AVIATION WEEK

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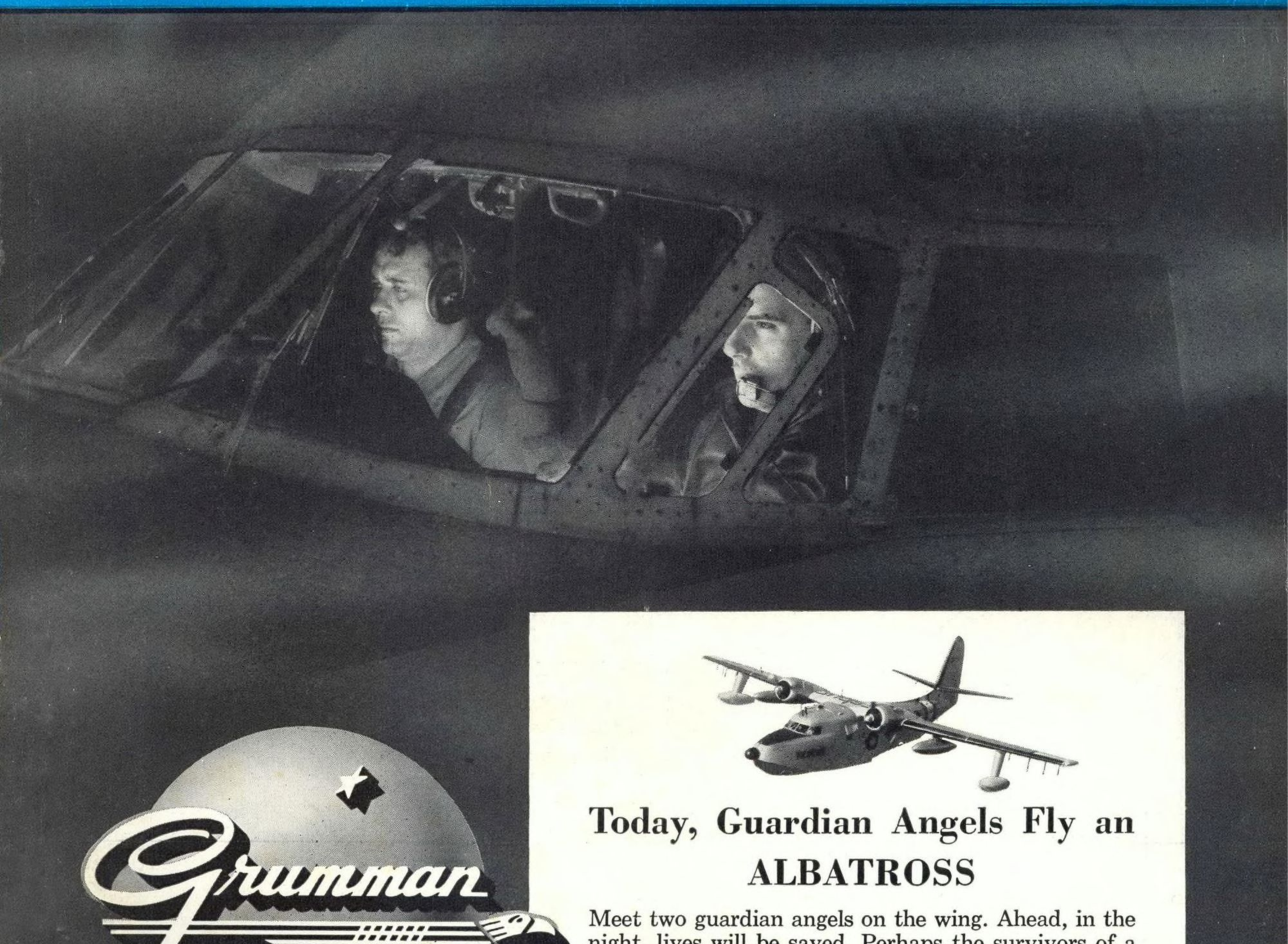

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NEWS DIGEST

Boeing Plans Jet Transport in 1954

Boeing Airplane Co. last week beat its two principal U. S. competitors to the punch by promising, in effect, to flight test a commercial prototype jet transport within two years. No U. S. competitor has publicly announced a firm jet transport construction program. And it is believed unlikely that either Douglas or Lockheed, the other manufacturers known to be planning jet transports, will produce a prototype within the next two years.

While Boeing did not publicly specify flight tests within two years, that is the interpretation observers placed on Boeing President William M. Allen's carefully worded, one-sentence announcement that his company "has for some time been engaged in a company-financed project which will enable it to demonstrate a prototype jet airplane of new design to the armed services and the commercial airlines in the summer of 1954."

► **First Details**—The new jet transport, a Boeing spokesman told AVIATION WEEK, will draw heavily on experience gained in development and production of the B-47 and B-52 jet bombers. This puts Boeing "in an excellent position competition-wise," he said.

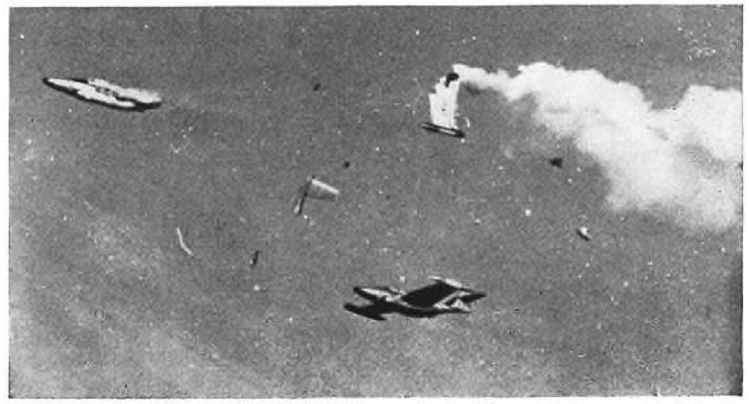
First details and illustrations revealing what the Boeing transport may look and fly like appeared in AVIATION WEEK June 18, 1951, p. 19. Boeing's Model 473 design proposal had definite B-47 and B-52 characteristics, including wing and tail shape and the twin-pod engine mounting.

(Douglas has a full-scale fuselage mockup of its DC-8 proposal, first details of which appeared in AVIATION WEEK Aug. 11, p. 13.)

Since the Boeing Model 473 was designed, it is understood some changes have been made. This might point to the B-52's Pratt & Whitney J57 powerplant as the logical one for the jet transport. A company spokesman says the design will incorporate "many new developments and refinements" of the B-52. Other B-52 features in the transport may include such wing aerodynamic refinements as the "feeler ailerons," spoilers and extra large flaps.

► **Seat Layouts**—The Model 473 proposal to the airlines suggested three passenger seating arrangements: a five-abreast, 97-passenger coach, and two 60-passenger versions, one domestic and one international. Boeing quoted a cruising speed of 500 mph. at 40,000 ft. and a maximum speed of 580 mph. with normal rated power and 125,000-lb. gross weight at 40,000 ft.

Presumably the engines would be slung in pods under the wings like the B-47 engine installation. Model 473 design called for two double pods, but there has been some consideration of four separate pod installations.



NORTHROP F-89 DISINTEGRATES only 200 ft. off the ground while thrilling the crowds viewing the International Aviation Exposition at Detroit during the Labor Day weekend. Five spectators were hurt in the spectacular crash which killed pilot and radarman. Other F-89 (background) emerged unscathed.

Domestic

Boeing B-47 armament systems are being delivered by General Electric Co., approximately 14 months after the firm received a production contract from USAF.

Scheduled jet airline service in the U. S. is "some five or six years away," according to H. M. Horner, president of United Aircraft Corp. He added that to compete with the DH Comet "we must have powerplants at least twice the size" of the Comet's.

Wind storm damaged Carswell AFB, Ft. Worth, Tex., totally destroying one B-36 and inflicting major damage to at least six others. Power was disrupted at the Convair-Ft. Worth plant adjacent to the USAF base and considerable damage was done to B-36 servicing stands.

Chase Aircraft Co., Inc., has signed a 99-year lease with Mercer County, N. J., for 54 acres at Mercer County Airport, W. Trenton. Firm plans to erect a $2-million plant on the site, with initial work to start soon. Chase's present facility nearby will be turned back to Navy within the next year.

Lockheed F-80s had flown 37% of all fighter sorties in Korea as of July 31, according to USAF. More than 80,000 sorties are credited to the FEAF Shooting Stars. Altogether 128 Lockheeds were knocked down as of that date, only 12% being destroyed in the air.

Twin-engine Navion conversions will be handled by Jack Riley Aircraft Manufacturing Co., Inc., Ft. Lauderdale, Fla., and Longview, Tex. Dauby Equipment Co., Los Angeles, retains engineering control of the project, which was described in AVIATION WEEK Mar. 31, p. 28.

Financial

Trans World Airlines reports $1,957,402 net income after taxes, in the first half of 1952. Second quarter earnings were $2,510,325.

Seaboard & Western Airlines is paying a 30-cent-per-share dividend on common stock payable Sept. 18 to holders of record on Sept. 9.

Slick Airways reports an $18,900 profit after taxes for July compared with a $14,800 loss in July last year.

Northwest Airlines reports net profit after taxes of $277,766 during July on operating revenues totaling $5,288,852.

Henry J. Kaiser Co. has completed a $22-million loan agreement with a group of banks.

Ryan Aeronautical Co., San Diego, Calif., notes net profit for the nine months ended July 31 was $609,669, with gross business for the period being $22,219,829.

AVIATION CALENDAR

Sept. 8-10—American Standards Assn. third national standardization conference, Museum of Science and Industry, New York.

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

Sept. 8-13—American Rocket Society fall meeting, Hotel Sheraton, Chicago.

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

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

Sept. 23-25—Air Transport Assn. annual engineering and maintenance conference, Saxony Hotel, Miami Beach, Fla. (closed meeting this year).

Sept. 25-26—Radio Technical Commission for Aeronautics fall assembly meeting, Hotel Statler, Buffalo, N. Y.

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

Sept. 27—Nantucket Air Tour dinner and hangar dance (Ancient Order of the Deep), Nantucket Is., Mass.

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

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

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

Oct. 7-8—Aircraft Electrical Society ninth annual display meeting, Pan Pacific Auditorium, Los Angeles.

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

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

Oct. 19-24—American Welding Society national fall meeting, Bellevue-Stratford Hotel, Philadelphia.

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

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

Oct. 28-30—AIEE Air Transport Committee annual meeting, Commodore Perry Hotel, Toledo.

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

Nov. 11-12—Piper distributors' annual meeting, Lock Haven, Pa.

Nov. 17-20—National Aviation Trades Assn. annual convention, Hollywood-Roosevelt Hotel, Los Angeles.

Dec. 2—Symposium on light-metal heavy forgings and extrusions for aircraft, SAE, ASME, IAS and AIME.

PICTURE CREDITS

7—Wide World; 32—Lockheed Aircraft Corp.; 40, 45, 46—Northrop Aircraft, Inc.

Washington Roundup

Through Rose-Colored Glasses

Secretary for Air Thomas Finletter and Secretary of Navy Dan Kimball were wearing rose-colored glasses when they painted their picture of U.S. air power for American Legionnaires.

This was on the same day Senate Preparedness Committee, headed by Texas' Sen. Lyndon Johnson, released its black picture. Ironically, the Johnson report on the status of air power was based on testimony from USAF and Navy—before the most recent "stretchout" of the air program.

Johnson subcommittee:

"As of March 31, although our percentage of jet aircraft had increased we had fewer planes in the Air Force than at the start of the Korean war. Of those planes, a greater proportion of them was second line than before Korea.

"In other words . . . there has been a net loss in total inventory from July 1, 1950, to March 31, 1952.

"The total inventory requirement for 126 modern combat wings, as of April, was three times the number of modern aircraft available. . . .

"By July we had only one-half of the combat wings with modern equipment which were deemed necessary. . . .

"Our Naval Air force picture is no better. As of March 31, the Navy had less planes than it had at the start of the Korean war. Moreover, the preponderance of second-line planes to total inventory was greater. . . . The ratio of jet to piston engines was absurdly low. . . . This dismal picture was painted even blacker by the Deputy Chief of Naval Operations for Air when he pointed out that production slippages were continuing, and that schedules had not been met in the past, and were still not being met."

Secretary Finletter:

"The Air Force is in pretty good shape to take care of any eventuality which might happen now or in the near future. . . . If anything happens today we would be in a position, notably through our Strategic Air Command, to deliver a blow of the utmost seriousness upon anyone who might start anything. Our striking power in the Strategic Air Command is, I believe, the most dreadful weapon . . . that had ever been in the hands of man. . . . The basic objective of the whole air establishment (is to provide a chance) to work out a peaceful world. . . . But in the meantime, we do not intend to let our guard down."

Secretary Kimball:

"At present, our Naval (sea-air power) forces in many places throughout the world are providing a powerful deterrent to the spread of aggression. . . . In the aviation field, we have several planes now coming into production which can out-perform the best planes known to be in the hands of those who oppose our way of life. We have even better aircraft in the developmental stages. All of the aircraft we are now getting are entirely new since the war."

Finletter's Advice

Secretary Finletter's advice to American Legionnaires, presumably directed at criticism of the Air Force by the Johnson subcommittee for specific instances of waste of manpower and funds:

"Do not become too impatient at some of the individual signs of mismanagement . . . we are really aware of these things and are trying to do our best. . . . Do not give overdue emphasis to some of the examples of mismanagement which are brought to your attention. I believe you have to look at the over-all picture."

The Johnson subcommittee did in its last report. It found:

"The history of our air buildup is a saga of bad programming, neglected warnings, lack of coordination, abuse, misuse, and disuse of power, bad advices to the executive, and a general refusal on the part of our governmental agencies to pull together or work together in a dedicated way to strengthen our air arsenal."

Foster: Rosy Picture, Too

Deputy Secretary of Defense William Foster had rosy words for American Legionnaires on defense production—which were also at odds with Johnson Subcommittee observations.

Is a proper defense for the U.S. being provided? Foster: "An unqualified 'yes.'"

Has there been, according to the Johnson Subcommittee, "little effective organization, less cooperation and a pitifully insignificant amount of coordination?" Foster: "The success of the armed forces in carrying out the unprecedented triple assignment—partial mobilization, Korean war, development of radically new weapons—has been due largely to the coordination in operation, research, procurement, and management brought about through unification . . . the tieing of our military procurement together . . . has increased our ability to roll with the punch. . . ."

Are continual "improvements" in aircraft playing havoc with defense by holding up production? Foster: "Instead of producing and storing mountains of weapons . . . we are changing the tooling of our production lines to reflect the latest outstanding technical improvements, and the weapons and equipment produced are the finest—not 'frozen' designs already becoming obsolescent."

Industry to Blame?

Air Force is pinning blame on the industry for U.S.'s failure to develop and utilize heavy presses.

USAF Undersecretary Roswell Gilpatric reviewed for Senate Appropriations Committee: "Aircraft manufacturers simply said, 'We don't think we need this type of press. . . .'"

Sen. Homer Ferguson: "But if you had said to them, 'We want this machine installed in your plant,' do you mean to say they would not have allowed you to install it?"

Gilpatric: "They were not interested in the output of these presses up to a year ago. They said simply, 'We do not want to make our airplanes out of forgings. We want to machine the parts.'"

Sen. Joseph O'Mahoney: "Industry said that?"

Gilpatric: "Yes, they were not convinced that this was the way to build airplanes as designed today."

Ferguson: "Have you convinced them today?"

Gilpatric: "Yes. We had a survey made last fall and they completely changed their mind."

—Katherine Johnsen

WHO'S WHERE

In the Front Office

King Williams has been designated special assistant to the president of Pacific Airmotive Corp. and will handle a special assignment as the firm's European representative. Williams was scheduled to leave for the Continent Sept. 5 to investigate the foreign market for PAC. He is a former director of the Illinois Chamber of Commerce. New manager of PAC's Manufacturing division is **Anthony J. Kreiner. E. L. Black** has been named administrative assistant of the division.

Charles D. Frazer, formerly executive vice president of the National Air Council, has become a senior associate and manager of Washington, D. C., office of Hal Leyshon & Associates, Inc., public relations firm in N. Y. C.

Henry I. McGee and **Stanley P. Davis** have been designated vice presidents and directors of Northwestern Aeronautical Co., St. Paul, Minn., fixed base operator and overhaul base.

J. P. Donald Garges has been named vice president-engineering and assistant general manager of East Coast Aeronautics, Inc., Pelham Manor, N. Y., a subsidiary of Barium Steel Corp. Garges has been chief engineer with ECA since 1948.

W. C. Whitehead has been elected executive vice president of the Garrett Corp. He retains his position as manager of the firm's Airsupply division, which he has held since 1948. **B. N. Snow**, vice president-sales of AiResearch Mfg. Co., a Garrett division, will work out of the president's office on special assignments and **W. J. Pattison**, assistant to the president, has been named AiResearch director of sales and service.

Changes

J. W. Allen has been promoted to chief engineer-electrical accessories of Eclipse-Pioneer division of Bendix Aviation Corp., Teterboro, N. J. Other E-P promotions include: **P. F. Bechberger**, chief engineer-electrical instruments; **J. E. Bevins**, chief engineer, mechanical accessories; **M. R. Houseman**, chief staff engineer; **H. Konet**, chief engineer-mechanical instruments; **H. Loen**, chief engineer-production liaison and **P. A. Noxon**, chief engineer-automatic pilots.

B. J. Garnett has been appointed assistant chief engineer, airborne equipment G. M. Giannini & Co., Inc., Pasadena.

William H. Haugh has been named purchasing agent for Chance Vought Aircraft division of United Aircraft Corp., Dallas, Tex., succeeding **William F. Gerety**, resigned.

Charles W. Grosser has been appointed manager of tours, a new position, for Northwest Airlines and **Jack Keillor** has been named manager of agency sales.

A. C. Ballauer, formerly ramjet copter project engineer with McDonnell Aircraft Corp., is the new chief engineer of Parsons Corp., Aircraft division, Traverse City, Mich.

Capt. Richard E. White, USNR, has been appointed Ryan Aeronautical Co. representative in Washington, D. C.

INDUSTRY OBSERVER

▶ **First application of the transitvan packaged cargo loading system to military aircraft will be for the Douglas C-124 cargo plane. Prototype containers are now under construction. Meanwhile, plans to tailor some containers to fit the Convair XC-99 have been discarded since it is not expected that additional planes of this type will be built.**

▶ Application of small gas turbine engines to power aircraft starters, turning over the big new turbojets now coming into use, makes an interesting sideline for U. S. engine makers. Ultimate development may result in turbines small enough and light enough to carry in the airplanes. Two of the small Boeing turbines are being used in a starter cart for the YB-52 and XB-52, but later B-52s are expected to have little Continental turbine starters incorporated in the planes.

▶ **Star attraction at the static Detroit air show was the Douglas D-588-II Skyrocket, holding unofficial world's speed and altitude marks. The needle-nose sweptwing white research craft was inspected by many thousands in its first public appearance.**

▶ While only one of the Navy jet fighters, a Grumman F9F, was demonstrated in-flight refueling with the North American AJ-1 refueling tanker, other new Navy jets making their bow at the Detroit show, such as the Chance Vought F7U-3 Cutlass, the North American FJ-2 and the later sweptwing Grumman F9F-6 Cougar, also will be fitted for the refueling operation. These new fighters were described officially by the Navy for the first time last week in the 45,000-ft. altitude and 650-mph. speed class.

▶ **Informed military sources speculate that the Curtiss-Wright version of the British Olympus twin-compressor turbojet will be competitive in power with the Pratt & Whitney J57, currently the most powerful U. S. jet flying. Bearing out this speculation is the fact the British recently have announced the Olympus has a thrust rating of 9,250 lb. Presumably this announcement would not be made until the manufacturer was satisfied that engine power was well beyond that figure. Both the "twin-spool" engines should level out somewhere in the 15,000-20,000-lb. power range, which appears to be the next stage of production engines beyond the current 10,000-lb. thrust class.**

▶ Army now has three helicopter transportation companies in-being and programs seven more, each to be equipped with 21 large cargo versions plus two utility copters.

▶ **Navy expects the Douglas F4D Skyray interceptor and the McDonnell F3H Demon general purpose fighter to complete carrier suitability tests within the next few months. Also, first flight of Navy's twin-jet Douglas A3D attack-bomber is due this fall.**

▶ Following modernization of Essex-type carriers to carry bigger and heavier aircraft, the Navy is now considering a similar program for its larger 45,000-ton Midway class carriers built at the close of World War II. Presumably such modernization may include replacement of present catapults with the British-developed steam catapult programmed for the forthcoming Forrestal class carriers. Navy has said the British device is powerful enough to launch its heaviest jet fighters even when a carrier is at anchor or steaming down wind.

▶ **Air Force says the present strength of the USAF is 96 wings, that it is expected to climb to about 120 wings by 1954, up to 143 in 1955.**

▶ Grumman's XF10F-1 Jaguar, carrier-based Navy fighter, is said to have exceeded Mach 1.0 during a series of flight tests at Edwards AFB, Calif., in spite of reported J40 engine and longitudinal airplane stability problems. The latter are believed to be the penalty for Grumman's pioneering efforts to develop an aerodynamic-type control surface boost for high speed jets to replace the commonly used hydraulic boost system. Combination of engine and stability problems explain why the XF10F has made only a dozen flights since it was flown to Edwards last spring in a Douglas C-124A Globemaster.

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RAF Transonic Deltas Star at SBAC Show

- **New military designs in Farnborough spotlight.**
- **But share interest with fast commercial types.**

By Robert B. Hotz
(By Cable to Aviation Week)

Farnborough, England—British dependence on the triangular delta wing to transform the Royal Air Force into a modern air armada capable of fighting at transonic speeds was evident at the opening of the 13th Society of British Aircraft Constructors exhibition at Farnborough before a record crowd of foreign military and civil air officials.

Although the British drive for exports to hard currency markets is reaching a new frenzied pitch over prospects of commercial jet transport sales to U.S. airlines, main emphasis was on the new generation of transonic military aircraft still in the prototype development stage and at least several years away from significant production and military service in air force of NATO nations.

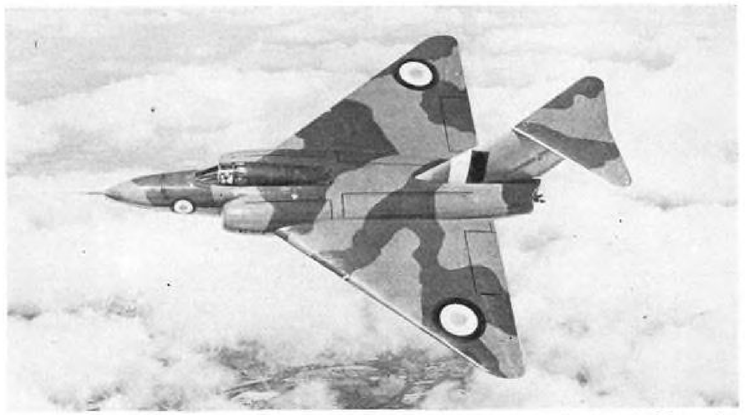
► **Twin Stars**—American products were represented by a flight of four North American F-86s built under license by Canadair and flown by RCAF pilots who are part of the air defense of England. The F-86 still is the best jet fighter in operation service in England.

Twin stars in the transonic galaxy were a pair of Hawker Siddeley group delta prototypes already ordered into super-priority production. One is the Avro Model 698 four-jet bomber that made its first flight only two days before the SBAC show opened. The other is the Gloster Javelin, a twin-jet all-weather fighter making its initial public appearance at the show.

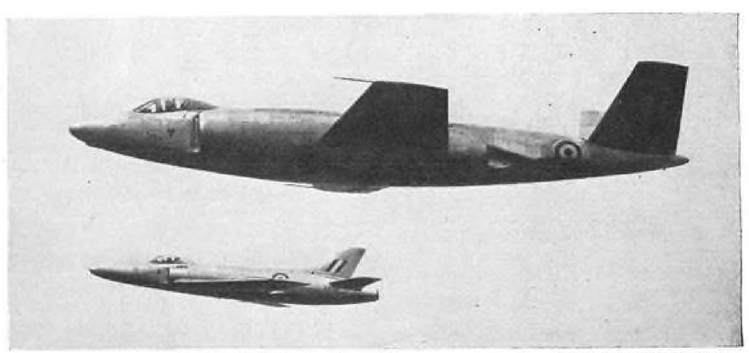
On the first two test flights the Avro 698 developed landing gear trouble and failed to appear on opening day, although it flew from Avro's Manchester plant to the Ministry of Supply experimental field at Boscombe Down. It was scheduled to fly over the SBAC show on short hops from Boscombe Down later in the week.

