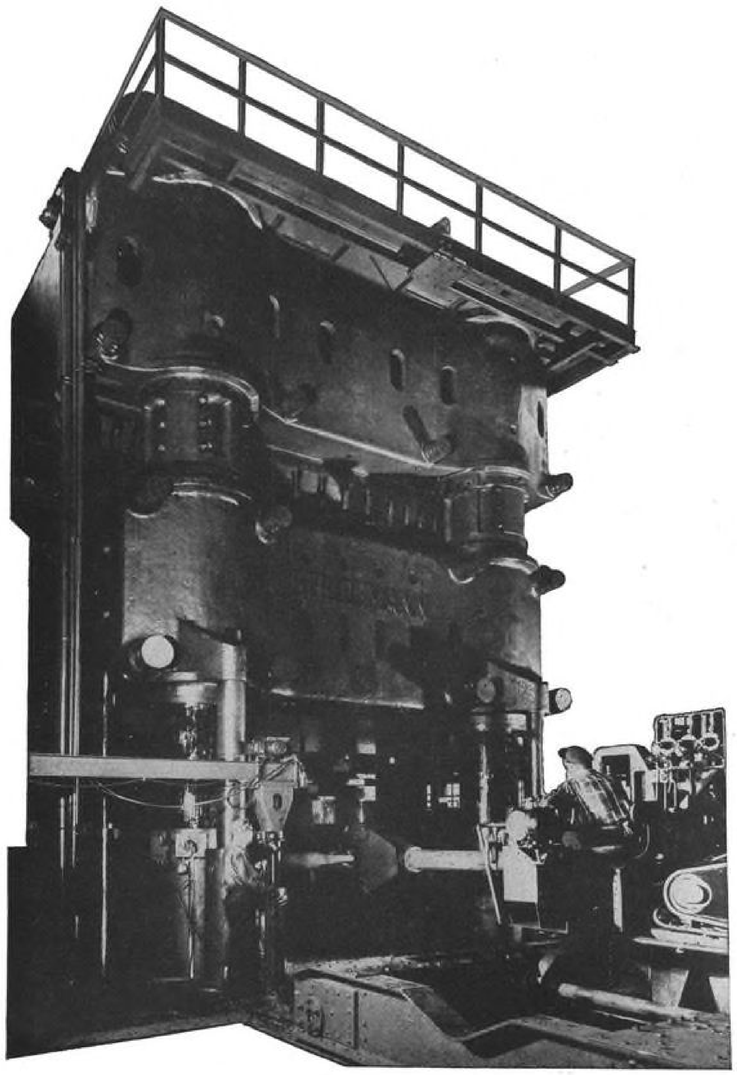

Lifted from a nearby preheating furnace by a giant manipulator, a 350-pound forging blank is brought into position between the polished dies mounted in the huge Schloemann press. Then, 15,000 tons of pressure flow the metal into a strong, complex shape—*another quality Alcoa® Aluminum Forging!*

The difference between this forging and others is more than a difference of size. The man at the manipulator, the man at the press control board are members of an Alcoa team which has had more aluminum forging experience than any other in the country. The alloy was developed, the dies were designed, and the metal-working temperature was selected by other members of this same Alcoa team.

As load requirements mount, aluminum forgings become the obvious choice in more and more aircraft applications. Your nearest Alcoa sales office—listed under "Aluminum" in your telephone book—is your short cut to 65 years of aluminum know-how. Aluminum Company of America, 1800-B Alcoa Building, Pittsburgh 19, Penna.

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IAS 22nd Annual Meeting Reports:

Biggest Attendance, Most Papers

New highs were established by the Institute of the Aeronautical Sciences at its twenty-second annual meeting in New York last month. The five-day session, which ran from Jan. 25-29, saw the following:

- **A greater number of papers** presented than ever before at an annual meeting of the Institute.
- **More technical sessions,** covering a greater number of aeronautical categories than have been the subject of previous meetings.
- **A larger attendance** than ever before, which gave the Institute a new target next year.

Greatest emphasis was placed on aerodynamics, aeroelasticity, electronics, and rotating-wing aircraft. Other sessions included structures, meteorology, aeronautical engineering education, aircraft design, motorless flight, flight safety, air transport, flight propulsion, and rocket propulsion.

Participating organizations included the American Helicopter Society, Institute of Radio Engineers, Institute of Navigation, Radio Technical Commission for Aeronautics, American Meteorological Society, American Society for Engineering Education, Soaring Society of America, American Physical Society, Daniel and Florence Guggenheim Aviation Center at Cornell University, and American Rocket Society.

AVIATION WEEK presents here summaries of papers delivered at the various technical sessions. Because of the length of this material, it will be necessary to present it in installments, of which this is the first.

Aeroelasticity

► **A Theoretical Investigation of the Oscillating Control Surface Frequency Response Technique of Flight Flutter Testing.** Raymond A. Pepping, Chief Dynamics Engineer, McDonnell Aircraft Corp.

A theoretical background is presented for a frequency response technique of flight flutter testing using harmonic deflections of a control surface as the excitation mechanism. A graphical method is outlined for defining system flutter stability from measured driving control surface hinge moment per unit control surface deflection. Computed results for a specific flutter system are presented to exemplify the method of data interpretation.

It is shown that, without complicating the interpretation of test results, the control surface restraint of the test article can be tailored to provide added or artificial stability for testing purposes. This indicates the possibility of flight flutter testing, with safety, up to, or slightly beyond, the critical flutter velocity of the normal configuration and obtaining measured data from which to define this critical velocity.

► **An Approach to the Buffeting of Aircraft Structures by Jets.** John W. Miles, Consultant, Santa Monica Division, Douglas Aircraft Co., Inc., and Associate Professor, Department of Aeronautical Engineering, U.C.L.A.

Experience has shown that the fluctuating loads induced by a jet may cause fatigue failure of aircraft structural components. In order to throw some light on this and similar problems, the stress spectrum and the "equivalent fatigue stress" of an elastic structure subjected to random loading are studied.

The analysis is simplified by assuming the structure to have only a single degree of freedom and by using the concept of cumulative damage, the results being expressed in terms of quantities that can be directly measured. As an example, a similarity expression for the probable value of the equivalent fatigue stress of a panel subjected to jet buffeting is derived.

► **The Story of Shimmy.** W. J. Morcland, Chief, Mechanics Research Branch, Aeronautical Research Laboratory, WADC, Wright-Patterson Air Force Base.

A theory of landing-gear shimmy is de-

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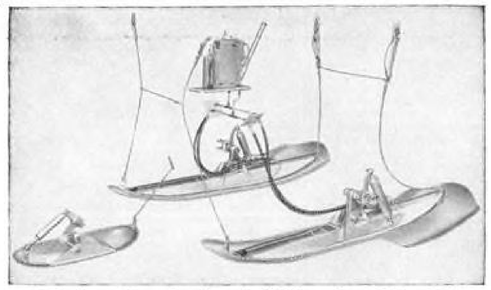

Exploded view (above) of typical light plane Wheel-Ski installation showing complete hydraulic actuation mechanism, power pack unit, ski attachment axles and mechanical rigging. Federal Wheel-Skis can be interchanged between most popular aircraft within the same gross weight category by obtaining the proper installation conversion kit.

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veloped in which the basic assumptions involving the part played by the tire, the airframe, and the gear proper have been individually submitted to direct test.

Analysis and analog studies of the theory are used to establish a design procedure for obtaining a stable gear with a minimum of artificial damping.

The predictions of the theory have been tested on a model whose parameters can be varied to simulate nose-gear structures of light highspeed fighters, as well as heavy bombers.

A complete description of the model and a summary of the test results are presented in the paper.

Full-scale field test results are given for instrumented fighter, bomber, and cargo-type aircraft.

Rotating-Wing Aircraft

(Joint Session in Cooperation with the American Helicopter Society)

► **Economic Considerations of the Transport Helicopter.** James B. Edwards, Santa Monica Div., Douglas Aircraft Co., Inc.

A review of present operational and planning phases relative to the design of commercial transport helicopters and an examination of anticipated future requirements in the field.

► **Design of The Transport Helicopter.** David E. Postle, Dir. of Research, Mohawk Airlines, Inc.

This paper presents a survey of the role of the helicopter in scheduled air transportation; a review of experience of the local service air lines with the DC-3; an analysis of desired performance characteristics, power requirements, operating range and fuel requirements, and aircraft utilization and accessibility of components; and a discussion of furnishings, special equipment, cockpit standardization, cargo accommodations, and the noise problem.

► **The Helicopter in Transport Service.** Igor I. Sikorsky, Engineering Manager, Sikorsky Aircraft Div., United Aircraft Corp.

A presentation of present and future possibilities in the development of transport helicopters and their use, based on an assessment of the experience of the past few years in military and commercial operation.

► **The Local Service Air Carrier Design Requirements for the Transport Helicopter.** Byron A. Moe, Director, Operational Planning, Allegheny Airlines, Inc.

The rapid development of the helicopter as a vehicle for short-haul air transportation accentuates the need for constructive design planning that will permit an early entry of this machine into the scheduled air transport industry.

Although the various military services have achieved much success with the helicopter, the final test of this aircraft as a part of our transportation system can only be determined under the conditions of all-weather scheduled air carrier operation.

In an effort to provide the most orderly transition of this vehicle from its strictly military function to that of commercial acceptance, those design requirements peculiar to the air transport industry should be resolved at the earliest possible time.

Aerodynamics

► **Transition-Point Fluctuations in Supersonic Flow.** J. C. Evvard, Chief, Supersonic Propulsion Div., M. Tucker, and Warren C. Burgess, Jr., Aero Research Scientists, Lewis Flight Propulsion Lab., NACA.

Random movements of the transition point location on a 10-deg. cone were observed at supersonic speeds by means of many flash schlieren photographs. Distribution functions that statistically define the transition point location were determined for several Mach numbers, Reynolds number per foot, and free-stream turbulence intensities in two supersonic windtunnel facilities. Concomitant temperature recovery factor distributions were measured for all test conditions.

The axial extent of the transition point distribution function determined from schlieren data increased with tunnel turbulence level. Corresponding axial extensions of the transition region denoted by recovery factor measurements were observed. The data suggest that a sharp transition from laminar to turbulent flow takes place and that this flow pattern moves randomly along the aerodynamic surface. Utilizing the statistical distribution functions obtained from schlieren data and surface temperatures as time averaged by the surface thermocouples, a hypothesized instantaneous surface temperature distribution has been calculated for eight sets of experimental measurements.

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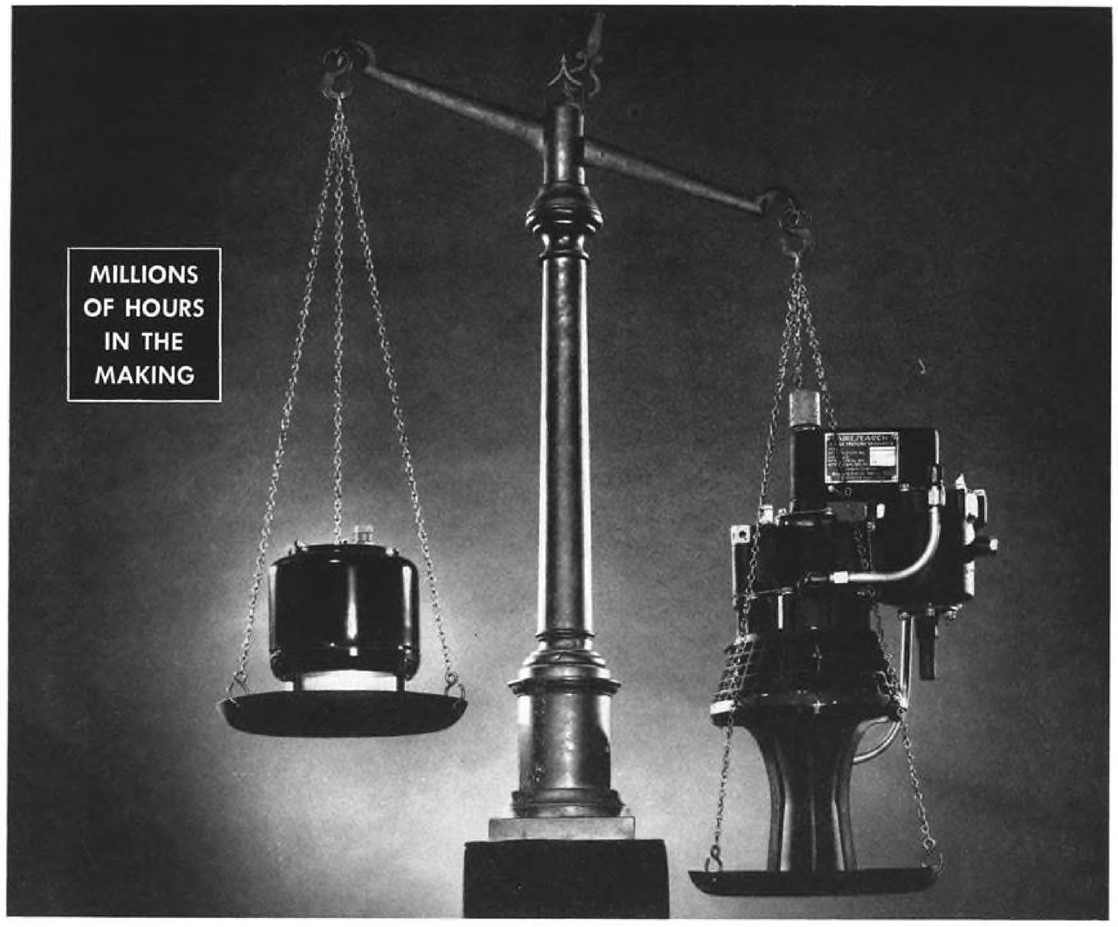

NEWEST AiRESEARCH CABIN PRESSURE REGULATOR

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AiResearch, pioneer in aircraft cabin pressurization since 1939, produced all the regulators for the Boeing B-29, only pressurized World War II airplane. These units had an airflow capacity of 15 pounds and weighed 10 pounds.

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Since 1939 AiResearch engineers have spent millions of hours developing and testing scores of regulator models. More than 60,000 pressure regulators have been produced for U. S. aircraft alone, along with thousands of other cabin pressure controls for both military and commercial aircraft.

Development of the cabin pressure regulator is another example of how AiResearch achieves ever greater performance from smaller size and weight at lower cost.

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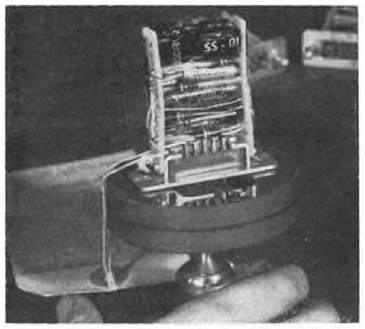
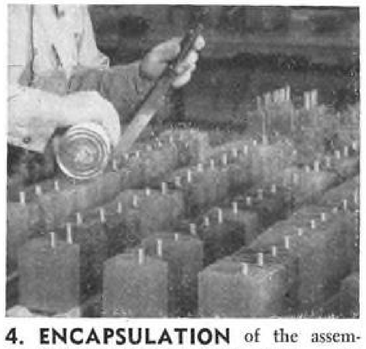
Designer and manufacturer of aircraft equipment in these major categories

1. POTTED PLUG-IN units start here, with hand-assembly and soldering. They are used throughout newer equipments.



2. WIRED plug-in looks like this before potting. Unit may have up to 3 tubes. Air Arm pots 66 different circuits.

3. DIP in non-hardening plastic provides soft cushion to protect internal parts.



4. ENCAPSULATION of the assembly is accomplished in these molds, which give unit rugged container. Another Air Arm specialty is magnetic amplifiers.

Westinghouse Air Arm Division Looks for 'Tough' Avionics Jobs

By Philip Klass

Baltimore—A visit to the new multi-million dollar plant which Westinghouse Electric Corp. has built near Friendship Airport to house its Air Arm Division, and conversations with officials who run the operation, indicate that Westinghouse intends to maintain, and hopes to expand, its recently won role as one of the nation's major producers of military fire control equipment.

Radar fire control systems, developed and produced here, will equip the Navy's newest jet interceptors to track down enemy bombers, day or night, and are slated for use in new British interceptors. Air Arm officials also hope to crack the Air Force fire control market, currently dominated by Hughes Aircraft Co.

The Air Arm Division has also developed, and is producing, bomber-type defensive armament in the form of a radar-controlled gun turret for a new Navy attack bomber. Westinghouse autopilots, another Air Arm product, are in use on USAF's Lockheed F-94C and slated for later models of the Republic F-84F.

► **Recent Entrant**—Compared with companies like Sperry and Bendix, Westinghouse is a recent comer to the avionics field. Despite this, Westinghouse lays claim to several impressive "firsts," including:

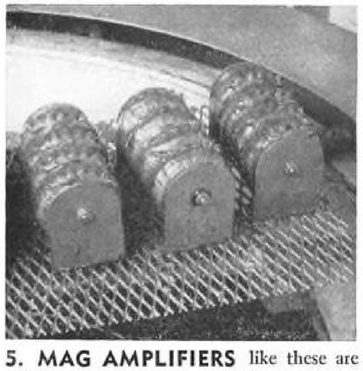
• **First radar combat kill.** Navy Douglas F3D, equipped with Westinghouse fire control and flown by Marine Corps crew in Korea, is credited with first interceptor radar kill in combat (AVIATION WEEK Feb. 9, 1953, p. 13).

• **First production fire control autopilot.** W-3A autopilot, used on the F-94C, is called first production-type equipment designed to maneuver interceptor into firing position in accordance with signals from (Hughes) radar-computer.

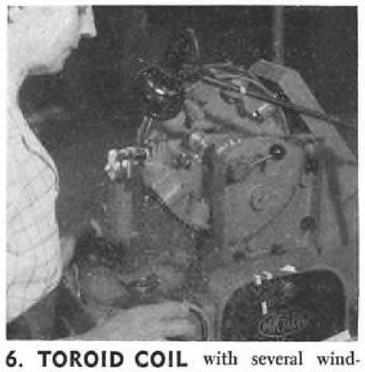
• **Mag amplifier pioneer.** Westinghouse says it has pioneered in this country the widespread use of rugged magnetic amplifiers to replace vacuum tubes in avionics equipment.

► **Change in Policy**—The Air Arm Division, formed about two years ago, represents an integration of most (but not all) of Westinghouse's avionics activities under one roof, and an expansion of these activities. As such, it is a sharp departure from the company's pre-World War II policy.

Prior to the war, Westinghouse's sales to the military consisted largely of modified versions of its standard industrial products, such as turbines, motors, switchgear, and controls. When war came, the company's consumer goods and other non-essential facilities were converted to producing combat-type military items. The company found itself manufacturing a strange assortment of items, many foreign to its normal lines, many designed by other companies which had been engaged in purely military work prior to the war.



5. MAG AMPLIFIERS like these are widely used as rugged long-life substitutes for servo system vacuum tubes in Westinghouse Air Arm equipments.



6. TOROID COIL with several windings forms the heart of the mag amplifier. Toroid is wound on plastic-encapsulated Hypernick core by this Micafil machine.

Like many others, Westinghouse had its problems in adapting the drawings, designs and production techniques of other companies to a manufacturing organization accustomed to its own long-established procedures and techniques, according to Frank W. Godsey, Jr., manager of Westinghouse's several Baltimore divisions (which include Air Arm, Electronics, and X-Ray, the latter two located separately from Air Arm).

► **Lesson Learned**—This wartime experience was one factor behind the company's postwar move to set up permanent engineering and manufacturing facilities devoted to military avionics work during peacetime. "In the event of war, Air Arm can feed designs, know-how, and work to our civilian product plants, and we are set up to do it speedily," Godsey says. But there were other factors behind the formation of the Air Arm division.

