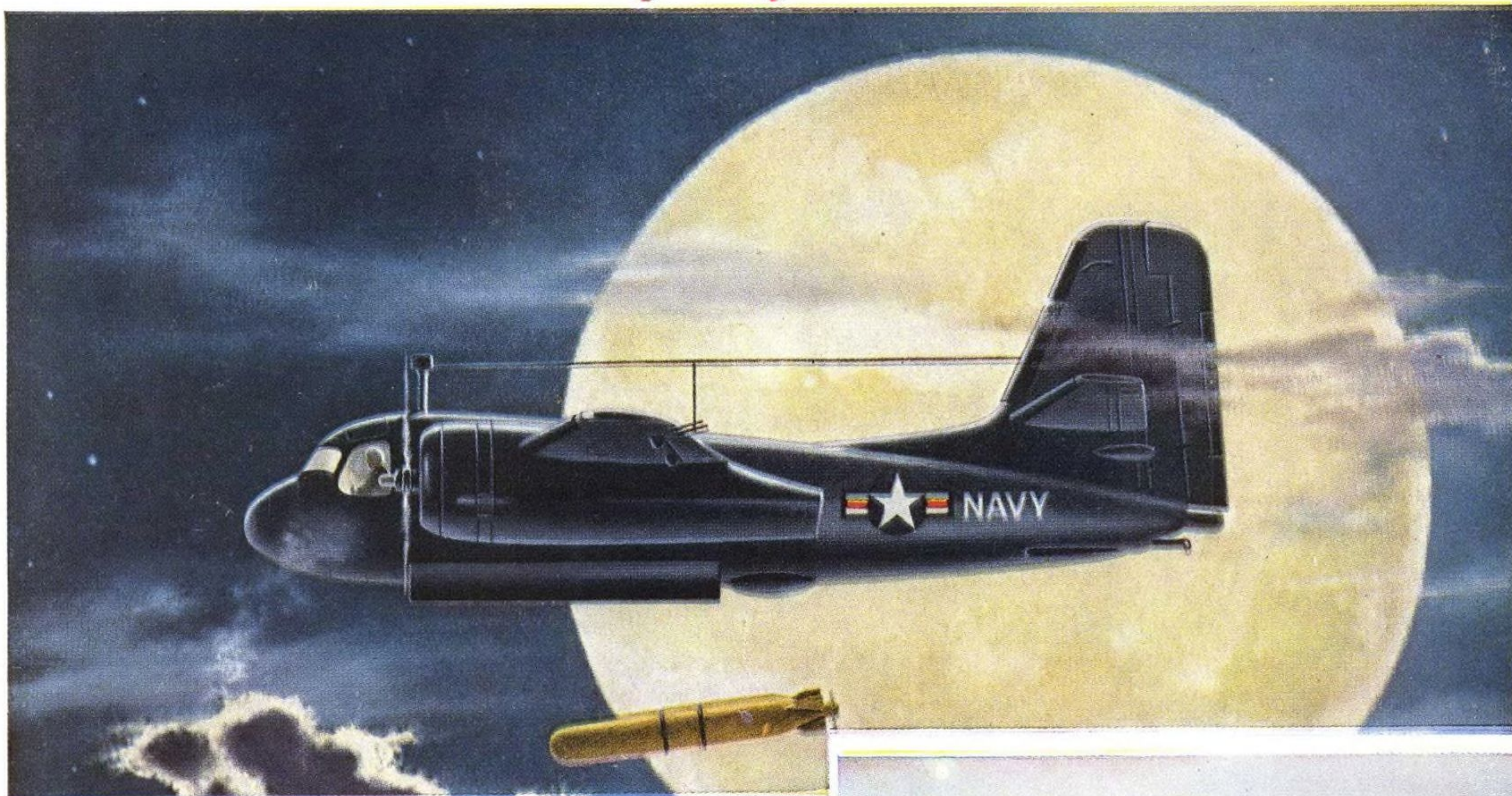


AVIATION WEEK

AUG. 9, 1954

50 CENTS

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S2F

From tin fish to censored

The TBF Avenger was built to deliver tin fish to surface ships. This she did with alacrity during World War II. She also corked harbors with mines, sought subs and sank 'em. The new S2F is more a submarine specialist. Filled with electronic gear that detects, plots, and pin-points an unseen sub, she can drop a *censored* charge