► **One-Man Crew**—Test pilot Roland Falk, sole crew member for the giant bomber, handles a delta wing plane grossing in the 150,000-lb. class with wingspan of about 100 ft. and length of approximately 120 ft. The four-Armstrong Siddeley Sapphire engines, each delivering 6,500 lb. thrust, and buried in wing roots with air inlets along the leading edge of the wing.

GLOSTER JAVELIN two-seater is RAF's latest super-priority all-weather interceptor.



JAVELIN packs engines, armament, large-capacity fuel tanks in its broad delta wing.



VICKERS SUPERMARINE 508 is for Royal Navy; accompanying VS Swift is RAF fighter.

The Avro 698 has no horizontal tail and carries provisions for drogue landing chute. The giant bomber was developed from earlier Avro work with two delta research planes, the 707A and B (Aviation Week Oct. 9, 1950, p.20), which were one-third flying scale models of the 698.

Avro also is building a pair of delta wing training planes with side-by-side seating to instruct military pilots in handling characteristics of this type, new to military services.

► **Javelin vs. DH 110**—The Gloster Javelin won its super-priority production rating in a stiff flight test evaluation against the de Havilland Model 110 which John Derry pushed past SBAC crowds at well over 700 mph. on deck.

The Gloster Javelin (formerly G.A. 5) is powered by two Armstrong Siddeley Sapphires mounted in the wings alongside the fuselage. It spans 52 ft. and is 57 ft. long. Gloster officials say that the plane's fuel capacity is "unequaled."

Its broad delta wing provides considerable space for stowage of heavy armament, much fuel and equipment necessary for hard hitting interception. Exceptionally good maneuverability is claimed for the Javelin.

The first Javelin lost its elevators during an early test flight and was destroyed on landing. Gloster test pilot Bill Waterton obviously was under orders to keep the Javelin out of high speed range at the show and did most of his flying in slow lazy circles with flaps down. In contrast the DH-110 gave an excellent demonstration of its high speed characteristics and maneuverability although SBAC officials prevented Derry from making a supersonic dive with resultant shock wave thunderclap because of noise complaints.

The DH-110 is essentially the wing plan of the earlier DH-108 tail-less research plane with addition of a modern, transonic version of the traditional de Havilland twin tailboom.

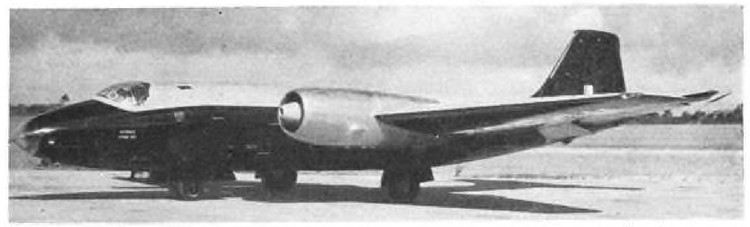
► **Vickers 508**—Another extremely interesting military type was the Vickers Supermarine Type 508 twin-jet naval fighter powered by two Avons. The prototype flown at the show by Mike Lithgow featured an extremely thin straight wing and V-shaped tail. However, production versions will shift to sweptwing with conventional tail. Under Lithgow's expert handling it was obvious that twin Avons offered tremendous power for the airframe configuration.

In addition to its excellent high speed performance, Type 508 demonstrated remarkable stability at extremely low speeds required for aircraft carrier approaches and landings.

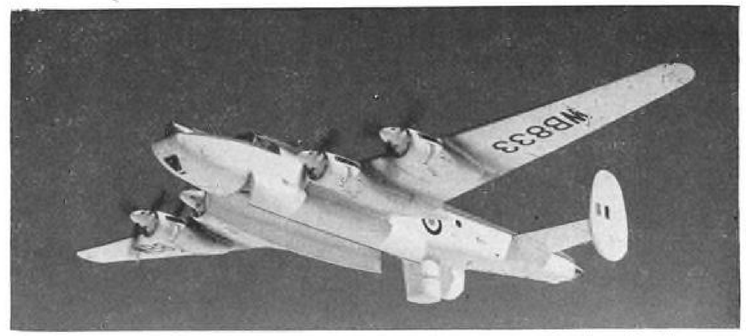
A new version of the sweptwing Vickers Valiant jet bomber also made its initial public appearance. It sported a thinner wing than the original prototype which crashed on a test flight last year. Air inlets for the four Avon engines also were enlarged and reshaped at their wing root location.

► **Missing From Show**—Originally scheduled but now missing from the display were: Boulton Paul P. 120, another delta wing research plane that crashed

Also Shown at Farnborough Display . . .



OLYMPUS-CANBERRA will test powerful Bristol engines for future application.



AVRO SHACKLETON 2 sub hunter-killer shows cleaner nose, relocation of radome.

SAUNDERS-ROE SKEETER is being offered for military and light civil markets.

SAUNDERS-ROE PRINCESS is 140-ton flying boat powered by ten Bristol turboprops.

BOULTON PAUL P. 120, latest research delta, crashed just before show opened.

on a test flight late in August; Handley Page crescent-wing multi-jet bomber that experienced landing gear trouble and was unable to make its initial test flight; Saunders-Roe Princess, giant flying boat powered by 10 Proteus turboprops.

The Bristol Britannia emerged from its first public display as a powerful competitor in the future world transport market. Foreign visitors were impressed by its clean lines, excellent handling characteristics on landing approaches despite gusty crosswinds and lack of noise. With more powerful engines replacing the present four Bristol Proteus Mark II turboprops, the Britannia should emerge as a genuine trans-Atlantic airliner.

Some knowledge of the comparative state of British and American development on turbojets in the 10,000-lb. class can be gained from the fact that the Bristol Olympus is now flying with a pair installed in a flying test bed rig aboard a Canberra. Pratt & Whitney Aircraft's J57, leading U. S. entry in the split compressor field, made its initial flying test bed operations over a year ago in a Boeing B-50A loaned by the Air Force.

The Olympus is scheduled eventually to power production versions of the Avro 698 bomber and is being considered for larger versions of British jet transports.

▶**Sprite Comet**—The original Comet prototype made a spectacular takeoff using two Sprite rockets in addition to normal complement of four Ghost turbojets. The Sprites generated 4,300 lb. thrust apiece for 23 seconds and lifted the 105,000-lb. jet airliner off the runway into a steep climb. The Sprites left no visible exhaust.

Among new helicopters exhibited were the Bristol 173 twin-engine passenger copter and a new version of the Saunders-Roe Skeeter, a personal helicopter, originally a Cierva project. The Bristol 173, which looks similar to a Piasecki HUP, demonstrated unusual stability while hovering in the gusty winds. It is powered by two Alvis 550-hp. piston engines and can operate on a single engine.

The Big Show

• USAF, Navy and Army exhibit newest planes.

• But jet crash mars 3-day Detroit exposition.

Detroit—Air Force, Navy and Army airmen, to show the public where the taxpayer's air-dollars are going, vied at Detroit's three-day International Air Exposition in the biggest air show of 1952, comparable in everything but name to the National Air Races of 1951.

Marred by a fatal jet interceptor accident (see page 7) and handicapped by rains and high winds, the excellent flight shows of the three services showed evidence of careful attention to detail.

Three new military planes not previously shown to the public and several other new versions of older types made their debuts.

Here are some of the exposition's best highlights:

▶**Air Force**—Strategic Air Command demonstrated precision of its long-range flying when it sent a B-36 from Spokane to Detroit the long-way 'round, via the North Pole, on a 37½-hr. mission which ended on schedule to the minute at Wayne Major Airport, scene of the exposition. Unofficial reports said it was the first B-36 polar flight.

• The first public U. S. show of AF's crack Skyblazer flying team, which has flown 258 jet-aerobatic exhibitions in Europe for NATO countries, established these four Republic F-84 pilots in a high spot among the world's all-time precision fliers.

The pilots are Maj. Harry K. Evans, Heaters, W. Va., lead pilot; Capt. Lawrence (Dagwood) Damewood, Roanoke, Va., slot man, and twin brothers Capts. Charles (Buck) Pattillo and Cuthbert (Bill) Pattillo, Atlanta, Ga., who fly the wing positions interchangeably. Rained out the first day, the Skyblazers demonstrated their precision on each of the last two days.

• A Boeing B-47 made a nonstop flight from Edwards AFB to Detroit (over 2,000 mi.) in 3 hr. 19 min. Time was slightly under the record of 3 hr. 27 min. set by Col. Keith Compton in an F-86 Sabre with refueling stops over the same route in August, 1951.

• Other Air Force flight demonstrations included the sonic "boom" by an F-86 Sabre; an in-flight refueling demonstration by a KB-29 tanker and B-50D bomber; flight of the Fairchild XC-120 detachable Pack-Plane, fuselage without its pack, flown by Walt Hensleigh, Fairchild production test pilot.

▶**Navy**—Introduction of the latest Chance Vought F7U-3 Cutlass, the Grumman F9F-6 sweptwing Cougar and the North American FJ-2 Fury, three new Navy jet fighters in the 650-mph. class which have just completed carrier qualifications, highlighted the Navy flight show.

• Navy's famous precision flyers, the Five Blue Angels, flying new Grumman F9F-5 Panthers with higher-powered Pratt & Whitney J48 engines, vied with the USAF's Skyblazers in a major league competition that some observers felt was won by the Skyblazers.

• Other Navy events: a demonstration of Navy's new carrier-based in-flight refueling tanker, a modified North American AJ-1 attack bomber, which uses the British probe-drogue system and was feeding a Grumman Panther in a flyby; four Navy Bell trainer helicopters put on a precision formation demonstration featuring a square dance, and a merry-go-round formation; Navy jets in squadron formations vied with USAF jet squadrons.

▶**Army**—A demonstration of Sikorsky H-19 helicopters as combat troop transports and light personnel carrier and liaison plane demonstrations by Cessna L-19 planes, the new Beech Twin Bonanza L-23, the de Havilland Beaver L-20 and the smaller Bell H-13 helicopter featured the Army presentation.

▶**Civilian**—Civilian aspects of the show, while overshadowed by the military, included introduction of such new planes as the twin-engine Aero Commander, the tiny one-place Mooney Mite and this year's new versions of the Beech Bonanza and Cessna's 170 and 190 series.

▶**Show Stuff**—The low-altitude precision flying of such aerobatic masters as Beverly Howard and the current international champion, Marion Cole, along with other Cole Air Show participants, rounded out the program.

Probably most spectacular aircraft to appear outside the military lists was billed as the world's smallest current biplane, a Stits Special whose tiny 7-ft. wingspan is aided by slots in the wings and which flies very creditably.

Finletter Cites Red Air Buildup

Secretary lauds U. S. decision to concentrate on air power; others express views at AFA session.

By Alexander McSurely

Detroit—The balanced-force concept of U.S. national defense has been knocked out, "I hope for good," Air Secretary Thomas K. Finletter told the Air Force Assn. at its annual convention last week. Thus the theory of an equal three-way division of appropriations between the three services has been eliminated.

Finletter hailed the 143-wing Air Force decision, which recognized the key position of land-based air power without providing for corresponding increases in the other services, as an air power milestone and recognition of the air power campaign which started with Billy Mitchell and since has been carried on continuously.

The recognition, he said, was forced by the recent advances in atomic weapons and atomic power and the "inextricable combination" of atomic and air power.

▶**Red Bombers**—Reviewing the Korean situation, Finletter said the Chinese Communist air force now has approximately 2,100 planes, 1,300 of which are jets, mostly MiG-15s. Recently, he said, the Soviets have added "quite a few" twin-engine jet bombers comparable to the Canberra and our B-45 for ground support. While these have not yet appeared in Korean combat, that possibility is being considered and could change the whole character of the air war.

To offset this possibility, the overall striking force of the Far Eastern Air Force has been increased about 50%.

▶**Kelly AFA President**—Election of Arthur F. Kelly, Western Air Lines vice president-sales, as president of Air Force Assn., succeeding Harold Stuart, former Assistant Air Force Secretary, was voted. Kelly was Deputy Chief of Staff of the European division of Air Transport Command in World War II and is a colonel in the USAF reserve. Stuart becomes chairman of the AFA board, succeeding Tom Lanphier, vice-president of Consolidated Vultee Aircraft Corp.

▶**Air Power Symposium**—Viewpoints of three representative manufacturers of airframes, engines and components expressed at a symposium during the meeting gave government agencies some food for thought about complexities and cross purposes of the large number of government agencies and organizations participating in the procurement program.

In turn, industry was given something to think about, too, not only from the three undersecretaries of the three military departments, but by Walter P. Reuther, president of United Auto, Aircraft and Agricultural Implement Workers (CIO) who appeared on the symposium panel.

Following are symposium highlights:

• **Mundy I. Peale**, president, Republic Aviation Corp. "The greatest difficulty is that we have not yet been able to establish with absolute clarity the functional role of each of these (33 government agencies concerned with procurement). I believe we would all be released from a heavy drag if we could feel that we knew precisely who was responsible for what function, and that various instrumentalities would not keep the air power program in a turmoil by crossing lines, challenging authority, and—if I may say so—calling shots which do not happen to be on their own particular billiard table."

• **Malcolm P. Ferguson**, president, Bendix Aviation Corp. "Split-second performance demands an entirely new concept of accuracy and reliability for each component. World War II frequencies of electric circuits were held to 5% variation. Today effective performance of equipment is impossible if there is more than ⅛ of 1% variation. I have three recommendations: greater standardization, co-operative planning with component makers, curtail excessive specification writing. Our company makes a $20 item weighing two pounds. Specifications for this item were recently placed on a scale by an exasperated engineer and found to weigh exactly 48 lb."

• **Ira Eaker**, vice-president, Hughes Aircraft. "It looks like we are moving into an era, not too far away, when the electronics share in modern weapons may rise to 75%. In 1940 the electronics industry grossed $500 million. In 1952 its gross will reach approximately $5 billion. In any all-out war it will certainly run to a volume of at least $20 billion a year."

• **Roy T. Hurley**, president, Curtiss-Wright Corp. "We are faced with a period of at least 10 years in which changes in design of structures of aircraft engines will be many and extreme. We cannot wait for full development of the engine as a prototype before we proceed to solve manufacturing problems.

"Providing manufacturing know-how and special equipment and machines must parallel engineering development and testing on the same time schedule. If this is not done the engine will be obsolete when placed into production. It is of little avail to subject the Air Force to unjust and unfair criticism for not having jet engines available if they are forced to operate under a pricing and facilities program which in turn does not permit industry to operate on a sound financial basis to provide a proper foundation for additional executive engineering and manufacturing talent which cannot be attracted under these conditions.

"This situation will not be corrected until the problem is faced by all levels of government and corrective measures instituted. Earnings of the industry for the period 1934-1952 average approximately 2% of sales after taxes. This is not sufficient to provide facilities."

• **Walter P. Reuther**, UAW-CIO president. "Our union has been dealing with the aircraft industry over a period of years. During wartime and times of emergency when the industry is feeding off the fat goose of military contracts and guaranteed profits, management hides behind a smokescreen of false patriotism to evade meeting its responsibilities to its employes.

"During peacetime, when industry pickings are lean and employes' collective bargaining power is weakened by layoffs and cutbacks, management still fights against legitimate demands for wages and working conditions that will give a decent standard of living. As of May, 1952, the average rate in the automobile industry for the same kind of work as in the aircraft industry was 22.7 cents an hour higher ($1.948 compared to $1.721)."

• **Roswell L. Gilpatric**, Air Force Undersecretary. "Total volume of business of 15 major aircraft companies has grown from its nadir of ¾ billion in 1946, which represented a decline of 90% from World War peak of 1944, to over $2½ billion in 1951. Assuming an annual volume of $8 billion of sales, and average profit before taxes of 7% of sales, these companies' total profits after taxes of 70% will be 2.1% of net sales, or 26% of their net assets as of Dec. 31, 1951.

"This latter percentage will obviously decrease somewhat by 1953 or 1954 as the net assets of aircraft companies are increased through retained earnings. These profit rates do not compare unfavorably with 1943-1945 results. These statistics to my mind go far to meet any argument that present procurement policies of the Air Force will result in inadequate profit margins thereby strangling the growth of the industry. On the other hand, it does not necessarily follow that the estimated profits if realized will be excessive, particularly when uncertainties of military aircraft business are taken into account."

Midgets Turn Up 200 mph. at Detroit

Detroit—The familiar little yellow midget racing plane "Bonzo" piloted by the old racing master, S. J. (Steve) Wittman, of Oshkosh, Wis., skidded around the turns of the Continental Trophy 2½-mi. race course at Wayne Major Airport here for a new record time of 197.29 mph. It was just a fraction of a mile faster than the 197.218-mph. time of first place winner in 1951, John Paul Jones, Van Nuys, Calif.

But turbulent air made the race less than a fair criterion of the gradual climb in speeds which continues each year. Actually Wittman's Bonzo can do more than 230 mph. on the straightaway, and qualified at an even 200.

▶ **Flying Hazard**—Jones, who flew a daring low-flying race in No. 2 position, finished the 1952 race a few yards behind Wittman after several efforts to pass him from underneath. The race committee ruled that Jones' flying had been hazardous to other pilots and penalized him by moving his standing back to sixth in the race. His time: 197.16. His plane, "Shoestring," had qualified at a new midget record of 203.16 mph.

A veteran of many previous Continental races, Bill Falck, Warwick, N. Y., in his constantly improving slim-nosed "Rivets" plane, succeeded to second place with 194.38 mph. Falck had qualified at 200.89 mph. but made a slow start and came from behind to pass Bob Porter, in "Buster." Wittman's second plane, and Bill Brennand, another Wittman-trained race pilot, who this year flew a special design Pitts.

Brennand and Porter, both of Oshkosh, had times of 192.31 and 180.72 respectively, to get third and fourth places. Sixth plane in the race, James Kistler's "Skeeter," from Los Angeles, was flagged down after the other planes finished and later advanced to fifth place when the committee cracked down on Jones.

▶ **Minor Refinements** — Aerodynamically, the 1952 race showed only a few minor refinements over earlier races. Many of the newer midgets now flying appear to follow the Wittman design closely.

Analysis of the race indicates that the spark of design innovation which made the midget races a crowd-pleaser in the first postwar years has faded into a set pattern, with the same planes and the same pilots taking top honors, year after year.

The Continental competition continued its record for safe performance in the actual races, with no major crackups or personal injuries.—**A. McS.**

Subcommittee Findings

• "Despite the conclusions of the Joint Chiefs of Staff, it has been decided for fiscal considerations to postpone the target date for securing the minimum essentials of air preparedness by at least a year. This decision—termed the 'stretchout'—was not made for military reasons."

• **"The stretchout—whatever the reasons for its imposition—will give us less security than we need; at a later date than we need it. It will increase the unit cost of aircraft by 2½ to 3%, just as buying an article on the installment plan increases the cost of that article. It may well cost more in the future than the $3 billion it is saving in fiscal 1953."**

• "The stretchout will affect seriously and unfavorably the amount of military aid that can be given to Western Europe."

• "The stretchout has aggravated the distress of the aircraft industry arising from the 'off again, on again, gone again' scheduling of the Defense Department."

• **"Despite the handicaps, the aircraft industry can increase its production considerably provided only that it receives the tools, materials, and manpower that are necessary."**

• "Aircraft production has been hampered by the lack of a 'topside' authority with power to put an end to the endless research and development and order concentration on volume production of that which has been developed already."

• **"Military authorities have hampered production because of their fears that a 'freeze' in designs will leave them with obsolescent planes on their hands. They have belabored this point unreasonably, particularly in the face of accelerated production by a prospective enemy."**

• "A tendency toward 'gimmickery' has loaded some of our planes with gadgets to a point where their effectiveness has been decreased."

Senators Assail Air Power Lag

Military and civilian authorities share subcommittee's strong criticism for 'unrealistic' production targets.

By Katherine Johnsen

Senate Preparedness Subcommittee's periodic criticism of military and civilian defense leaders for fumbling management of the aircraft program reached a crescendo in its last report demanding that "push" replace "let up" in air power mobilization.

▶ **Two Findings**—In a capsule, the subcommittee, headed by Texas' Sen. Lyndon Johnson, said: Supremacy in the air is a "must," so let us achieve it as quickly as possible.

The group reported these two findings:

• The aircraft industry was capable of meeting the goal of a 143-wing Air Force (including 126 combat wings) and a Naval Air arm of 16 fully modernized air carrier groups at "close to" the original target date set by the Joint Chiefs of Staff: mid-1954.

• The industry is now capable of a greater effort than the "stretchout" program postponing the achievement date to mid-1955. (Editor's note: Latest stretchout puts off the date to mid-1956: AVIATION WEEK Aug 25, p. 14).

▶ **Summary**—The subcommittee summed up the basic reasons the industry hasn't performed up to its capabilities—and can't unless and until the failing in Washington leadership are corrected:

• **"Unrealistic" production schedules.** "No reason acceptable . . . has been advanced for the failure of the combined brainpower of the military and civilian authorities to establish realistic production targets. . . . No business organization would countenance the excuses and self-serving justifications for either the unrealism of the schedules established or the inability to meet even the reduced schedules.

"Despite attempted legerdemain with charts and graphs, nothing can obscure the fact that our planners have failed miserably. They have continuously erred in setting production goals. . . ."

• **Lack of determination.** But, given the will, even the optimistically unrealistic schedules could have been met.

Although aircraft industrialists, such as United Aircraft Corp.'s president, H. M. Horner, have cautioned against the over-optimism of the President's original goal of a five-fold increase in aircraft production within a year, announced in his speech declaring a national emergency, Dec. 17, 1950, "the majority of the aircraft industry still maintains that, if their prerequisites for accelerated production had been met, even the most optimistic production targets would have been hit."

Yet military and civilian defense leaders in Washington "have yet to acknowledge that, given the necessary determination, our productive resources could produce in line with our needs."

• **Failure to meet industry requirements.** Instead of receiving "the required understanding attention" necessary to meet production goals, the aircraft industry has been treated with "bureaucratic inattention."

"The industry stipulated its requirements. These were definite and firm contracts, necessary plant expansion, sufficient quantities of skilled manpower, first priority on strategic materials, available components, government-furnished equipment, machine tools, participation in research and development, and continuity of operation."

These requirements, however, were given less and less attention, as urgency dwindled from the mobilization program: "Procurement procedures slowed up contract letting. Amortization certificates were issued slowly. Inadequate mobilization planning did not make skilled manpower available quickly enough or in sufficient quantity until the institution of the Controlled Materials Plan they had to race with civilian users for available materials; even after that the CMP ticket was only a 'hunting license.'

"When materials became available in sufficient quantities, the lack of general and special-purpose machine tools rendered them partially useless, so that allocations outran their usability. The defense establishment furnished neither equipment nor components as promised. Relative urgency lists were not created until early in 1952, some 18 months after Korea."

▶ **Observations** — The subcommittee quoted these illustrating observations from the industry:

• **"Machine tool builders** were swamped with orders from non-defense industries, who were able to move quickly and at once immediately after Korea; whereas, we had to prepare and submit a facility program and then have it approved by the government."

• **"At the time war** broke out in Korea, Boeing Airplane Co. could place an order for standard aluminum extrusions and expect to have the order filled in 10 weeks. Today the normal procurement time for the same items is 38 weeks."

• **"An adequate priority** rating would reduce the expense of additional personnel required for follow-up and expediting of machine tool and other procurement. It would eliminate many costly delays occurring in the factory due to shortages which necessitate out-of-sequence operation and use of less efficient machines. It would avoid schedule revisions which are not only costly themselves but which put the program further behind the desired delivery objectives. . . ."

• **"One of the basic** difficulties is that there is an expert (in the military procurement organization) in every field of jet engine design. The fuel expert is interested in seeing that all of his ideas are placed into effect. Other experts are also interested in seeing that their ideas are accepted and made a requirement in the production of engines. . . ."

• **"The military services** have not advised Allison division of General Motors Corp. which one of its projects is the more important. . . . Allison believes that it would be advisable for the armed services to determine which project is the most important in the manufacturer's plant."

▶ **Schedules**—"Blow hot, blow cold" production schedules "further crippled" the industry:

• **June, 1951.** Peak production rate of 1,050 planes a month for the Air Force and 350 monthly (by December, 1952) for Naval Aviation was set.

• **November, 1951.** Five months later, the goals were increased to 1,400 monthly for USAF (by December, 1953) and 425 monthly (by September, 1953) for Naval Aviation.