"The more complex weapons systems require companies with considerable breadth, including finances, facilities, and know-how," Godsey points out. Westinghouse has such breadth and feels a corporate responsibility to take on such difficult defense assignments, he points out.

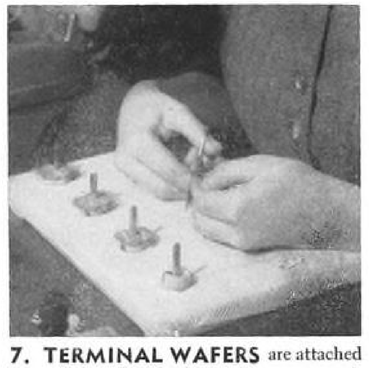
► **Military Business Attractive**—Westinghouse management also considers military business attractive, despite its relatively low profit return on sales, Godsey says. Reason is that the company puts more emphasis on percentage return on assets than return on dollar sales, he says. "With reasonable aggressiveness," Godsey expects Air Arm to prove a financially attractive partner to the company's normal industrial and consumer divisions.

In 1954, Air Arm expects to ship $70-$100-million worth of avionics

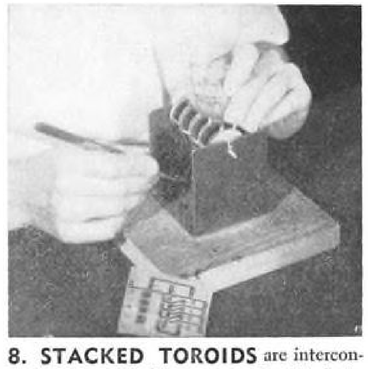
WESTINGHOUSE'S NEW AIR ARM PLANT is located adjacent to Baltimore's Friendship Airport, facilitating flight testing. Hangar connects with airport by taxi strip.

ENVIRONMENTAL TEST CHAMBER is used by Westinghouse to subject equipment to full operating rigors. Plant also has a firing range, complete with cold chamber.

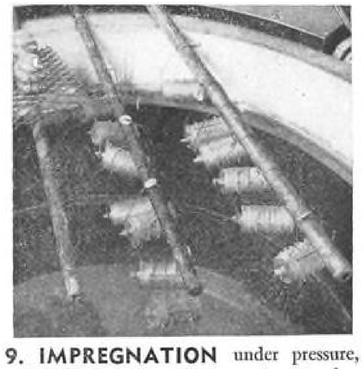
BATTERY OF ANALOG COMPUTERS is used in work on autopilots and fire control systems. Computers are connected to aircraft control mockups in adjoining room.



7. TERMINAL WAFERS are attached to each toroid after it has been wrapped, and individual windings are soldered to the terminals by the assembler.



8. STACKED TOROIDS are interconnected as required by means of printed circuit strip wrapped around the assembly and then dip-soldered to the terminals.



9. IMPREGNATION under pressure, and baking, make unit impervious to humidity. Westinghouse says special impregnant helps mag amplifier dissipate heat.

equipment, Godsey says, and he adds this is "far below ultimate capacity." Total plant employment, now at 2,700, is expected to rise to 4,000 by year end.

► **Air Arm Nucleus**—When Air Arm was formed, the nucleus of the new division came from Westinghouse's Special Products Division. This was a "catch-all" for company activities which did not fit logically into regular industrial or consumer lines. This division first got into military avionics work early in World War II when it was asked by the USAF to develop a computer for the B-29 fire control system, as a backstop to the General Electric program.

The division also did gyro stabilization work for application to Army tanks and to the Douglas B-26 periscopic gunsight. This in turn led to the development, after the war, of the company's autopilot, the first in this country to use rate-type gyros throughout.

As the state of interceptor fire control art advanced to the point where engineers were considering tying the radar-computer into the autopilot, it became apparent that a rate-gyro type of autopilot was needed. When Lockheed decided to try such a "closed loop" system in its F-94C, Westinghouse had the jump on competition and landed the autopilot contract.

► **Air Arm's Role**—Air Arm sees its avionics role as the development, design, and manufacture of complex airborne systems, such as aircraft fire control and stabilization, missile guidance and stabilization, according to B. M. Brown, recently appointed division manager. The division generally is not interested in "bits and pieces" type of business, says it cannot hope to compete with the "loft-type operator" on products with a low engineering content.

Not all of Westinghouse's avionics work is assigned to Air Arm. Aircraft electrical generation and distribution system equipment is handled by the Aviation department of the company's Small Motor Division at Lima, Ohio. Large land and ship-based radar is the responsibility of the Electronics Division, Baltimore. If this radar is destined for use in aviation, Air Arm and Electronics divisions may work jointly on the project.

Asked about Air Arm's interest in commercial aviation, Dr. S. W. Herwald, manager of engineering replied: "If the airline problem is as tough as the military, we're interested." (Air Arm has designed an instrument approach aid flight director which American Airlines is currently testing on a Convair.)

Plant Facilities

The new 452,000-sq. ft. plant adjacent to Friendship Airport is ideally located for Air Arm's mission. For instance, the type of avionics equipment which Air Arm designs requires lots of experimental flight testing, usually involves frequent modifications and quick fixes. This makes it desirable to keep flight test activities close to the engineering department.

► **Everything Is Handy**—Air Arm's 25,000-sq. ft. flight test hangar is located only 150 yards from the main plant, and is connected by a short taxi strip to the main airport runways. Friendship has two 9,500-ft. runways (with room for two more parallel runways), making it suitable for Air Arm's jet operations. It is currently flying a Navy F3D and a USAF F-94C. The airport is equipped with both ILS and surveillance radar.

Baltimore itself is the site of the USAF's Air Research & Development Command, and is only half an hour away from the Navy's BuAer and the Pentagon in Washington. The Navy's air evaluation center at Patuxent River, Md., and the Wright Air Development Center at Dayton are also handy.

► **New Firing Range**—Adjoining the taxi strip, a firing range is being constructed which will enable Air Arm engineers to check gun turret performance (dispersion patterns, ammunition feed, etc.) with the equipment installed in the airplane. To check turret performance under extremely cold conditions, a chamber is being installed on the firing range which will permit turrets (uninstalled) to be fired at temperatures as low as −55C.

Environmental test facilities within the plant itself include: altitude, temperature, humidity, salt spray, fungus, sand blast, impact, and a circular accelerometer. One test chamber, large enough for personnel to enter, can simulate altitudes up to 80,000 ft., at temperatures of −55 to 200F.

By going to such extensive (and expensive) test facilities, Westinghouse expects to prove out practically all aspects of equipment design itself and not wait until military evaluation tests have pointed up equipment shortcomings.

► **The Factory**—The Air Arm plant, like most new ones, consists of a single-story factory area, with office area and engineering labs in a two-story structure adjoining two sides of the factory. The plant is well lighted, 50 ft-candles per sq. ft., and occupies an area of about 11 acres on the 75-acre plot which Westinghouse owns.

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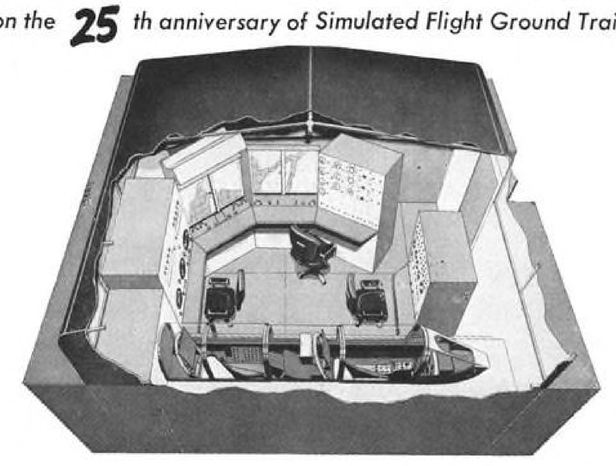

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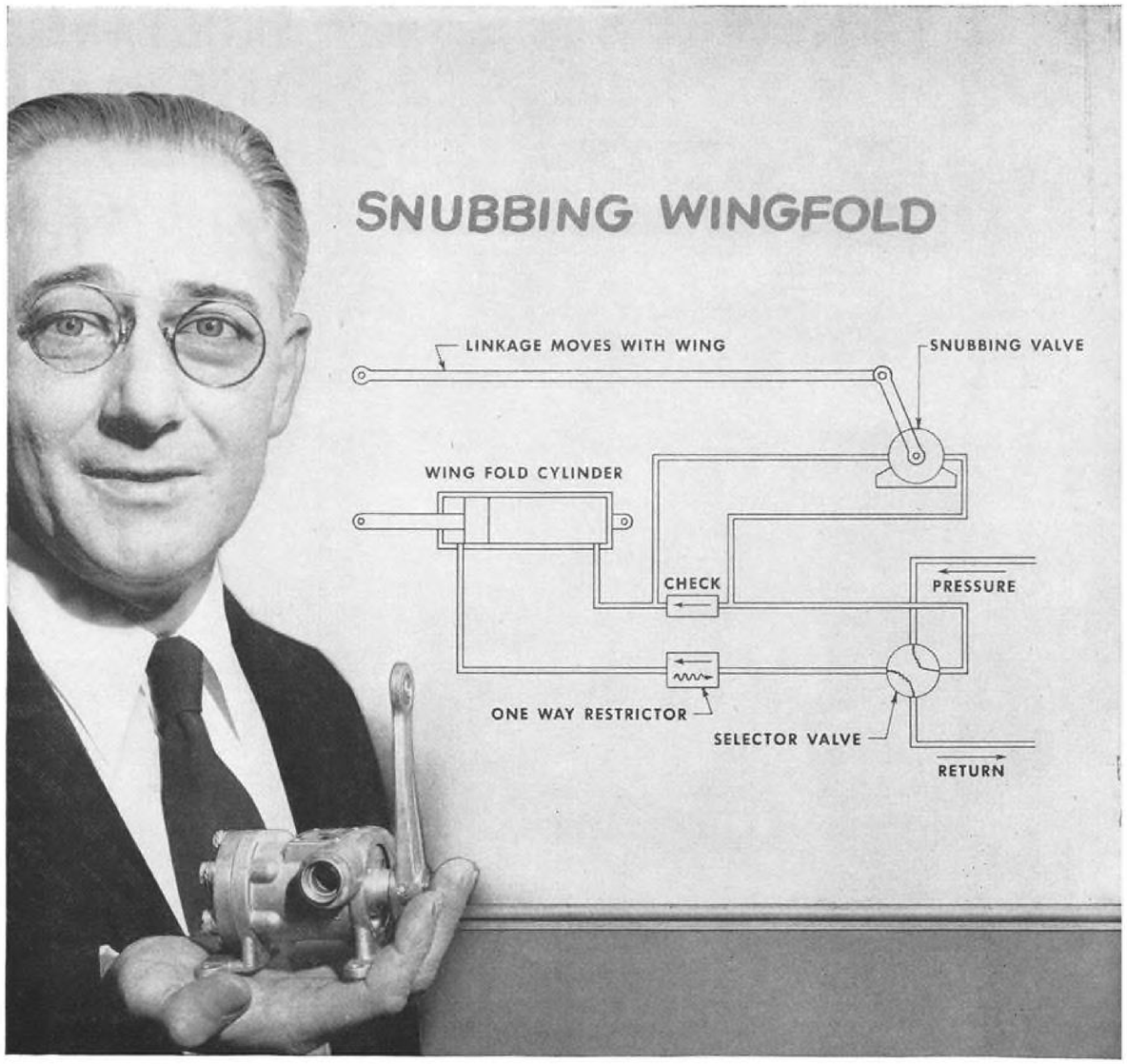
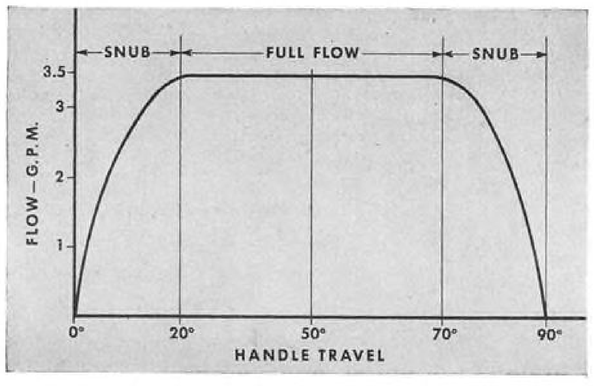
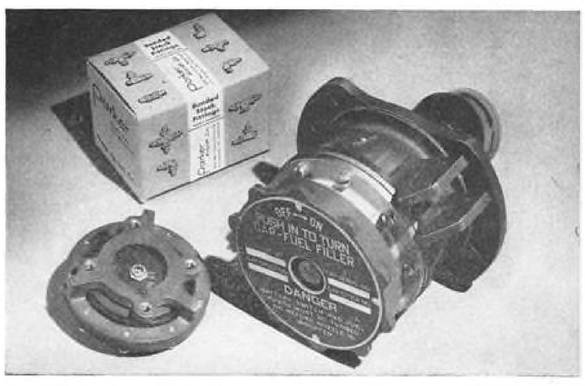




Flow vs. handle travel at 60 psi. maximum pressure drop shows how new Parker shear-plate valves provide fine metering at each end of the plate travel.



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Adaptability of new Parker valve helps simplify hydraulic-system design

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"Parker's shear-plate valves are also intriguing to designers," he continues, "because they can provide the best snubbing available. This snubbing is the result of metering at each end of the plate travel . . . made possible by the tear-drop shape of the ports.

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plant, Westinghouse farmed out production of its W-3A autopilot (for the F-94C) and early models of its Navy fire control systems to other divisions of the company. Rather than transfer these projects midstream, the company decided to finish out production of these older designs in their original locations. Only new designs, now going into production for the first time, are being manufactured at the new Air Arm plant.

▶ **Comparison With Hughes**—Inasmuch as Westinghouse and Hughes Aircraft both produce fire control equipment, it is natural to compare their factories. An observer quickly notes two marked differences. The Air Arm plant has comparatively few precision machine tools and has practically none of the automotive-type production lines found at Hughes.

Whereas Hughes has a large number of imported precision machine tools, the Westinghouse plant uses U. S.-built machines entirely, except for Swiss Micafil toroid coil winders, according to R. K. McDevitt, manager of manufacturing. Major reason for this, is the different design approaches which Westinghouse and Hughes have used in their fire control computers.

Although both computers are analog types, Westinghouse performs its computations electrically, using non-linear potentiometers; Hughes uses essentially a mechanical-type calculator (in current systems), which involves precision gears, differentials and linkages.

▶ **Different Philosophies**—The absence of automotive-type production lines at the Air Arm plant is due to different operating philosophies. Westinghouse does not think it is justified in going to the added expense for a relatively low-production equipment.

One spokesman expressed overall Air Arm philosophy this way: "We think the Air Arm manufacturing plant should be geared to small quantity production runs expected from peacetime military needs and for pilot production runs of new equipment needed in time of war. Heavy production runs should be fanned out to other (Westinghouse) plants set up to handle manufacturing on that scale."

Westinghouse is proud of its modern plating room, which can turn out 67 different types of plating. Familiar overhead exhaust hoods for fumes have been replaced by a side and underneath ducting system. A quality-control lab in one corner of the plating room is used to check samples of the plating solutions at regular intervals.

Air Arm has helped develop a new technique for bending radar waveguides which greatly reduces fabrication costs. The bending technique involves the use of chain inside the waveguide.

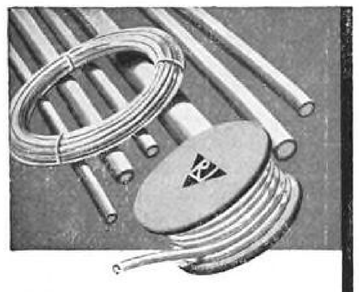
Design Philosophy

The basic engineering philosophy at Air Arm, as expressed by Dr. Herwald, is to advance the state of fire control art by modest-sized, reasonably safe steps, rather than to risk a bold venture which carries much greater risk of failure. This doesn't mean that Westinghouse is reluctant to explore radically new approaches. However, Herwald feels these should be investigated independently and that the nation's defense should not be committed to an unproven theoretical possibility.

If the Westinghouse approach is more conservative than that of Hughes Aircraft, it reflects the fact that the Navy, its principal fire control customer, has a more conservative air defense program than USAF. It may also reflect the fact that Westinghouse is an old line company; Hughes is brand new.

▶ **Plant Many Seeds**—Herwald feels that industry should "plant lots of development 'seeds,' recognizing that many won't mature or prove out." Interestingly enough, Westinghouse thinks that the avionics companies should do more development with their own funds. Air Arm policy is to chart a logical course of future development, use military funds wherever possible, fill the gaps with its own money.

For example, Westinghouse con-



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cluded that there was a need for a new type of equipment for highspeed day fighters. With its own funds, Air Arm developed such a unit and is now attempting to interest the military services.

▶**Getting More Out**—Herwald thinks that present radar fire control art may be fast approaching the point of diminishing returns. He believes that more efforts should be devoted to enabling the military users to get more of the potentially available performance out of their equipment.

For example, Herwald believes that fire control equipment must be made easier for the operator to use, more foolproof. In designing its newest system, Air Arm called in psychologists, consulted with BuAer and Naval Research Lab engineers. The result, Herwald says, is a big improvement over the predecessor equipment, but there's still room for improvement, he adds.

Herwald can see advantages for the military if all fire control equipment manufacturers (both Navy and USAF) could standardize the operational aspects of their equipment, much like auto manufacturers some years ago standardized on gearshift positions.

▶**Greater Reliability**—Greater equipment reliability is another way of getting more out of the existing state of the art. One Westinghouse approach to this objective is the wide use of magnetic amplifiers in its autopilot, computer, and radar servo systems. Magnetic modulators for radar are also under development to replace hydrogen thyratron tubes.

Herwald points out that the only basic limitation to the wider use of mag amplifiers is their comparatively low frequency response. This can be improved by the development of better magnetic core materials and/or the use of a higher a.c. supply frequency. Westinghouse is exploring both avenues.

As a company, Westinghouse is heavily committed to magnetic amplifiers, and is doing much basic research on core materials. Company has spent a million dollars in mag amp manufacturing facilities, much of it at Air Arm.

The other approach under study at Air Arm is the use of magnetic frequency converters to raise the basic supply frequency (400 cps.) by a factor of three or more. When mag amplifiers are operated at 1,200 to 2,000 cps., extremely high performance servo systems are possible.

▶**Mag Amp-Transistor Combination**—The attractive features of transistors and mag amplifiers have led Westinghouse, like others, to use both in combination, for experimental servo amplifiers.

Air Arm, however, is wary of using transistors in production equipment until more reliable units are available. Meanwhile, the division is experimenting with transistors in a variety of radar and servo circuits.

▶**Another Approach**—For those circuits where tubes are required, Air Arm uses small plug-in units, consisting of one, two or three sub-min tubes, associated wiring, and components, all rigidly encapsulated in plastic for ruggedness. Air Arm produces these in 66 different potted circuits, in six different size units, for use in its radar, computer, and autopilot approach coupler.