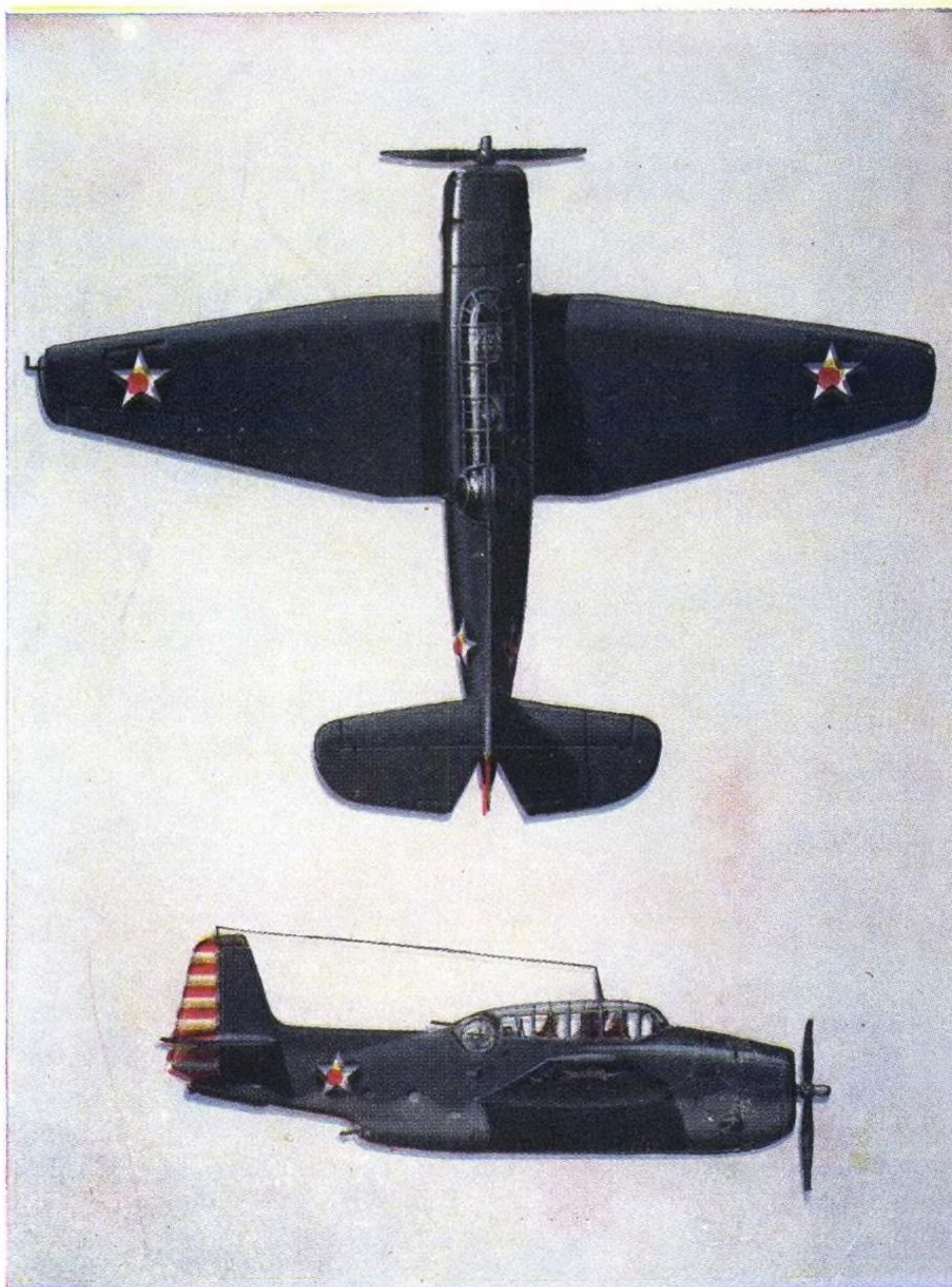
that will guarantee "point of no return" for the sub. The S2F is the latest of a long line of highly effective aircraft designed and built for the U.S. Navy.