• **January, 1952.** Instead of putting the November schedule into effect, a revision reduced the rates to a peak of 800 planes a month for USAF (by December, 1952) and 354 monthly for Naval Aviation (by May, 1954).

• **Net result.** From June, 1951, through April, 1952, USAF and Naval Aviation have received approximately 20% fewer aircraft than scheduled under the June, 1951, program.

▶ **Bureaucratic Bungling** — Although both the Office of Defense Mobilization and the Munitions Board have sweeping authority to put the mobilization program on a coordinated, directed, business-like basis, there has been "little effective organization, less cooperation, and a pitifully insignificant amount of coordination."

"Everybody has a different story. No one of them jibes with the other. Each bureaucratic finger points 'to him.' The defense effort is a history of stones being thrown from glass houses. . . .

"Every segment of the defense agencies seems to have spent more time in criticizing and cavilling than in working together. No one echelon of this high command of defense production ever assumed or ever appeared to have assumed the necessary initiative until a very late date to break bottlenecks, to establish urgent priorities or to cut through the nonsense of inter-agency rivalries in order to get things done. . . ."

▶ **"Gimmickery"**—Failure to freeze designs, based on the desire continually to improve performance with new gimmicks and gadgets, has been and still

Actions Recommended

• "The National Security Act of 1947, even as amended in 1949, must be further strengthened to vest specific responsibilities for control of military production and for procurement of military material. It is a dangerous thing for 'tinkering' to continue unceasingly. The Defense Department should submit proposed legislation to the next session of Congress to effectuate this recommendation."

• **"Pending action on this proposed legislation, the Secretary of Defense, or the President, should appoint a full-time production czar with power to determine priorities, to freeze designs to the necessary extent, and order quantity production initiated, so that our minimum air requirements are met as quickly as possible."**

• "The Secretary of Defense should appoint a committee to reassess the nation's air strategy; re-examine research and development procedures and re-evaluate design procedures. The committee should have among its members at least two prominent scientists and the chairman of the National Advisory Committee for Aeronautics."

• **"The Secretary of Defense should issue specific directives to implement the recommendations made by the special assistant to the secretary along the following lines that contractor incentives be increased; that sources of procurement be broadened to eliminate apex buying; that there be a simplification of procurement procedures; that there be a minimization of design changes; that contracts be placed more quickly; and there be a simplification of procurement regulations regarding contract changes."**

• "The Secretary of Defense should report to Congress—through this subcommittee—no later than Dec. 1, 1952, his proposed program for plant expansion along with the details of the progress accomplished and firm dates for future development."

• **"The chairman of the Munitions Board should present to Congress immediately the proposed monthly schedules of aircraft production, by types, and should continue to present such schedules along with aircraft acceptances on a monthly basis until the 143-wing Air Force and the authorized Naval Aviation programs are completed."**

• "The Aircraft Advisory Committee to the Munitions Board should present to Congress recommendations to maintain the aircraft industry in a healthy state in periods of peace as well as in periods of defense mobilization."

is a major obstacle to production.

Attention should be directed "to the cost both in over-all weight and in dollars that must be charged to every new gimmick and every new demand for more and more performance. . . . Are all the gimmicks that we are putting in our aircraft absolutely necessary to insure combat effectiveness . . . or are we improving ourselves completely out of the picture?"

► **Equal Forces**—Although the current 1953 fiscal year budget represents "the first wedge" into the "equal force" concept, it has not been completely discarded: When the decision was made to cut the defense budget from $55 to $52 billion, "almost equal amounts were pared from the three service budgets."

Air power should be the first priority in the defense buildup:

"We have committed ourselves to a strategic pivot—the atom bomb.

"Although its use will not be tied solely to air power, it can best be carried and used in the early stages of any conflict in that way.

"If the transport of the atomic bomb is the essential fulcrum of our offensive power, its delivery is the vital center of our early military strategy. The complementation of land and sea forces is secondary and must be so budgeted, in terms of time particularly. If the enemy proposes the same method of aggression, our defensive effort must rely, of necessity, on our internal air security. That this suggests a preponderant effort directed initially to increased air power is obvious.

"A balance of forces is not an equality of forces. . . . We still need to perfect a real balance based upon the facts of modern war."

AA DC-7s to Get Sperry Autopilots

American Airlines will equip its 25 new DC-7s now on order with Sperry A-12 autopilots, complete with ILS approach couplers and a newly-developed cutoff device designed to automatically disengage the autopilot in event of malfunction.

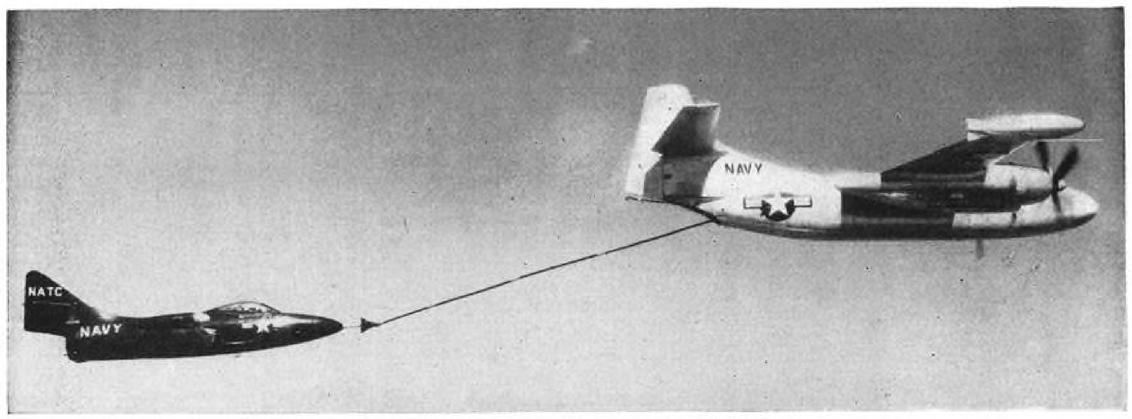
In confirming the equipment purchase, a Sperry spokesman said the new cut-off, the result of several years development, uses an accelerometer which detects any airplane acceleration about the pitch axis.

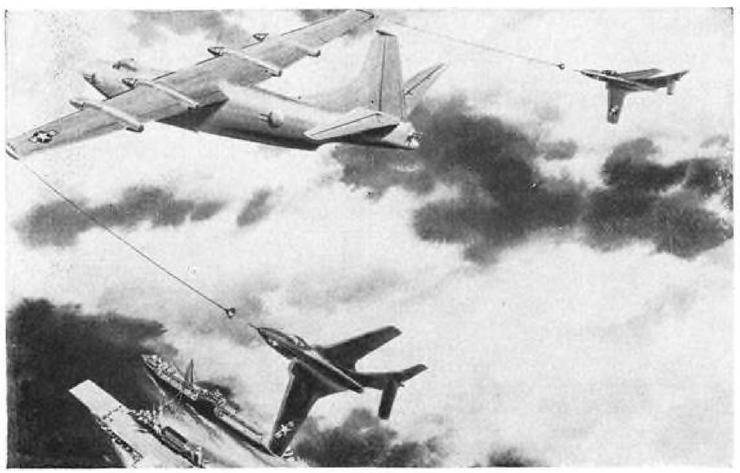
This accelerometer signal is used to trigger the autopilot cut-off device and flash a warning light under either of two conditions:

- If the plane climbs or dives and the autopilot fails to develop the correct control signal to level the plane.
- If the autopilot develops a control signal without a previous plane maneuver which needs such autopilot correction.

The automatic pilots and approach couplers will be installed by Douglas prior to delivery of the DC-7s, scheduled to begin early in 1953. The automatic cutoff devices will be installed by American Airlines after the DC-7s are in service.

American indicated it has been particularly interested in the concept of the automatic cutoff. With the Sperry design becoming available for DC-7s, American expressed confidence that the complete Sperry system will help the airline make definite strides toward improved schedule reliability during conditions of low ceilings and visibilities.





NAVY TESTS AIR REFUELING

Following Air Force's lead, Navy is running tests on refueling its fighters aloft to extend their range and permit them to escort carrier-borne jet bombers on long distance missions. Above, a Grumman F9F-5 Panther takes on jet fuel from modified North American XAJ-1 using the British-developed probe-and-drogue system. The AJ has had its fuselage-mounted jet engine removed to permit stowage of hose and mechanism. The tests were under supervision of the Naval Air Test Center, Patuxent, Md. At left is an artist's conception of two Grumman F9F-6 Cougars taking on fuel through hoses extending from wingtips of Convair P5Y turboprop flying boat. At least two planes could be refueled simultaneously. Navy has ordered a number of AJ Savages modified as aerial tankers (Aviation Week Sept. 1, p. 13).

High Aspect Ratio Cuts H.D. 31 Drag

- **This means less power is needed to do job.**
- **Other advantages: Less weight and less fuel.**

By David A. Anderton

Extremely high aspect ratio is one of the keys to reducing the cost of air freight, says M. Hurel.

To back up that statement, his firm —Avions Hurel-Dubois of Paris—is completing the first of two high-wing H.D. 31 transports which feature an aspect ratio of 20.2, nearly twice that of contemporary American transports.

Foundation for the work was built on a series of experimental flights with the tiny H.D. 10-01, a 75-hp. high-wing monoplane with an aspect ratio of 32.5. Government interest followed Hurel's demonstration of this test craft, and orders were placed for two of the bigger planes using basically the same ideas.

▶ **Background**—Hurel's ideas for utilizing the high-aspect-ratio wing parallel those of the Institut Francais du Transport Aerien.

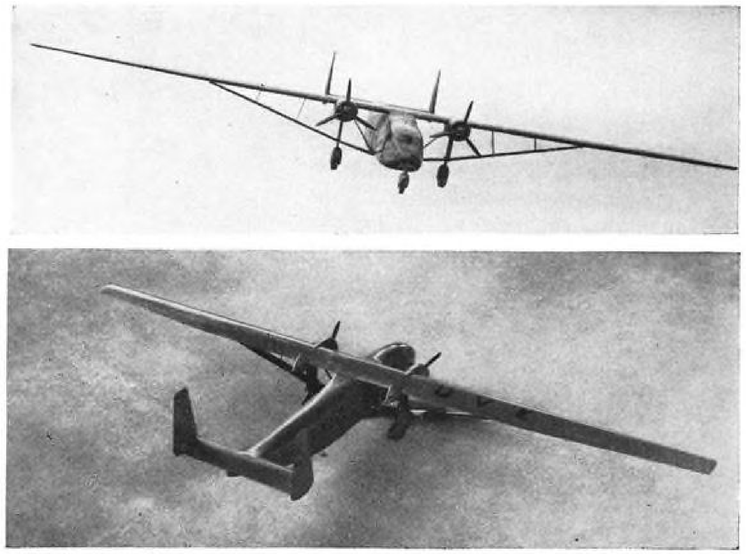
This group, after a very comprehensive study of air freight about two years ago, concluded that there were then available only two new approaches to reduced cost of air freight.

One method was the turboprop engine; the other was a wing of extreme aspect ratio.

Hurel had been thinking along the same lines, but was more interested in the high-aspect-ratio wing. The design, fabrication and testing of the little airplane carried out his ideas and justified them.

The IFTA research paper started by considering all the possible ways to reduce aircraft construction, operation and maintenance costs. It turned over the possibilities of boundary layer control, new metals, advanced fuels, new approaches to streamlining. It also reconsidered the older ideas for reducing drag or weight—refinements in cooling, better structural planning and fabrication techniques.

▶ **Why High AR?**—You choose a high aspect ratio wing because it decreases the induced drag component. That's why sailplanes—seeking to root out the last possible increment of drag—have such wings. And that's why transport aircraft generally use a higher aspect ratio than fighters.



MODEL H. D. 31 shows its braced wing and high aspect ratio in two different views. First of two airplanes ordered by French Air Ministry is nearing completion at the Paris factory of Hurel-Dubois. Prototype flight date is set for end of this year.

Induced drag is an inverse function of aspect ratio. Double the ratio and you halve the drag coefficient. You don't change the other drag components one bit; profile and skin friction and parasite drag of the airframe stay with you.

So the important thing is to reduce induced drag in those places where it is going to give you the biggest payoff—in other words, in flight conditions where the induced drag is a considerable portion of the total drag.

Since induced drag is also a function of the square of the flight lift coefficient, it follows that the higher the lift coefficient, the higher the induced drag. Fighters fly at low lift coefficients, and induced drag is one of the least of their worries.

But transports—or load-carrying freighters—fly at moderate lift coefficients and the induced drag is a respectable portion of the total drag. Here is where we have to look for the big return on the investment.

▶ **Hurel's Studies**—Hurel went looking, too, and made a whole series of design studies to see if the theory would work out in practice.

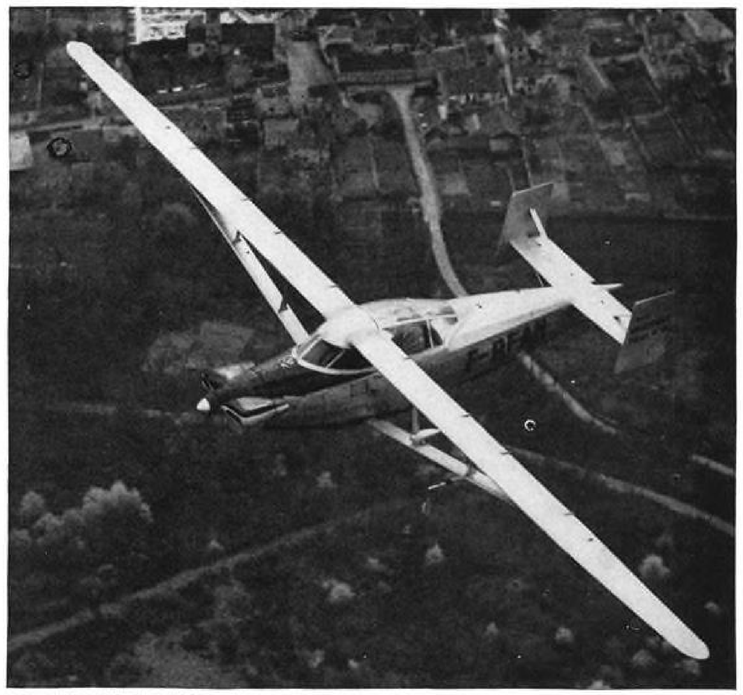
He computed the weight estimates for a variety of planes with equal power, wing section and area and equal range. Aspect ratios were varied from five to 40.

The studies produced some intriguing angles. For example, study a present-day transport with AR about equal to ten. If you were to up this figure to 25 or 30, you could increase the payload from two to 3.5 times. You'd also get a weight increase of about two or three times, and in-

Hurel-Dubois 31

Calculated Performance Data
(With two Wright C7 engines, 800 hp. ea. at takeoff)

- Max. speed, sea level.....168 mph.
- Max. speed, 9,850 ft.....174 mph.
- Cruising speed, 9,850 ft....153 mph.
- Landing speed..... 64 mph.
- Takeoff distance.....1,310 ft.
- Distance to clear 15 m. (49 ft.) obstacle with one engine failure at critical point. 3,281 ft.
- Time to climb to 9,850 ft...15.5 min.
- Absolute ceiling, two engines .....22,000 ft.
- Absolute ceiling, single engine .....5,900 ft.



REMARKABLE WING of Hurel-Dubois Model 10 research aircraft has aspect ratio of 32.5 Small craft was built to prove out Hurel's theories about such wings, has considerable flying time in its present form. Careful planning of strut-wing intersection has reduced interference drag to zero, in some cases even producing negative drag increments.

creased takeoff run and reduced cruising speed.

This apparently says that there is no point in experimenting with the high aspect ratio.

But suppose, thought Hurel, that we compare on the basis of performance.

Compare two planes having equal payload, range and single-engine climb. What then?

Hurel found that an aircraft of his type would have a lower total weight of airframe, powerplant and fuel than existing conventional types. The counterpart to a DC-3 weighing 28,600 lb. and carrying 7,275 lb. of load over a distance of 680 mi. is a Hurel-Dubois type of 21,825 lb. And the HD job would perform the same service at a cruising speed only 5% less than that of the DC-3. Takeoff distances would be the same.

▶ **What's the Catch?**—Hurel found—as others before him have—that the weight of a cantilever wing increases very rapidly as the aspect ratio increases. Above an AR of 12, the weight was prohibitive.

Hurel made his studies for both the cantilever and the externally braced wing, and found that the braced structure could continue to be made light at very high aspect ratios.

A typical braced wing of AR equal to 30 weighed only twice as much as a wing with AR of ten. Increasing the AR of a cantilever wing only to 13 was enough to double its weight.

The catch appeared to be in the drag increase of the braced wing. Interference between wing and struts, due to vortices formed in the connection between the two surfaces, caused drag increments greater than the reductions obtained from the increased aspect ratio.

So Hurel worked out a method of reducing the vortex formation to zero; in fact, under certain conditions a drag reduction is produced at the intersection of wing and strut. Most of the strut area produces lift which adds up with the wing lift.

Strut incidence decreases from the fuselage to the point of wing intersection. Wing incidence is constant between the fuselage and the strut connection, and then decreases to the wingtip. This washout keeps the ailerons functioning at low speeds.

▶ **Aerodynamic Features**—Tail surfaces for aircraft with high aspect ratios can be designed smaller and therefore lighter. The tail of the H.D.31 still has to handle both trim changes and center-of-pressure shifts during changes of angle of attack.

But for a high-aspect-ratio wing, which has a very small chord, the physical dimension of these CP changes is

small and can be easily handled by moderate tail areas.

The downwash from a wing of small chord is also less pronounced than from a wing of large chord. So there is less reduction in angle of attack of the tail with the high AR wing of the Hurel-Dubois series.

These two factors—trim and downwash changes—add to permit a reduction of tail area and weight and a reduction of rear-fuselage weight.

Torsional stresses produced by aileron deflections on wings of large span are particularly serious. Hurel's wing structure is formed of two Alumag shells with electrically welded stiffeners; the shells are assembled with leading and trailing edge bolts.

▶ **Engine Problems**—Engine location presents another little problem. Because of the narrow chord, there may be some difficulty in fastening high-powered engines with their high torsional stresses. And these engines can not be enclosed in the wing, so there will be an increase in total drag.

This suggests that Hurel-Dubois aircraft may be better suited for turboprop engines—they're lighter, smoother-running and give less drag.

Bracing is more advantageous on fuselages of large depth because the weight of the struts decreases as the included angle between strut and wing increases. High and narrow fuselages are not advantageous commercially, because of the loading problems with small floor space. But this objection breaks down where the gross weight of the plane is large enough to warrant a double-deck fuselage.

▶ **Big Transport**—Although many of Hurel's ideas were incorporated into the experimental lightplane, final values have to be proved by the flight tests of the H. D. 31, the twin-engine transport.

When AVIATION WEEK visited the Hurel-Dubois plant recently, construction of the ship was well along, with first flight expected sometime at the end of this year.

Fuselage was estimated to be about 75% complete, wing center section about 90%.

The shop is not highly mechanized, hand tools being generally used. Workmanship was of a high order, and Gallic pride in the work was very evident.

In October 1951 the factory was an empty hangar; inside of six months equipment and offices had been installed and construction of the freighter had begun.

▶ **Basic Description**—The H.D. 31 is a

GOOD TO THE LAST DROP

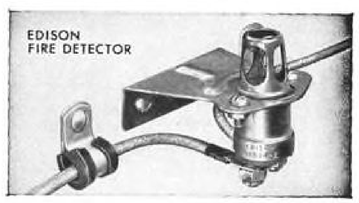
With outer skin panels removed and avionic viscera exposed, this drop-test vehicle at NACA's Ames Aeronautical Laboratory, Moffett Field, Calif., is being readied for freefall. Test missiles such as this combine a standard recoverable body with a variety of wing shapes for determination of aerodynamic characteristics. Dropped from high altitudes, the vehicles slam through the sonic door during the plunge to earth. Automatic instrumentation records data during the drop; dive brakes and a parachute recover the vehicle in undamaged condition.

...achieved by EDISON engineers

Vibration in the lower frequencies revised many performance specifications when aeronautical engineers tackled the job of designing rotary-wing aircraft.

In the case of fire detection, Bell, Piasecki and Sikorsky engineers sought the system least likely to cause false alarms. The EDISON system was selected by all three because of the unique design of its thermocouple-type detectors which have no moving parts and are unaffected by vibrations throughout the range from 0 to 1000 cps.

Fire detection on aircraft is a relatively new field, yet EDISON has been a leader since the beginning and is continually pushing development of new systems for the future of aircraft safety. Send for free Bulletin AW-10A-3003.



PIASECKI H-21 HELICOPTER

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high-wing, twin-engine monoplane. Two Wright C7BA1 engines are mounted close inboard on the 147-ft.-span wing. The fuselage, 72 ft. long, has the esthetic lines generally associated with the better French aircraft. Tail surfaces are constant-chord stabilizer and twin tapered rudder fins. The tricycle landing gear is fixed.

Main wing structure is in three sections, a center section of constant chord and thickness and tapered, washed-out outer panels. Double-slotted flaps of 30% wing chord are fitted, and conventional ailerons are used.

The center section spans about 79 ft., carries the two engines and is the strut-braced portion of the wing. The removable outer panels span 34 ft.

Most of the fuselage dimensions are determined by the shape of the freight compartment which is rectangular, and according to the company's drawing, measures about 33 ft. long. This area is about 7 ft. wide and 6½ ft. high. There is no obstructing structure within the freight compartment.

Total volume of the compartment is 1,550 cu. ft. The height of the 6½-ft. square loading door is about 45 in. off the ground.

Interior arrangement of this compartment is such that either freight or a mixed load of freight and passengers can be carried. Anchor rings are attached at even intervals to the floor and fuselage sides. There are rigging ropes and quick-connect fasteners for anchoring freight. Passenger seats are of the folding type and can be mounted and dismantled quickly.

Passenger capacity would be 36, in nine rows of four abreast.

➢ **Other Components**—The elevator is a single-piece unit passing through the rear of the fuselage. At its ends are carried the vertical tail surfaces.

The elevator's incidence is adjustable on the ground, and control surfaces are balanced aerodynamically and dynamically.

Each of the main landing gear wheels is carried by a shock strut housed within a fairing which is part of the wing structure. The nose wheel is mounted on a rocker-arm rig. All wheels have low-pressure tires.

Pilot's compartment is arranged for three persons. It is heated and soundproofed. The control arrangement is for pilot and co-pilot in the conventional manner. A radioman-navigator is placed on the right of the compartment, behind the co-pilot.

Model 31 is being built around Wright C7 engines with takeoff ratings of 800 hp. each. Gross weight of the craft then becomes 29,750 lb., of which 10,460 is useful load.

Performance for freight-carrying is given by HD as follows:

• **Over a distance of 310 mi.**, the craft

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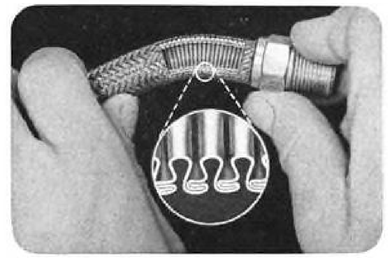
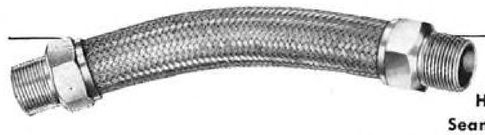
All-Metal Flexible Hose

stands up to conditions that would ruin rigid tubing. You can use it for scores of ticklish jobs . . . Connect misaligned or moving parts of machinery. Absorb vibration, or pulsation. Transmit vacuums, shield wires and cables against electrical or electronic interference. Handle difficult gases, vapors or liquids—from ammonia to acid to sea-water to steam. There's more than one application in your plant *right now* that needs TITEFLEX.

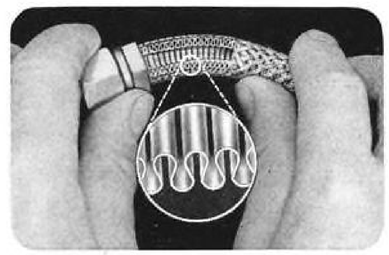


Sectional view shows rugged, flexible, seamed construction of Titeflex.