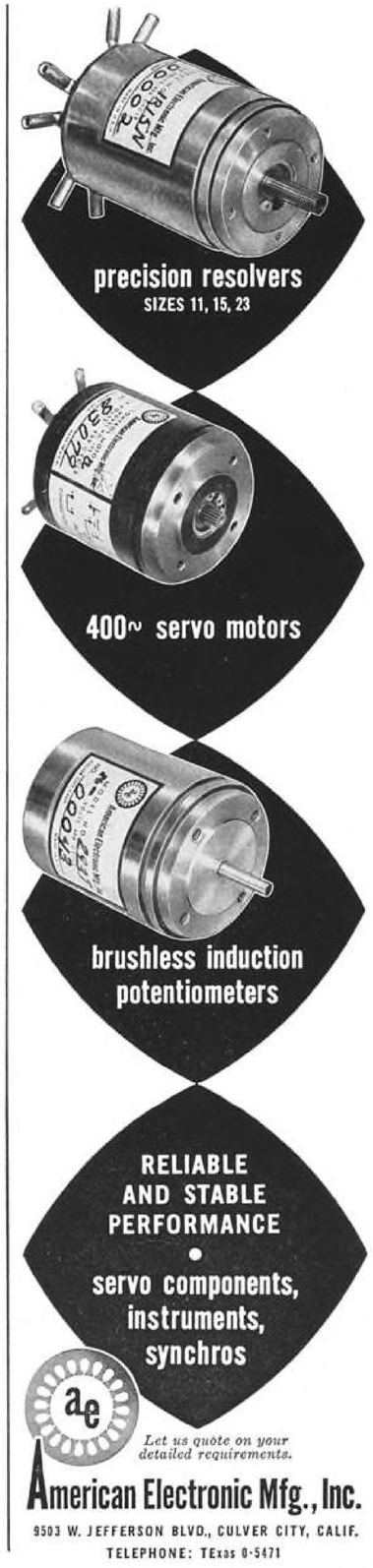
Wide use of these plug-in units permits compact chassis layout and eliminates the familiar "rat's nest" of exposed chassis wiring and components. Even more important, it simplifies trouble shooting and repair. The fault need only be traced down to the defective plug-in, which can quickly be replaced. Defective units are discarded since encapsulation prevents internal repair.

▶**Major Contribution**—Westinghouse has made a significant contribution both to easier maintenance and to improved reliability with a new single-package fire control system. All of the many components, except for the cockpit indicator and amplifier, are fitted on to a frame so they conform to the contours of an interceptor's nose section. The complete system-package can be quickly installed or replaced as a unit; individual components in the package are also easy to replace.

To appreciate the importance of this

Ground-Air Pack-Set

Target spotter for USAF's ground support aircraft, equipped with four-channel 26-lb. UHF communications pack-set, can operate from frontline vantage points which are inaccessible to radio-equipped jeeps previously used. New AN/PRC-14, designed under Rome Air Development Center sponsorship and manufactured by Air Associates, Inc., weighs half as much as its predecessor. Air Associates is currently designing an even smaller, lighter-weight set.



single-package construction, one has only to look at the F-94C's fire control system, with some 35 "black boxes" scattered around the nose section. However, this Hughes system is of an earlier vintage than the new Westinghouse package. It is possible that newer Hughes systems now under design will come in single-package-type construction.

▶**Other Advantages**—The single-package construction permits Westinghouse to fabricate and furnish practically all of the interconnecting wiring between system components, simplifying the initial installation by the aircraft manufacturer.

Another advantage of the packaged construction is that a single ducted cooling system can serve all of the black boxes in the package, with the amount of cooling air for each set according to its internal heat dissipation. This is a more efficient arrangement than the more common practice of putting individual cooling fans in each box.

From a logistics standpoint, the new Westinghouse packaged system is particularly attractive to the Navy. Except for cockpit accessories, the same fire control package can be used on all of the Navy's new crop of interceptors.

▶**Push to Test**—Westinghouse has made it easy for a pilot, radar operator, or maintenance man to spot-check its new fire control system. Equipment can be checked by setting up a test problem (using special built-in circuitry), pushing a button, and then watching the radar scope. Air Arm believes strongly in built-in test provisions, wherever feasible.

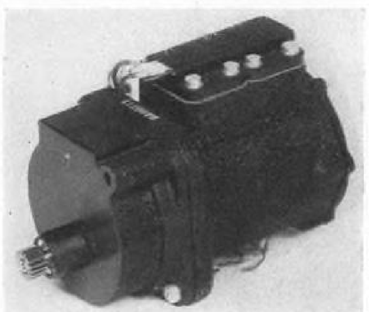
External test equipment for field use is also required and Air Arm has set up a separate group whose prime function is to get such equipment designed and out on time. The group handles test equipment design for all Air Arm products.

Westinghouse says it has been delivering equipment instruction books in advance of the equipment itself, a very desirable, but not-too-frequent practice in the industry.

Another maintenance aid is an elapsed-time meter which keeps a running tabulation of the number of hours the fire control is operated. This permits establishing maintenance and overhaul periods based on equipment use, instead of on the less significant airplane hours.

▶**Engineering Staff**—Air Arm engineering department numbers around 1,000, of whom approximately 500 are graduate engineers or scientists, 150 are draftsmen. The balance are in supporting functions, including model shop and flight engineering. Many of the Air Arm test pilots are also engineers, an important requirement when testing complex equipment in a single-place aircraft.

The Air Arm engineering staff is effectively larger than its numbers would indicate, Herwald emphasizes. Reason is that the division draws on engineering talents in other company divisions,



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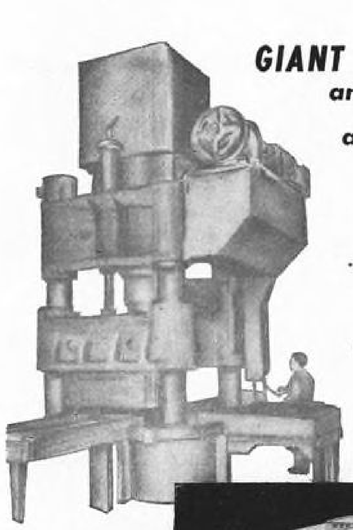
Lightweight actuator, weighing under 2 lb., developed by Minneapolis-Honeywell's Aeronautical Division for avionic use, consists of two-phase 400-cps. induction motor, velocity signal generator, and 50:1 gear train. Output torque of new model MG13A is rated at 1 in.-lb. for continuous duty, 1.4 in.-lb. under stalled conditions. It measures 2⅛ in. dia. and 5 in. long. M-H says actuator meets all appropriate MIL and AN specs.



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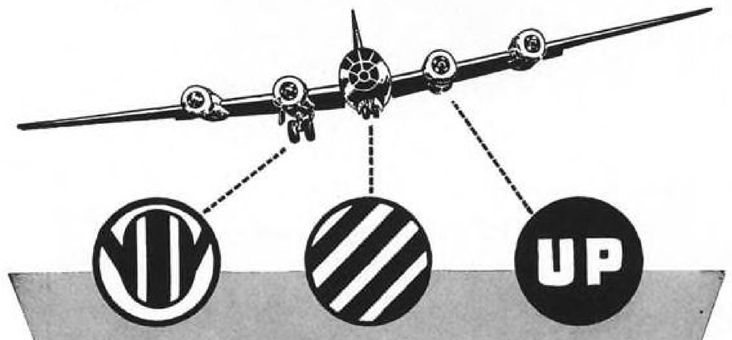

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► **Airplane Simulation**—Because much of its work involves servo system and airplane stability problems, Air Arm has the familiar battery of analog computers (Reacs). To provide realistic closed-loop tests, complete duplicates of the airplane's control and boost systems are constructed in a room adjoining the computers; one mock-up for each type airplane under study.

The mock-up is constructed with a manufacturing tolerance build-up which represents the most adverse condition from a stability standpoint, Herwald says. To assure that the mock-up accurately duplicates the airplane, frequency response tests are run on both before the mock-up is used for computer runs, Herwald adds.

In fire control systems, the human pilot (or radar operator) becomes a part of the overall system; his reaction time affects system performance. Air Arm also constructs cockpit mock-ups for its fire control studies which permit human reaction time to be included as an input to the analog computers.

Air Arm expects shortly to supplement its present computer facilities with a three-axis rate table; at present it has a single-axis table.

► **Frustration and Hope**—It is a source of frustration to Air Arm people that Westinghouse has not yet been able to crack the Air Force fire control market, or the Navy autopilot market. The result is that a Westinghouse autopilot and coupler is being used to "close the loop" on the F-94C, equipped with a Hughes radar-computer; Navy interceptors, equipped with Westinghouse radar-computer system, use General Electric (and other) autopilots.

Westinghouse would like to sell a complete closed-loop system, entirely of its own making. E. F. Coy, manager of application engineering, and his assistant, G. T. Ringe, both have high hopes of doing this.

FILTER CENTER

► **Project Tinkertoy School**—Sanders Associates, Nashua, N. H., is conducting training programs to familiarize industry engineers and manufacturing personnel with Tinkertoy-type electronic design and manufacturing techniques. (Sanders participated in the Navy-Bureau of Standards automatic factory development program.) A one-week introductory lecture course costs $600 a person. A two-week advanced lecture and lab course costs $800 a week. One manufacturer, in conversations with AVIATION WEEK, questioned whether high fees might discourage smaller com-

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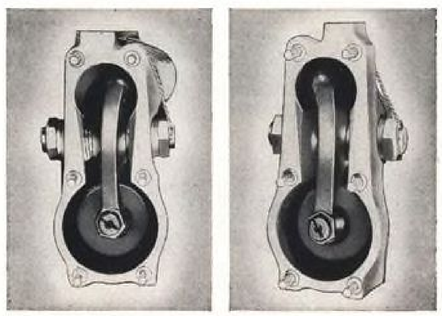

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panies from sending representatives. Sanders says it is offering the courses as a service to industry. Enrollments will be accepted only until Feb. 19.

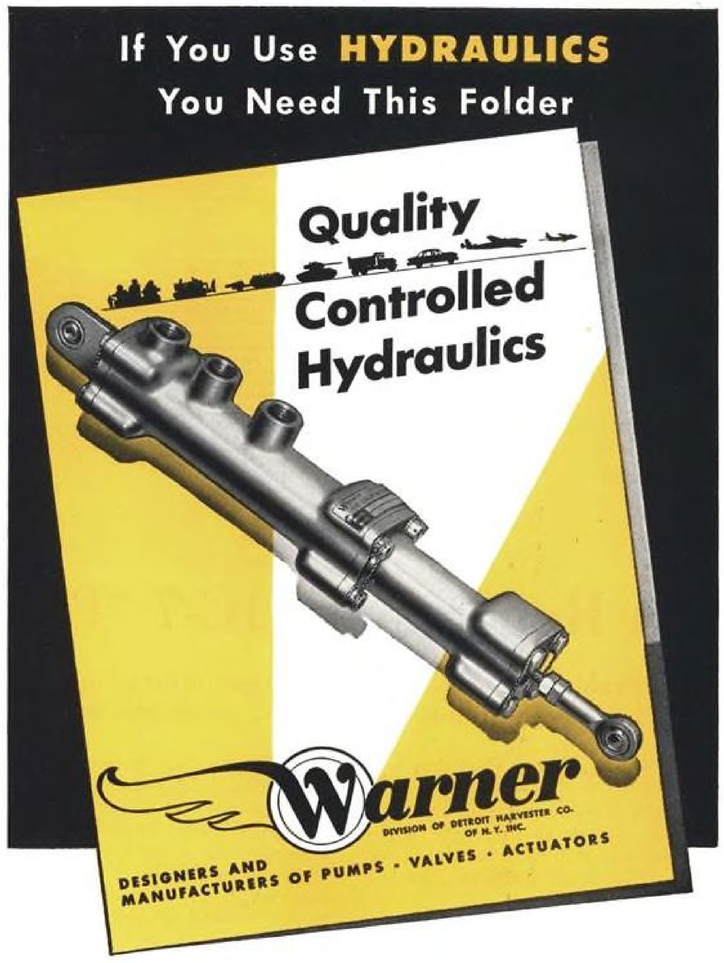
► **World's Tiniest Relay?**—Watch for G. M. Giannini & Co. to announce a pea-sized relay, possibly the world's smallest—at least this side of the Iron Curtain. New relay will be hermetically sealed in glass, will be available in either single-pole normally open or normally closed models. Device will be made in East Orange, N. J.

► **M-H Tests Fire Control Coupler**—Minneapolis-Honeywell says it has developed and successfully tested an interceptor fire control system coupler for its autopilot which enables an interceptor's radar-computer to maneuver the plane automatically into firing position. The test plane is believed to have been a Northrop F-89D, which uses the M-H E-11 autopilot. For its coupler design studies, M-H purchased additional batteries of analog computers to enable it to conduct simultaneous three-axis simulation.

► **New Microstrip Licensees**—Two microwave component manufacturers have signed license agreements with International Telephone & Telegraph Co. to manufacture its newly developed Microstrip (printed-circuit) microwave components and plumbing, following IT&T's licensing offer to the industry (AVIATION WEEK Nov. 30, p. 54). A company spokesman reports a third firm is ready to sign. The two licensees are: Carl W. Schutter Manuf. Co., Lindenhurst, L. I., N. Y., and Diamond Manuf. Corp., Wakefield, Mass.

► **ANDB Rejects Ekco Radar**—Evaluation of the British E. K. Cole "poor man's GCA" (AVIATION WEEK Dec. 8 1952, p. 59) by the Marine Corps under Air Navigation Development Board sponsorship, showed it to be inadequate for landing either fixed-wing aircraft or helicopters, an ANDB spokesman says. Tests showed that it was too difficult for operator to keep his radar antenna aligned on the approaching aircraft and that the use of indicating lights and an A-scope (instead of a PPI) did not provide the operator with sufficient information on the aircraft's position. These possible shortcomings were cited in the AVIATION WEEK article.

► **No Go on Mag Amplifiers**—Collins Radio has abandoned its attempt to come up with an autopilot which uses magnetic amplifiers throughout and will use a few vacuum tubes in the production version. Company is currently demonstrating autopilot, installed in a Twin-Beech, to airlines to get their comments. —PK



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AA Reports on DC-7 'Teething' Troubles

Problems uncovered in first two months of operation have been minor, carrier says; pilots like the plane.

By George L. Christian

American Airlines is well pleased with its new, speedy Douglas DC-7s after the first two months of scheduled operation. "Teething" problems have been relatively minor.

American reports its pilots as saying that the plane "has beautiful control characteristics," and maintenance personnel comment that the ship is fairly trouble-free, considering the numerous changes and innovations the transport incorporates.

The carrier has purchased 25 DC-7s, 12 long-range and 13 medium-range versions of the plane. Commercial service was inaugurated on Nov. 29, 1953. The airline currently has taken delivery of nine DC-7s, expects to have its whole fleet by April of this year. Late last month, American increased its New York-Los Angeles schedule to two roundtrips daily in each direction.

AVIATION WEEK went to AA officials to find out how the aircraft was behaving during its initial phases of commercial operation.

▶ **Frank Talk**—In a frank discussion of pros and cons of the first two months of DC-7 operation, American officials conceded that the airline was having trouble keeping to its 7:55-hr. westbound schedule.

In an equally outspoken manner, AA engineers pointed out the strong and weak points of the aircraft equipment and components. Particular emphasis was placed on three features new to the DC-7, which did not exist on any of the preceding "DC" family.

▶ **Speedier Seven**—American is adopting a four-pronged program to eke the last mph. out of its -7s, to meet its less-than-eight-hour westbound non-stop transcontinental schedules. To date, a good percentage of the westbound flights have exceeded eight hours, due to the heavy headwinds encountered during winter months, coupled with the fact that the -7s have to fly some 2,000 ft. under the 23,000-ft. cruising altitude originally planned, because of power drop when the plane's Turbo Compound engines are leaned out to cruise fuel consumption (AVIATION WEEK Dec. 28, 1953, p. 11).

American's program:

• **Better ground operating procedures.** American is working out ways of cutting to an absolute minimum the time from blocks to takeoff.

• **Better airborne operating procedures.** The carrier is concentrating on precision navigation, coupled with the best possible weather forecasts, to allow pilots to fly optimum flight paths—the route of the shortest time regardless of distance. Autopilots will help too.

• **Aerodynamically cleaner aircraft.** AA is looking over its -7s with an eye to cleaning up every possible part of the plane to reduce drag as much as possible. Examples are better sealing of gaps between trailing edge of the wings and ailerons and flaps, possible use of spinners on the propeller hubs, and generally better fairing around the cowling area.

• **Better engine performance at altitude.** The airline's powerplant engineers are consulting with Wright to see if it is feasible to improve the Turbo Compound's altitude performance, possibly through modifications to the engine's supercharging system.

▶ **Performance Summary**—Among the innovations on the DC-7, never before tried on Douglas' DC-series aircraft, are the Turbo Compound engines, all-electric instruments, and Freon air conditioning system.

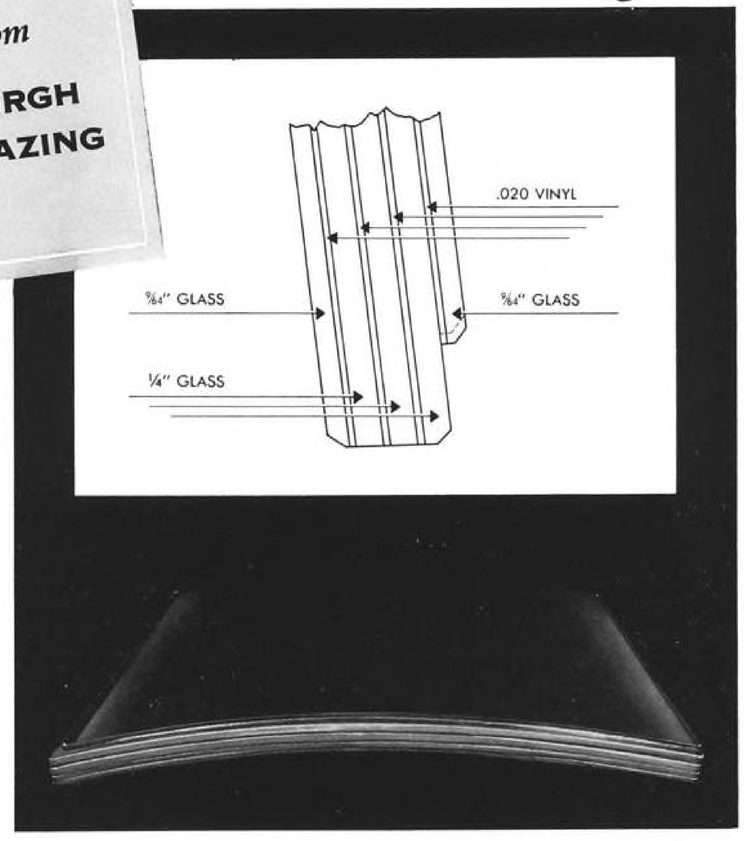
• **Turbo Compound engines.** These new-type powerplants, embodying a completely different method of power recovery through three exhaust-driven turbines whose energy is returned to the engine's crankshaft through a fluid drive-type coupling, have operated quite well, says AA. To date, the airline has experienced two turbine failures, one with a small fire, one without. And three torquemeter pistons have failed. Wright Aeronautical is actively engaged in remedying both types of malfunction.

• **All-electric instruments.** The DC-7 is the first commercial Douglas plane (and probably the only modern commercial air transport except for the Boeing Stratocruiser) which does away entirely with the vacuum system. All gyro instruments are electrically driven. (And since the flying surfaces are thermally de-iced, there is no need for a vacuum pump.) The alternating current system itself is working very well, according to AA electrical engineers, although some

How big areas of curved Multiplate are used in the windshields of the Douglas AD-5

A report from

THE PITTSBURGH AIRCRAFT GLAZING FILE



DESIGN of the Douglas AD-5 "Skyraider," called for a divided windshield of curved bullet-resisting glass more than one inch thick. The accompanying diagram and photograph show how Pittsburgh Multiplate Glass was engineered to this job.

The Multiplate used in this windshield consists of five plies of glass with vinyl fillers between. In the cross section above, the inside and outside plies are 9/64" and the three interior plies of glass are 1/4". Vinyl fillers are .020", giving an over-all thickness at this point of 1 1/32" +1/8"—0".