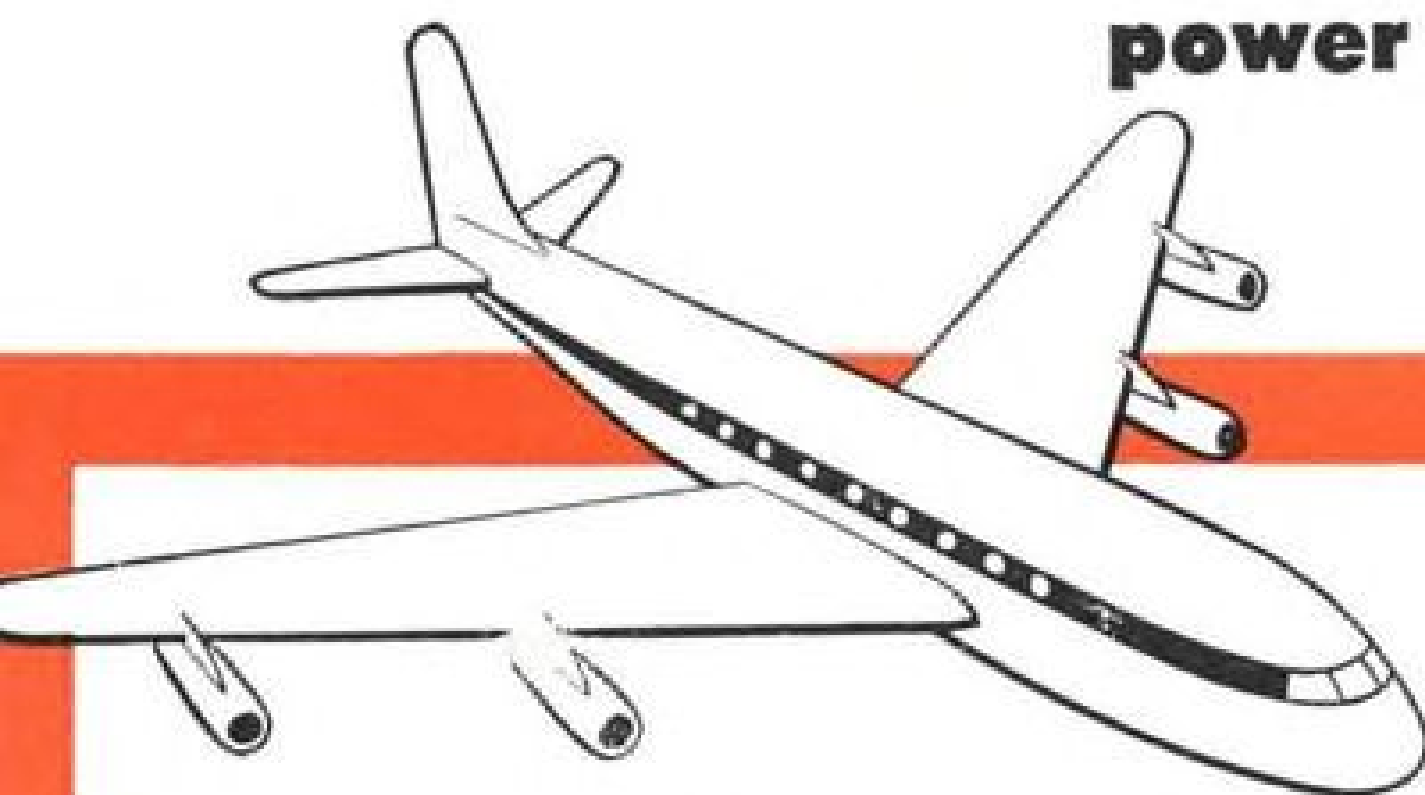
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AMPHIBIANS, METAL BOATS, AND AEROBILT TRUCK BODIES