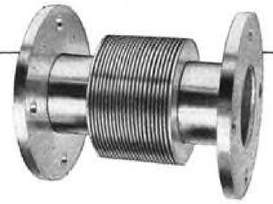


UNIFLEX
Helically-Corrugated Seamless Flexible Tube

is tough, corrosion-resistant, leakproof. Use it in applications too tough for ordinary concentric tubing. For example, oil burners, hydraulic lines, air conditioning equipment, refrigeration machinery, pumps, compressors, diesels and machine tools. Metal-to-metal seat of UNIFLEX fittings assures leakless service. Helical, seamless wall structure gives it greater flexibility and longer life. Thoroughly tested in service, UNIFLEX offers real advantages where conventional tubing gives trouble.

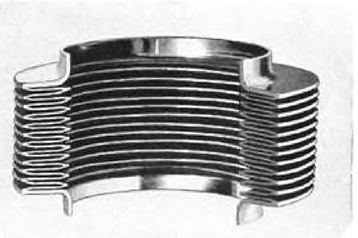


Note the helically-corrugated, seamless wall structure of Uniflex.



TITEFLEX BELLOWS

have unique, welded, convoluted-diaphragm construction. They absorb lineal movement in many types of equipment—*without* weakening lines and without reducing the flow rates of gases or liquids being conveyed. Use TITEFLEX Bellows to accommodate lineal contraction and expansion or high frequency vibration, to seal high pressure valves and shafts, or to handle gases and corrosive liquids at high temperatures. For special applications, special designs can be furnished. Complete bellows assemblies can be supplied with any required types of fittings.



Cross-section shows the welded, convoluted-diaphragm construction of Titeflex Bellows.

FOR FREE LITERATURE check the products (below) that interest you and mail the coupon. By return mail we'll send you current TITEFLEX literature, containing full descriptions, technical data and suggestions for use. Also, if you have a specific problem, our Engineering Staff will be glad to discuss it with you without obligation.

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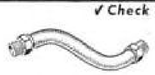

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can carry a payload of 8,800 lb.
- **For 621 mi.,** the load is reduced to 7,700 lb.
- **For a range of 1,240 mi.,** the load must go down to 5,500 lb.

These figures are all for headwinds of 31 mph. for the entire stage length.

Hurel has released estimates of a similar airplane with a pair of Pratt & Whitney R-1830 engines rated at 1,200 hp. each for takeoff. Gross weight of this more-powerful craft would be 37,500 lb. and useful load would approximate 14,000 lb. Over a 1,240-mi. range, load would be about 7,700 lb. Alternately 40 passengers could be carried.

Why Jet Engines Seem So Noisy

How noisy is a jet engine?

Not as noisy as you might think, AF experts have concluded after a study at MacDill AFB, Fla. Jet noise is no more intense than piston engine noise, for instance, but is spread over a much wider range of frequencies.

▶ **Ideal Lab**—The MacDill study was made by a couple of experts from USAF's School of Aviation Medicine. They found MacDill the ideal place to study different plane noises. As part of the Strategic Air Command, it supports three types of jet aircraft—Boeing B-47 bombers, Republic F-84 fighters, Lockheed T-33 trainers—and four-engine piston planes—Boeing C-97 refueling tankers and B-29 and B-50 Superforts.

The study found that B-47 engines in flight put out noise as high as 108 decibels. On the line these same engines shatter the air with 138 db., close to the point where sound leaves off and pain begins.

▶ **What to Do**—Well-fitted ear plugs are the generally recommended answer to the problem of high noise levels. In the case of jet engine noise, the plugs make it possible to hear conversation better, because they tend to filter out engine noises which buck the upper frequencies of speech and radio communications. The men on the line at MacDill did not realize this, and when they wanted to hear, pulled out the ear plugs.

Noise on long flights can produce fatigue, as well as ear damage. B-47 pilots wore crash helmets, which helped, but on the longer flights, with aerial refueling, extra cotton in the ears was suggested.

The men in the C-97s, B-29s and B-50s—normally not equipped with crash helmets—had ear plugs prescribed.

▶ **Other Noises**—Apparently human nature enters strongly into the reaction to noise. Auxiliary power units put out 118 db. for perhaps 20 continuous

minutes, but ground crews using them ignored the auxiliaries, and plugged their ears to keep out the noise when the jets taxied by.

Firemen on trucks at the end of the runway complained about jets roaring overhead with a peak, short-time noise intensity of 106 db. But they didn't mind the 96 db. the fire trucks kicked up when idling, nor the 120 db. whenever pumps were tested.

In the radio shack, generators produced as high as 108 db. for 30 or 40 minutes out of each hour. Operators found this unobjectionable, but complained when jets landing and taking off nearby ran the noise meters up to 110 db. for very short intervals. On the base, the usual noise of human activity ran up to as high as 90 db. while jet planes overhead seldom exceeded 86 db.

► **Conclusions**—The report concludes that jets may be irritating but they are no serious threat to the hearing of anyone except maintenance men. And the men on the line are in no danger of going deaf if they wear well-fitted ear plugs.

THRUST & DRAG

One of the things that worries me is exactly why it takes two years to get an airplane into production. Is it because everybody has said so and the repetition of that figure has become an accepted truth?

Listen to one of the aircraft executives talk. He says that it takes two years because he has to get tools and equipment and engines lined up. By inference the airframes can be banged out rapidly, and all the holdups that occur are because of the subcontractors and suppliers.

Then talk to the suppliers. They can't get tools and materials to build components or equipment or engines. Then the machine-tool people have their say. They can make tools fast enough, they state, if people know enough to order what they want and not to run around canceling and reinstating orders.

It is the services who seem to end up holding this particular buck. And they can't really be blamed too strongly because they have to hold pretty much to a budget limit imposed on them by Congress.

And Congress, as everybody knows, is the elected instrument of the people.

As to those who cite complexity and the difficulties of the new kinds of aircraft, let them consider the way Kelly Johnson managed the Lockheed XP-80 job. From conception to first flight took 143 days, or less than half a year. And the job that Kelly and his staff faced was just as formidable as the tasks which are confronting design crews now.

It seems to me somebody had better get on the ball and do some top-level thinking about this. It's bad enough not knowing what kind of airplanes we ought to build and who should build them, let alone not knowing how long it should take to build them.

* * *

The Monarch Machine Tool Co., Sidney, Ohio, makes (the firm says) the finest lathe in the world. The firm also makes one of the finest efforts that I've seen to attract young engineers. It's in the form of a booklet called, "It's your future . . ." and it gives briefly the story of Monarch, the company policies for engineering employes, financial status and description of Sidney. The presentation is lively, with little spot sketches in the margin contrasting with well-chosen photos to illustrate the text. It's worth a look, and the Monarch people probably would be glad to send you a copy if you have a good reason for asking.

—DAA

TESTER FOR FUEL CELLS

This giant vulcanizer will be used for curing aircraft fuel cells. Handling cell installations as large as those in Boeing B-52 jet bomber, vulcanizer's shell is 15 ft. in diameter, 45 ft. long, 1⅞ in. thick. Vulcanizer was built for Goodyear Tire and Rubber Co. by Biggs Boiler Works under subcontract with Adamson-United Co.

Subcontractors Build Half the P2V-5

- **This typifies Lockheed plane production now.**
- **About 4,000 subs help build firm's aircraft.**

Lockheed Aircraft Corp. is putting the push on its subcontracting. This year, its subcontracting program has been expanded 21.4% so that now 97 different assemblies or major parts of Lockheed planes are made by others. Total of subcontracting is about 30% of all Lockheed production.

For the company's Navy P2V-5 Neptune, 51% of the plane is built by others, but on its other military jobs, fewer items are subcontracted. In manhours, 43.5% of the P2V is handled outside as against 39% for the T-33. For the new F-94C Starfire interceptor, 31.2% of the manhour job will be subcontracted. On its Super Constellation—both commercial and military—Lockheed does practically the entire job.

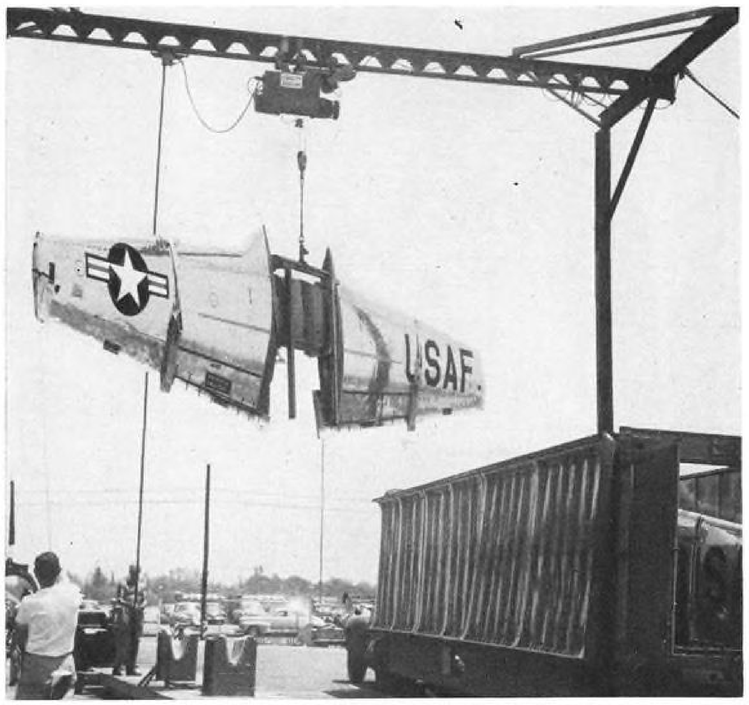
► **Money Involved**—Value of this large-assembly contracting for Lockheed's California operations represents $255-million worth of contracts—more than half of company's $456 million of total orders for purchase of aircraft components and allied items. (The company also is setting up the USAF facility at Marietta, Ga., to build Boeing's B-47.)

► **Who's Participating**—The nine companies producing major assemblies for Lockheed include Cessna Aircraft Corp. and Beech Aircraft Corp., Wichita; United Aircraft Corp.'s Chance Vought division and Temco Aircraft Corp., Dallas; Kaiser Mfg. Co., Oakland, Calif.; Rohr Aircraft Corp. and Solar Aircraft Corp., San Diego, Calif.; and Rheem Mfg. Co. and Industrial Fabricators Co., Los Angeles, Calif.

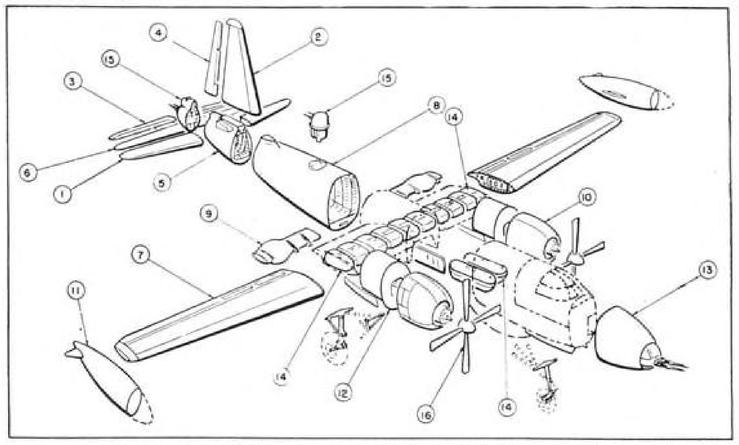
In addition to these major subs, there are about 4,000 others in the categories of vendors and outside producers.

► **Preliminaries**—What is involved in a subcontracting program is highlighted by what Lockheed had to do to start the program for the P2V:

- **Recode about 15,000** aircraft parts and assemblies.
- **Reschedule about 30,000** shop orders to provide a cushion of parts and permit transfer of tooling.
- **Transfer 15,200** individual tools to subs. Some fixtures needed special ship-



T-33 WING being unloaded from special van at Lockheed's Van Nuys, Calif., plant, completes long trip from subcontractor, Beech Aircraft Corp., Wichita.



P2V-5 PRODUCTION SPLIT, showing what parts are made by others for Lockheed: 1, stabilizer; 2, fin; 3, elevators and tabs; 4, rudder and tab; 5, aft fuselage; 6, variable camber assembly (Parts 1 to 6 made by Chance Vought); 7, outer wing and tips (Temco); 8, waist body structure; 9, center section flaps (Parts 8 and 9 by Kaiser Mfg.); 10, powerplant package; 11, tip nacelles (11 and 12 by Rohr); 12, engine nacelle barrels (Solar); 13, fuselage nose (Rheem); 14, fuel cells (Industrial Fabricators); 15, waist and tail gun turrets and 16, propellers, government-furnished. Lockheed builds forward and center fuselage sections and center wing (dotted).

ping cradles and braces weighing as much as 11,000 lb.
- **Ship 556,000** individual parts and assemblies to subs to help initial production.
- **Transfer $4-million** worth of raw materials.
- **Prepare and maintain** 375 source books and 455 manuals covering purchase and process specifications, assembly charts, and other engineering and manufacturing data.
- **Incorporate about 2,400** design changes as engineered on the subcontracted units.
- **Develop specially designed** trucks and trailers to tote completed P2V assemblies.

Council to Push Production Progress

Aircraft industry production and plant-operation executives and machine tool builders will be interested in the workings of the newly formed council for Technological Advancement—an affiliate of Machinery and Allied Products Institute (MAPI).

The council will "program, pioneer and promote ideas" in these major fields:
- **Exchange and promotion** of engineering ideas on plant modernization and construction, alternative production methods, etc.
- **Technological trends** and new techniques, products and industries.
- **Equipment leasing** and financing to speed acquisition of new facilities.
- **Inter-industry** and university collaboration on economic and industrial research.
- **Relation of patents** to technological advancement.
- **Marketing of industrial equipment.**
- **More extensive education** of industry on capital goods economics.
- **Economic measurement** of effects of changing value of the dollar on industry's equipment depreciation and replacement policies.
- **Measures which may be taken** by industry to alleviate cycles of demands for capital goods.
- **Education of industry** on capital goods economics.

Program of the Council will be under the guidance of a board of trustees composed of 38 industrial executives of companies "particularly identified with technological advancement." Council headquarters will be in Machinery and Allied Products Institute's offices—120 S. LaSalle St., Chicago, Ill.

BELL'S BIG GUN

For flexibility and mobility during final welding of Boeing B-47 engine nacelle tailcones and firewalls, Bell Aircraft Corp., Buffalo, N. Y., developed this novel spotwelding "gun." Crane-operated, the unit can service fixtures on a 50-ft. line. Choice of standard and special arms permits welds inside 2⅝-in. tubes, on surfaces as narrow as ¼ in., around corners and into angles. The unit being spotwelded is mounted in a rotating base fixture.

PRODUCTION BRIEFING

▶ **Aeroproducts division** of General Motors Corp., Dayton 1, Ohio, has received two new engines for test stand checks of its propellers. One is a Wright R3350-85 compound engine for testing props to be used on the Fairchild C-119G and C-119H; the other is an Allison T40 turboprop powerplant for checking props for Convair R3Y, Douglas A2D and North American A2J.

▶ **AiResearch Mfg. Co.,** Los Angeles, has moved to larger quarters in a new building at 9225 Aviation Boulevard, bringing all its engineering activities under one roof. The single-story structure contains 37,500 sq. ft. of floor space.

▶ **Allied Products Engineering Corp.,** Los Angeles, has been named California representative for plastics and allied products made by Chemical Development Corp., Danvers, Mass.

▶ **Bettinger Corp.,** Waltham, Mass., has purchased Toledo Porcelain Enamel Products Co., Ohio. The new division is expected to move into the field of ceramic coatings of alloy metals for high temperature applications in jet and piston engines.

▶ **Dayton Rubber Co.,** Dayton, Ohio, has purchased American Latex Products Corp., Los Angeles, a major supplier of foam rubber products to West Coast aviation firms. American Latex will be operated as a division of the parent firm.

USAF CONTRACTS

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

Anchor Mfg. Co., 377 W. Broadway, New York, reflector, cutter-cable, 5,000 ea., $33,940; target fighter aircraft, 304 ea., $1,507,381.

Armco Steel Corp., Middletown, Ohio, steel, foil, magnetic shielding, 200 rolls, $26,000.

Aro Equipment Corp., Enterprise & Trewitt Sts., Bryan, Ohio, spare parts for support of C-6 bomb hoist, 1,000 ea., ring-lock, link-limiting cable, 200 ea., armature motor, 250 ea., case-gear, 300 ea., crank assembly-bomb hoist, 2,000 ea., switch assembly-control, 3,000 ea., disc-assembly brake, 3,000 ea., shaft, 2,600 ea., drum-cable bomb hoist, 5,100 ea., gage, cable drum, shaft, bomb hoist, 3,000 ea., $514,765.

Atlas Film Corp., Atlas South Blvd., Oak Park, Ill., production of a motion picture, 1 ea., $58,587.

Aviation Engr. Corp., 34-56 58th St., Woodside, N. Y., type B-18, temperature indicator, 336 ea., $65,083.

Bastian-Blessing Co., 4201 W. Peterson Ave., Chicago, cylinder assembly, 4,144 ea., body-emergency assembly valve, 3,612 ea., bushing emergency assembly valve, 1,052 ea., cable assembly, 412 ea., connector assembly, 6,812 ea., cylinder-oxygen, 412 ea., $75,899.

Bear Mfg. Co., 2016 5th Ave., Rock Island, Ill., indicator-wheel alignment tester, 122 ea., $33,613.

Bell & Howell Co., 7100 McCormick Rd., Chicago, spare parts, lens assemblies, sprockets, arm assemblies, $97,902; movie equipment, $126,393; motion picture projectors & instruction books, $59,867; spare parts for cameras, lenses, cranks, mounts, $297,893; spare parts for projectors, $28,820; head assembly, 315 ea., $71,316.

Belmont Radio Corp., 5921 W. Dickens Ave., Chicago, radio direction finder GRA-9, 117 ea., $62,101.

Bendix Products division, Bendix Aviation Corp., South Bend, carburetor flow bench, 22 ea., bleed check test stand, 7 ea., air circuit test stand, 7 ea., $343,830; special tools, 70 ea., $48,328; overhaul & maintenance parts, $41,285; brake assemblies, 297 ea., $477,444; spare carburetors & spare parts R3350-85 engines, $171,592; 56" x 16" wheels, 1,250 ea., 24" x 16-5/16" brakes, 1,294 ea., spare parts & data, $3,351,560; wheel assembly, 20" x 4.4", 1,688 ea., $86,374.

Beseler Co., Charles, 60 Badger Ave., Newark, N. J., projectors, with working plans, $32,286; 255 H-1 projectors, $98,247; VuGraph projectors, $59,357.

Bianchi, Carlo, & Co., Inc., 24 Union St., Framingham, Mass., tiedown, cargo airplane, type C-2, 19,548 ea., $405,425.

Black & Decker Mfg. Co., Towson, Md., grinder, valve refacing, 203 ea., $54,570.

Blake, Whitney, Co., 1565 Dixwell Ave., New Haven, wire-polychloroprene sheathed, buna compound insulated, 5,250,000 ft. $489,563.

Bobrich Products Corp., 330 Fifth Ave., New York, tow-targets—banner type A-68, 30,117 ea., $641,543; cover, camera, spares, 1,176 ea., $76,440.

Boeing Airplane Co., 7755 E. Marginal Way, Seattle 14, jettisonable aluminum fuel tanks for B-50, 700 gal., $6,010,063; "On Top" kits for B-50 & B-29 aircraft, $38,300; remove and reinstall 8 engines and remove 5 AN/APQ-24 systems from B-50D airplanes, $32,772; services & materials necessary to effect contractural repair of B-50 airplane, serial no. 48-096, $185,058.

Bolsey Corp. of America, 118 E. 25th St., New York 10, camera, 200 ea., $131,114.

Briggs & Stratton Corp., 2711 N. 13th St., Milwaukee, spare parts, item 1 thru 21, $25,168.

Brooks & Perkins Inc., 1950 W. Fourth St., Detroit 1, ten 3,500-lb. aerial del. plat-

NEWS Edo NOTES

THE ARMY'S L-19 NOW FLIES ON EDO FLOATS

The versatility of the Army's newest observation-reconnaissance plane has been greatly enhanced with completion of its flight tests as a seaplane on Edo floats. The Cessna L-19 seaplane has proven itself as agile and spectacular in performance off water as its land plane counter part. Its power and high-lift flaps make this a seaplane of extraordinary performance.

Thus the L-19 is added to the long list of aircraft which have been successfully converted to seaplane use through Edo floats. Actually more than 350 different types of aircraft at home and abroad have been approved as seaplanes on Edo's.

For 27 years now the aviation world has looked to Edo as a dependable source of dependable seaplane floats and the center of seaplane flying development. This unique position is viewed by the entire Edo organization not just as a tribute to superior design and manufacture but also as a major responsibility to the aircraft industry and to those individuals who depend on floats for operations where other aircraft cannot fly. To that end, production of Edo floats is being maintained at the greatest possible rate.

Edo CORPORATION
Since 1925 COLLEGE POINT, NEW YORK

forms, ten 7,000-lb. aerial del. platforms, $131,389; plotting board PT-105, 57 ea., plotting board PT-106, 114 ea., engineering data, 1 lot, maintenance data, 1 lot, $195,682.

Brown & Mole, Inc., Strong Ave. & Chettic, Coplague, N. Y., target banner, 200 ea., maintenance data, 1 set, $109,720.

Brunner Mfg. Co., 1821 Broad St., Utica, N. Y., compressor, 188 ea., spare parts (10%), data, 277 sets, $74,151.

Bruno New York Inds. Corp., 460 W. 34 St., New York, AN/URM-23 R. F. wattmeter set, 1,355 ea., $1,434,212.

Buda Co., Harvey, Ill., spare parts, $50,478.

Busch Camera Corp., 500 S. Clinton St., Chicago, mount, camera A-27A, 792 ea., $38,793.

Buttondex Corp., 386 Fourth Ave., New York, bracket, gun trunnion, 9,588 ea., $29,627.

Canadian Commercial Corp., Washington, 263 Harvard Mark IV trainer airplanes, spare parts, groundhandling equipment data, $33,603,920.

Cannon Electric Co., 3209 Humboldt St., Los Angeles, electrical connectors, misc., $51,491.

Carter Parts Co., 213 Institute Place, Chicago 10, toggle switches, tools & data, 16,500 ea., $242,067; special tools & toggle switches, 13,300 ea., $61,669.

Central Commercial Industry, Inc., Lowrey Organ div., 1215 W. Washington Blvd., Chicago 7, remote tuning assembly, 579 ea., $126,960.

Century Lighting, Inc., 521 W. 43 St., New York, spotlight, 1,160 ea., $40,348.

Cine Product's Supply Corp., Evesham Ave., Ashland, N. J., spare parts, lens assemblies, sprockets, $77,171; spare parts, lens assemblies, sprockets, arm assemblies, $183,044.

Clark, David, Co., 360 Park Ave., Worcester, Mass., anti-G suit valves, regulating, $266,174.

Clayton Mfg. Co., 401 North Temple City Blvd., El Monte, Calif., type B2C vapor pressure cleaners, 210 ea., type B3 vapor pressure cleaners, 397 ea., $639,712; vapor pressure cleaners, 615 ea., vapor pressure cleaners, 52 ea., spray type cleaner, 100 ea., $964,489.

Collins Radio Co., Cedar Rapids, Iowa, equipment 18S-4, radio transmitter & receiving set, $623,267; AN/ARN-14 equipment, 2,805 ea., $1,040,304; AN/ARN-14 equipment made of various materials and used on various aircraft, 3,918 ea., $1,528,024.

Colonial Radio & Television div., Sylvania Electric Products Co., 254 Rano St., Buffalo, N. Y., radio receiver, 923 ea., radio transmitter, 2,225 ea., power junction box, 2,163 ea., $3,501,383.

Columbian Enameling & Stamping Co., Inc., 1536 Beech St., Terre Haute, Ind., tray-photographic, 5,200 ea., $50,942.

Connecticut Telephone & Electric Corp., 70 Eritannia St., Meriden, Conn., cushionheadset, 179,364 ea., neckpiece, 7,420 ea., $101,779; microphone-carbon, 11,942 ea., $27,705.

Consolidated Industries, Inc., Lafayette, Ind., tank assembly, 12,000 ea., $2,914,464.

Consolidated Vultee Aircraft Corp., Ft. Worth, tests in climatic hangar, technical order compliance on B-36 aircraft, repair on two B-36 aircraft, $1,137,922; construct propeller test booms for B-36 aircraft, comply with technical orders, furnish oxygen equipment as CFE, furnish kits for ECP CG36-832, spares for B- and RB-36H aircraft, $14,536,990; services & materials for repair of B-36 aircraft, $6,064,022.