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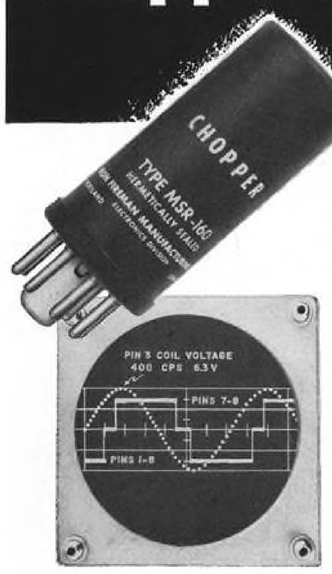

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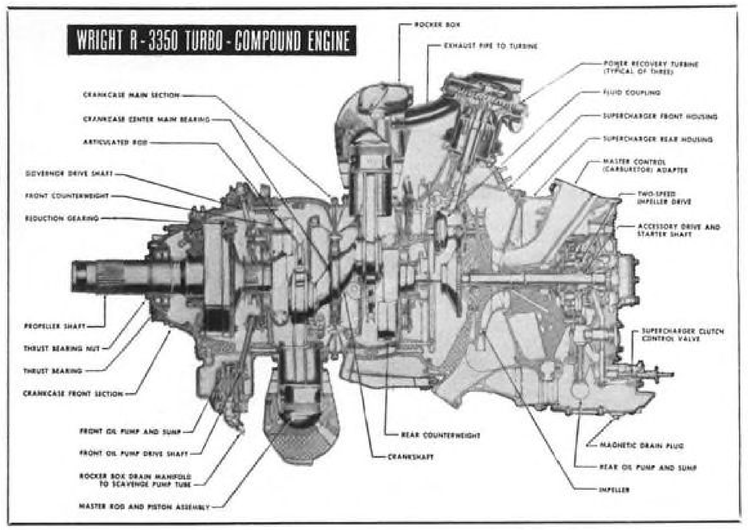


trouble of a temporary nature has been experienced with the Eclipse-Pioneer artificial horizon.

• **Freon cabin air conditioning system.** American reports that, to date, it has had little experience with its Freon cabin cooling system, because most operation has been during cold, winter weather. The system, which was tailored by AA and Douglas to the airline's DC-7s, functions well on the ground. As with all new equipment, further tests are being conducted currently. Full results will be known when the system is put to the test during this summer's hot-weather operation.

Powerplants

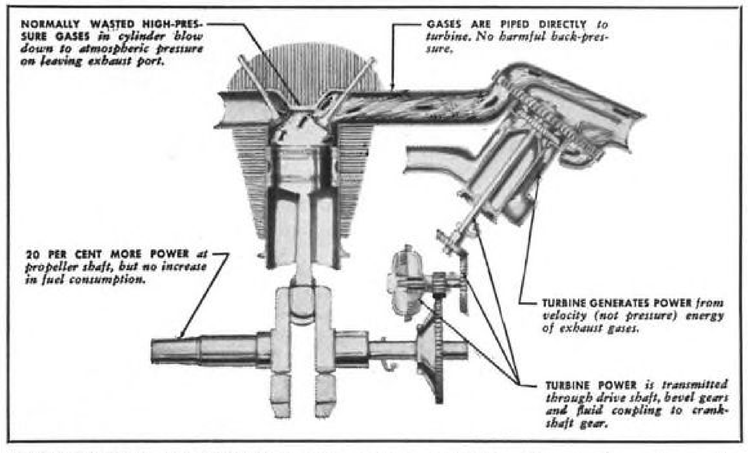
As had been anticipated by potential operators of the Wright R3350 Turbo Compound engine, the turbine, as any new aircraft accessory, is giving a certain amount of trouble. But the troubles are not of basic design. They are usually of more superficial nature—of the type that will gradually be eliminated by careful inspection and patient beefing and local fixes American says.

W. C. Lawrence, AA's director of development engineering, likened defects such as nozzle box and cooling cap cracking to the nuisance of Convair augmentor tube cracking when that plane was first put into service.

The augmentor tubes' life rose from a low removal time of under 300 hr. to a current maximum of 4,800 hr., he pointed out. Now they are no longer considered a problem.

Similarly, while the nozzle box and cooling cap are recognized as current trouble makers, AA does not foresee any major problems and believes that the troubles will gradually be eliminated by patient "crack chasing."

For instance, Wright has already devised a fix for strengthening intersection of the exhaust nozzle with the nozzle box casting by installing a reinforc-



HOW POWER RECOVERY turbine system of Turbo Compound engine works.

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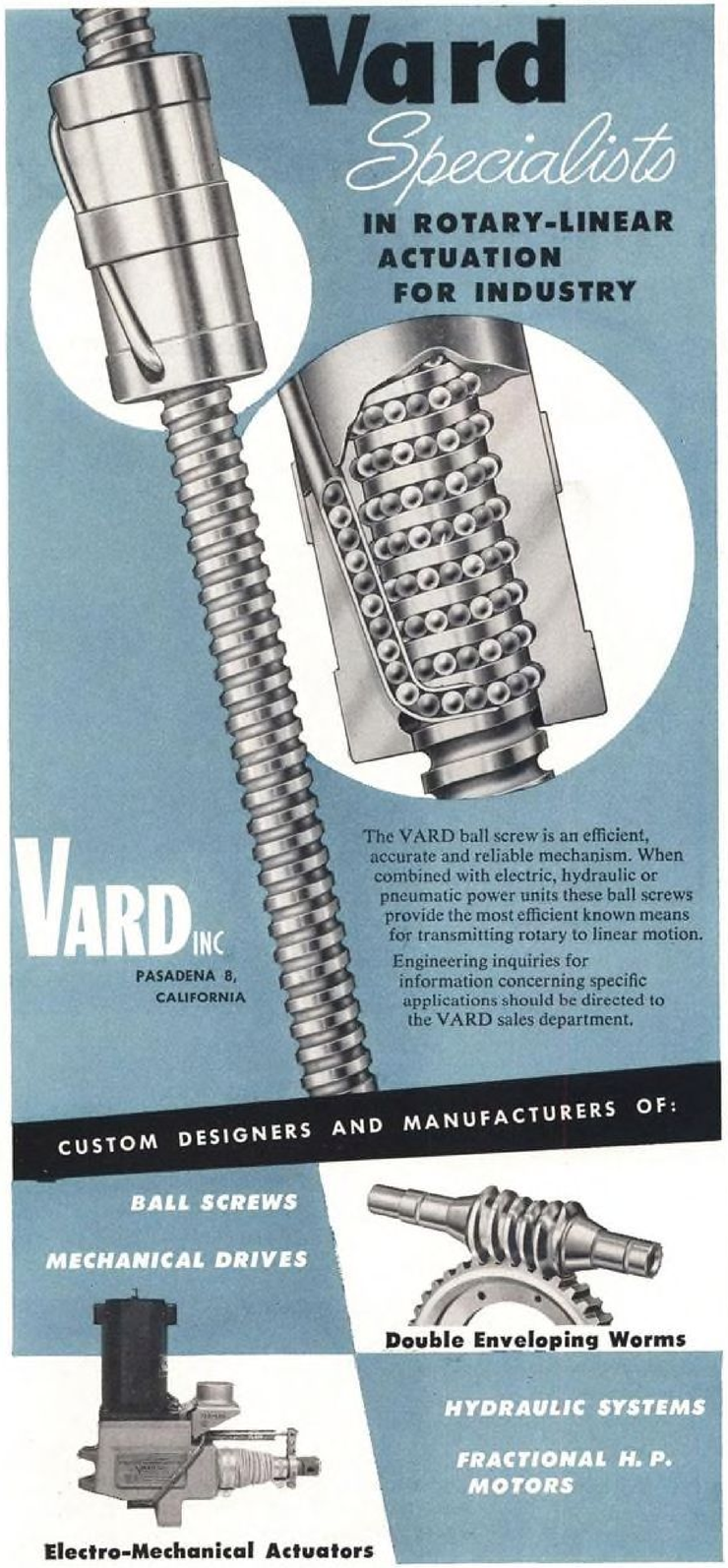


ing doubler and gusset at that point.

► **Turbine Failures**—American has experienced two exhaust turbine failures. The first occurred during takeoff from New York International Airport, when the plane was still on the ground. A small, localized oil fire resulted which was quickly extinguished. There were no injuries of any consequence (a few passengers sustained minor bruises as a result of using the emergency evacuation chutes). Apart from the engine, the plane was undamaged.

► **Overspeed**—First Turbo Compound turbine failure occurred on No. 2 turbine on No. 2 engine, Dec. 21, 1953.

First indication of trouble was from the fire warning system. Since plane had not quite reached V_1 speed, pilot slammed on the brakes, reversed all four propellers, shut down No. 2 engine, and brought the plane to a safe, if sudden, halt.

Because of the fire warning, pilot elected to evacuate his passengers via the two emergency escape chutes. This resulted in a couple of bruised shins and a rope burn or two—nothing more serious. The minor oil fire, set by exhaust heat, was put out with a dose of CO_2. (Some say that the Port of New York Authority's fire engines, which were quick to appear on the scene, put out the fire—it seems to be a toss-up as to who gets the credit.)

Careful analysis of the incident revealed that the failure, which resulted in the turbine shedding its blades, was due to the turbine becoming decoupled from the engine, American engineers say.

When this happened, the turbine immediately went into an overspeed condition, since exhaust pressure on the turbine still existed, but there was no restraining force to keep the unit within operating rpm. limits.

(It is interesting to note that Wright built a controlled overspeed condition into its Turbo Compound turbines. To assure an overspeed condition of not more than 25%, the manufacturer drilled small holes in the shanks of four blades per turbine, spaced at 90 deg. to each other. This weakens the shanks sufficiently to guarantee breakage at not over 25% overspeed. When the control blades rip off, this triggers the rest of the blades and the turbine is denuded. Object is to assure complete retention of the blades by the flight hood without having to reinforce that member to an unreasonable degree of weight).

Decoupling of the No. 2 turbine (which is at the 7 o'clock position) was traced to the failure of a turbine drive gear adjacent to the turbine's fluid coupling. The gear failure had its nucleus in a tool mark on the gear.

Wright immediately changed its surface finish call out and broke the edge of the gear to give it greater radius.

► **Marginal Retention**—The reinforced flight hood retained most of the shedding blades, but retention qualities were marginal. Some pieces actually penetrated the hood. When they got through they had been slowed to low energy. But the one piece was still traveling fast enough to pierce the engine's diaphragm between No. 1 and 2 zones.

A redesigned, reinforced hood is now being installed on a retrofit basis.

► **Hood Problem**—The problem facing the engineers was not only one of designing a hood which would retain the blades satisfactorily in case of turbine failure, but also of producing a unit rugged enough to keep it from parting from the nozzle box because of the explosive energy created when the blades let go. In this particular case, the flight hood did come off and dropped into the bottom of the engine cowling.

In connection with this incident, American engineers spoke highly of the Kidde continuous-warning type fire detector which is a new installation on AA's DC-7s. In this incident, it gave adequate warning. And, they added, the system is sensitive and gives good all-around protection.

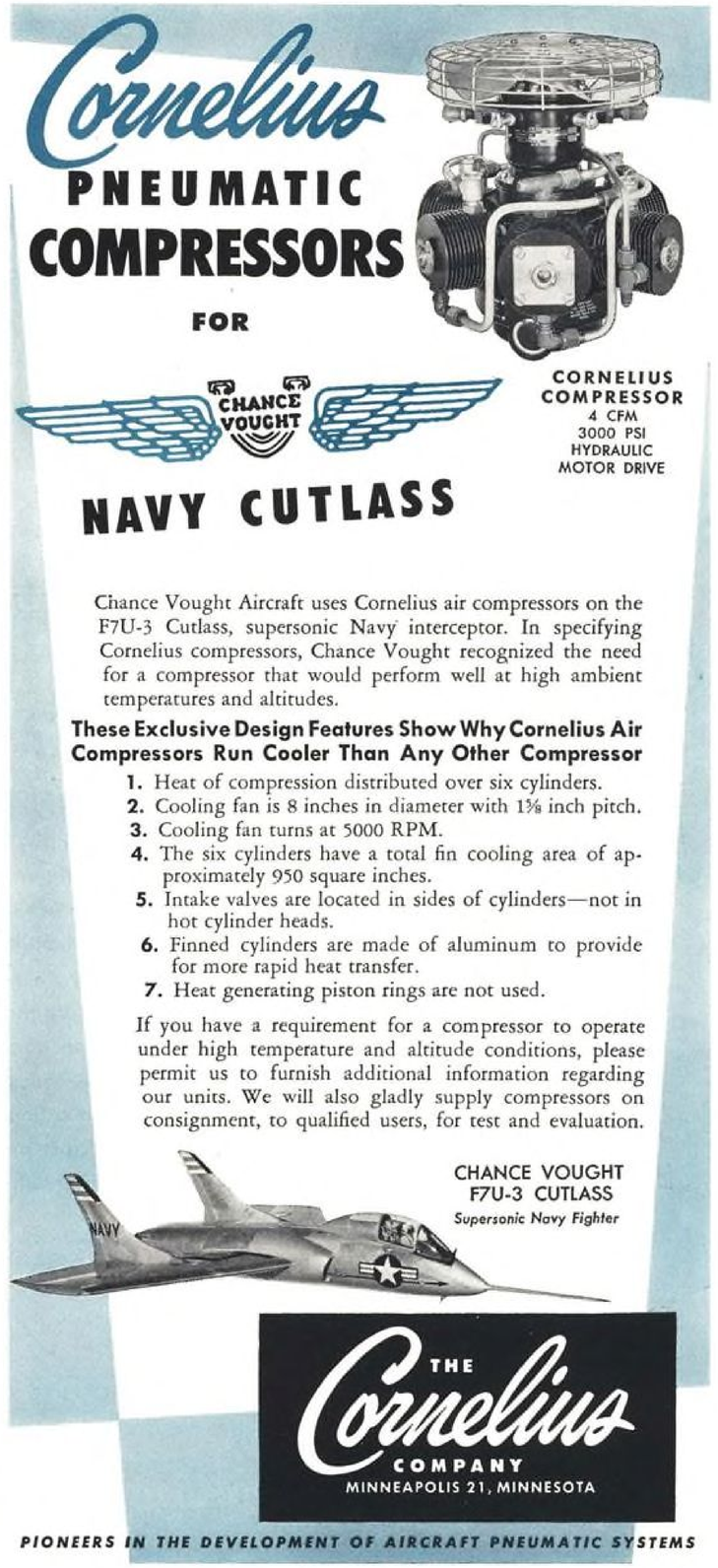
► **No Oil**—The second turbine failure occurred Jan. 7, as an eastbound flight was cruising over Bryce Canyon, Utah. Failure was on No. 1 turbine (at 3 o'clock) on No. 4 engine. Propeller was feathered and flight returned to Los Angeles on three engines without further incident. Return flight took 2:22 hr.

This failure was detected by the flight engineer and co-pilot, who were taking readings on engine exhaust flame color. They noticed that the exhaust flame from the No. 1 turbine of No. 4 engine was excessively orange and sparks were flying beyond the cowling. The prop was feathered immediately. There was no fire.

Immediate cause of the incident was failure of the turbine shaft between the cooling impeller and the turbine wheel at the shaft splines. Genesis of the trouble was probably "O" ring failure at the bottom of the driveshaft, American says. This prevented lubricating oil from being forced to the shaft's bearings.

American engineers conjecture that it is reasonable to think the shaft's upper bearing failed because lack of lubrication caused overheating. This in turn could lead to excessive wobble of the shaft resulting in interference between the cooling cap and wheel, leading to failure of the entire unit.

In this case, there was one puncture of the flight hood (the hood was the old style, not having yet been beefed up in accordance with the latest recommendations). The puncture occurred in an unreinforced part of the unit. A



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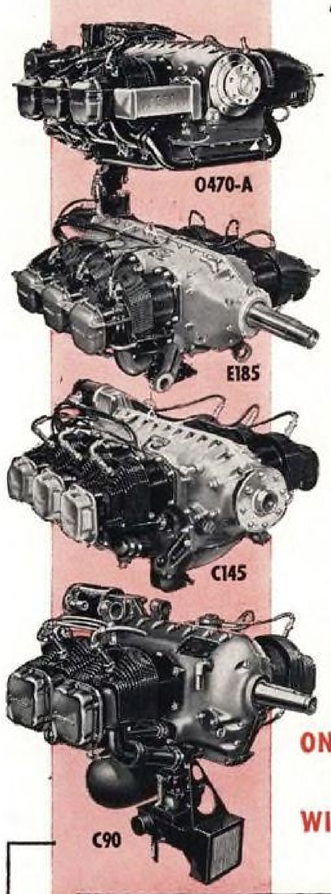

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piece of the turbine put at least one nick in a cowl flap. Force of the turbine's blades split the weld in the unit's tailpipe.

AA engineers said that the failure probably would not have occurred had the lack of lubrication affected No. 2 turbine. Being at 7 o'clock, gravity would probably have allowed sufficient oil to flow to the bearing to provide adequate lubrication. This could not happen to No. 1 turbine whose position is 3 o'clock.

► **Nozzle Box Cracks**—American says it is experiencing cracks in the turbines' nozzle boxes. The carrier is currently engaged in a nozzle box reinforcement program initiated by Wright.

This consists of local strengthening, with doubler and gussets, of the intersection of the exhaust nozzles with the nozzle box casting. American does not feel that the trouble is serious and believes that it will eventually be eliminated.

► **Piston Problems**—AA has experienced three torquemeter piston land failures. Wright has already made one improvement, manufacturing the piston from a forging rather than a casting.

A later change will invert the pressure cell to pressure-regulate outlet rather than inlet oil, which will relieve piston ring wear. These two fixes should lick the piston land breakage problem.

► **Good Power Section**—On an overall basis, American likes the Wright Turbo Compound engine. Its engineers point to the excellent power section of the R3350, which in its later models has given highly reliable performance in such planes as the Lockheed Constellation and Super Constellation and the Navy P2V patrol bomber.

The airline, which at this writing had accumulated a maximum of 356 hr. on its oldest Turbo Compound, told AVIATION WEEK that it had experienced no abnormal servicing problem with the powerplant. But the integral oil filters do have to be cleaned often, because the filters are fine mesh and pick up "lots of small stuff."

The Civil Aeronautics Administration has approved a 1,000-hr. overhaul period for the engine, contingent on the condition of three sample engines inspected at the end of 800 and 900 hr. of operation.

American's engineers look to the future of the Turbo Compound "with an air of optimism." They see no reason why the commercial version of the powerplant cannot reach the 3,700-takeoff-hp. rating currently approved for the military version of the engine.