AVENGER



**8 reasons why engineers
chose constant frequency A-C
power for new jets...**



Recently, a staff of engineers was asked to analyze all types of electrical systems available and to prepare recommendations on the best system for a series of new jet tankers and transports. Of all constant frequency systems, of all other types of systems, the Sundstrand-driven constant frequency a-c system rated highest for these eight major reasons:

- 1 Reserve and Reliability**—Sundstrand's constant frequency a-c system meets all reserve and reliability requirements.
- 2 Less Weight**—constant frequency a-c power means savings of several hundred pounds of weight. These savings accrue in generation, distribution, conversion, and utilization.
- 3 Greater Growth Capacity**—initial installation provides substantial load growth capacity, with further growth capacity available through the addition of another drive-alternator unit.
- 4 Full Power**—full rated electrical system power, plus overload capacity, is available from engine idle to full thrust.
- 5 Greater Fault Clearance Capacity**—faster clearing, less structural damage where faults occur.
- 6 Simpler System**—power generation system has

only three pieces of rotating equipment having brushes, commutators, and regulators—means less maintenance.

- 7 Fewer Types of Power** are required, resulting in less confusion, simplified training, smaller stocks of equipment.
- 8 No Beat Frequency** between inverters and alternators to cause unsatisfactory operation of certain equipment. The Sundstrand-driven system is the only one in which alternators can be paralleled.

Get the complete story on how the Sundstrand-driven constant frequency a-c system proved itself superior to all other types. Let us help you make an analysis of your power requirements. Phone or write our home or district office.



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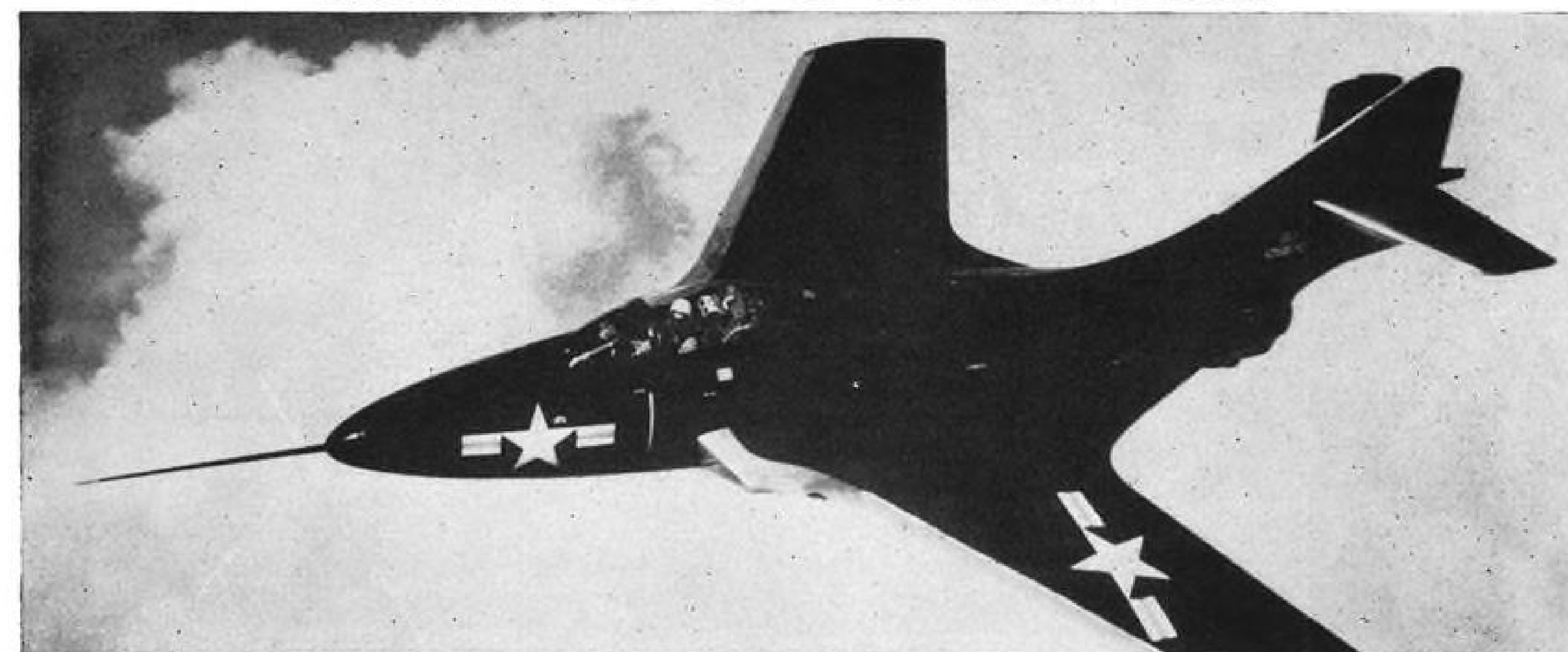
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RESEARCH KEEPS