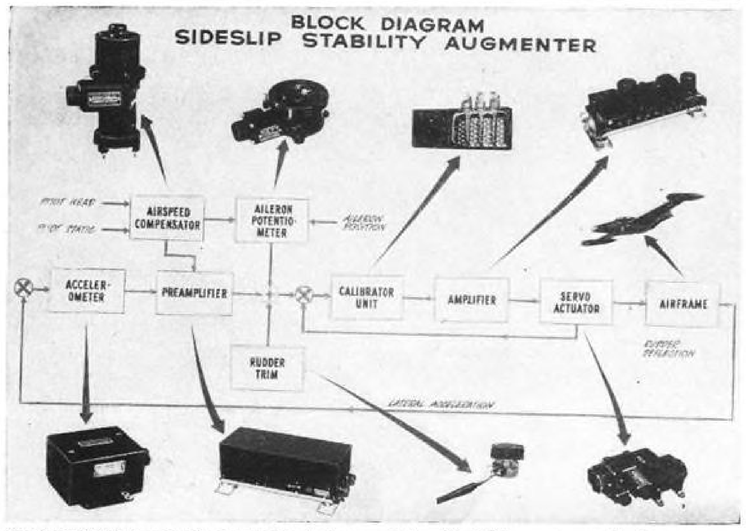
Continental Electronics Ltd., 302 Oakland St., Brooklyn, electrical connectors, misc., $27,647.

Continental Motors Corp., Muskegon, Mich., O-470-11 engines, spare parts & data, 422 ea., $1,478,333; model PC-60-2 engine, 683 ea., $1,617,192; spare parts, $563,538.

Cornelius Co., P. O. Box 905, Minneapolis, portable air compressors, 817 ea., $394,382.

Courter Electric Products, Inc., 440 Sixth St., Grand Rapids, amplifier, 4,640 ea., $293,180.

Cowhig Industries, 899 Boylston St., Boston, Mass., spare parts, $37,571.



SCORPION'S longitudinal stability is increased by this 30-lb. servo mechanism.

Avionics Damper Steadies F-89

Northrop sideslip stability augmenter will help put rockets where they're aimed; eliminates Dutch Roll.

By Philip Klass

Hawthorne, Calif.—Northrop Aircraft Co. has developed a 30-lb. avionics device for its F-89s which eliminates the crosswind forces that skew rockets off their aiming point. Simultaneously it makes the airplane a more stable gun platform by eliminating "Dutch Roll."

The system, called a sideslip stability augmenter, also makes the F-89 essentially a two-control airplane in which the pilot almost never uses his rudder pedals.

►**Improves on Yaw Dampers**—The augmenter, produced for Northrop by Minneapolis-Honeywell, resembles the yaw dampers used in many other jet fighters and bombers but it goes them one step better in eliminating sideslip. This explains why Northrop calls its system a sideslip stability augmenter. (Boeing nicknamed its B-47 damper "Little Herbert," while McDonnell has dubbed its F2H system "Damper Dan.") By almost any name, the systems generally resemble a single-channel automatic pilot.

►**Special Features**—The new Northrop development is noteworthy because it:

• **Eliminates sideslip** as well as damping out Dutch Roll.

• **Uses a sensitive accelerometer** instead of the commonly used rate-type gyro.

• **Has an airspeed compensator** which varies the degree of damping action at different airspeeds and altitudes.

• **Provides damping** in maneuvers as well as in straight and level flight, a feature not found in some systems.

• **Coordinates turns** automatically, at any airspeed, without pilot rudder pedal action.

The Northrop development is also interesting as evidence of a trend by some airframe manufacturers to assume system responsibility for avionics equipment which directly influences the flying characteristics of their airframe. In some cases, like at Northrop, the airframe manufacturer then subcontracts the actual system production to an avionics manufacturer.

►**The Need**—In practically all of today's highspeed jet fighters and bombers, the aerodynamicist has had to sacrifice lateral stability to obtain the desired maneuverability. As a result, a gust disturbance can set up a lateral directional oscillation in which the rolling and yawing frequencies are slightly out of phase. The "Dutch Roll" term derives from its similarity to the weaving of a skater's body.

Dutch Roll is obviously disconcerting to a pilot during cruise conditions. It is even more serious under combat conditions where it makes the plane a very unstable gun platform.

The current trend to rockets for fighter armament raises another problem. A rocket fired from a moving airplane will head into the relative wind, regardless of the heading of the airplane at that instant.

Any airplane sideslip at the instant of firing will cause the rocket to veer from the pilot's aiming point, possibly missing the target. The angle of rocket deviation is roughly equal to the sideslip angle. Northrop has eliminated this source of aiming error with its augmenter system.

►**No Rudder**—Whenever the pilot wants to turn, he simply displaces the ailerons; the augmenter automatically introduces the necessary rudder displacement to coordinate the turn (eliminate sideslip). According to D. T. McRuer, head of Northrop's servomechanisms section which developed the augmenter, the turn is coordinated at all airspeeds.

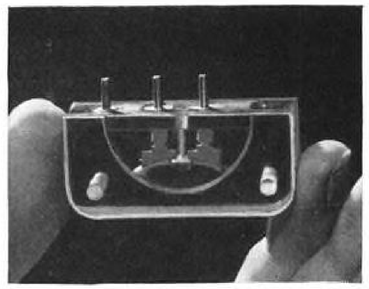
The two-control, no-rudder operation is essentially a useful by-product which is included because it adds practically no weight or complexity.

A motor-driven servo actuator operates the rudder through the Northrop hydraulic power boost system to introduce augmenter action. The servo is connected through a linkage which prevents actuator (and rudder) movement from being transmitted back to the pilot's rudder pedals.

The pilot can slip or skid the F-89 if he desires (for example, to close formation) by applying a light pressure on his rudder pedals and operating them in normal fashion. This in effect neutralizes the action of the augmenter. Actually, the augmenter servo will be working at cross purposes to the pilot's action until the servo reaches the limit of its travel (equivalent to five deg. rudder travel). The pilot doesn't feel the augmenter servo counter force. It merely seems to him that he has to push his rudder pedals farther (but not harder) to obtain the desired degree of rudder action.

►**How It Works**—McRuer explains augmenter operation by comparing it with the pilot's normal reactions and procedures. "When the pilot sees the ball in his bank indicator (a not too-sensitive accelerometer) move off center, he applies appropriate rudder. The faster the ball moves, the faster he pushes on the pedals. The augmenter operates in similar fashion," McRuer says.

The bank indicator function in the augmenter is performed by a Northrop-developed accelerometer with extremely



ACCELEROMETER is sensing unit of Northrop sideslip stability augmenter.

high sensitivity. It is installed near the airplane's center of pressure. In straight and level flight, any change in airplane sideslip attitude causes a sidewind component of force to be applied to the airplane, giving it a lateral acceleration.

The magnitude of the lateral acceleration measured in this position is proportional to sideslip angle, for small angles. Thus the a.c. signal generated by the accelerometer is proportional to the sideslip angle and hence a measure of the amount of rudder needed to wash out the sideslip.

During banking turns, the accelerometer compares the lateral axis components of gravity and centrifugal force. If the two are not equal, the accelerometer generates a signal calling for rudder displacement to coordinate the turn.

► **Sensitive Accelerometer**—The Northrop accelerometer is essentially an inclinometer which is partially filled with an electrolytic liquid. McRuer says the device will detect accelerations in the micro-G range. The devices's construction is not unlike that of electrolytic switches used to erect vertical gyros (AVIATION WEEK July 14, p. 52).

When lateral acceleration is zero, the electrolytic is centered and passes equal currents from a center electrode through two electrodes, one located at either end of the inclinometer. When the device experiences a lateral acceleration, the electrolytic shifts position, increasing current flow to one end electrode and decreasing it at the other. The direction of the acceleration determines which end electrode carries the larger current.

► **Linear Output Required**—Accelerometer sensitivity was not the only problem involved in designing the system. Northrop needed a rate-of-change of sideslip signal for use in stabilizing the servo system and obtaining it from a network which takes the first derivative of the sideslip signal (from the accelerometer). However this imposes a severe linearity requirement on the accelerometer, i.e. the output signal must be proportional to lateral accelera-

PRE-AMPLIFIER unit is one of the components Minneapolis-Honeywell makes.

tion within very close limits.

McRuer says this linearity requirement has been met in the present design. Changes in ambient temperature which would otherwise affect the accelerometer signal gradient have been compensated for by an ingenious, but undisclosed method.

▶ **Optimum Damping**—The accelerometer signal is demodulated (converted to d.c.) in a small pre-amplifier which also generates the rate signal previously cited.

The gain of the pre-amplifier, and the ratio of rate/displacement signals used, is determined by an airspeed compensator. This device contains aneroid (bellows) movement which is vented to the static and pitot lines and which drives three potentiometers.

Two of the pots are used in conjunction with the pre-amplifier; the third is used to assure coordinated turns at all airspeeds. The airspeed compensator enables the augmenter to provide optimum damping throughout the altitude and speed range of the airplane.

▶ **Servo System**—The remainder of the servo system is conventional. Northrop uses a standard servo amplifier and servo actuator which M-H is also producing for the Boeing B-47 yaw damper.

The servo amplifier converts the d.c. signal output of the pre-amp to an a.c. signal using a small chopper. The signal is then amplified and applied to one phase of a two-phase a.c. motor in the servo actuator.

The servo actuator has a follow-up potentiometer which provides d.c. feedback proportional to rudder displacement. The actuator also drives a small tach generator to provide an a.c. rate

signal which is introduced through the cathode of the first stage tube in the servo amplifier.

► **Cross Control**—Although the accelerometer could provide a signal to call for rudder needed to coordinate a turn, the device saturates at a relatively low G value. If the system depended solely upon the accelerometer to call for rudder during a turn to overcome adverse yaw due to the ailerons, the plane might wallow in an uncoordinated turn for the first few seconds.

Northrop gets around this problem by using a small potentiometer follow-up assembly which is driven from the aileron control cables. Displacement of the ailerons immediately generates a d.c. signal which is introduced between the pre-amp and the servo amplifier to call for displacement of the rudder.

The aileron follow-up signal is also necessary under steady-state turn conditions to buck-out the follow-up signal from the displaced rudder.

Because the amount of rudder displacement required for turn coordination varies with airspeed, the signal gradient of the aileron follow-up pot is varied from a potentiometer in the airspeed compensator. Rudder trim can be introduced by operating a poteniometer on the pilot's console which inserts a d.c. signal between the pre-amp and servo amplifier

► **Collaboration**—Northrop and Minneapolis-Honeywell have worked very closely on the F-89 augmenter program, according to Bert McFadden of Northrop's servo-mechanisms section. For example, two Northrop engineers spent several months in Minneapolis working out the initial production design of the accelerometer and airspeed compensator with M-H engineers.

To speed up the program, Northrop has used existing M-H components such as the servo amplifier and servo actuator. The pre-amplifier, however, was developed originally by Northrop specifically to work with the new accelerometer. M-H reworked the initial Northrop design to adapt it to Minneapolis-Honeywell's production line techniques.

Northrop engineers indicated that it should be possible, by redesign, to reduce augmenter system weight somewhat.

This is always true of the first design of a complex system.

While Northrop didn't indicate what direction this redesign could take, an obvious one would be to use a smaller servo motor and servo amplifier since valve on the rudder power boost system.

► **Proof of the Pudding**—The writer got a first-hand look at the augmenter in action, at least in a synthetic sense.

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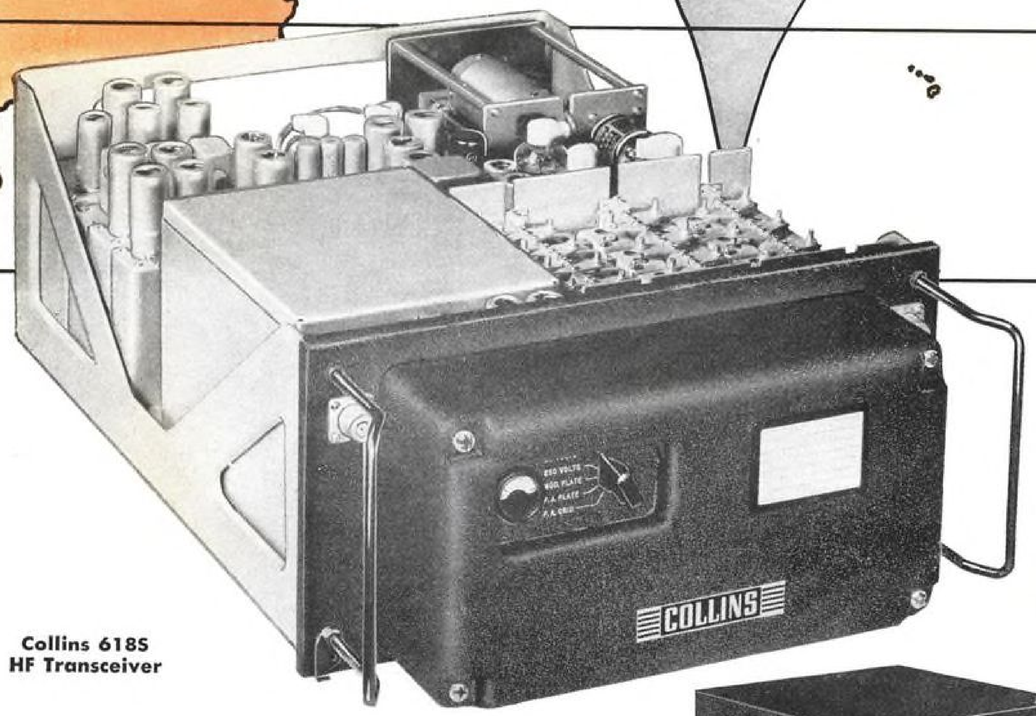
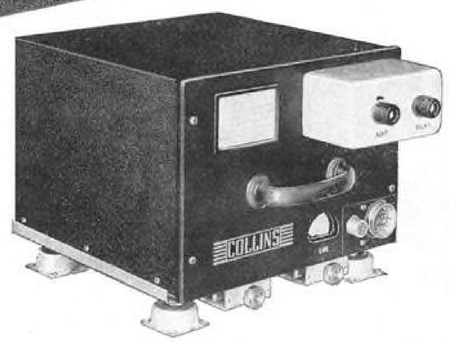


Collins 618S
HF Transceiver



Collins 180L-2 Antenna Tuning Unit
(Also used with Collins ART-13 and 18S)

SPECIFICATIONS

SIZE: 1½ ATR TRANSCEIVER

WEIGHT: Approximately 75 pounds, which includes both Transceiver and Power Supply

TUNING: Internal circuits automatically tuned after insertion of crystal

POWER OUTPUT: 100 watts phone and CW

INPUT VOLTAGE: 28 volts DC and 400 cycle, 115 volts AC

First airborne Transceiver to use mechanical filters.

The NEW... Collins 618S 144 Channel HF Transceiver

Up To 144 Channels – 2 to 25 megacycles

100 Watt Power **Automatic Operation**

The Collins Radio Company takes pride in announcing the 618S HF Transceiver as a long awaited successor for overseas operations to the Collins 18S Transceiver now being used everywhere in the air. The 618S is designed primarily to meet the requirements of the many commercial airlines engaged in interchange agreements and international operations. Its 100 watt power is proven completely dequate for domestic and overseas operations.

The 180L-2 antenna tuning unit matches the output of the 618S to standard aircraft antennas and *guarantees* peak performance on ALL frequencies under ALL operating conditions. Another advanced design feature is the use of the Collins mechanical filter in the IF circuit which provides maximum adjacent channel rejection.

Every engineering effort has been directed toward insuring the utmost in dependability, ease of maintenance, and the elimination of ground adjustments formerly necessary to implement a frequency. No coil changing — no tune-up required — modular type construction is used, and the units are plug-in type for ease of servicing and maintenance.

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COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

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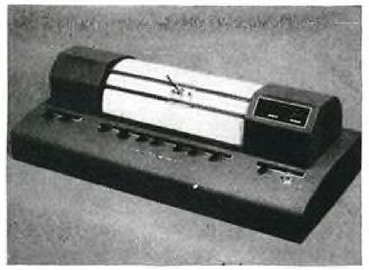
Northrop uses a full-scale mockup of the F-89 control system which includes control surfaces, cabling, power boost and augmenter systems. The device, which fills a large room, simulates the airplane in flight through the use of electronic analog computers (AVIATION WEEK May 28, 1951, p. 34).

An ingenious Northrop-devised combination of four Brush recorders and a projector made it possible for the writer to sit in the pilot's seat, "fly" the mockup, and see projected in front of him a complete time-history of the plane's bank angle, rudder displacement, sideslip angle, etc.

A Northrop Aircraft engineer modified a commercial projector to sit astride the four Brush recorders and project their pen movements on the chart paper on the screen).

A sharp kick on the flight simulator rudder (simulating a gust) caused the F-89 simulator to oscillate—until the Northrop augmenter was turned on. Then the oscillation was almost instantly damped out.

During turns, with the augmenter on, only aileron displacement was needed to make a coordinated turn; without the augmenter serious sideslip oscillations developed unless the writer concentrated on operating the rudder pedals.

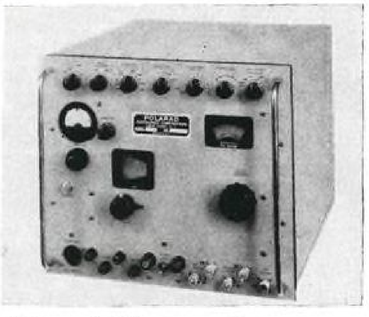


Digital Plotter Gives Step-by-Step Record

A digital plotter which charts a graph of one variable against another in incremental steps in response to electrical impulses from an electronic digital computer or differential analyzer has been announced by Logistics Research Co. The device, called the Logrinc Digital Plotter, can be used to plot any intelligence in which the variables change in discrete steps.

The plotter uses a ball-point pen to record on either a 12-in.-wide continuous strip or on a 12x18-in. chart. The device permits simultaneous movement in .1-in. steps along both the X and Y axes at rates up to 20 steps per second. Plotting impulses can be taken from switch or relay contacts. The plotter contains its own power supply and operates from 110 volts a.c.

Logistics Research Co., 141 South Pacific Ave., Redondo Beach, Calif.



Signal Generator Has High Stability

A new microwave signal generator is available which covers the range of 7,000 to 10,750 megacycles and can provide either pulse or frequency modulation, with either delayed or undelayed synch signals. The generator is said to have high stability to assure accurate measurement. Called the Model MSC-4, the signal generator provides single direct-reading dial control of frequency and uses non-contacting shorts on the klystron cavity.

Polarad Electronics Corp., 100 Metropolitan Ave., Brooklyn, N. Y.

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► **Airlines Eye Sperry Radar**—Several airlines are reported to be interested in new lightweight navigational radar which Sperry Gyroscope Co. is developing for USAF as replacement for the AN/APS-42 radar now going into military use. USAF reportedly refuses to take the security wraps off Sperry's new development.

► **Aerodynamics Causes Avionics Trouble**—North American's F-86D is reported to suffer momentary reverse reading of its altimeter at the start of pitch maneuvers due to transient airflow conditions around the static vent. Human pilot can be told to disregard reversal, but it confuses the altitude control of the F-86D's Lear F-5 autopilot (as it would any autopilot).

► **Servo Problems Solved**—Avionics systems designers faced with complex dynamics problems in the field of servo mechanisms stability, aerodynamics or thermodynamics can take their problems to Computer Corporation of America for solution under a new service announced by the company. Computer Corp. is the manufacturer of the IDA analog computer. Inquiries should be addressed to the company, Computer Corporation of America, 149 Church St., New York 7, N. Y.

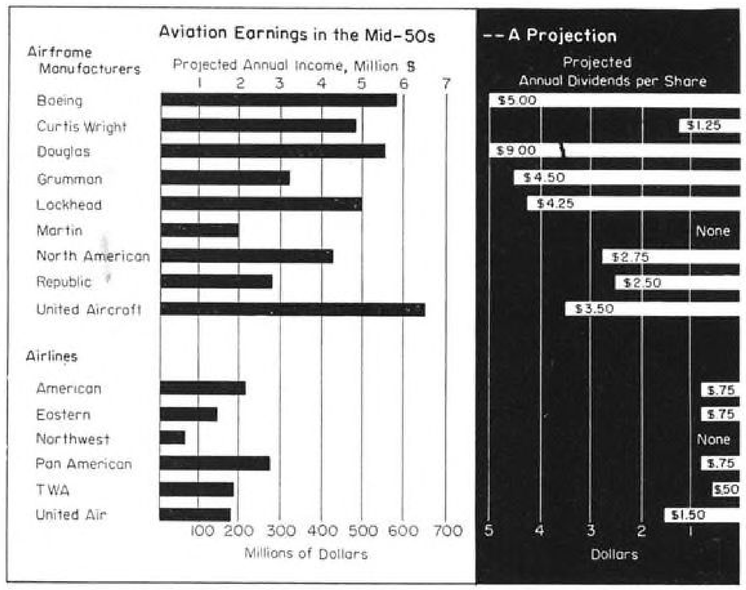
► **AA Investigates Microwaves**—American Airlines is taking a good look at possible use of microwave communications link to connect its Roanoke, Va., airport station and a remote mountain top on which it would like to install a VHF transmitter. Present transmitter location is connected by telephone lines, but contemplated spot has none.

► **New Technical Bulletins for the Avionics Engineer:**

• Characteristics of five different types of high-Q toroidal inductors are described in Lenkurt Electric Co. bulletin TL-P4. (1161 County Road, San Carlos, Calif.)

• Technical descriptions and outline drawings of a variety of electrical bushings and terminals designed to Spec MIL-T-27 are contained in catalog published by Heldor Bushing & Terminal Co., Inc. (225 Belleville Ave., Bloomfield, N. J.)

• New Model MB-1 portable oscillator operating entirely from self-contained batteries and covering the frequency range of 2 to 20,000 cps. in four decade ranges is described in Southwestern Industrial Electronics Co. bulletin. (P. O. Box 13058, Houston, Tex.) —PK



Survey Bullish on Air Earnings

- **At least 10,000 military aircraft will be produced annually in the mid-Fifties, Value Line study says.**
- **End of excess profits tax in 1953 will help assure good profits; increase in airline traffic also seen.**

The future looks good for aviation groups, according to the August issue of "Value Line," an investment advisory service. The current issue also includes a review of present operations of the aircraft and airline industries, and general industry comments. Specific projections are shown on the individual companies analyzed by the service.

Long-term prospects are considered bright for the aircraft group. Sustained production schedules are expected to be maintained through the end of 1955, the present target date for 143 wings for the Air Force and 16 carrier groups for the Navy. Value Line estimates this will result in a complement of about 50,000 military planes.

An estimated attrition rate of "perhaps 25% a year" is applied as a conservative backdrop for expecting the production of a minimum of 10,000 planes annually with a 20% obsolescence factor. (This would compare with only 9,000 planes estimated for 1952). This projected production for the second half of this decade is cited as continued assurance of sustained activity for the aircraft builders.

▶ **Rise in Earnings Seen**—The investment service presents a number of pertinent observations on narrow profit margins. It asserts:

"Under existing statute, contractors are allowed to earn up to 10% pretax on military projects. This results in only a 3% return on sales at net income after allowance for the maximum 70% profits tax to which most aircraft manufacturers will be subject this year.

"Nevertheless, the industry is so sharp that earnings are rising in an encouraging fashion despite narrow profit margins and maximum tax liability. If the excess profits tax is allowed to lapse in mid-1953, as provided in present statute, and if there is no offsetting increase in the severity of price redetermination, a marked improvement in earnings is likely to be reported by the aircraft companies over the next 3 to 5 years."

As preface to its individual aircraft comments, Value Line declares:

"In general, we visualize earnings for the middle Fifties at about double those estimated for the current year. Dividend payments may show an even wider increase. The market's capitalization of the earnings and dividends of aircraft manufacturing stocks is likely to remain conservative because this is basically a cyclical industry, heavily dependent upon government business which has fluctuated enormously in the past.

"**We do not expect these stocks to sell for any long period in the future on less than a 7.5% dividend yield basis.**"

▶ **One by One**—The advisory service's views on the future sales earning and dividends for the separate aircraft companies reviewed may be summarized as follows:

• **Boeing:** "We forecast average annual sales of $575 million in the mid-Fifties. If the excess profits tax is removed, as we believe likely, earnings are expected to average $10.25 a share and dividends $5 a share in the period 1954-1956."