► **Propellers**—AA has experienced a few cases of premature termination of prop feathering sequence. This involves nothing more serious than pushing the feathering button again to feather the prop completely. And the incident only

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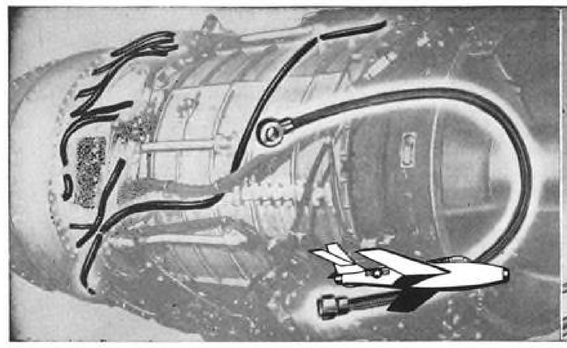

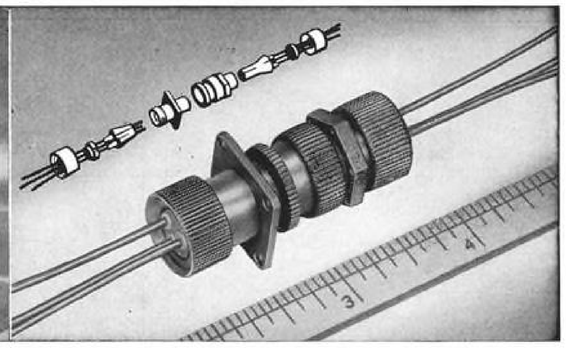

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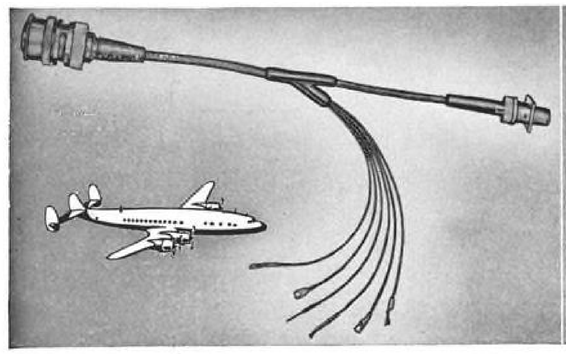

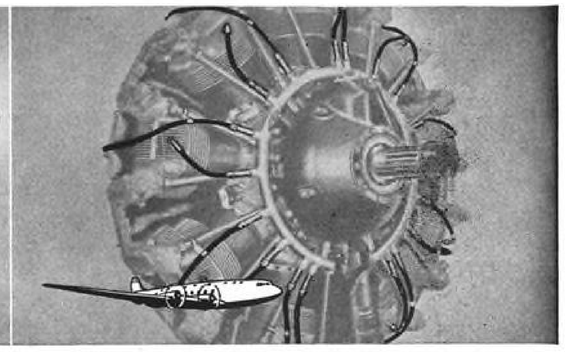

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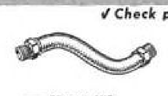

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happens at high altitude where outside temperatures are very low.

The malfunction has never interfered with an actual feathering operation, AA reports. Hamilton Standard has come up with a fix which should prevent future premature feathering terminations.

Instruments

AA spokesmen say they have experienced several premature removals of Eclipse-Pioneer artificial horizons. Some of the reasons they listed were: pilot's and co-pilot's instruments not agreeing because of stickiness, excessive precession, and the little airplane hitting horizon bar of the glass face of the instrument. This problem can be licked, AA believes, by altering production techniques. The carrier stresses that the basic design is "very good," and says EP has taken steps to prevent recurrence of the trouble.

► **Autopilot Marriage**—American will install the Sperry A-12 automatic pilots in its first seven long-range DC-7s. Fleetwide installation will depend to a considerable extent on how these first seven work out. The airline will weigh utility of the unit against any problems its use poses.

Asked why the autopilots were not installed by Douglas when the planes were delivered, AA made this point: Marriage of a sensitive autopilot such as the A-12 to a high-performance airplane such as the DC-7 is a very complex affair which cannot be accelerated with a shotgun wedding.

The DC-7 was certificated in such a relatively short time that the solution to autopilot installation problems lagged behind. But AA sees the final solution in the near future. The autopilots will be equipped with automatic approach couplers to simplify instrument approaches.

The carrier does not see that the automatic approach control will lower operational limits until some time in the future.

► **No Vacuum**—A major policy change involved when American bought its DC-7s was the elimination of the vacuum system. All gyro instruments are electrically driven.

Here is how the carrier insured adequate standby sources of a.c. power for its instruments: Under normal conditions, a.c. is supplied by two inverters, either of which can supply sufficient power for all the DC-7's a.c. The plane's a.c. needs are only 75% of either inverter's maximum rating.

In case of failure of both inverters, the flight engineer can switch on a battery-powered inverter. Since the battery is normally connected to the main bus, the inverter is actually bus-powered.

If this inverter breaks down, the crew

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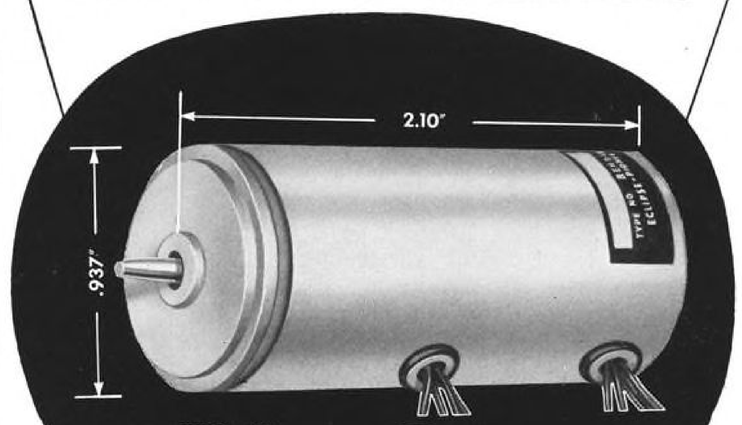

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GENERATOR DATA

Linearity—½ of 1% to 4000 rpm
Output—300 mv/1000 rpm with 18 volt, 400 cycle excitation
Null—10 mv or less

MOTOR DATA

18 or 26 volt, 400 cycle, 2-phase low inertia motor

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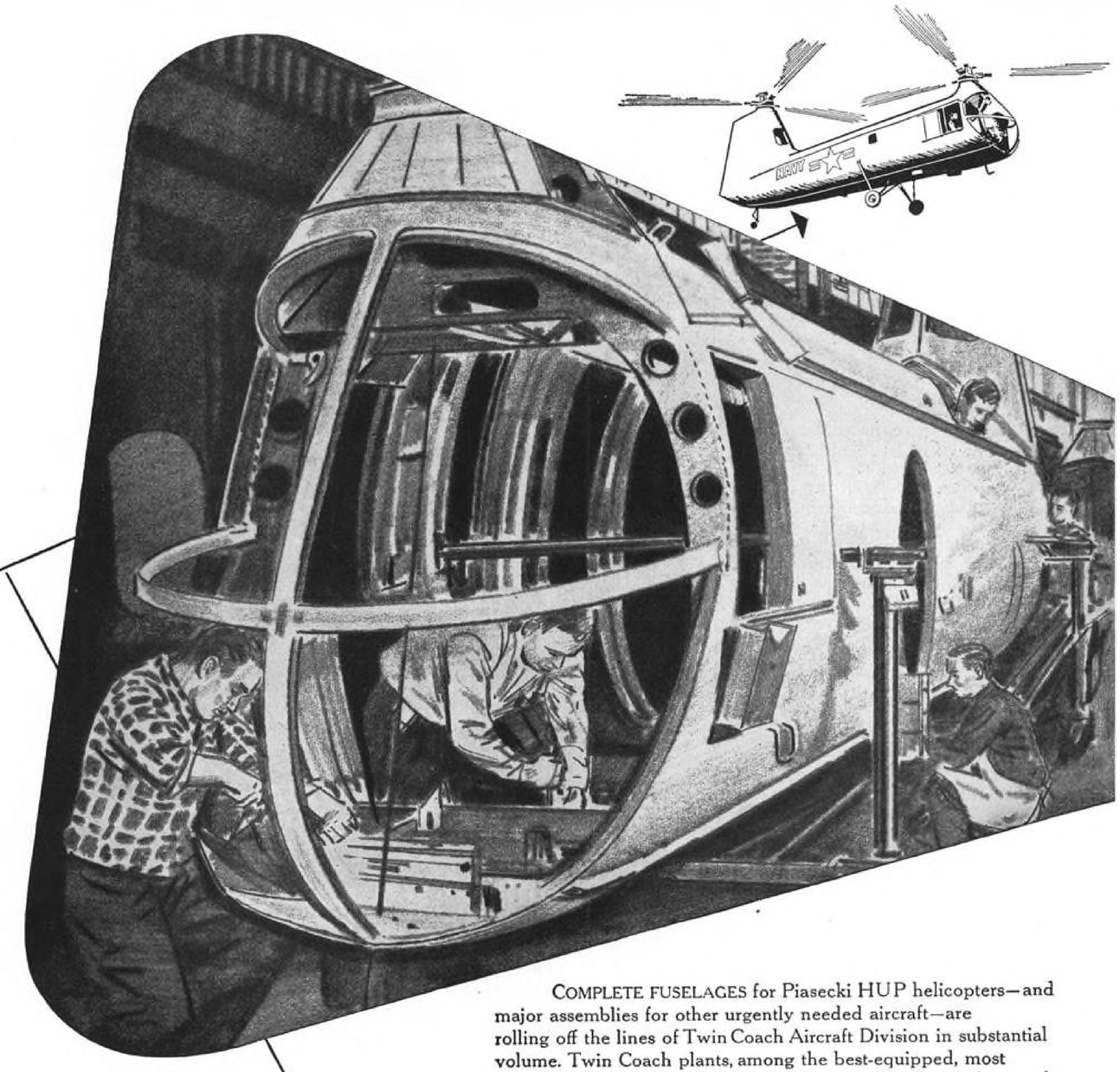

COMPLETE FUSELAGES for Piasecki HUP helicopters—and major assemblies for other urgently needed aircraft—are rolling off the lines of Twin Coach Aircraft Division in substantial volume. Twin Coach plants, among the best-equipped, most modern in the nation, are competently staffed by men who are the real early birds of the aviation industry. Many have over 25 years of unbroken aircraft experience. Modern facilities, modern equipment plus *experienced* manpower make Twin Coach a dependable source for every type of airframe assembly.

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Twin's Early Birds Build Whirly Birds

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can resort to two Eclipse-Pioneer engine-driven alternators mounted on Nos. 2 and 3 engines. The 100 va. units supply a.c. at the proper frequency for instrument operation with engine rpm. ranging from 2,000 to 2,400. This range takes care of any climb, cruise, letdown or landing condition of engine operation.

Equipment

The airline sums up its limited experience with the Freon cabin cooling equipment to date this way: The units have tested out up to expectations. Ice cooling tonnage produced is slightly above that anticipated.

► **Improvement Expected**—Considerable improvement from a weight standpoint is in the offing. American now gets five tons of cooling for 485 lb. in equipment weight. By using new materials, it hopes to get the five tons for as little as 250 lb. And with the new refrigerant gases now on the horizon, it is possible that the units may put out as high as seven to nine tons for the 250 lb. in weight. So American is optimistic about the future of its airborne air conditioning system.

It is too early to evaluate the maintenance reliability of the Freon system.

► **Goodyear Brakes**—AA's DC-7s are equipped with Goodyear triple-disk brakes, which have excellent braking qualities, according to the carrier.

It has experienced these minor troubles:

• The brake's parts are protected against corrosion by being plated with cadmium and zinc. These metals tend to melt off under the brake's high operating temperatures. Result is that molten metal tends to clog up brake clearances, causing them to drag. Solution, according to AA, is to strip off the cadmium and zinc and go to a protective finish such as Parkerizing.

• There has been a tendency for the brake's aluminum back plate (stationary part of the brake) to distort under load, permitting attachment bolts to loosen. American says Goodyear is going to a forged-steel back plate to increase its strength. Bolt size is also being increased by one.

► **Electrical & Hydraulic**—The DC-7s' electrical and hydraulic systems function well, according to engineers who specialize in these systems.

The planes' Vickers fixed-displacement hydraulic pumps have been changed from 25 deg. to 30 deg. to give greater capacity.

AA say "the hydraulic system of the DC-7 is basically the same as that on our DC-6s, -6Bs and -6As, because the high degree of reliability of the system as demonstrated in these planes did not indicate that any major changes were necessary." AA has retained AN hy-

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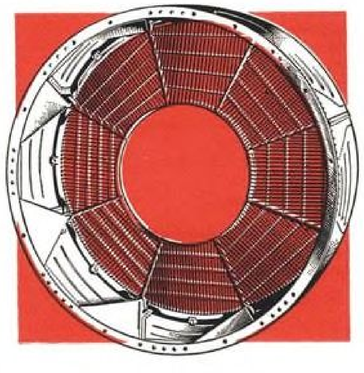

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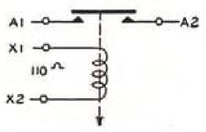
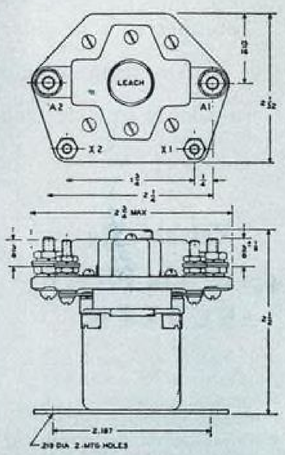


DIMENSIONS



CHARACTERISTICS

APPROVAL:
Approved as AN-3350-1 per Spec MIL-R-6106 (inverted terminals and side mounting).
Approved as AN-3350-2 per Spec MIL-R-6106 (supersedes AAF B-11, B-5B and NAF 1204-1 for new design)

CONTACTS:
Arrangement—Single pole, single throw, normally open, double break.
Rating—50 amps resistive, inductive, and motor load at 29 v d-c.

COIL:
110 ohms, 24 v d-c continuous duty.
Pick-up—18 v d-c max.
Drop-out—7 v d-c + 0, —5.5.

WEIGHT:
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draulic fittings, and uses standard mineral fluid in the planes' main hydraulic system. Cabin supercharger hydraulic drive system uses Monsanto's flame-resistant Skydrol fluid.

▶ **Speed & Range**—To sum up American's opinion of its DC-7s, airline spokesmen say: "In the DC-7, American Airlines has a plane with the speed, range and high degree of comfort which will keep our airline in the forefront of the business of air transportation until U. S. jets are proved and ready to carry the flying public."

Swiss Introduce New Plane Instruments

A new line of Swiss aircraft instruments, designed for wide application in airline, military, executive, private flying and gliding fields, has been introduced in the United States.

Manufactured by Peravia Instruments, Berne, the line includes precise barographs with altitude scales up to 65,000 ft., accelerometers, tachometers, tachographs, altimeters, accelerographs, turn indicators and radio sounding balloon equipment.

One operator, by use of a Peravia Motograph, found that 30% of his planes' engine operating time was on the ground and under more severe conditions than in any airborne operation. A revised operating control procedure resulted in substantial reductions in mechanical malfunctions, the company reports. (The Motograph is an instrument, mounted in an engine nacelle, which records manifold pressure, rpm., and pressure altitude as a function of

Tape Navigation Aid

Newly developed plastic tape has been put to use on navigation charts by private pilots. It is said to enable easier following of a desired course line, leaving clearly visible any notations as to wind velocity, true heading, magnetic variation and the like. Notations are written on small pieces of the tape, then placed at appropriate points on map. Manufactured by Labelon Tape Co., Inc., tape sticks without moistening, can be applied and re-applied, and can be written on with any blunt pointed instrument.

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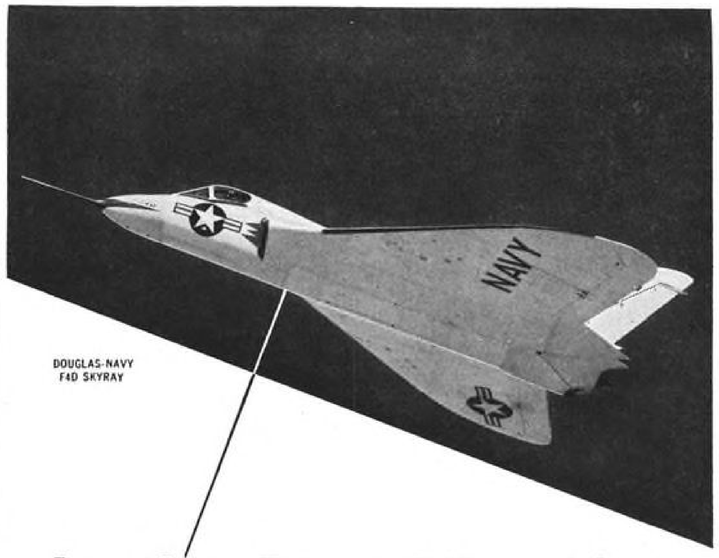

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AI-11032, Army-Navy type UG-37A/U, high voltage pulse receptacle pressurized. Ceramic insert, neoprene rubber gaskets.

AI-11022, special type BNC high voltage plug. Mates only with high voltage receptacles and jacks, for use with RG-59/U cable. Weatherproof, Teflon insert, Neoprene rubber gaskets.

AI-11006, Army-Navy type UG-355/U Klystron Coupler. Weatherproof, Styrene Copolymer and linen base bakelite inserts. For use with klystron tube 726C.

AI-11030, Army-Navy type UG-306/U, type BNC right angle adapter. One male, one female end. Weatherproof, Teflon inserts. Neoprene rubber gasket.

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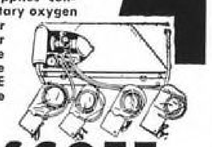

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time on a 2½-in. wide roll of waxpaper giving coverage of 60 hr. of operation (AVIATION WEEK May 5, 1952, p. 56).

Peravia barographs modified for special test work have been ordered by a leading aircraft manufacturing firm, while others have been used by gliding enthusiasts, according to The Matisa Equipment Corp., who are introducing the Swiss line in the U. S.

British European Airways conducted a clear air gust research project using Peravia accelerometers, the firm adds.

Matisa says that Peravia research and engineering facilities are available for the development of special-purpose instruments. Matisa' address: 224 South Michigan Blvd., Chicago 4, Ill.

OFF THE LINE

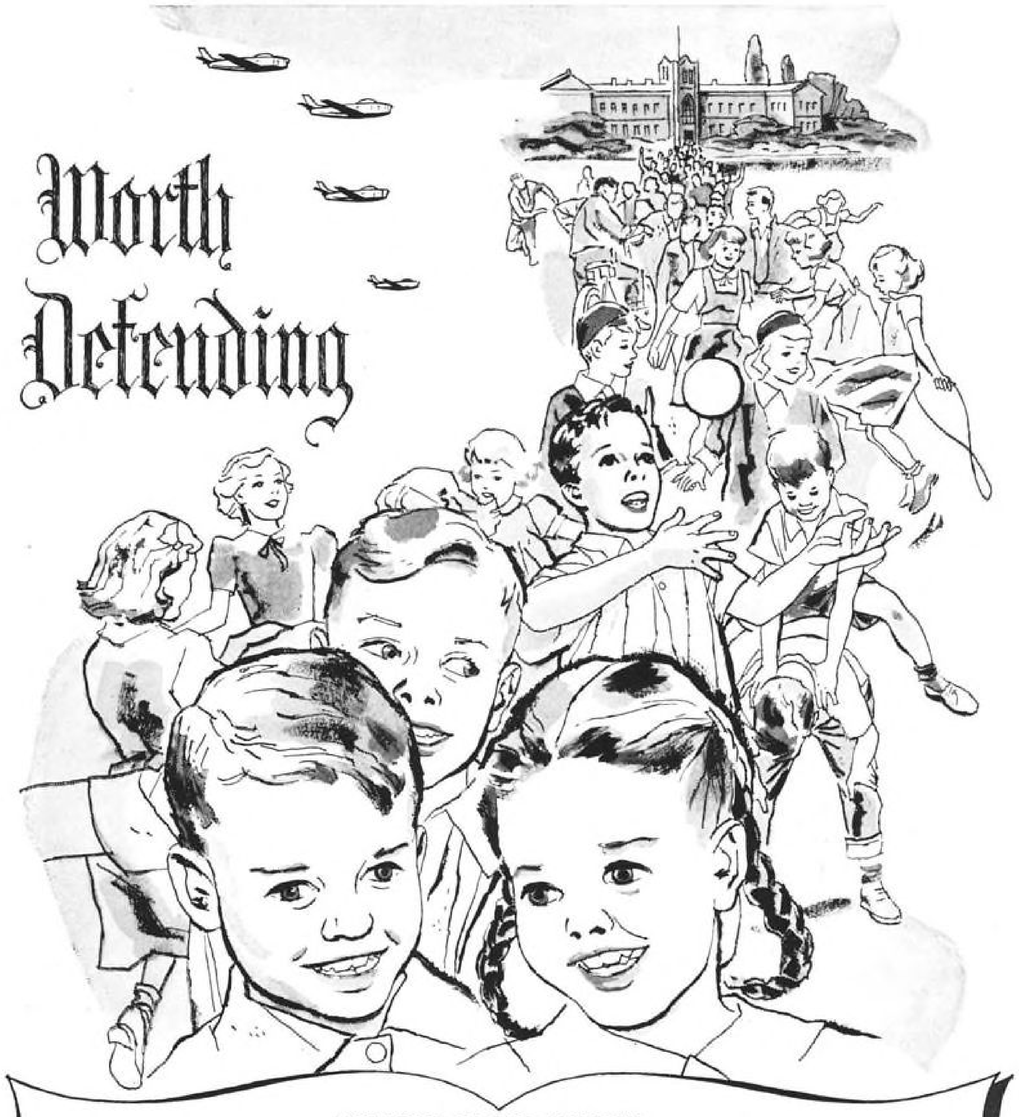
Decker Aviation Corp. has expanded instrument overhaul facilities to perform complete overhaul, modification and repair work of all flight, navigation and engine instruments of Air Force B-47 and B-52 jet bombers. The company says it "has all the laboratory facilities and trained technicians to provide this service on any instrument whether mechanical and pressure, electrical, gyro or electronic." Decker has been CAA-licensed for these four instrument classifications. And the company has quality control approval from the USAF, USN and RCAF.