• **Curtiss-Wright:** "Even allowing for the 'stretchout' of military aircraft output, our forecast is that sales volume will mount to perhaps $475 million by the mid-Fifties. On the conservative assumption that about 4% of this sales volume will carry through to net income, our forecast is average earnings of $2.35 a share in the years 1954-56. Dividends are placed at $1.25 a share."

• **Douglas:** "Our forecast for the middle Fifties is average annual sales of $550 million. Earnings for the years 1954-56 are estimated at $17.60 a share and dividends at $9.00 a share, on average, our assumption being that about 4% of sales will be brought through to net income once the excess profits tax lapses. Another stock split-up may be voted as the forecast level of profits is attained. . . .

"Douglas is considering the production of a jet air transport. Financing arrangements have not as yet been worked out. The financing of such a development program is a serious matter, for without firm orders on hand or promise of government support, development of a prototype commercial jet plane would involve considerable financial risk for the company."

• **Grumman:** "We forecast average annual sales for Grumman of $325 million for the period 1954-56. Once the excess profits tax lapses a considerably larger portion of pretax profits should be brought through to net income. (Grumman now pays the maximum 70% rate.) Our long-range forecast is average earnings of $8 a share. In view of the company's strong financial position and its liberal dividend policy in recent years, dividends may average $4.50 a share in the mid-Fifties."

• **Lockheed:** "We look for sales volume to average about $500 million (after allowance for the recent 'stretchout' of production schedules) in the period

1954-56. On the assumption that the excess profits tax will be removed and that net income will approximate 4% of sales, earnings are forecast at $8.70 a share and dividends at $4.25 a share for the mid-Fifties."

• **Martin:** "For the long pull (the period 1954-56) our forecast is average sales of $200 million, earnings of $3.90 a share and no dividends. . . . As a result of the large losses sustained in recent years under its commercial aircraft program, the company enjoys an accumulated carry-forward tax credit of about $40 million (or roughly $20 a share)."

• **North American:** "Our forecast for the years 1954-56 is average sales of $425 million. Assuming that about 4% of such a volume would be carried through to net income after the excess profits tax is lifted, we forecast average earnings at $5.00 a share and dividends at $2.75 a share."

• **Republic:** "For the long pull (the period 1954-56) Republic should enjoy a large volume of business under the military aircraft procurement program which is scheduled to peak in late 1953 and continue at a high rate through 1954 and into 1955. Our tentative forecast for this period is average sales of $275 million and earnings of $5.50 a share. The dividend forecast is $2.50 a share."

• **United Aircraft:** ". . . We forecast average sales for United Aircraft in the years 1954-56 of $650 million. Earnings are estimated at $7.90 a share during this period upon the assumption that about 4% of sales will carry through to net income once the excess profits tax has been lifted. Dividends are forecast at $3.50 a share."

▶ **Cautious on Carriers**—A more cautious, albeit optimistic, view is advanced for the air transport group by Value Line. The long-term projection for the airlines is summed up as follows:

"With volume and capacity expected to equate at record levels, earnings will also register improvement. But the growth in earnings will not be in keeping with that which would normally be expected in such a highly leveraged business.

"In the first place, the extension of low-fare coach service will weaken rate structures and serve to narrow operating margins. In addition, higher interest and depreciation charges in connection with the expansion of facilities will drain off a large portion of the increase in revenues. Nevertheless, on higher volume, moderate gains in earnings are indicated."

▶ **Individual Airlines**—As with the aircraft group, the investment advisory service also presents its long-range forecasts for the individual airlines included in its review.

• **American:** "With a high level of

business activity and personal income expected to be superimposed on the strong secular growth trend in airline traffic, we foresee average gross revenues of $220 million in the years 1954-56. Higher depreciation charges and a continued downward pressure on rate structures, however, will prevent earnings from gaining as rapidly as might be expected in such a highly leveraged business.

"In view of the probability of the eventual obsolescence of present flight equipment through perfection of jet transports and the tendency for the purchase price of new airplanes to increase geometrically, dividends will probably remain conservative throughout the mid-Fifties. For the years 1954-56, we envisage average earnings and dividends of $2.10 and $.75 a share, respectively."

• **Eastern:** "On the basis of the increased capacity provided by the new planes and the expected continuation of the secular growth trend in airline traffic, we visualize average gross revenue of $150 million a year in the mid-Fifties. Earnings, bolstered by the lapse of the Excess Profits Tax law, are expected to average $4.30 a share despite substantially higher depreciation charges. In view of the extreme financial conservatism of the management, no radical change in the dividend rate is foreseen. We expect dividends to average no more than $.75 a share in the 1954-56 period. . . .

"Directors of Colonial Air Lines have accepted Eastern's offer to purchase Colonial's assets. Although CAB has other plans for merging Colonial, there is a good chance that they may eventually give their approval. Unification of the two lines would add considerably to Eastern's basic earning power and result in an upward revision of our long-range earnings estimates."

• **Northwest:** "Presupposing the addition of new, more-efficient airplanes by 1954 or early 1955, we envisage average gross revenues of $72 million in the 1954-56 period. Earnings, however, are not expected to register a similar improvement.

"Interest and depreciation charges will increase incident to the acquisition of more costly equipment, and the expected extension of coach service over Northwest's low-density routes will adversely affect operating margins. Thus, despite an increase in revenues and greater efficiency to be derived from the utilization of improved equipment, earnings are expected to average no more than $1.50 a share in the years 1954-56.

"In view of the strained financial position and the large capital outlays that appear to be necessary, resumption of dividends is probably more than five years away."

• **Pan American:** "For the years 1954-56, we forecast average gross revenues of $275 million and average earnings and dividends of $1.60 and $.75 a share, respectively."

• **TWA:** "For the years 1954-56, we foresee average gross revenues of $195 million, average earnings of $3.35 and average dividends of $.50."

• **United:** "Earnings gains will be circumscribed by the expected conversion of the convertible preferred and the consequent dilution of per share earnings. For the period 1954-56, we foresee average gross revenues of $180 million, average earnings of $3.50 a share and average dividends of $1.50."

(The opinions reviewed are those of Value Line advisory service and not necessarily those of this writer. Neither the writer nor AVIATION WEEK *sponsors or endorses the service.)*

—Selig Altschul

WHAT'S NEW

New Literature

Proper dimensioning of engineering drawings is an ability acquired by experience, but a possible shortcut to experience is being offered by the Gisholt Machine Co. E. C. Helmke, of Gisholt, has prepared a booklet, **Practical Dimensioning,** which should be a definitive guide to the subject for student engineers, and a quick review for those with more experience in the business. Gisholt is offering a sample copy of the booklet free to anyone writing in on a company letterhead. Price in quantity is 30¢ per copy for two to 49 copies; 50 or more cost 20¢ each. Gisholt Machine Co., 1221 E. Washington Ave., Madison 10, Wis. —DAA

New Publications

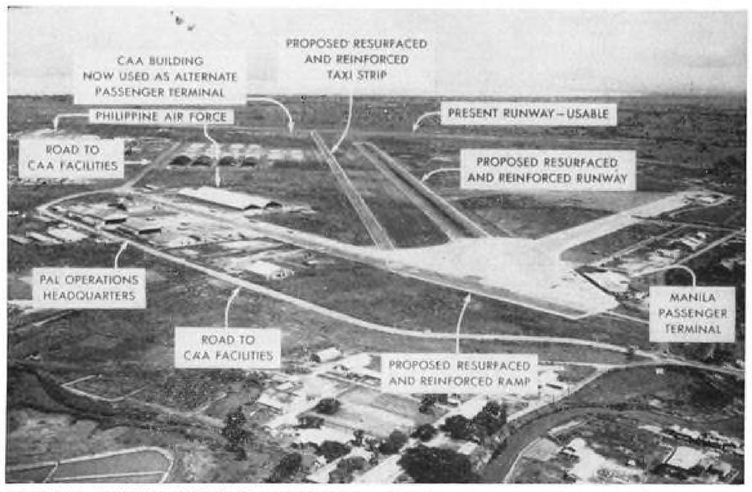
Newly developed techniques for making small, low-temperature electrolytic capacitors from tantalum metal foil, are described in a recent government report, Pb 105,600, entitled **"Final Report, Investigation and Research Pertaining to the Development and Design of Electrolytic Capacitors for Low Temperature Operation."** It sells for $2.00 in microfilm; $3.75 in photostat form; obtainable from the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C.

Publications Received

• **Travel Abroad; Frontier Formalities, Facilities for Educational Travel,** 1951, published by Unesco. A guide to the regulations and facilities governing the movement of persons from one country to another.

EQUIPMENT

PAL'S DC-6 SLEEPER, Mindoro, is one of four in the carrier's fleet.



MANILA INTERNATIONAL AIRPORT is PAL's operations and overhaul hq.

Philippine: Carrier That Returned

PAL maintenance practices, rising business help push profits up; new DC-6Bs, 340s portend expansion.

By George L. Christian

Manila—Philippine Air Lines has staged a really great comeback.

When the Japs invaded the Philippines in 1941, PAL—not yet a year old—had extended its services throughout the Islands. The war put a stop to that, and the carrier moved—base, planes, and baggage—down to Australia for the duration. With the end of the war, the carrier returned, and with mostly native labor, on machinery much of which was salvaged or improvised, and in battle-damaged, bomb-scarred buildings, PAL has since achieved an impressive maintenance and operations record.

Now the airline looks forward to making a reality of President Andres Soriano's "Operation Dream"—a one-carrier round-the-world service linking most large areas of Spanish-speaking peoples. Delivery of two new Douglas DC-6Bs in July and expected delivery of six Convair 340s next year may help bring the dream's fiulfillment closer.

▶ **Good Year**—PAL's postwar rebirth and expansion, sparked largely by Ed Bolton, vice-president-advisor, has been marked by many noteworthy achievements, the carrier's officials feel. This record last year showed:

• **Lowest unscheduled engine removal** rate of any R2800 operator. During the twelve months ended June 30, 1952, PAL removed only two engines for failure, according to Pratt & Whitney. No other R2800 operator could equal this record on a comparable engine-hours operated basis, says P&WA. And PAL cites its unscheduled R2800 cylinder removal at intermediate stations as a low six in two years.

• **First DC-6 operator** to have its major airframe overhaul period hiked from 8,000 to 10,000 hr. Increase was based on excellent condition of PAL's first DC-6 to undergo its 8,000 hr. major and was approved by the Philippine CAA and Douglas Aircraft Co.

• **Jumped net profits** to almost $1,450,000 in 1951, an increase of 307.6% over 1950. Eliminating profits from equipment sales, net was about $1,130,000, a rise of 280%.

• **Pushed total payload** from 70.17% to 81.71%.

• **Increased cargo ton-miles** to 3,196,000, a 47% one-year jump.

• **Pulled 11-hr. utilization** per day out of its DC-6s. During this reporter's visit, only three DC-6s were in service, the fourth being in for a major; but these weekly routes were flown: two roundtrips, Manila-San Francisco: 15,576 mi.; one roundtrip, Manila-London: 17,166 statute mi.; one roundtrip, Manila-Tokyo: 3,758 statute mi.; two round trips, Manila-Hong Kong: 1,398 statute mi.; total, 37,898 statute mi.

• **PAL's inter-island operation** has shown healthy growth. Overall load factor moved up from 65% to 77%. Passenger revenues climbed 16.8%, and revenue passengers 21.3%. Inter-island will get a shot in the arm when the six Convair 340s scheduled for delivery early next year come in. This will also permit increased service in the Orient. The two DC-6Bs the carrier got in July now provide more flights to Europe.

▶ **On the Base**—Philippine Air Lines does many jobs at its large base here.

• It is completely self-sufficient on DC-3 overhaul, and does its own work on its fleet of four Noorduyn Norsemen.

• Its shops have taken over the R2800 overhaul previously done by KLM at Schiphol Airport in Holland. This represents about one-third of PAL's R2800 overhaul; the balance is done by United Air Lines in San Francisco.

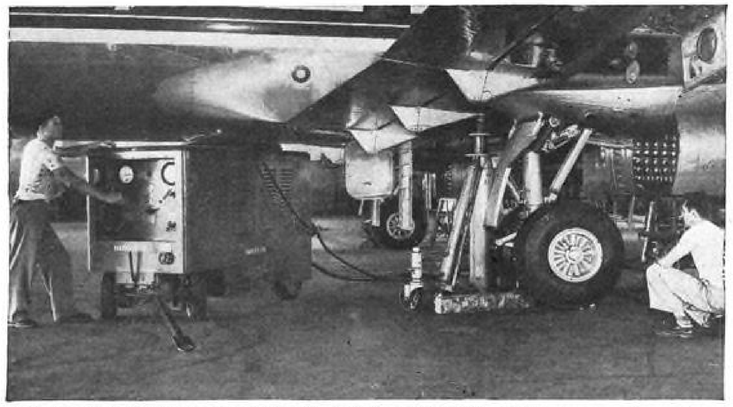
• It performs most DC-6 overhaul here, with the exception of major airframe (UAL does this) and specialized equipment.

• Inspections 1 (60-80 hr.) through 8 (4,000 hr.) are a Manila function.

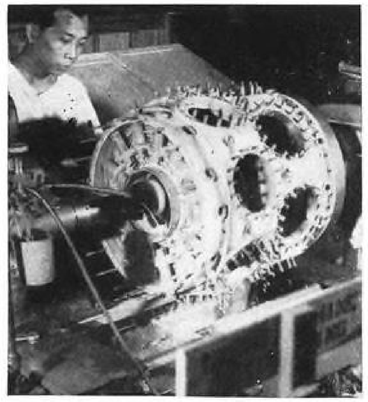
• Complete DIRs (Depot Inspection and Repair) are being performed here on two C-47s, under USAF contract. Negotiations are on for additional aircraft. Philippine spokesmen say theirs is the only commercial shop in the region with complete C-47 overhaul facilities, including engines. This

TESTING TOPICS

GREER OIL RADIATOR TEMPERATURE CONTROL VALVE STAND is shown here checking operation of thermostatic control and surge relief valve used with aircraft oil radiators under low, normal and high temperatures. At right is the *Greer Vacuum Pump Tester* for testing complete performance of vacuum pumps.



GREER PORTABLE HYDRAULIC TEST MACHINE, shown in operation above, provides hydraulic test fluid under 3400 psi pressure and at flow rates up to 20 gpm for checking hydraulic system of modern aircraft on the flight line.



HEALD cylinder grinder grinds out center main bearing liner on R2800s.

enables USAF to save considerable time and money by avoiding long, time-consuming ferry flights to Stateside for DIRs. And the planes can be returned to duty in Korea and Japan in much shorter time.

The initial USAF (C-47) DIRed by PAL at the Manila shop received its first overhaul since 1944, and 100% of plumbing and wiring had to be replaced.

• Northwest Airlines DC-4s come into PAL's mahogany overhaul docks for inspection and turn-around maintenance.

• PAL performs heavy maintenance on Philippine Air Force C-47s and overhauls many PAF engines.

Other aircraft serviced by PAL at Manila are: KLM Constellations, Garuda Convairs, Thai Airways DC-4s, Civil Air Transport C-46s, and SAS's DC-6s when diverted to Manila. Occasional work such as annual inspections and conversions is also performed on executive amphibians, DC-3s, etc.

► **Pampered Engines**—Philippine Air Lines, with its long over-water and barren-region hauls, is understandably fussy about the care given its DC-6 powerplants. Its engineers cite these reasons for the remarkably low cylinder removal rate and top-of-the-pack unscheduled engine failure rate:

• **Crew discipline.** When the airline first started service, engine failures were excessive—crews were pulling too much power to keep on schedule, according to PAL. Schedules were readjusted to accommodate speeds obtained at more conservative power settings. (Average time lost was 17 min. on a 9:30 hr. hop.) Crews were instructed to adhere rigidly to the operating specifications set up by the airline, and failures took a nosedive.

• **Compression checks.** PAL's maintenance crews pull compression checks on the engines at every 1, 2 and 3 inspection, an average of one every 30-32 hr.,

to catch incipient cylinder malfunctions before they become reasons for feathering.

• **Engine Overhaul Shop.** Complete, conscientious, and competent engine overhaul facilities and personnel contribute in no small measure to the engine story, PAL says. And UAL, which still does two-thirds of the R2800 engines, has done a superb job, Walter L. Hurd, Jr., general operations manager, told AVIATION WEEK. He said United is doing a fine job, on airframes as well as on engines. He said PAL would be hard pressed to operate its world-wide routes with only four aircraft were it not for the strong anchor United is affording at the eastern end of PAL's runs. Philippine looks for an even better engine record when its Sperry analyzers are installed in all the DC-6s. One unit is already in operation.

▶ **Powerplant Overhaul**—PAL's engine overhaul shop contains much of the modern machinery required to turn out a first-class overhauled engine. But here and there are ingenious adaptations and improvisations born of necessity.

• **A Heald No. 73 cylinder grinder** has been adapted to grind out the center main bearing liner on R2800 engines. And an adapter plate to fit crankcases is in the works. The machine can quickly be reconverted to a cylinder grinder.

• **In the carburetor shop** a home-made but effective "carburetor exerciser" works diaphrams and reduces soak time from 8 hr. to 1 hr. Device was made from an old, converted C-47 de-icer boot pump. Fuel flows through carburetor entire time the diaphram is being exercised. Poppet valve is moved through full range about six times a minute.

• **Two 15-in. tanks welded** together provide an inexpensive, easy-to-use test rig to check out DC-6 cabin pressure emergency relief valves.

• **Submerged fuel booster pumps** are tested in a locally made tank.

▶ **Half Stands**—Another idea of PAL's is to cut standard P&WA engine parts stands in half, segregating parts from nose section, power section and rear section. This simplifies inspection and reassembly.

Vapor Blasting parts such as valves and valve springs is giving excellent results, PAL spokesmen say. Shell blasting also is doing a good job. But they are trying to find someone in the Philippines to grind up coconut shell locally to avoid having to import shell from the U. S.

Both ends of all reconditioned spark plugs are dipped in "Seal Peel" plastic preservative to protect them from corrosion or weather effects. Advantage of Seal Peel is that it is quickly and easily removed, creates a hermetic seal and does not get between electrodes to foul them.

When completed engines emerge from the buildup shop, they are taken to modern test cells capable of accommodating up to four powerplants. Cells were built to take R1340s, R1830s, R2000s and R2800s.

▶ **Reclamation & Repair**—A section of PAL's shop is Reclamation and Repair. It might not be warranted in the U. S. because of high labor cost, but pays PAL big dividends. Spare parts come high in pesos, and are often hard to get; labor is reasonable. So, many parts that normally would be junked are repaired and put back into stock, even if considerable work is required to restore them to serviceable condition.

Minimum stock level for Stateside parts is a one year supply.

▶ **Around the Shop**—One trick used by PAL sheet-metal men when replacing pieces of skin is to use the removed piece as a template for drilling the new sheet. This cuts wrinkling and buckling due to poor alignment to a minimum.

An accumulator explosion prompted the airline to build a test tank out of ⅜-in. boiler plate. Operation is watched in a mirror.

▶ **DC-3 Dope**—All of PAL's inter-island flights are operated with DC-3s, except for a few flown by Norsemen. Since the airline does practically no night flying yet, the large apron area starts to fill with DC-3s every afternoon about four o'clock.

They are trim looking ships inside and out. Some of their features:

• **Tops are painted white** to reduce heat.

• **Fancy cabins sport murals** on the forward bulkhead, hand-painted by muralist Mateo Beronza.

• **Bottom of bulkhead** in cabin is slanted forward to provide foot room for passengers in front row of seats.

• **Seating arrangement** for 26 passengers includes eight rows of three seats plus a double fore-and-aft seat at the rear of the cabin, facing the entrance door.

• **Neat all-aluminum baggage racks** brighten up the plane's interior. They also wipe clean easily saving much maintenance time.

• **Cowl flaps are fixed** in approximately the trail position to avoid maintenance on hydraulic controls and associated linkage. Pilots are well pleased with the setup except that cylinder head temperatures tend to go too low when flying through heavy rains experienced in the inter-island operation. Remedy for this is to increase rpm.

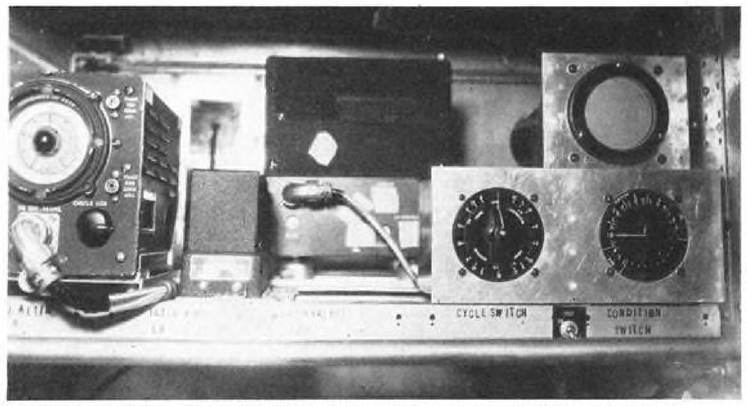
• **Emergency door hinges** are being moved from top to forward side of the exit. Purpose is to keep door from beating passengers on head and back should they have to crawl out. PAL is also contemplating putting Colonial Airlines' exterior handle on its emergency exits, thinks it is a good idea and simple and cheap to install.

• **Simplified instrument panel** comes in for praise from pilots. Flight instruments, grouped in front of pilot and co-pilot are identical in arrangement, not "mirror images" of each other. Thus, when pilot and co-pilot swap positions, all instruments have the same relative positions. Autopilot was removed to save weight and maintenance. Hops are so short, pilots felt it was not needed. All engine instruments have been grouped in the center of the instrument panel, equally visible to both pilots. Tachometer is directly in front of propeller controls, and manifold pressures are in front of throttles. All instruments are dual type.

▶ **Flying Fish**—Fish being one of the principal commodities of the Philippine Islands. PAL has three C-47s rigged to fly them north from the southern islands. Smell and corrosion proved to be problems. To combat the former, PAL installed airtight seals on the forward bulkhead door.

Corrosion proved harder to lick. Large "pans" on the cabin floor collect water and blood. This is drained overboard through a special exterior line on the underside of the rear fuselage. But the bellies still corrode and require

UNCLUTTERED AND NEAT are areas around PAL's mahogany work stands.



SPERRY ENGINE ANALYZER (right) is first commercial DC-6 installation.

periodic skin replacement.

On south-bound flights, C-47s are loaded with a large assortment of cargo, everything from textiles, newspapers, foods, to machinery and parts.

▶ **Geared to the Weather**—The Philippine Islands have a very definite weather pattern. Heavy rains fall from July to October. Best flying months are April, May and December.

So PAL has geared the flight schedules, maintenance and employe vacations to the weather. Heavy maintenance, for instance, is crammed as much as possible into the rainy season, when flight schedules are curtailed.

Vacations are timed as much as possible for the pilots to take theirs while planes are in for maintenance, and mechanics take off when the planes are back in the air.

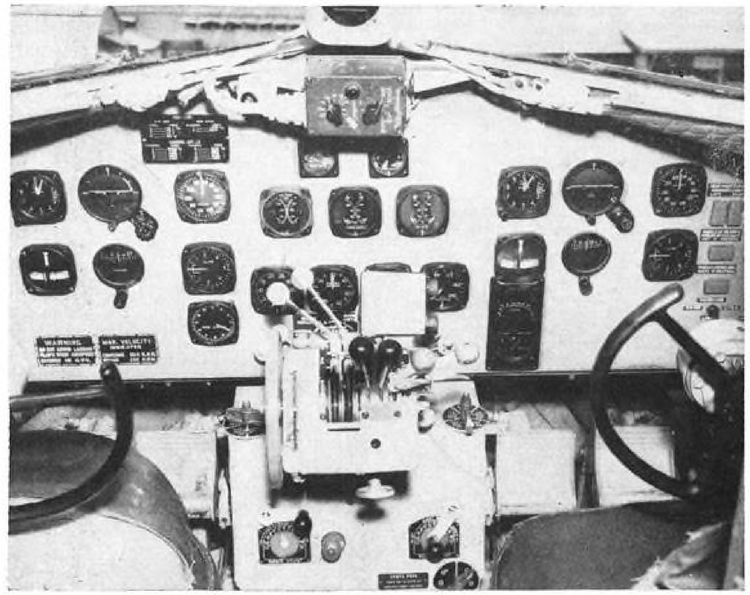
▶ **Broadening Horizons**—Two activities recently inaugurated by PAL to increase aircraft utilization are Sunday and night flying. Sunday flying, started on the airline's main route and two important spurs, has proved successful and worthwhile economically, according to Hurd. Service has helped increase aircraft utilization, has generated new business and has proved generally popular. Hurd forecasts Sunday flying will soon expand.

Night flying cuts into the time planes sit on the ground, and gives interisland pilots night flying time.

▶ **Communications Problems**—PAL maintains its own communications network and weather-reporting facilities at almost all of its stations and at two offline points. The Philippine CAA supplies daily weather reports and pertinent weather data. PAL supplements this information with hourly reports from its stations having the facilities, and during their operating period.

In many cases, at small stations, the radio man has sufficient meteorological training to double for the weather man. Philippine Air Lines' spokesmen praise the courage of these radio/weather men in staying at their posts during the typhoon season. (With the exception of typhoons, Philippine weather was reported as being reasonably stable.)

PAL says it paid the whole cost of



DUAL ENGINE INSTRUMENTS on PAL DC-3 panel help simplify the display.

erecting and operating all these stations (Philippine CAA now operates four stations) and had to supply generators and generator sheds at four-fifths of them, where there was no commercial power source.

The airline also operates its own entire aircraft control system and handles several of its own homer beacons.

► **Strong on Training**—When World War II engulfed the Philippines, aviation and PAL closed down in the islands. So, when Philippine Air Lines came back into operation in 1946, many men who were promoted from the floor to supervisory positions had no supervisory experience. The situation was made more acute by the rapid expansion of the airline.

A Mr. Phillips, who came to the islands as an instrument technician, became interested in the problem and organized what turned out to be the first management training program to exist in any industry in the Philippines, according to PAL. It follows the basic Air Service Command courses used during the last war.

Other plans put into effect are a "job improvement program," equivalent to U. S. employe suggestion plans, and on-the-job training coupled with technical class room instruction.

The airline invested $3,250 in the job improvement idea, and in its first six months saved $13,350, PAL says.

The Filipino mechanic has fully justified the increasing responsibilities allotted him, foreign supervisors unanimously told this reporter.

Foreman of the engine overhaul shop, for instance, gave his men a warm pat on the back for their quick comprehension of the job at hand, nimble dexterity in handling precision parts and steady loyalty with which they did each job exactly according to the book. Their patience fits them for the exacting, repetitive jobs always found in an overhaul plant.

► **Complete Commissary**—Latest addition to PAL's headquarters here is a spic and span commissary. Tony Sobral, supervisor of passenger service, proudly points out the unit is operated by the former chef of Rome's Chiampino Airport. Stocking foods, wines and delicacies from all over the world, the plant is responsible for preparing all food put aboard PAL's flights out of Manila. It incorporates an up-to-date kitchen and refrigeration plant, store rooms and a dining room for local personnel.

► **Airport Problem**—PAL faces a problem when it gets its fleet of Convair 340s. Manila is the only station in the Islands with the traffic potential to justify the Convair that also has an airport capable of handling the aircraft, according to PAL officials. At least eight other airports have traffic potentials heavy enough for the plane, but the airports require improvement. PAL says some money has been appropriated by the Philippine government for the local CAA to use on airport improvements.

► **"Operation Dream"**—Colonel B. L. Anderson, PAL's vice president, told AVIATION WEEK of his company's plans. Addition of the two DC6Bs to PAL's International fleet has permitted these increases in flight schedules:

• **One roundtrip Manila-London** has

been added. The new schedule operates into two cities, new for PAL—Zurich and Frankfurt. Other European flight operates via Rome and Madrid.

• **Added roundtrip Manila-Tokyo**, serving Okinawa in both directions.

But the big plan, wistfully called "Operation Dream" by PAL officials, is a one-carrier, round-the-world service. This would fulfill PAL President Andrés Soriano's dream of linking most large areas of Spanish-speaking peoples.

To implement such a plan, a three-man commission was recently appointed by President Quirino of the Philippines to negotiate a bilateral agreement with Mexico—Mexico City is one of the principal cities through which the round-the-world service would operate. Trans-Atlantic route had not been finalized at press time.

Interesting sidelight on Operation Dream is the naming of PAL's two new DC-6Bs, which will play a large part in implementing it. One is "Magellan's Cross," signifying the burial place in the Philippines of Ferdinand Magellan, the world's first circumnavigator; the other is "Mactan," the place where he was killed.

► **Past History**—Philippine Air Lines is a far cry from its predecessor, Philippine Aerial Taxi Co. (PATCO), organized in 1931. The company started passenger service between Manila and Baguio in 1933. Service was extended to Camarines Norte and Cagayan in 1935 and from Manila to Paracale and Legaspi in 1936.

Philippine Air Lines was organized in February, 1941, by Soriano and PATCO's franchises and licenses were purchased by PAL.

By December, 1941, service had been extended throughout the islands, only to grind to a halt when the Japanese invasion came.

All PAL pilots, including the chief pilot and operations manager volunteered and were given commissions in the Army Air Force. Soriano also entered the service.

The pilots flew the aircraft to Australia, carrying much-needed air personnel to the new base of operations from which men and planes participated in many battles including Macassar and Java.

Commercial activities were resumed in February, 1946.

► **Route Picture**—PAL's present fleet consists of 2 DC-6Bs, 4 DC-6s, 33 DC-3s and 4 Noorduyn Norsemen, one of which is float-equipped.

The international route, operated with DC-6 and -6B equipment extends from San Francisco westward to Honolulu, Wake Island, Guam and Manila.

The European segment stops at Calcutta, Karachi, Tel Aviv, Rome, Madrid (or Zurich and Frankfurt) and London. DC-6, -6B equipment also serves Hong

Kong, and Tokyo via Okinawa. DC-3s fly nonstop to Taipeh, Formosa, twice a week.

The inter-island operation serves some 40 cities daily in the Philippine Island group.

Philippine Air Lines points to its role in contributing mightily towards cementing the Island group into a healthy, well-integrated economic and cultural entity. And its international operation is rapidly spreading the good will of the Philippines throughout the world.

Victor L. G. Gore, Israel's Director of Civil Aviation, recently commented to this reporter, "We in Israel did not fully grasp the community of interest that exists between our country and the Philippines until PAL started serving Tel Aviv. They are now only 24 hours away. Both nations are profiting from the airline's close tie between the two countries."

Carrier Fleets Evaluate TCP

TCP, fuel additive developed by Shell Oil Co., is seeing its first fleet-wide use in Northwest Airlines' ten Boeing Stratocruisers.

All gasoline in the 108/130 and 100/115 octane ranges supplied by Shell to NWA's Boeings after Sept. 1 will contain TCP, according to the airline. The TCP diet will be available to the Northwest's twin-decked transports over the carrier's entire 20,000-mi. transcontinental and Orient route system.

At the same time, Trans World Airlines expects to finish its evaluation of TCP by the end of this month.

TWA is using the additive in half of its Skycoach fleet, while the other half uses untreated gasoline for comparison.

TCP reduces lead spark plug fouling by changing the normally conductive deposits on plug electrodes to lead oxybromide, an electrical non-conductor.

Not only does the chemical promise to extend spark plug life, it may well stretch aircraft range by permitting engines to operate at leaner mixtures than heretofore (AVIATION WEEK Aug. 25, p. 44).

Here's How to Avoid Plane Fueling Fires

Fueling and de-fueling precautions that should be observed around aircraft are listed in a pamphlet, "Aircraft Ground Fueling Servicing—Fire Hazards," soon to be issued by National Safety Council, Chicago. It will be listed as Data Sheet D-A. 4.

Four conditions are likely to produce fuel ignition during aircraft servicing, NSC says. The conditions and their precautions:

- **Electrostatic discharge.** Bonding and grounding should link truck to ground, aircraft to ground, and aircraft to truck.
- **Hot exhaust pipes** and other heated surfaces. Fueling should not be started until aircraft engines are stopped and ignition system shut off.
- **Open flame.** The usual no smoking within 50 ft. of an open flame should be increased to 150 ft. because of unpredictable wind gusts.
- **High-frequency radar.** All radio and radar equipment on the plane should be shut down before servicing begins. Fueling should be done at least 100 ft. from any airport radar equipment.

Other advice: Do not allow concurrent maintenance functions which might ignite fuel; keep clear escape path for fueling equipment; do not fuel during electrical storms.

NSC has issued other pamphlets pertaining to airport safety. They include:

- "Electrical Grounding of Airplanes."
- "Automotive Equipment Operators on Airport Ramps—Mental and Physical Requirements."
- "Air Terminal Vehicular Traffic Safety Guides."

OFF THE LINE

Why-wasn't-it-done-long-ago department. Corrosive and ugly exhaust stains on DC-4 wings are on their way out. New tailpipe extensions, engineered by Ledkote Products Co., Inc., in conjunction with Capital Airlines are being manufactured by the Aviation division of Ledkote. The stainless steel extensions deflect exhaust gases far away enough from the wing to decrease cleaning costs 70% and eliminate damage to de-icer boots, according to the Long Island City, N. Y., manufacturer. Ledkote says it is also making extensions for Colonial and Delta Air Lines, and is expanding production to supply other carriers. Interesting sidelight: first shipment of extensions was made just one week after receipt of order.

NEW AVIATION PRODUCTS

Cavitation Nipped

A new pressurizing kit to increase air pressure in hydraulic reservoirs in aircraft has been placed on the market by Romec division of Lear, Inc. Its purpose is to prevent cavitation of engine-driven hydraulic pumps by compressing air in the oil tank.

The kit, Model RR-9470, operates intermittently and is fully automatic. It starts pumping at 7 to 8 psi. and stops when pressure in tank reaches 9.75 psi.

The rig will deliver 100 cu. in./min. of air at 35,000 ft. altitude. It consists of a 30-cu. in. silica gel dehydrator and Type Q-1 air compressor. No lubrication is needed. It weighs 9.5 lb.

Romec div., Lear, Inc., Elyria, Ohio.

Plane Fabric Tester

Strength and general condition of fabric-covered surfaces on aircraft now can be determined easily and accurately by a new impact tester developed by CAA's Technical Development and Evaluation Center.

The tester is a spring-loaded cylinder with a smooth, rounded plunger that can be driven against fabric with a preset impact force. If the material is not up to standard strength, the tester will penetrate it.

Former methods involved removal of strips of fabric for further testing. Thus the surface needed repatching regardless of the outcome of the tests, and the condition of only the strip samples had been determined accurately.

The unit is made by Steel City Testing Machines, Inc., 8843 Livernois, Detroit 4, Mich.

LETTERS

Aero-Sonic Propeller

We are in receipt of a letter from Wright Air Development Center, Wright-Patterson AFB, Ohio, referring to an article that appeared in your June 2 issue, quoting a former Chief Engineer of this company as to the alleged advantages of the Aero-Sonic propeller.

The Wright-Air Development Center refers to their Technical Report No. 6171 (Whirl Test No. 2307), Calibration of Aero-Sonic Propeller. Mr. Eddie LaTulippe, former engineer with us, is misquoting from this technical report and we request in the future that you contact us before publishing any articles on this propeller. Mr. LaTulippe is no longer in our employ.

VERNON R. TODD, General Manager
Aero-Sonic Corp.
92 Congress St.
Brooklyn 2, N. Y.

Not an Observer

The DC-7 cutaway view, page 91, of your June 16 issue, contains an error immediately apparent to all flight engineers and pilots of large transport aircraft. Three seats are shown in the pilot's compartment area, one of them labeled "observer's seat." That apparently leaves only two seats for two pilots and a flight engineer, the minimum crew on this type airplane.

The seat labeled "observer's seat" is in the usual location of the flight engineer on the DC-6. Possibly this seat is meant for the flight engineer on the DC-7. If so, I sincerely hope AVIATION WEEK (and Douglas Aircraft) did not intentionally label it as shown. A pilot observes his flight instruments continuously, but he would resent being called an "observer."

For the same reasons, flight engineers strongly resent being ignored completely or obscurely referred to as "observers," particularly by an aviation journal which should know better.

J. H. BURTON, Flight Engineer
Six Belfry Lane
Hicksville, N. Y.

*(The drawing was prepared by Douglas, who says the seat is the flight engineer's—*ED.)

From Follett Bradley

RE: News item from AVIATION WEEK July 21: "Navy supercarrier USS James V. Forrestal keel-laying ceremonies last week were marred by USAF officials' apparent refusal to attend."

Once upon a time a young Naval ensign went to his captain and asked for a leave of absence to get married. Although he had not had enough service really to rate a leave, under the circumstances the skipper granted him a few days.

Some months later, the ensign again asked for leave, this time because his wife was going to have a baby. The captain refused, saying: "I gave you leave before as I thought your presence was necessary at the laying of the keel, but I see no good reason for your presence at the launching."

In the case of the Forrestal, the reverse is true. There was no need for USAF presence while a huge overhead crane swung a section of steel into place, but when the ship is launched and even more on her builder's trials and shakedown cruise, I venture to predict that USAF interest will be keen.

FOLLETT BRADLEY
Maj. Gen., USAF (Ret.)
66 Poplar St.
Garden City, N. Y.

*(Gen. Bradley wrote the letter above only a few days before he died—*ED.)

Our MIT Fellowship

I would like to express my appreciation to all at AVIATION WEEK who were responsible for the Aviation Week Fellowship.

The two additional years of education made possible for me by the Fellowship permitted me to obtain my Master's degree and complete most of the requirements for the Doctor's degree. I have recently accepted an appointment as Instructor in Aeronautical Engineering on the MIT staff, and will complete my Doctoral thesis under this arrangement.

HERBERT M. VOSS
229 Commonwealth Ave.
Boston, Mass.

Progress Lags

A shower of roses to MATS for adopting rearward facing seats in their new Convair C-131 (AVIATION WEEK July 21, 1952), but a loud Bronx cheer to the air transport industry and CAA for not adopting this and many other obvious safety provisions sooner.

For example, I am unhappy to see that CAA is finally begrudgingly accepting GCA as a secondary monitoring blind approach procedure eight years after it was in safe operational use in the Army and Navy.

I suppose that it will take CAA another five years before it will set up long-range radar stations to keep track of aircraft on the important airways, although a total of only eight 100-mi.-radius stations are necessary to adequately cover the high-density airways from Boston to Washington and New York to Chicago.

Then it will probably take the airlines an additional five years to install IFF equipment for dependable radar identification. It seems to me that someone, somewhere along the line, isn't doing an adequate selling job. Can it be true that "obsolete" World War II equipment and old ideas like rearward facing seats are too advanced for today's air transport industry and CAA?

C. T. RICE
1161 Lowell Road
Schenectady 8, N. Y.

New Performance Standards Under Study

- **Government-airline group seeks accurate safety gauge for changes in airworthiness, operating regulations.**
- **Revised proposals, more for tomorrow's designs than today's transport types, may be ready in December.**

By F. Lee Moore

Almost unnoticed in the air transport industry, a five-man working group of industry, Civil Aeronautics Administration and Civil Aeronautics Board engineers is preparing what qualified observers believe is the biggest step forward in the science of making air safety regulation.

The so-called "CAA-CAB New Performance Working Group," with cooperation of industry and government both here and abroad, is developing standards preparatory to drafting an entirely new set of transport operating and type certification regulation proposals in December.

The proposed new regulations will be based on statistical measurement of risk for any flight. The unchanging laws of probability applied here should give the regulations a degree of refinement and safety control revolutionary compared to present standards based on subjective analysis of past experience only.

► **Timetable**—The new statistical approach to safety regulation is similar to analyses used daily in quality control by many manufacturing industries.

Timetable of development of these regulations toward adoption:

• **October, Washington.** Tentative selection of basic criteria such as average engine failure rates.

• **Nov. 11, Montreal.** Discussion of tentative standards with the International Civil Aviation Organization.

• **December.** U. S. industry will get an entire detailed proposal of the new regulations for trial application by airlines and manufacturers to actual flights, followed by industry recommendations for revision of the draft proposal.

• **May or June, 1953, Europe.** Conference of ICAO engineers for final drafting of standards to be proposed for adoption by member nations.

• **June, 1953.** U. S. industry will get a draft release of CAB's proposed new regulations.

• **August, 1953, Washington.** Annual Airworthiness Review by industry and government will thrash out any important differences that may still exist, and determine whether this new approach to safety regulation is ready for adoption. CAA and CAB will then study additional proposals and criticisms arising out of the conference.

• **Jan. 1, 1954.** Adoption of the new performance regulations is scheduled, assuming industry and government are confident of their soundness.

The working group preparing these new standards at CAA: Stan Nowland, United Air Lines; Hugh Freeman, CAB; Jack Carran, J. Matulaitis and Ray Maloy (chairman), CAA.

The new performance regulations will apply directly only to new transport designs—piston and turbine alike. But they also may affect operation of present transport types where the new standards show changes in present regulations desirable.

For example, the pilots may get more temperature-humidity accountability, restricting gross weight on takeoffs during hot weather. The airlines may get more lenient gross weight limits on twin-engine flights over high terrain, through application of the so-called drift-down principle (AVIATION WEEK Aug. 31, p. 51).

► **New Approach**—Present regulations have developed piecemeal throughout air transport growth. Most decisions setting minimum safety standards by regulation have been a matter of judgment, modified by experience. Resultant regulations have proved safe and reasonable, by and large, but they may not be consistent.

Now the U. S. and foreign aviation agencies are working on new performance standards from a basic statistical approach to calculated risk.

• **Defining safety.** Deviations of different planes from the average performance occur with frequency variation, forming what is called a "normal curve." Somewhere near the substandard end of that curve you must draw the line as "minimum acceptable" performance.

For instance, the worst en route performance of a four-engine plane with two engines out may be determined as a 100-ft.-a-minute climb. That is the worst you should ever expect, but you have to accept the fact that once in a million cases or so, freak variables could make performance even lower.

Next the question arises, how far above that minimum acceptable level should the average two-engine-out performance be required so that the "incident rate" (occurrence of unacceptable performance) is so rare that we have a "safe" regulation?

Tentative thinking of the working group is that somewhere between one and ten incidents per 10 million flights is an acceptable calculated risk. This criterion of safety is based on the fact that as the U. S. operates twin-engine transports today the probability of both engines quitting or being feathered while in the air is about once in one to 10 million flights. We accept that level of risk. Therefore it is an acceptable and conservative starting point to define a uniform standard of safety for all operations, the group believes.

With this general approach in mind, here is how the standard is computed:

• **The "incident" rate.** An incident as defined in this new performance standard is not an accident. It is the probability of unacceptable performance occuring when you require average performance a certain degree above the minimum standard.

Variables

Here is an example of the variables that will be incorporated in regulations to be proposed by the new CAA-CAB New Performance Working Group.

The power output of an engine has "standard deviation" of 2 or 3% from the fleet-wide average performance of that type engine. That means that if the average takeoff power is 2,100 hp. and there is 3% deviation:

68% of the engines will be within 2,163 and 2,037 hp.
16% will produce more than 2,163 hp.
16% will produce less than 2,037 hp.
2.3% will produce more than 2,226 hp.
2.3% will produce less than 1,974 hp.
0.13% will produce more than 2,289 hp.
0.13% will produce less than 1,911 hp.

• **Setting the safety margin.** Having defined the acceptable incident rate, you must compute the necessary margin above it to get the average performance you require (in order to hold incidents down to the acceptable frequency). That means you must compute the major variables that may reduce one plane's performance below the fleet average.

Take a four-engine plane with two engines out: major variables in its performance will be engine power, drag (aerodynamic cleanliness), speed (pilot handling), instrument calibration, instrument reading error, gross weight estimates, outside air temperature and humidity.

Each of these variables has a predictable frequency pattern, that can be computed into the form of a normal curve. Put them all together and you get one grand frequency distribution in the form of a normal curve.

Knowing that curve, you can point off the minimum acceptable incident rate on the graph. Then you look up the curve to its peak and you have the "average" performance to guarantee no more than the acceptable frequency of substandard performance, or "incidents." You have a defined level of safety per flight statistically arrived at. Then you check it against actual fleet performance.

• **Airlines checking figures.** The airlines have voluntarily run fleet flight tests to check the accuracy of the CAA-CAB working group's calculations. Preliminary reports indicate that fleet performance varies more than was the statistical prediction. This variable, too, will be computed into the formula.

Then comes the problem of drawing up regulations to meet at least the defined minimum safety level on every flight of every certificated plane.

► **Applying the Theory**—Once you have the basic safety level defined and a formula for computing it, the first application is to certification of new transport types. But a prototype aircraft is not a fleet. Therefore, the new regulation will require that certification tests be so run that average fleet conditions can be computed. And the airplane flight manual must show the average performance.

Then applying the flight manual to the new performance operating requirements, the new plane will operate with a predictable level of safety.

And all other aircraft types so certificated will operate under the same defined safety requirements. The "incident" rate in the new regulations has been set so low on the deviation curve that individual differences in performance will require no waiver or special consideration.

Using the plane type's average performance as set forth in the manual,

you then calculate the gross weight limitation on any particular flight, just as under the present regulations, based on temperature, terrain, wind, calculated weight and altitude.

▶ **Effect of New Standards**—This December, the first firm proposal of the new regulations will be sent to industry for trial application. Until then, the main job is integration of major aircraft performance variables into the statistical analysis.

So far, the en route climb requirements are furtherest along. Approach and landing are next. Takeoff is complicated, especially by two problems: the variables in runway accelerate-stop performance, and the determination of the engine feathering frequency in various segments of takeoff and climbout.

Executive Fleet

- **Businessmen swing fast to using own planes.**
- **This trend opens new sales-service markets.**

Day in and day out, more than 9,000 private airplanes of all sizes and shapes and comprising a special part of the postwar air transport revolution shuttle around the U. S. and beyond its borders.

This segment of the air fleet belongs to American business, from oil companies to mushroom growers, and it rapidly has become an important factor in the aviation industry because of the potential it offers in sales, service and maintenance. In fact the business plane has been responsible in a large measure for sustenance and growth of many aircraft servicing organizations and is looked upon as a "must" market by makers and sellers of aircraft, equipment and fuel.

▶ **Growing Fast**—The rapid growth of this important new air transport field may be measured by the fact that only as recently as 1946 there were approximately 2,000 business planes, perhaps 500 being multi-engine and the remainder single-engine. By last year the multi-engine types had approximately tripled and the single-engine craft more than quadrupled. The figures are much higher if another 7,500 planes are added that are used part-time for business and part-time for pleasure.

The U. S. petroleum industry alone operates some 2,400 aircraft ranging from Cessna 170 and Beech Bonanza up through the Convair-Liner and Douglas DC-4. Some of these planes go back and forth across the Atlantic to take executives and technicians to the Near East's oil fields. One firm operates practically a domestic airline between its New York and Washington, D. C., offices and its southwest oil fields.

The day of the corporate "hangar queen" is setting fast—as far back as 1949, government statistics indicated that very trend—that business and professional flying topped scheduled airline operation hours by 1.1 million hours. Utilization of business planes reportedly runs as high as 900 hr. yearly and going up steadily to 1,000 hr. Calculated on the basis of revenue passenger miles, executive transports last year flew some 1 billion passenger miles. This mark is noteworthy when recalling that the scheduled carriers reached the same figure only 11 years previously after many years of intensive effort.

▶ **Growth Factors**—What are the factors behind this rapid growth of business flying? Among the important ones:

• **Growth of U. S. airports.** There are more than 6,000 airports in the country compared with approximately 2,300 in 1940, making it possible for the executive to reach out-of-the-way spots not served by scheduled airliners. The whole 3 million-plus sq. mi. of this country are served by only 585 unduplicated airline stops, including trunk, local and cargo services.

• **Plant decentralization.** The postwar tendency to locate new facilities in smaller communities away from major cities has forced executives to step up their traveling to keep operations meshing. The airplane has allowed executives to cut their overseeing time from days or weeks to hours or days.

• **Favorable tax allowances.** Corporation can depreciate up to 25% of its plane the first year and amortization allowed by the government is even more favorable if a used plane is purchased.

Profits in owning a company plane are subtle. Unlike the airlines, the company doesn't fly X miles with Y passengers and cargo and then make a report that the plane has generated so many revenue dollars to be balanced against its operating costs. Only when plane costs are tallied against time saved, permitting people to double or triple their coverage, or beats scored on competitors does possession of the airline show its profitable aspects.

Plane manufacturers and salesmen have hundreds of case histories of successful use of the business plane. Says the sales manager of one planemaker: "In approaching a businessman, we no longer stress the mechanical features of our airplane. He cares no more about them than he does about what is under the hood of his automobile. But when we show him what the airplane will do for him, our selling job is over."