Gyroscopic test rig, being installed by Stratos Division of Fairchild Engine and Airplane Corp., will spin accessory airborne equipment at high Gs, simulating loads imposed on such equipment when installed in fighters maneuvering at high speeds. The machine, built by Greer Hydraulics, will go into Stratos' Bay Shore, N. Y., plant.

Avianca (Colombian National Airlines) has signed a contract with Lockheed Aircraft Service, Inc., Idlewild, for all maintenance and other services on two DC-4 passenger planes scheduled for service on the carrier's Guayaquil-New York run. Terms are fixed price per flight hour.

Titeflex, Inc., Newark, N. J., has opened a Michigan office at Rm. 641, Book Building, 1249 Washington Blvd., Detroit 26. In charge is Edward Frank.

Oil filtration systems for aircraft engines delivering over 3,000 hp. are under development by the Aviation Products Division of Winslow Engineering Co. in cooperation with engineers of several major airlines, the company announces. Aim is to secure adequate filtration without excessive weight or bulk penalties.



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Company states unit can be used safely on ferrous or non-ferrous metals and will sort raw stock, semi-finished or finished parts by their metallurgical characteristics such as analysis, hardness, structure, etc. Known and acceptable parts are used as standards for adjusting instrument.

Unit may also be used as a hand sorter. Operator watches screen and manually throws out off-standard parts. It can also be used with a type 407 automatic relay unit.

Relay units eliminate operator discrimination and make it possible to sort many thousands of parts per day, says manufacturer. Parts can be passed through test coil on a belt conveyor or other fast-feeding means, it is noted.

Relay unit also sends out reject signal whenever off-standard part passes through test coil. Signal can be used to operate a solenoid-operated reject gate, or other reject means.

J. W. Dice Co., 1 Engle St., Englewood, N. J.

Hydraulic Press Reduces Both Tube Ends at Once

New double-end tube reducing hydraulic press reduces both ends of a tube simultaneously.

To reduce 2-in. diameter, thin-walled, seamless steel tubing to 1¼ in. at each end, two reductions are required in order to prevent buckling. Two-station machine reportedly has solved problem, using a preliminary reduction as well as a final reduction die.

Dies are mounted internally in each ram along with internal automatic hydraulic knockout in each ram. As ram returns after reduction, knockout automatically ejects tube.

One cylinder block with its pumping unit and controls can be moved along bed by motor-driven lead screw to accommodate tubes from 3 ft. to 12 ft. long in increments of 6 in. Keys across the bed take the thrust load, tubes are automatically fed through machine.

Air-operated tube clamps are used for longer tubes, eliminating tendency to bow during reduction. Lubricant pump and reservoir unit at each end of press lubricate tube ends prior to reduction.

Manufacturer states that press is capable of producing at rate of 150 tubes per hour.

American Steel Foundries, Elmes Engineering Div., 1150-C Tennessee Ave., Cincinnati 29, Ohio.

Low Price Is Feature of New Temperature Chamber

A relatively inexpensive temperature chamber for evaluating operating characteristics of aircraft components under conditions of heat and cold has been developed by Mantec, Inc. The price is $725.

Features include stainless steel interior, 5½-in. glass wool insulation, steel exterior, motor-driven fan for air circulation, counterbalanced lid, and a usable working volume of approximately 12 cu. ft.

Chambers have dual thermostats for high and low temperature control, use block dry ice as refrigerant.

Mantec, Inc., Dept. AW, El Segundo, Calif.

ALSO ON THE MARKET

Tester for pre-stretching and proof-testing aircraft cable and other wire assemblies is reported to test five different sizes of cable simultaneously. Claimed to have 6,500-lb. capacity, it is built with five separate tensioning units, each having a different range. Each unit can be preset to exert any load within its range for 3 seconds to 20 minutes. Bulletin RE-9-53.—Riehle Testing Machines Division, American Machine and Metals, Inc., East Moline, Ill.

Lightweight torches feature ball-type oxygen and acetylene valves which are positioned for thumb adjustment. Style 400 is designed for light welding and brazing operations; style 300 is intended primarily for oxyacetylene burning or welding of lead products. Optional units, such as tips, mixers and extensions, are available for both styles.—Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

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WHAT'S NEW

Telling the Market

Sheet metal fabricator for punching, notching and nibbling up to 165 strokes per minute is described in catalog 10-AA available from Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y.

First Fifty Years is an attractive commemorative volume covering history of Clark Equipment Co., makers of materials-handling machines, axles, wheels, transmissions and numerous other devices. Write the firm at Buchanan, Mich.

Negative filing system to insure ready reference to technical photos is detailed in leaflet being distributed by Sales Service Division, Eastman Kodak Co., Rochester 4, N. Y.

Machining of glass-bonded mica is covered in 23-page booklet, From One Machinist to Another, being issued by Mycalex Corp. of America, Clifton, N. J.

The How Book of Cost-Cutting Materials Handling is booklet including latest methods for analyzing materials handling problems. Write Yale Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia 15, Pa.

Welding machines, more than 20 models, are described in catalog being distributed by Air Reduction Sales Co. Included are sections on accessories and electrodes. Write the firm at 60 East 42d St., New York 17, N. Y.

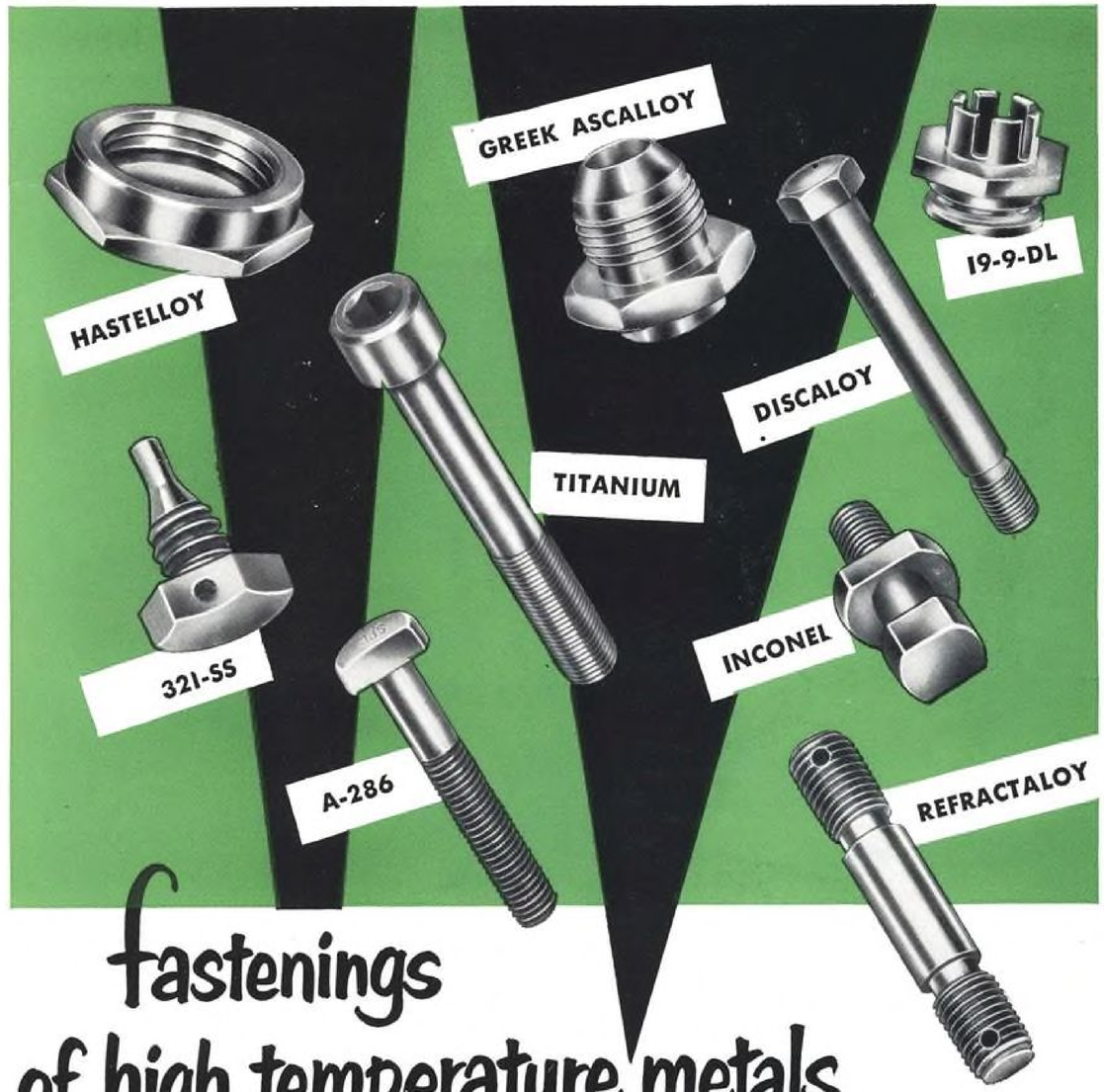
Publications Received

• **The Papers of Wilbur and Orville Wright**—edited by Marvin W. McFarland—pub. by The McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. Two volumes, $25.00, 1,278 pages. Mr. McFarland, sponsored by Oberlin College, has edited the letters, diaries and scientific papers of the Wright brothers. These papers, from the Library of Congress Aeronautical Division, cover the experiments of 1899-1905 (Vol. I) as well as the years of public recognition and acclaim, 1906-1948 (Vol. II).

• **Helicopter Operation and Design Requirements**—by IATA Helicopter Symposium—pub. by Technical Secretariat, IATA, International Aviation Bldg., Montreal 3, P. Q. Canada. $6.00, 183 pp. Condensed record of symposium, held during the sixth Annual Technical Conference of IATA.

• **The Physics of the Stratosphere**—by R. M. Goody—pub. by Cambridge University Press, 32 East 57th St., New York 22, N. Y. $5.00, 187 pages. Describes the present state of stratospheric research, including considerations of weather, temperature, experimentation and equipment.

• **Optimum Climbing Techniques for High-Performance Aircraft**—by Maurice A. Garbell—pub. by Garbell Research Foundation, a non-profit corporation, 1714 Lake St., San Francisco 21, Calif. $3.25, 70 pp.



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CAA Backs Avgas Tax to Support Airways

- **Charge would cut 20% from airlines' net profits.**
- **Congress to use report in framing legislation.**

By Richard Balentine

A revised airways user charge study calling for support of the $85.3-million federal system through imposition of an aviation gas "gallonage" tax was sent to Congress last week by Civil Aeronautics Administration.

Because direct charges for use of specific airway facilities and services "do not appear to be administratively feasible and might well tend to lower the general level of safety," the study reveals that only indirect charges such as the "gallonage" tax would be practical.

As proposed in the current study, the charges would cut about 20% off domestic trunk airlines' annual net profits if the plan is approved by Congress and the President.

► **Ton-Mile Tax**—A second indirect charge would be a gross ton-mile tax applicable to all aircraft of more than 4,500 lb. maximum gross takeoff weight and a graduated registration fee or airways use license for all planes weighing up to 4,500 lb.

However, the study finds the "gallonage" charge preferable since it would involve less administration problems both to the government and users of the system and would find readier acceptance.

CAA's study was prepared by chief economist Richard K. Waldo and Herbert J. Guty, transportation economist, under the direction of Joseph D. Blatt, assistant administrator for program coordination.

It is the result of an earlier draft submitted to Civil Aeronautics Board, Defense, State and Treasury Departments and to nine transport agencies and associations directly affected by the projected plan.

► **ATA Comment**—The earlier study aroused bitter comment from Air Transport Assn. when released in October (AVIATION WEEK Nov. 2, 1953, p. 71). ATA attacked the basic assumptions and statistical methods and logic of the CAA report.

The association figures domestic scheduled airlines' airways use responsibility comes to about $12 million a year instead of the more than $21 million proposed by CAA. Last week ATA officials were studying the revised user-charge proposal, although feeling was they would stand on their prior comment.

► **Guide for Congress**—No specific recommendations are made in the entire 151-page study. It was submitted to Congress as an objective report to be used "in framing and considering airways user charge legislation."

The study finds the "gallonage" charge method of obtaining operating funds "the most desirable method of obtaining a return for the federal government." This approach has received considerable support in the past, both from the government and the industry and was favored in CAB's 1945 report on multiple taxation, in the Board's 1944 report of investigation and research, and in CAA's 1950 report on a user-charge program.

► **Measure of Use**—Chief merits of the plan are its equity and administrative simplicity, the study reports. Reasoning is that "the amount of fuel consumed by an aircraft is proportionate to its weight, power and distance traveled. Thus, assuming that on most flights an aircraft is an actual or potential user of the federal airways, the amount of gasoline consumed would measure both the use made of these facilities and the benefits derived from them."

Commercial scheduled carriers thus would take the heaviest burden of the charge. Military users of the federal airways system would not be included in the "gallonage" charge, because such a tax would involve merely a bookkeeping transaction.

Figured in fiscal 1955, CAA expects it would receive $21,250,000 (see table) a year from scheduled carriers if a 2½-cent-per-gallon charge were imposed. Other civil carriers would contribute $4 million a year.

In 1952, scheduled airlines consumed approximately 550 million gallons of aviation gasoline. Irregular carriers used 130 million gallons.

► **Adjustment Possible**—With the advent of jet transports on the federal airways system, the "gallonage" charge could be adjusted to compensate for variation, the report says. Indications

Airways Tax Revenues

Estimated receipts from charges to be imposed on domestic civil aviation gasoline in fiscal 1955:

User group	Estimated gasoline consumption (Millions of gallons)	Estimated receipts (000 omitted) At 1½ cents per gallon	At 2 cents per gallon	At 2½ cents per gallon
Scheduled air carrier	850	$12,750	$17,000	$21,250
Other civil	160	2,400	3,200	4,000
Total	**1,010**	**$15,150**	**$20,200**	**$25,250**

Estimated receipts from various gross ton-mile charges imposed on aircraft of more than 4,500 lb. maximum gross takeoff weight:

User group	Estimated gross ton-miles (millions)	Estimated receipts (000 omitted) At ½ mill per gross ton-mile	At 8/10 mill per gross ton-mile	At 1 mill per gross ton-mile
Scheduled air carrier	22,000	$11,000	$17,600	$22,000
Other civil	1,200	600	960	1,200
Total	**23,200**	**$11,600**	**$18,560**	**$23,200**

Estimated receipts from aircraft registration fees imposed on all aircraft up to 4,500 lb. maximum gross takeoff weight:

Weight category (Lb.)	Number of active aircraft	Annual fee per aircraft	Estimated total receipts (Actual)	Annual fee per aircraft	Estimated total receipts (Actual)
0-1,500	26,567	$5.00	$132,835	$10	$265,670
1,501-2,500	14,030	10.00	140,300	25	350,750
2,501-4,500	9,171	25.00	229,275	50	458,550
Total	**49,768**		**$502,410**		**$1,074,970**

Source: Department of Commerce

are that first models of jet transports will consume twice as much fuel per mile flown as comparable piston engine aircraft.

As to collection of the "gallonage" charge, CAA suggests it be collected at the refinery level at the time of the sale of the fuel, keeping administration of the levy and expense of collection at a minimum.

For international airlines, a different charge per gallon would be required, the report says. However, it is suggested that no foreign carrier charge be made until after the domestic user-charge plan has been initiated.

A charge which was based on domestic airway use would not necessarily be equitably related to international airways costs and use because of the difference in the number of facilities provided per mile flown.

▶ **Alternative**—Big problem would be that a "gallonage" charge should be levied on a uniform basis, because there is no way of determining at the refinery level whether the fuel is to be used on domestic or international flights.

The gross ton-mile charge and graduated aircraft registration fee are posed as possible alternatives to the aviation gas tax.

The ton-mile tax is seen as easy to calculate although complex to administer because of the involved processing of operations reports that would be necessary.

The registration fee idea, similar to automobile registration now paid to states, would have no direct bearing on use of the airways, the report finds. Chief advantage of this method of user charge would be its administrative feasibility, although it would not be as simple as the "gallonage" charge.

It might conceivably prove burdensome to smaller aircraft operators, because the fee would be paid in a lump sum, says the report.

For aircraft of more than 4,500 lb. gross takeoff weight, three types of charges are suggested:

- **Revenue ton-mile.**
- **Airplane mileage.**
- **Gross revenue.**

"Domestic civil aviation appears to have reached a level of economic maturity which will permit it to make a reasonable contribution toward meeting the annual costs of the federal airways system," the study reasons.

It points out that "approximately 96% of domestic revenue ton-miles were flown by subsidy-free air carriers during fiscal 1953. The precise level at which user charges should be initiated should take full account of the past as well as the prospective earnings of the carriers, and Congress, in deciding upon the suitable level, should avoid charges that would place an undue financial burden upon the industry."

Bricker Would Tighten CAB Grip on Airlines

Legislation giving Civil Aeronautics Board increased control over nonscheduled airlines by authorizing the Board to impose civil penalties for economic violations has been introduced by Sen. John Bricker, chairman of the Senate Commerce Committee.

The measure, backed by CAB, failed to pass the Senate two years ago after Sen. John Sparkman, then chairman of the Small Business Committee, denounced it as primarily directed against nonskeds. The bill, however, also would apply to scheduled air carriers.

Rep. Charles Wolverton, chairman of the House Commerce Committee, has introduced the bill in the House.

▶ **Violation Actions**—CAB at present can take two courses with economic violations:

- Issue a cease-and-desist order or revoke operating authority.
- Institute through a U.S. attorney civil action for an injunction or a criminal action.

The Senate Commerce Committee, in approving the legislation in July 1952, commented:

"From a practical standpoint, suspension and revocation proceedings can only be used as a last resort in cases of knowing or willful violations; and the criminal actions are not appropriate except in the most flagrant and serious cases.

"The only other existing remedies for economic violations—cease-and-desist orders and injunctions—operate only against future conduct. Thus, an offender is in a position at this time, by exercising a little caution, to engage in illegal practices until an enforcement action is commenced and may even continue such conduct during its pendency."

▶ **Swift Action**—"This permits him to reap economic rewards from unlawful conduct over considerable periods of time without undue danger of incurring monetary penalties.

"Availability of civil penalties would tend to take the profits out of economic violations and, in this way, provide a strong deterrent to unlawful conduct.

"Experience has shown that swift and sure punishment is frequently more effective than heavier punishment unduly delayed. The civil penalty remedy would permit the Board to act swiftly in dealing with most offenders."

Modernize Airways For Future: Lee

Continual modernization of the federal airways system will be required if the airline industry is to serve the expected 40 million air travelers in 1960, Fred B. Lee, Civil Aeronautics Administrator, predicts.