Domestic Trunkline Traffic

	Jan.-June 1952	% Change from a year ago
Number of passengers	10,642,628	up 9%
Passenger miles	5,684,598,000	up 17%
Mail ton-miles	33,578,957	up 17%
Express ton-miles	18,162,244	down 17%
Freight ton-miles	54,607,068	up 8%
Total rev. ton-miles	658,763,120	up 15%

Airlines' '52 Volume Up Sharply

The scheduled domestic airlines will haul 13% more volume this year than last, according to a forecast by the Economic Research division of Air Transport Assn.

ATA forecasts: revenue passenger miles will gain 14% to 11,600,000,000; mail ton-miles up 8½% to 70,742,000; express decline 9% to 38,700,000; airfreight increase 8% to 109,000,000 ton-miles. The 1.6-million ton-mile decrease in express will be overshadowed by the 8.4-million growth slated in airfreight.

▶ **Other Gains**—Total traffic the first half gained 15% over a year ago to 658,763,120 revenue ton-miles. The second half of this year will be up slightly (687,236,880), but only 10% higher than a year ago.

ATA is not predicting international airline business, but reports that total volume the first half of this year is up 16% over a year ago to 197,640,437 revenue ton-miles. Scheduled revenue passenger miles are up 17% to 1,389,415,000; U. S. mail is up 2% to 10,657,578 ton-miles; foreign mail has gained 8% to 2,648,135 ton-miles; cargo (freight and express) is up 7½% to 34,972,170 ton-miles.

Average passenger flight has increased greatly this year on both domestic and foreign routes. Both are up about 8%—international flights to 1,300 mi., domestic to 535 mi.

▶ **Local Lines**—Local service airlines' business so far this year has followed the pattern of the trunk lines. But they haven't gained as much—possibly because they haven't been able to buy new equipment to increase schedules at the same rate as the trunks.

Local lines' total revenue ton-miles the first half are up 5% to 16,173,984. Of that total, the passenger mile gain is 5% to 152,606,000; mail is up 17% to 423,752 ton-miles; express down 13% to 405,772, and freight up 18% to 543,639 ton-miles.

While the local service airlines have gained only 5% over last year, their traffic is nearly double the 1950 volume.

CABIN CONDITIONING FLEET GROWS

United Air Lines' DC-6 gets a ground air conditioning treatment from one of five large mobile units recently purchased by the carrier to supplement a similar number already in service. Each conditioner can deliver 2,000 cfm. of chilled air from Chrysler Air-Temp units or 250 Btu./hr. from the Stewart-Warner heater installation. Truck body is by Fruehauf Trailer Co., 1½-ton chassis by International Harvester.

Mail Rate May Dim NWA Profit Chances

Northwest Airlines' final mail rates recently set by CAB have observers speculating whether the company will be able to make a profit.

The Board set a domestic rate of 53 cents a ton-mile, estimated to yield $1,458,000 this year. For the cold weather months of January-April, this year, that means Northwest must refund $470,000 for overpayment at the old temporary rate.

But the new international rate of about $5,750,000 a year may yield about $1,950,000 more than the old rate. For the first four months of this year this international rate increase comes to about $577,000, which offsets the domestic cut of $470,000 for the same period.

▶ **The Problem**—What stumps some observers is that Northwest's showing the first half of this year under the old rates is an operating loss of $2,083,000 for the system as a whole.

That $2-million loss was obscured partly by large non-recurring income. The company picked up a non-operating income of $1,017,000 from sale of Martin 2-0-2s and another $541,000 net tax credit for the period. Even after these two adjustments, Northwest reports a net loss of $525,000 for the first half.

But CAB officials say the company "should" get along on the new domestic rate "with good management."

▶ **A Bigger Slice**—Northwest's "final" domestic mail rate of 53 cents a mail ton-mile is the same final "compensatory" rate that Capital, Delta, National and Western are getting and Braniff is also slated for. In fact, there is some question whether Northwest should not be cut to 45 cents by next year. Northwest used to be called one of the Big Five—next biggest after American, Eastern, TWA and United. The latter get only 45 cents a mail ton-mile.

CAB says Northwest's operation has shown steady improvement since last year's heavy losses from the grounding of the Martin 2-0-2s by its pilots.

CAB still hasn't decided what sort of final mail rate to give Northwest to cover that period.

CAB Membership To Remain Intact

Membership of Civil Aeronautics Board will not change before February or March, and perhaps for another year or more—regardless of who wins the presidential election Nov. 4. The only member whose term expires Dec. 31 is Chan Gurney, and he is assured of a temporary "recess appointment" until the Senate acts on a new presidential nomination.

CAB is composed of five members, whose six-year terms expire in successive years, with no expiration in the sixth years. The chairmanship goes to one of the five members by presidential designation.

▶ **Possibilities**—Washington observers generally predict that Gurney will be reappointed. He is a Republican, appointed last year by the Truman Administration.

If the Republicans win, the ex-senator is likely to be designated chairman. Oswald Ryan is the only other Republican member.

More Services Asked

(McGraw-Hill World News)

Tel Aviv—Extension of domestic air services in Israel appears likely. Aryeh Pincus, Director General of Air Communications, declares that a strong demand exists for air services covering Elath, Tel Aviv, Haifa, Rosh Pina and having extensions to Jerusalem and Sdom. Existing airstrips at all these points should be modernized, he declared.

SHORTLINES

▶ **Alaska Airlines** has received CAA permission to operate one of its two previously grounded DC-4s on passenger service although the other is restricted to cargo duty. The two were grounded by CAA July 24 because of safety violations and a high engine failure rate. Later they were allowed to give cargo service only.

▶ **Braniff International Airways** asks CAB extension of its Route No. 9 terminal from Chicago to Milwaukee.

▶ **California Hawaiian Airlines** says its $121.50 fare to Honolulu would be "substantially lower than that charged by other airlines offering comparable deluxe service." CHA operates 61-passenger Connie service, with two lounges and a galley.

▶ **Caribbean-Atlantic Airways** is recommended for a five-year renewal of its certificate, with route extensions among the Caribbean islands for more economical utilization, plus suspension of Chicago & Southern routes east of Jamaica (already the subject of a CAB mail rate investigation).

▶ **Central Airlines** has a CAB proposal for mail pay of $1,425,000 a year from this July 1, or about 84 cents a plane mile to break even.

▶ **Civil Aeronautics Board** has okayed equalization of airfreight rates among various airports serving the same city; cargo landed at one can be trucked to another without extra charge.

▶ **Northwest Airlines** has a CAB proposal of a permanent "non-subsidy" domestic mail pay rate of 53 cents a mail ton-mile and international mail pay of $5¾ million a year, of which 80% would be subsidy . . . Company load factor Aug. 1-25 was 70% compared with 77% a year ago and 69% this July. . . . Started adding tricresyl phosphate to its Stratocruiser fuel this month, says its the first airline to use it.

▶ **Railroad and Airline Wage Board** will meet with airline management and pilot representatives in seven cities Sept. 12-Oct. 1 to explain policy and problems, all at 10 am; Sept. 12, Chicago, regional Wage Stabilization Board room, Builders Building; New York, Sept. 19, same room, 346 Broadway; Atlanta, Sept. 24, CAA 50—7th St., N.E.; Dallas, Sept. 26, auditorium Mercantile National Bank; Los Angeles, Sept. 29, Federal Building; San Francisco, Oct. 1, Flood Building.

▶ **Transocean Air Lines** reports its DC-6A converted to 76-passenger DC-6B offers the "fastest and lowest fare . . . between the Pacific Coast and Guam. Price is $325, flight time 24 hrs.

▶ **TPA Aloha Airline** $1.8-million monopoly suit appealed against Hawaiian Airlines and Inter-Island Steam Navigation Co. has been dismissed by a Honolulu Federal Court.

▶ **Trans World Airlines** has added New York-Pittsburgh to its 68-passenger DC-4 aircoach service.

▶ **United Air Lines** final mail rate to Honolulu has been set by CAB at 45 cents per ton-mile—same as the domestic rate.

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P-5236, Aviation Week
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236	2"x.058	4130 & 8630
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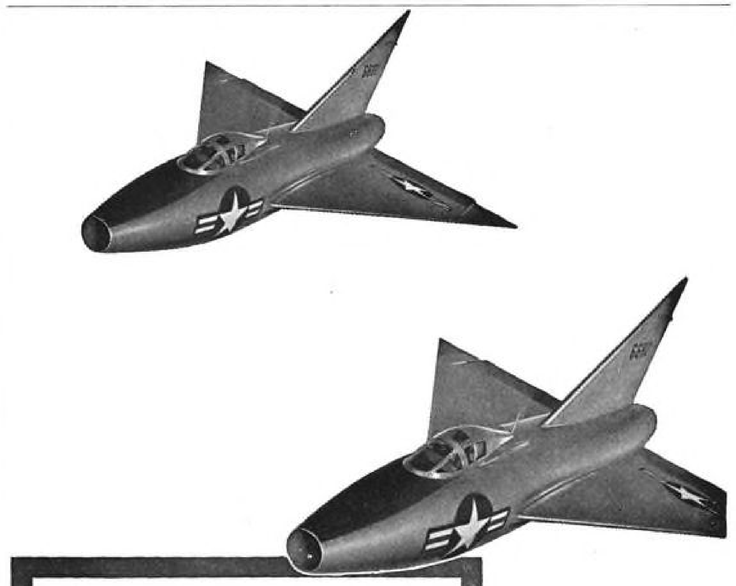

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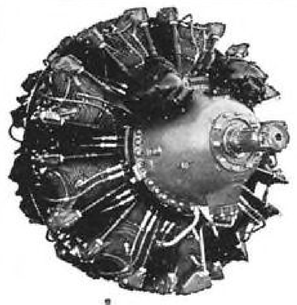

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19	1375F	Holley carburetor
407	SF9LN-2 (manufacturer's part No. 10–12453-6 Spec. AN9511)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10–26170–1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)

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814	35814	Blower Ass'y
53	48362	Shaft
75	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84289	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
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38	18597-2	Airsearch	Aluminum Oil Cooler
120	MF9-713-15A	Vickers	Hydraulic Pump
550	TFD 8600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H260-K & KA	Pesco	Hydraulic Pump
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
44	5BA25DJ4B	G. E.	DC Motor (¼ HP)
50	RDB2220	Holtzer Cabot	DC Motor
115	P4CA2A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32226)	Nasco	Ignition Switch
687	RS-2	Mallory	Selector Box
90	JH950-R	Jack & Heinz	Starter Motor
492	S-841 (94-32253)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10°–1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Skinner	Gasoline Filter
250	558-1A	Eclipse	Oil Separator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117–47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart-Warner	Heater
230	921-B	Stewart-Warner	Heater (200000 BTU)
85	12924–2	Adel	Lock Valve
80	DW28	Eclipse	Transformer
97	6041H-146A	Cutler Hammer	Relay (B-12)
22	0655-D	Aro	Oxygen Regulator
148	PG928AS1	Minn. Honeywell	Air Ram Switch
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SO THEY TELL US

Air War

"One of the startling realizations, looking at the air war in Korea, is the fact that the Rusisans have two jet fighters in the near Mach 1 category, and the Type 15, with the new engine, is just as tough as the MiG-15," AVIATION WEEK's Bill Jessup reports from the Japan-Korea war zone. "Veteran fighter pilots of the 4th & 51st Fighter-Interceptor Wings say it's as fast and maneuverable as the MiG, and it holds together as well as the newer MiGs which carry the beefed-up tail sections." The new engines turn up about 6,200 lb. thrust, compared with the 5,200-5,500 output of the older models.

Many of our recent victories over Red fighters may be attributed to a better version of the Sabre, Jessup says, a few of which are now in Korea. "But in the final analysis, the major advantage which the U. S. fighter has over the Russian is the complete exploitation of the Sabre's capabilities," Jessup writes. "American pilots have wrung every ounce of performance out of the airplane. They feel that Red pilots have not done the same with the MiG, and hope they never do."

The F-86E has been put through 14 Gs-plus and flown home! Jessup says the first case reported was by the Royal Canadian Air Force Sabre wing in England. The tail pilot in a flight of four, making a pass at a cloud, went into the cloud on his pullout. His plane registered close to 14½ Gs. Not long ago Col. Francis Gabreski pulled the same G load, according to pilots of the 51st Wing, which he commanded in Korea. Both planes were pulled out of line and were unflyable afterward. But both flew home.

What the Communists are doing with their air force still puzzles American air commanders, Jessup writes. "For a long time, MiG Alley was the Reds' training course. There have been few signs of training classes lately. And still there is no real way of tying the Red air effort to the Korean War. One possible and not improbable explanation is that the Red air commander at Angtung or Ta Tung Kou in Manchuria has not met the Red air ground commander in North Korea."

"The military pressure tactics which the U. S. forces are supposed to be waging in Korea in a so-called effort to force the Communists into a political settlement in the truce talks are principally military maneuvers with military objectives," Jessup contends. "The air attacks on the complex of powerplants in North Korea, including the Suiho stations on the Yalu River, are a good example. For at least a year an Air Force lieutenant colonel carted the powerplant target folder back and forth from FEAF headquarters to the Far East Command headquarters, both in Tokyo. Ridgway would not approve the attacks. The same USAF officer, reportedly now a colonel, put the plans before Gen. Clark, who saw no objection in tackling them. Clark queried the Pentagon, which also raised no objection. The strikes were set up. Results have been military, including a marked decrease in the efficiency of the Communist radar interception net. Ground action similarly has military objectives at stake, keeping the enemy off-balance and off important terrain features. Military pressure necessary to bring a political settlement would require at least twice the military might now committed to Korea, and might open a bigger war, in which event all UN troops would leave Korea to defend Japan."

High-altitude investigations include study of the so-called "jet streams" which are found in various parts of the world. Obviously, if any pattern could be found to these high speed wind belts, to enable aircraft to find them, and fly with them, the military advantages would be important—to the Russians as well as the U. S. A Navy pilot just back from Korea reports several U. S. fighter planes have encountered these streams.

This story is substantiated by Lockheed: An F-94 pilot coming in for a landing in Korea forgot to put the gear down. When he felt the bottom of the plane beginning to scrape the runway, he realized the trouble, and kicked in the afterburner. He blasted the plane back into the air, went around, put his wheels down, and came in for a normal landing. Damage is said to be slight.

Inter-service cooperation in the Far Eastern theater is now excellent.

Lockheed service representatives in Korea reported that F-80 fighter-bombers are taking off on combat missions carrying full tip tanks and two 1,000-lb. bombs. Pilots say the plane handles overload nicely. Water-alcohol injection, not RATO, is used on takeoff.

STRICTLY PERSONAL

Maybe He's Only an Honorary Member

Our **Ben Lee** reports that the well known syndicated columnist, **Fred Othman**, just arrived on an AA flagship from Washington, asked an American ticket counter chap to cash a small, emergency check the other day at Chicago airport.

The agent agreed reluctantly that he might if Othman could furnish proper identification.

Hoping to show he was really American Airlines all the way, Othman produced his ornate membership card signed by **AA President C. R. Smith** signifying Othman was a "Flagship Admiral," and thereby entitled to various privileges.

The agent studied the card for some time, then dropped it on the counter and said dryly, "That's no good."

Othman finally got his money by producing his driver's license issued by a distant state.

* * *

Strictly Personal

McGraw-Hill's research people sent out questionnaires to a couple of hundred AVIATION WEEK subscribers to get their opinions on various departments of the magazine. We were surprised how many wrote in notes for Strictly Personal. But one dour subscriber wrote under the question, "What do you dislike about AVIATION WEEK?" this frank answer:

"Sometimes contains petty personal articles which aren't necessary (Strictly Personal column)."

Despite the "ayes," this gripe proves you can't please everybody. But we still try. The voter, incidentally, works for CAA in Seattle!

* * *

Bad Weather Conversation

Pilot: "Downwind. I think."
Tower: "Cleared final, I hope."
—De Havilland Gazette

* * *

LaGuardia's Good Neighbor

During all the hoopla over LaGuardia Airport's noise, we asked **Pete Bulban** to find out if little Flushing Airport close by was still running, and how they were faring on Queens' brickbats.

Pete says Flushing was running full blast, with 90 little planes on the field. **Speed Hanzlik**, major domo there, said he's had no serious complaints from his neighbors, although one irate citizen did call up and threaten to punch his nose if he didn't stop operations. Nothing ever happened.

But on the other side of the picture, about the same time as the complaint, a woman came strolling across the field with her two youngsters. Said she lived in a new apartment project close to the field and hadn't known there was an airport there until she discovered it on this walk with the kids. —RHW

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—SEPTEMBER 8, 1952

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Mgr.

EDITORIAL

A Report to You

A SAFETY EDITOR—AVIATION WEEK has named Alexander McSurely as Aviation Safety Editor. This well-known staff member, who joined our predecessor magazine, Aviation News, in 1943, will concentrate on up-to-the-minute coverage of safety developments in both manufacturing and operation. We believe this is the first time any publication in the aviation field has ever given such recognition and emphasis to the vital subject of safety. AVIATION WEEK has given special attention to safety subjects since it was established in 1947, as did Aviation News before it, and we were early advocates on our editorial page of Jerome Lederer's proposal for a Flight Safety Foundation, before it was set up. AVIATION WEEK also sponsors annual awards, selected and given by the Flight Safety Foundation to several individuals deemed to have contributed the most to air safety in the previous year. With this appointment, we pledge even better news and technical coverage to air safety than we have been able to offer you in the past.

FARNBOROUGH COVERAGE—AVIATION WEEK sent its executive editor, Robert Hotz, and its engineering editor, David Anderton, to England to cover the annual exhibition of the Society of British Aircraft Constructors at Farnborough. Their efforts are being supplemented by our regular British correspondent, Nat McKitterick. AVIATIONWEEK's publisher, Robert Boger, also is on the scene. This unprecedented American coverage of the world's most important aeronautical meeting will bring you readers a complete report of current British and Continental aviation in this and coming issues of AVIATION WEEK.

ABOUT CONTESTS—We are often asked why AVIATION WEEK does not enter editorial or writing contests. Without implying criticism of any such event, our attitude has been to write and edit this magazine for you readers. We cannot fix our eyes on contest judges or prizes, present or future. We think you know most about what you want and value in aviation writing.

You readers vote on us every time you enter a subscription or renew one. You must pay hard cash for your subscriptions because, unlike some of our competitors, we don't give a magazine away for free. Our circulation is paid, and it is audited by the Audit Bureau of Circulations.

Yet our circulation now leads that of all other business papers in the aviation field by a hefty margin, although AVIATION WEEK in its present form is just five years old.

Our advertising sales department says this high readership is paying off with them too. And obviously, as we attract more ads, the editorial department gets a bigger budget for more new staff members (we have added several editors the past year in New York, Washington, Dayton, and Los Angeles), more traveling, more long-distance phone calls, more telegrams and trans-Atlantic and trans-Pacific cables, more correspondents, to bring you more news—and faster—than ever before.

So, we hope to keep winning the most important contest of all—the contest for your continued interest and readership.

P.S.—We have other improvements in AVIATION WEEK coming up too. In the meantime, remember that we are always glad to have your letters, telling us what you do or don't like about AVIATION WEEK, and how we can improve it, to help you.

Halting the March of Complexity

A coast-to-coast tour of important military development installations and laboratories presents abundant proof that some top Air Force officials are concerned enough with the problem of aircraft and equipment complexity to order a thorough study of the problem.

Obviously, any noticeable slowdown in this fantastic race toward complexity is out of the question immediately. But the important fact is that increasing attention is being given in upper echelons to the need to apply the brakes.

The touring visitor hears frequent plaints—especially from the theorists in the ivory towers—that simplification in fire control and automatic navigation, for example, are ridiculous desires in an age of supersonic flight, missiles, atomic power and a dawning of inter-stellar space activity.

Yet in the development labs we found one extremely complex system that may weigh a thousand pounds less when it is installed on combat craft five years from now than its predecessor model weighs on current planes. And its maintenance will be far easier by use of push-pull sub-units. It still will do the work of three to five men, and do it better than equipment now barely in combat. Some simplification was possible!

The theorists today are tackling problems that are literally out of this world. They are far ahead of the design, development and maintenance engineers, as we must always expect. But it is on these latter—and the government buyers—that we must hang much of the responsibility for simplification. The time has passed when extra gadgetry can be permitted to substitute for simplicity—and thinking.

Still Selling Aviation Short

CAA has revised a 1948 forecast that 20 million domestic passengers would be flying each year by 1955. The revision was necessary because that figure was exceeded in 1951!

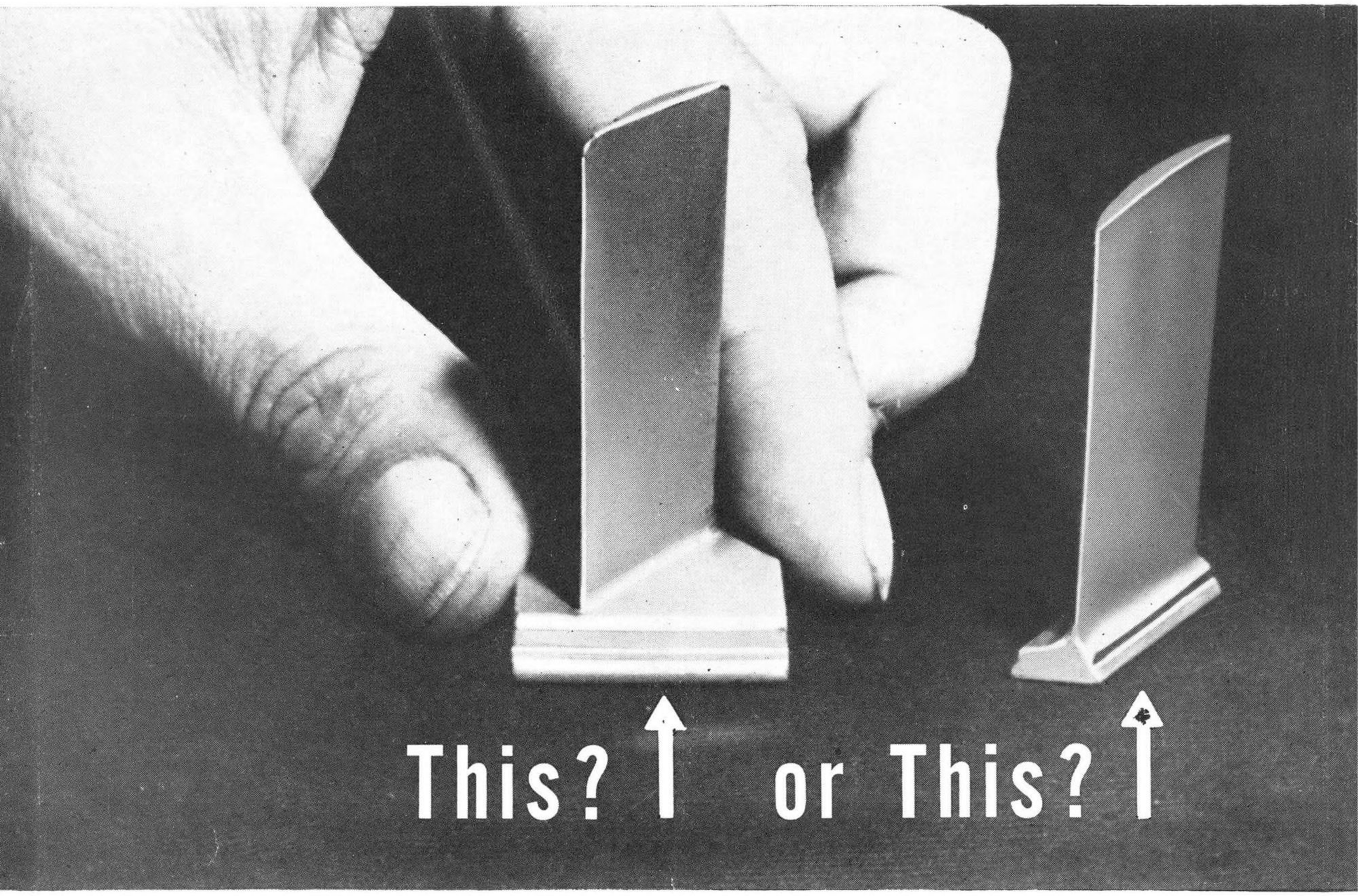
CAA now decides that domestic airlines will be carrying 40 million passengers a year by 1960, about twice as many as last year.

Even the airlines' own trade association has had to revise its guesstimates several times.

These quick changes seem to bear out our contentions on this page for several years—that the industry and government have consistently and persistently sold aviation's future short. Both are still doing it.

—Robert H. Wood

Which One Will Save a Million Dollars?



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

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

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

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

210-29

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