"We could not keep up with today's traffic if we had not, five years ago, made a start at modernization of the system along the lines recommended jointly by industry and government through the Radio Technical Commission for Aeronautics," he told the Institute of the Aeronautical Sciences in New York.

▶ **Cost Factor**—But improvement of the system "cannot be achieved simply by lavering new devices on top of those which have come into use during the last 25 years," Lee says. "The result would be confusion to the airways users, excessive workload for the airways operating personnel, and unacceptable cost to the taxpayers."

Lee points to the reduction of 452 communications stations by "approximately 40" and streamlining of the "more than 70,000 mi." of airways system by replacement of "old, low-frequency, four-course ranges" with VHF omnidirectional radio ranges as two important moves resulting from CAA's airways study.

▶ **375 VOR Stations**—Reduction of the communication stations "means equal or better overall service to users of the federal airways at less cost to the public," he says.

There are 375 VOR stations commissioned and nearly 20,000 VOR receivers available, making it possible to eliminate some of the old-time ranges.

NAL Copter Serves Miami Area

National Air Lines Sikorsky S-55 seven-passenger copter, one of three the carrier has on order, lands at new heliport located adjacent to the Miami Beach municipal auditorium. NAL recently received temporary approval from Civil Aeronautics Board to operate an experimental passenger copter service. Operations began Feb. 1 within a 150-mi. radius of Miami (Aviation Week Jan. 25, p. 88).

State Tests TVOR As Airways Extension

Minnesota's Department of Aeronautics is considering installation of TVORs (low-power omniranges) at principal state airports to supplement the federal airways, according to commissioner L. L. Schroeder.

The Minnesota project is in line with a Commerce Department policy to free federal agencies of activities that can be handled satisfactorily by local and state governments (Aviation Week Aug. 10, p. 51).

An experimental TVOR, built and loaned by Maryland Electronics Corp., currently is installed at the Austin (Minn.) Municipal Airport, is undergoing evaluation.

Decision to buy TVORs will depend "in part on retention of the VHF omnirange . . . as a part of the 'common system' by the CAA, in part on the successful coordination of non-federal radio navigational facilities with the federal system, and in part on cost," Schroeder says.

The question of "retention" of VORs may refer to doubts raised by the controversy over civil DME versus a newer military system, called Tacan. So far as is known, the military has not proposed the elimination of VORs, although Tacan does provide both DME and VOR-type information to military aircraft (Aviation Week Dec. 7, p. 40).

The Austin TVOR, operating on a full-time basis at 108.8 mc., meets CAA accuracy requirements, Schroeder reports. Minnesota has extended invitations to aviation officials of other states and cities to visit the Austin installation and several have accepted, he says.

Merger Put to Vote

Proposed merger of Pioneer and Continental Air Lines (Aviation Week Dec. 28, p. 17) will be put to vote Feb. 27 at a special meeting of PAL stockholders in Dallas. Continental shareholders will vote Feb. 28.

Sen. Johnson Asks Denny:

Does Politics Sway CAB Voting?

No, says Board member in Senate committee hearings, air transport policy is the only factor in decisions.

Concern over party-line voting in Civil Aeronautics Board decisions and possible influence over Board actions by the Undersecretary of Commerce for Transportation is indicated in questions put to CAB member Harmar Denny by Sen. Edwin Johnson, ranking Democrat on the Senate Commerce Committee.

Since the Dec. 3 decision in which Denny—voting with the two CAB Democratic members—upheld the Board's authority to permit nonskeds to carry mail, all voting has followed party lines.

With the two Democrats dissenting, the Republican majority has: revoked the operating authority of Air America, a nonsked; denied Eastern-Braniff-Trans World Airlines service to the West; and authorized American Airlines direct New York-Mexico City service.

Johnson specified that the questions were given to him in connection with Denny's Senate confirmation:

Johnson: "The law provides that not more than three members of the CAB shall be appointed from the same political party. What is the reason for that proviso, in your opinion? Would you say it was intended to insure to the political party in power political control of the Board?—or was its purpose just the reverse—to keep the Board free from politics?"

Denny: "The reason that there should be and are no more than three members of the same political party is that a bipartisan board is the nearest approach to a nonpartisan board that can be achieved. This division holds to a minimum of political decisions, which should be avoided whenever possible."

Johnson: "Do you think that the majority party members of the Board, whether they be Democrats or Republicans, should have 'strategy' conferences from time to time in order to get their signals from the Administration—determine what their party's policy is—before they are called upon in Board meetings to cast their votes on important issues?"

Denny: "Majority and minority party members or any group of members of the Board should have policy, not 'strategy,' conferences from time to time as they see fit. Cases before the Board are not decided on party issues or by party pressure but they are decided on air transport policies.

"The record clearly shows that the most frequent division is on the question of the saving or spending of the people's money. The record also shows many cases where there has been a division between the members of each political party represented on the Board."

Johnson: "To what extent does the Board, or individual members, consult with the Undersecretary of Commerce for Transportation on matters before the Board?"

Denny: "The Board or individual members consult the Undersecretary of Commerce for Transportation or the Civil Aeronautics Administrator in cases where the regulations of the CAB are administered by the CAA and when new regulations are proposed or changes are suggested not of a judicial nature."

Johnson: "In your opinion should the Board, or individual members, consult with the Undersecretary before making decisions on matters that the Board must decide?"

Denny: "No."

Johnson: "Has the Undersecretary of Commerce for Transportation ever volunteered to assist you, or the Board, in reaching a determination on any problems?"

Denny: "The Undersecretary or the CAA Administrator has never to my knowledge volunteered to assist me or the Board in reaching a determination of any problem. The CAA Administrator and his employes, all of whom come under the Undersecretary of Transportation, directly participate in proceedings conducted by the Board."

Johnson: "Based on your long experience in public life plus your experience in recent months as a member of the CAB, in your opinion would the aviation industry fare better, and would the public interest be better protected, it regulation were in the hands of a single secretary of transportation instead of a so-called independent quasi-judicial board?"

Denny: "My firm belief is that the aviation industry would fare better and the public interest be far better protected by an independent quasi-judicial board than by a single secretary of transportation or any other individual. The most important reason for this is the great value of the deliberative action and the sharing of opinions."

Johnson's last question referred to the proposed reorganization of CAB as an independent commission and realignment of CAA under an undersecretary for air services (Aviation Week Jan. 18, p. 14).

LA Airport Fights For Expansion Funds

Los Angeles—Lack of funds has blocked the long-range expansion program of the International Airport here at a time when traffic is at a record peak, according to the Department of Airports.

"The only method for completing the expansion will be through a bond issue," the department reports. Such a program, proposed for last November's election, failed to get the necessary two-thirds majority vote.

The city considered an attempt to obtain necessary funds through revenue bonds, but investing companies or lending agencies were not interested in bonds covering such costly projects as expansion and maintenance of runways.

Another attempt to obtain approval of voters will be made at next November's election.

► **Record Gains**—During 1953 every phase of airport activity showed record gains. An all-time high of 2.5 million passengers used International last year, increasing 13% over 1952. Other records:

• **Airfreight** totaled more than 49 million lb., 16% higher than the previous year.

• **Traffic** added up to arrivals and departures of more than 30,000 airline, military and private aircraft, up 37%.

• **Airmail** gained 1% to 30 million lb.

Combined revenue for International and San Fernando Valley Airport set a new high of $1,803,500, 17% greater than in 1952.

► **Makeshift Methods**—"All of this activity makes the completion of International Airport a critical 'must,'" warns Robert A. McMillan, general manager of the airport department. "In our present temporary facility, we are using every known makeshift method to deal with the heavy volume of passengers, mail, and freight.

"If the city of Los Angeles is to continue to hold its position in the coming years as one of the world's air centers, we must complete International Airport and be capable of handling three times the present volume of business."

► **Expansion Stages**—At present the city utilizes only 800 acres of the 2,588 set aside for airport purposes. Under development, as funds become available, is an extension of runways to accommodate all types of aircraft including transports up to the heaviest military jet bombers.

Final stage of the expansion calls for an additional runway system to parallel the present main runways. Simultaneous operation of both already is indicated as present facilities are operating at near capacity, the department reports.

► **Airport Hotel**—Up for immediate consideration is the construction and operation of a hotel on the airport. The Board of Airport Commissioners has under study proposals submitted from hotel operators and anticipates letting a contract within six weeks.

The hotel site covers approximately five acres. Construction will be at the expense of the hotel operator, who will have exclusive rights.

Proposals being considered were submitted by Louie R. Ritter of New York; William L. Tooley, Beverly Hills; Airport Hotels, Inc., a group of Southern California businessmen and builders; and Wagner Construction Co., Beverly Hills.

PAL Paper Project Boosts S-55 Seating

Philippine Air Lines has completed a paper project to increase seating capacity of a Sikorsky S-55 helicopter from eight to 11 planes. Reason that PAL feels it can squeeze in three additional seats is because average passenger weight in the Philippines is about 140 lb.

Sources at Sikorsky Aircraft say PAL has not ordered the S-55 and describe the airline's interest in the copter as "purely academic."

The proposal includes these features: remove heater and duct; install two-way VHF radio and beacon receiver plus two four-place and one three-place high-density passenger seats. Safety equipment includes first aid kit and life vests.

Crew baggage would be limited to 20 lb. Minimum gas load of 40 gal. would give a 100-mi. range with 12 gal. left for 20 min. reserve. With 11 passengers weighing a total of 1,540 lb., PAL calculates it will have 182 lb. payload left over for passenger baggage or cargo.

Pilot Layoffs Jump To Peacetime Peak

Airline pilot furloughs have jumped sharply in the past six months with an unemployment increase of 594, largest number since the end of World War II.

Total furloughed since last August was 809, spread over 21 airlines. But this was offset partially by rehiring of 215 pilots by five carriers.

► **Some Retained**—Indications are that the number of layoffs might have been greater if some companies had not retained pilots in anticipation of increased summer schedules.

Three main reasons are given for the extensive furloughing:

• Termination of Korean airlift.

• Increasing seasonal fluctuation.

• General leveling-off of airline industry as a whole in order to get full utilization of crews.

► **Two to 216**—Number of pilots furloughed by any single airline ranges from two to 216. Pan American World Airways had the greatest number, followed closely by Northwest Orient Airlines, Flying Tiger Line, Slick Airways, Transocean Air Lines and United Air Lines.

United took some of the sting out of its furloughing program by taking on 75 of its pilots as flight engineers. Several others are following suit, and one is integrating them with ground personnel.

CAB Sets Causes In Three Crashes

Pilot misjudgment of severity of weather conditions caused two airline DC-3 crashes last year and probably contributed to an accident that destroyed a C-46, Civil Aeronautics Board reports.

The three crashes—one scheduled flight and two military charter operations—killed a total of 80 persons.

► **Backed-Up Findings**—In the DC-3 disasters, CAB's conclusion is backed up by two Air Force pilots flying in the areas of the two accidents.

One watched a Delta Air Lines transport fly directly into a severe thunderstorm shortly before it crashed east of Marshall, Tex., May 17, killing three crew members and 17 of the 18 passengers aboard.

The other USAF pilot was flying on instruments near the route of a Regina Cargo Airlines aircraft less than an hour before the nonsked transport plunged into a 3,000-ft. ridge southeast of Vail, Wash., Sept. 1 on visual contact. Twenty-one persons died in the wreckage.

The Air Force pilot said visual flight from the crash site to McChord AFB, Wash., destination of the Regina DC-3, would not have been possible at that time.

► **Heavy Icing**—CAB says the third crash, of an Associated Air Transport C-46F west of Fish Haven, Ida., Jan. 7, was caused by turbulence that plunged the transport from its 13,000-ft. cruising altitude. The pilot lost control because of heavy icing that formed during the plane's descent, CAB found.

But the Board makes this comment on turbulence and icing conditions along the C-46's route: "It seems likely that even this condition could have been flown over by an increase of altitude of not more than 500 ft. These conditions are verified by another flight that preceded N1648M (the Regina C-46) by only a few minutes without difficulty. There was no request received from the flight for a higher altitude."

► **Findings**—On the basis of its investigations, CAB hands down these findings in the three crashes:

• **Delta DC-3.** ". . . Probable cause of this accident was (1) the encountering of conditions in a severe thunderstorm that resulted in loss of effective control of the aircraft and (2) the failure of the captain to adhere to company directives requiring the avoidance of thunderstorms when conditions would allow such action."

• **Regina DC-3.** ". . . Probable cause of this accident was the pilot's attempt to continue flight under the provisions of visual flight rules during instrument conditions."

• **AAT C-46.** ". . . Probable cause of this accident was the inadvertent descent into an area of turbulence and icing which resulted in the flight's inability to regain a safe altitude."

AA Attacks Eastern Action on Mexico

American Airlines charged last week that Eastern Air Lines' request for a stay order forcing postponement of American's nonstop New York-Mexico City route until Feb. 8 was "full of misrepresentation."

Civil Aeronautics Board the week previous had approved by a 3-2 vote inauguration of American's service to Mexico City (AVIATION WEEK Feb. 1, p. 70) "for the purpose of preserving the competitive position of U. S.-flag services . . . pending establishment on a long-range basis of a certificated air pattern between the U. S. and Mexico."

CAB's action would put American in competition with Air France, which operates nonstop Constellation service between New York and Mexico City.

► **Misinterpretation Charged**—Eastern immediately filed a stay order with U. S. Court of Appeals in the District of Columbia. "Eastern's statement misinterprets the Board's regulations when it says that action without notice and hearing can be granted only in an emergency involving safety," American charged. "In a situation such as this, which required the protection of the national interest, the Board has the power to grant such an exemption. . . .

"Eastern attempts to convey the impression that the exemption gives American some permanent right without a hearing," American said. "All that the exemption does is to permit the nonstop until there is a hearing on an application for a certificate amendment providing for the nonstop. American has had an application for such an amendment on file with the Board since April 1947."

American also rebuked CAB member Josh Lee who, with member Joseph Adams, had dissented from the majority decision. The airline said, "it is ironical for a champion of competition (Lee) to contend that principles of competition call for imposing on a U. S. carrier an artificial restriction making its service 25% slower than a competitive service of another country."

Two days after Eastern filed its complaint, Pan American World Airways also objected to CAB's American move.

CAB ORDERS

(Jan. 19-22)

ORDERED:

Investigation of reduced fares for States-Alaska service—proposed by Alaska Coastal Airlines, Ellis Air Lines, Pan American World Airways, United Air Lines, Western Air Lines and West Coast Airlines. Pending such investigation, hearing and decision by CAB, reduced fares are suspended until Apr. 23.

Mohawk Airlines to show cause why the Board should not fix, determine and publish a mail rate of $1,287,884 annually as fair and reasonable temporary rate of compensation to be paid the airline. It is equivalent to 45.25 cents per revenue-mile of scheduled operation.

APPROVED:

Pioneer Air Lines request to lease Martin

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American Airlines inter-company arrangement with Transocean, Trans World Airlines and various other air carriers.

DENIED:

Peninsular Air Transport and Aero Finance Corp. motion to consolidate.

Transocean Air Lines request to operate Intergovernmental Committee for European Migration flights between either Brussels, Belgium or Munich, Germany, and New York.

Aiken, S. C., application requesting Delta-C&S Air Lines service on flights between Augusta, Ga., and Charlotte, N. C., via Aiken and Columbia, S. C.

Remaining petitions for leave to intervene in the Denver service case filed by Idaho Falls and Pocatello, Ida., the chamber of commerce of Pocatello and Minneapolis-St. Paul Metropolitan Airports Commission.

DISMISSED:

Lineas Aereas Nacionales' (Lansa) application for foreign air carrier permit to serve Bogota/Barranquilla/Cartagena, Colombia and Miami, Fla.

GRANTED:

Pan American World Airways permission to serve Westover Field, Mass., and Burtonwood AFB, England, on regularly scheduled all-cargo flights for U. S. Air Force, provided no other property will be picked up or discharged at either of the two points. This permit expires in six months.

Eastern Air Lines and Kansas City, Mo., leave to intervene in the Denver service case.

(Jan. 22-28)

GRANTED:

City of St. Cloud, Minn., and its chamber of commerce; Minneapolis-St. Paul Metropolitan Airports Commission; city of Fergus Falls, Minn., and chamber of commerce; city of Brainerd, Minn.; state of Minnesota, city of Bemidji and Civic & Commerce Assn.; city of Thief River Falls, Minn., and Civic & Commerce Assn.; city of Alexandria, Minn.; state of North Dakota; North Dakota Aeronautics Commission, Bismarck, N. D.; city of Grand Forks, N. D., and chamber of commerce, leave to intervene in North Central Airlines case.

APPROVED:

Central Airlines application to serve Duncan, Okla., beginning Feb. 1.

Intervention of Postmaster General into the consolidated Ellis Air Lines and Alaska Coastal Airlines cases for renewal of certain temporary authorizations, principally mail.

AUTHORIZED:

Resort Airlines to suspend service temporarily at Guatemala City, Guatemala, and Merida, Mexico, for 60 days.

FIXED:

Mohawk Airlines temporary mail rate at 48.89 cents by the ratio of the scheduled miles flown during the month (not in excess of 5,500 times the number of days in the month) to the designated miles flown during the month.

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P-1390, Aviation Week
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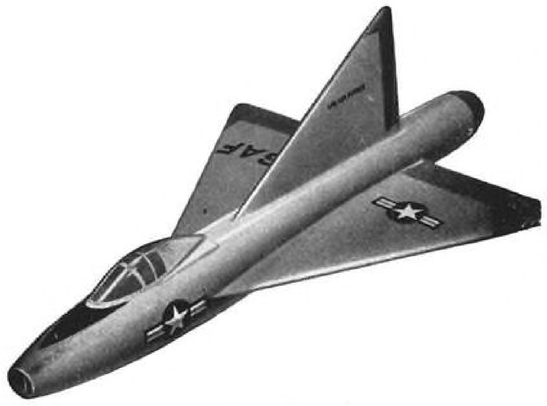

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P-1493, Aviation Week
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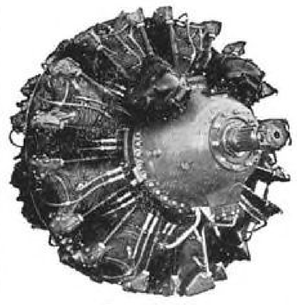

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FL-1544, Aviation Week
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Heater	Stewart Warner (200,000 BTU)	921B	230
Blower	Dynamic Air Engine	4582-AA-6C	18
Blower	Joy Manufacturing Co.	U-702-15	24
Tank Unit	Minn. Honeywell	G-1098D	11
Trim Tab Controller	Pioneer	#15701-R	20
Oil Cooler Assembly	U.A.P.	U8416-MM	12
Oil Cooler Assembly	U.A.P.	U8013-MM	14
Hydraulic Pump	Vickers	MF9-713-15H	120
Hydraulic Pump	Vickers	PF12-713-25BCE	124
Hydraulic Pump	Vickers	PF4-713-20BCE	327
Hydraulic Pump/ 3000 P.S.I.	Vickers	MF45-3911-20Z	43
Hydraulic Cylinder	Air Associates	HC2109	29
Hydraulic Cylinder	Air Associates	HC2110	8
Fire Detector	Edison	117-47	46
Fire Detector	CO_2 Mfg. Co.	ASDC2	65
CO_2 Cylinders	Kidde	981280	185
CO_2 Cylinders	Kidde	M870036B	47
Anti-Icer Pump	Adel	D7818	125
Auxiliary Power Unit	Eclipse	NEP-2	29
Auxiliary Power Unit	Lawrence	LER-30D	16
Pump	Pesco	1EAR-280BH	15
Pump	Pesco	1E-621	8
Pump	Pesco	2E258SA	21
Separator	Pesco	3V-217-HC	32
Accumulator	Vickers	AA14002A	35
Actuator	Air Associates	M-2031	22
Wobbie Pump (D-3)	Erie Meter	AN4014	17
Oxygen Cyl.	Kidde	923748	74

ENGINE ACCESSORIES

Starte	Eclipse	1416-12E	75
Generator	Ecilpse (NEA-3A)	716-3A	100
Starter Motor	Jack & Heinz	JH950-R	90
Generator	G.E.	2CM46A2	4
Generator	Eclipse	1003-4	71
Carburetor	Stromberg	PD12K10	550
Carburetor	Stromberg	PR48-A1	236
Carburetor	Holley	1685-HAR	90
Carburetor	Holley	1375-F	19
Magneto	Scintilla	SF9-LN-2	407
Fuel Pump	Pesco	2P248EB	6
Fuel Strainer	U.A.P.	U635A	76
Governor	Woodward	5x18	10
Prop. Reversing Control	Ham. Standard	72400	20
Oil Separator	Eclipse	564-2A	384
Oil Filter	Purolator	27314	100
Pressure Relief Valve	Aerotec	V301B7	20
Tachometer	Eclipse	2227-11-D3A	11
Vacuum Pump	Eclipse	610-2C	6
Spark Plugs	Aero	LS4-AD1	185,000

AIRCRAFT ENGINES & PARTS

Engine	Wright	R-1820-52	1
Engine	Wright	R-1820-54	16
Engine	Wright	R-1820-60	4
Engine	P & W	R-1830-43	1
Bearing	P & W	1045A	166
Flange	P & W	3506	500
Follower Assy.	P & W	8288	130
Blower Assy.	P & W	3M814	814
Shaft	P & W	48362	53
Shaft	P & W	48363	75
Gear	P & W	48461	390
Gear	P & W	76236	78
Bearing	P & W	84289	1178
Housing	P & W	84487	113
Nose Housing	P & W	84591C	77
Crankcase Assy.	P & W	84350-D	200
Pump Assy.	Wright Aero	420313	33
Drive Assy.	Wright Aero	416421	46
Q.E.C. Unit		FM1	36

AIRCRAFT ENGINES & PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
Q.E.C. Unit		PY4M(B24	17
Bearing	Torrington	NR6L12	25790
Bearing	Fafnir	AN200-K3L2	18273

GAUGES

Compass	Eclipse	36001-0	20
Gyro Indicator	Eclipse	14601-1F-B1	11
Gyro Indicator	Eclipse	10078-1AG	62
Position Indicator, Wheel & Flap	Weston	AN5780-2	400
Position Indicator, Wheel & Flap	G.E.	AN5780-2	1000
Position Indicator, Wheel & Flap	Eclipse	20100-11C-4-A1	23
Pitch Trim Gauge	Eclipse	15100-1B-A1	19
Cowl Flap Indicator	G.E.	8DJ29AAY	21
Oil Temp. Indicator	Lewis	77C3	23
Oil Temp. Indicator	Lewis	77C4	13
Oil Temp. Indicator	Weston	828TY13Z2	71
Manifold Pressure Gauge	Manning, Maxwell & Moore	AN5770-2	28
Fuel Quantity Gauge	Eclipse	3801-3B	128
Dual Carb. Temp. Gauge	Weston	828TY12Z2	40
Carb. Air Temp.	Lewis	77C3	22
Carb. Air Temp.	Weston	119862	40
Air Temp. Gauge	Weston	727TY70Z2	11
Air Temp. Gauge	Weston	727TY72Z2	85
Air Temp. Gauge	Weston	727TY73Z2	88
Air Temp. Gauge	Weston	727TY74Z2	83
Air Temp. Gauge	Weston	728-40Z2	10
Air Temp. Gauge	Weston	727-TY37P	298
Air Temp. Gauge	Lewis	47B22	33
Air Temp. Gauge	Lewis	47B23	28
Air Temp. Gauge	Lewis	47B24	54
Air Temp. Gauge	Lewis	47B21	30
Cylinder Head Temp.	Lewis	76B19	8
Torque Indicator	Eclipse	20100-42B-14A2	9
Tachometer Indicator	G.E.	8DJ13ABK	6
Tachomete Indicator	Eclipse	2222-1F-2A	200
Magnesyn Pos. Indicator	Eclipse	20000-8-A14	9
Magnesyn Transmitter	Eclipse	20000-43A-13A1	8
Magnesyn Indicator	Eclipse	23000-2A	67
Pressure Transmitter	Eclipse	22101-11-A4	15
Pressure Transmitter	Giannini	47114-D2.0-20	8
Differential Pressure Gauge	Kollsman	906-6-011	22
Differential Pressure Gauge	Kollsman	254BK-6-052	48

AIRCRAFT (RADIO)

Transmitter	Bendix Radio	TA-12B	20
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SHORTLINES

► **Aigle Azure,** independent French airline, has joined International Air Transport Assn., increasing IATA membership to 70 carriers.

► **Aircoach Transport Assn.** reports 38 of its 40 member airlines had no accidents involving passenger fatalities in 1953. Two fatal crashes during the year, both involving military personnel, killed 24 persons.

► **Air France** has concluded a reciprocal sales agreement with Guest Airways, whereby Guest offices in Acapulco, Mexico City and Miami will work with Air France offices in Mexico City and Miami for mutual sales benefits.

► **Allegheny Airlines** has applied to Civil Aeronautics Board for permission to extend its Pittsburgh-Philadelphia route to New York-Newark via Trenton, N. J.

► **American Airlines** has granted pay increases ranging from $3.47 to $34.67 a month for 5,500 general employes—the second general wage boost in six and a half months.

► **British Overseas Airways Corp.** is offering a group of 10 multiple-stopover Caribbean air cruises in conjunction with its subsidiary, British West Indian Airways. Most are first-class.

► **California Eastern Airways** has been awarded a two-month contract by USAF for service in the trans-Pacific airlift between California and Tokyo with four DC-4Es.

► **Capital Airlines** has introduced one-plane through service from Milwaukee and Minneapolis-St. Paul to Miami under interchange agreement with National Airlines.

► **Hawaiian and Trans-Pacific Airlines** had their biggest year in 1953, carrying a combined total of more than 555,000 passengers.

► **International Civil Aviation Organization** announces that on Feb. 13 Uruguay will become ICAO's 63rd member nation.

► **Lake Central Airlines** has moved its Chicago facilities into the new terminal at Midway Airport.

► **National Airlines** set a new record for passenger travel over its 33-city system in 1953, with overall traffic up 36% over 1952.

► **North Central Airlines** carried a record 217,663 revenue passengers on its system in 1953.

► **Pan American World Airways** will inaugurate direct service from U. S. to Denmark, Norway, Sweden and Finland Apr. 25. . . . PAA is awaiting approval for inauguration of tourist fares to all points on its Pacific routes, with action expected by mid-February.

► **Pioneer Air Lines** achieved an average of 42.65% occupancy on all its flights in 1953, compared with 41.82% load factor in 1952.

► **Port of Oakland, Calif.,** has granted United Air Lines a one-year lease on a total of 7,212 sq. ft. of space at Oakland Municipal Airport for the establishment of an expanded UAL airfreight terminal.

► **Scandinavian Airlines System** has opened a district sales office in Montreal.

► **Seaboard & Western Airlines** reports commercial and military operations on Atlantic and Pacific runs in November increased 61% over the same month for 1952, a total of 843,074 revenue flight miles logged in 4,285 hr.

► **Trans World Airlines** reports revenue passenger mileage over its domestic routes during the first 12 days of January increased 23.7% over the same period of 1953.

► **United Air Lines** set a company record for passenger traffic in December, operating 213,384,000 revenue passenger-miles for a 19% increase over December 1952. . . . The carrier has asked CAB approval to integrate seven Iowa and Illinois cities—Waterloo, Mason City, Ft. Dodge, Sioux City, Dubuque, Clinton and Rockford—with its coast-to-coast network.

► **Vickers-Armstrongs Aircraft Division** of Weybridge will open an office in Montreal to assist Trans-Canada Air Lines in the carrier's transition to turboprop Viscounts.

Air-Sea Travel

Scandinavian Airlines System is selling air-sea tickets to Africa, permitting passengers to travel one way by plane and the other by ocean liner.

Under an agreement with Farrell Lines, SAS provides a roundtrip discount on the combination tickets and allows passengers to stop over in Europe en route to their destination.

AVIATION CALENDAR

Feb. 11-12—American Institute of Electrical Engineers, western computer conference, Ambassador Hotel, Los Angeles.

Feb. 11-12—Montana Aviation Trades Assn., convention, Bozeman.

Feb. 15—American Society for Testing Materials and National Association of Corrosion Engineers, joint meeting, Dallas.

Feb. 18-19—Institute of Radio Engineers and American Institute of Electrical Engineers, transistor circuits conference, Philadelphia.

Feb. 21-23—Third annual Texas Agricultural Aviation Conference, Texas A&M College, College Station, Tex.

Feb. 22-23—Seventh annual National Model Plane Exhibit Contest, sponsored by Air Foundation and Cleveland Chamber of Commerce, Higbee Co. auditorium, Cleveland.

Feb. 24-26—Ohio-Indiana Agricultural Aviation Conference, Ohio State University.

Mar. 5-7—Society of Women Engineers, national convention, Mayflower Hotel, Washington, D. C.

Mar. 22-25—Institute of Radio Engineers, national convention, Waldorf-Astoria Hotel and Kingsbridge Armory, New York.

Apr. 5-6—Society of the Plastics Industry (Canada), Inc., 12th annual conference, Mount Royal Hotel, Montreal.

Apr. 5-8—American Management Assn., 23rd National Packaging Exposition, Convention Hall, Atlantic City, N. J.

Apr. 14—National Advisory Committee for Aeronautics, symposium on helicopter research for American Helicopter Society, Langley Field, Va.

Apr. 14-16—Society for Experimental Stress Analysis, spring meeting, Netherlands Plaza Hotel, Cincinnati.

Apr. 19-20—Symposium on automatic production of electronic equipment, sponsored jointly by Standard Research Institute and USAF, Fairmont Hotel, San Francisco.

Apr. 21-24—Second annual student paper competition for undergraduates and graduates, sponsored by the Texas section of IAS, Melrose Hotel, Dallas.

Apr. 22-23—Joint meeting of Radio Technical Commission for Aeronautics, Franklin Institute Laboratories, Institute of the Aeronautical Sciences (Philadelphia Section) and Institute of Radio Engineers (Philadelphia Section), Philadelphia.

Apr. 22-23—American Institute of Electrical Engineers, conference on feedback control, Claridge Hotel, Atlantic City, N. J.

Apr. 29-30—American Society of Tool Engineers, 10th biennial industrial exposition, Convention Center, Philadelphia.

May 4-6—1954 Electronic Components Symposium, Department of Interior auditorium, Washington, D. C.

May 5-7—Third International Aviation Trade Show, managed by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 12-14—Engineering Institute of Canada, annual meeting, Quebec.

May 16-19—American Association of Airport Executives, 1954 national convention, Louisville, Ky.

June 21-24—Institute of the Aeronautical Sciences, annual summer meeting, IAS Building, Los Angeles.

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LETTERS

Airlines & Youth

For years I have been an active reader of AVIATION WEEK, and find it to be the best publication for all phases of aviation in the world.

I have been active in all phases of aviation for 19 years, having had to work my way up the hard way to the point that I have such CAA certificates as Aircraft & Engine Mechanic License, and Flight Engineer Rating, as well as FCC Restricted Radio Phone License 3rd Class, but having had to do this by way of civilian methods I was unable to be accepted by the Air Force and consequently had no GI Bill or other aid to finance my education for any license that I hold.

I'm writing you to find out why the airlines seem to follow a program of hiring and advertising for young men, such as United Air Lines, for flight engineer trainees, ages 21-26 years; or American Airlines, 21-32; and others, with exception of TWA who approve of ages 23-27 for flight engineer and 22-31 for co-pilots.

It seems to be that insurance companies must have sold these aviation companies on the idea that a man is no longer useful after he's past 30 or 35, yet a man has to be at least 35 before he gets experience enough to even qualify for a good flight position.

It so happens that I have 2,000 hr. as flight engineer but can't be accepted by various airlines because I either can't pass an entrance examination (such as TWA has with college subjects that have no bearing on flying Constellations) or because they want kids 21-26 years (such as United).

The result is that I'm forced to take secondary positions in aviation when I'm more than qualified for higher technical flight positions. The age limit defeats me. I, as well as countless others who have had to earn certificates the hard way, deserve a better consideration than the airlines seem to want to give.

I'm sure if the airlines wanted valuable men they would not turn them down due to age, or make them go back to work as mechanic to work "up" to flight engineers, but consider the fact that CAA has given them enough examination to warrant serving the airlines in the category they are experienced in.

B. B.
Pasadena, Calif.

Side-by-Side Again

I was extremely interested in your article on page 42 of AVIATION WEEK Nov. 30 last, in which you quote extensively Mr. Danch's views on the side-by-side trainer layout ("Why Ryan Backs Side-by-Side Seats").

You will, of course, know that the RAF Prentice ab initio basic trainer was designed to a specification dated 1943 and the side-by-side arrangement was decided upon by the staff and students of the Empire Central Flying School which, at that time, included representatives of all the Commonwealth Air Forces and, indeed, it is most probable that officers of your forces were attending the courses.

There was in the RAF a quite considerable body of opposition to the idea on grounds which were, naturally, purely theoretical, but as the aircraft came into full use in the Flying Training Schools the practical advantages became so apparent that even the most verbose opponents were silenced. The fact that the next ab initio specification for the RAF in 1948 perpetuated the side-by-side scheme and produced the Provost seems to have set the seal of our Air Staff's approval on this layout.

This means that, so far as the RAF is concerned, all pilots are now trained to "wings" standard in side-by-side trainers, i.e. the Provost and the Vampire.

In the last paragraph but one of your article you say that there are many arguments against side-by-side seating and this remark has raised my curiosity. From my knowledge of AVIATION WEEK I feel certain that it has not been occasioned by any need to consider the feelings of the manufacturers of tandem-seat trainers! It would be very enlightening to hear the arguments of those who oppose Mr. Danch's views but they would not appear to be of much value unless they were backed by practical instructional experience of both arrangements.

I, of course, know many of the theoretical arguments, but I also know that practical experience has failed to bear them out. If you can find space to permit the opposition to set forth their views I am sure it would be read with great interest by many of your readers including myself.

A. N. KINGWELL
33 West Common
Harpenden, Herts
England

'Ideal' Business Plane

I have noticed your article relative to market research concerning a business plane in the Jan. 4th issue, as well as other articles appearing in AVIATION WEEK from time to time on this subject.

As a small business-plane owner, I would like to call your attention to the fact that most of your thinking seems to be in terms of what General Electric or Allis-Chalmers or other such industrial giants would find interesting in the way of a business plane. The very large and wealthy companies undoubtedly are interested in a number of large planes.

I think that you lose sight of the fact that there are far more medium-sized and small companies who are now using single-engine planes that would prefer twin-engine planes, and many, many more companies who have no planes at all who would be prospects for a very efficient, safe, twin-engine airplane.

To us, the ideal plane would be a four-place arrangement twin-engine, capable of flight on either engine, 200-mph.-plus cruising speed, landing speed around 50 mph. (actual glide speed), with dual instrumentation and stable flying characteristics; and most important, a price tag of around $25,000 or $30,000.

Of the new twin-engine airplanes either in production or shortly to be in production, none of them meets all of these requirements. If and when someone develops such an airplane, it seems certain to meet with tremendous acceptance.

J. E. POTTHARST, JR.
Mechanical Equipment Co., Inc.
861 Carondelet
Cor. St. Joseph St.
New Orleans 12, La.

'Constant Speed'

I think the name "constant-speed rotor," given to the Doman rotor in your Dec. 28 article (p. 32) encroaches somewhat upon the established term "constant speed." Giving it this name is like giving the name "constant-speed propeller" to a fixed-pitch propeller which, say, is powered by a dynamically damped engine. In either case, "constant speed" usually implies governing action due to pitch change.

My associates and I are developing a bona fide constant-speed rotor in which the hub has built-in automatic collective pitch control. This feature is obtained very simply by replacing the conventional blade-retaining ball bearings with special non-linear springs which are capable of converting part of the blade centrifugal forces into pitch-changing moments. The direction of each moment depends upon whether the centrifugal force causing it is greater or less than some predetermined desired value.

A manual lock-in is necessary for conventional blades. When this is unlocked momentarily, the moment increases pitch when the throttle is increased or when rpm. is high, and vice versa, and also reduces pitch quickly after engine failure.

We point to our constant-speed rotor as a source of economy in the swash plate, of weight reduction in the blade retention, and of a simplification of the controls. If this can be said of any rotor, we believe that our rotor, using Mr. Mazur's words in this article, "obsoletes contemporary designs."

WILLIAM H. RASER, JR.
Raser Aircraft Co.
108 N. Roosevelt Ave.
Endicott, N. Y.

Praise

Enclosed you will find the information you requested for your Mar. 15 Inventory of Airpower. We certainly appreciate being included in this widely used issue of what we consider one of the world's most accurate and popular aviation magazines. . . . We were more than pleased with the coverage you gave us in your Jan. 11 issue. We are indeed a small corporation struggling to advance ourselves in the aviation industry, and when you come through as you have we appreciate it very much.

WILLIAM F. CHANA, President
BeeCraft Associates Inc.
1536 Missouri St.
San Diego 9, Calif.

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Allison's service representative on assignment with the 318th Fighter-Interceptor Squadron at Thule Air Base didn't know he was writing an advertisement when he sent the following report—but we think you'll be interested in these comments from northern Greenland:

"I am sending a few pictures taken at Thule shortly before old Sol set for its last time here in the Arctic. I am sure that these pictures will be of interest—with a caption indicating satisfactory performance of the Allison J33 engine even in these adverse conditions, some 800 miles from the geographic North Pole, and almost due east of the magnetic pole.

"The Air Echelon overseas movement of the 318th with Lockheed F-94B's was made from McChord Air Force Base, Washington to Thule. This move, made without incident, indicates not only the pilots' capabilities and outstanding maintenance of equipment, but also the rugged dependability of the J33 engine. During the first four months of operation here, even with the onset of the Arctic night and extreme temperatures, this squadron is still logging hundreds of hours of combat-ready flight a month.

"I believe it would be quite fitting for Allison to indicate its appreciation of the Squadron's unrelenting confidence in the J33 engine and its prolonged effort toward making jet fighter operations both possible and practical in the far northern reaches of the globe."

Allison greatly appreciates this opportunity to salute the 318th Squadron of the Northeast Air Command for its splendid record in maintaining vigilant guard at the top of the world.

GM
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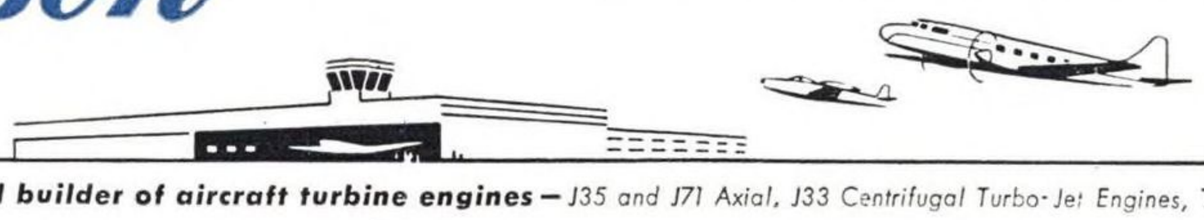
DIVISION OF GENERAL MOTORS, INDIANAPOLIS, INDIANA



World's most experienced designer and builder of aircraft turbine engines—J35 and J71 Axial, J33 Centrifugal Turbo-Jet Engines, T38 and T40 Turbo-Prop Engines