B.F. Goodrich

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NAVY COUGAR JETS are now getting safer, high-speed carrier landings and take-offs with the B. F. Goodrich airplane Tubeless Tire—first high-pressure tire of its kind in the world!

This new airplane tire has no tube to go flat—no tube to bunch up or shift during landings and take-offs. Like the famous B. F. Goodrich Tubeless Tire for passenger cars, it has a patented inner liner, part of the tire itself, that eliminates the inner tube!

With the B. F. Goodrich airplane Tubeless Tire, there's no tube to add weight. And instead of tire and tube, there's only one unit to mount. Only one unit to warehouse, too.

The patented inner liner retains air much longer than conventional tubes. Ridges molded on the outside of the tire bead prevent air loss around the rim. On two-piece wheels, a rubber O-ring seal keeps air from escaping through sections.

Designed and developed by B. F. Goodrich, this new high-pressure Tubeless Tire has passed the most severe tests, including a special "bottoming" test specified by the Navy. It showed the tire retained air even when compressed flat to the rim! Then came successful flight tests on the Grumman Cougar. Now Cougars are making operational flights with the tire. B. F. Goodrich is speeding development for use on commercial

aircraft as well as military planes.

The new high-pressure airplane Tubeless Tire is still another first in aviation tires from B. F. Goodrich, leader in rubber research and engineering. Other B. F. Goodrich products for aviation include wheels and brakes, Avtrim, De-Icers, heated rubber, inflatable seals, Pressure Sealing Zippers, fuel cells, Rivnuts, hose and other accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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Aviation Week

AUGUST 9, 1954

VOL. 61, No. 6

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AVIATION WEEK, August 9, 1954

HIGH BLOWER TAKE-OFFS AT 13,400 FEET...and

"not a single spark plug irregularity
with **CHAMPIONS**"



Mr. Duane Stranahan, Vice Pres.,
Champion Spark Plug Company
Toledo 1, Ohio

June 10, 1954

Dear Mr. Stranahan:

Our operation of DC-6 and DC-6B aircraft at La Paz, Bolivia, with an airport elevation of 13,400 feet above sea level, subjects the engine ignition systems and particularly the spark plugs to unusually severe conditions. The take-off requires the use of high-ratio engine blower with water/alcohol injection due to the fact that air density at this altitude is only 65% of that at sea level, and the time during which take-off power is required is twice as long as for the normal sea level take-off.

These severe take-off conditions, coupled with the well-known effect of reduced atmospheric pressure on the ignition system, require extra reliability and performance of the spark plug. We use the Champion R37S-1 spark plugs in all cylinder locations of the R-2800 CB-17 engine except the rear position of the front row cylinders, in which the Champion R56S plug is used. We have not experienced a single spark plug irregularity at La Paz with this winning combination since inception of the operation.

Very truly yours,

T. J. Kirkland
T. J. Kirkland
Vice President-Operations



The RC26S and R37S-1 are the most widely used of Champion's many types of aircraft spark plugs.

Champion is proud of the part it plays in helping Panagra, as well as ninety-four other major airlines, maintain safe, dependable air service all over the world.

When you purchase Champion Spark Plugs for your aircraft engine or for any other power plant, you are obtaining the world-famed product of a company which devotes all its research, resources and integrity to the production of spark plugs alone.

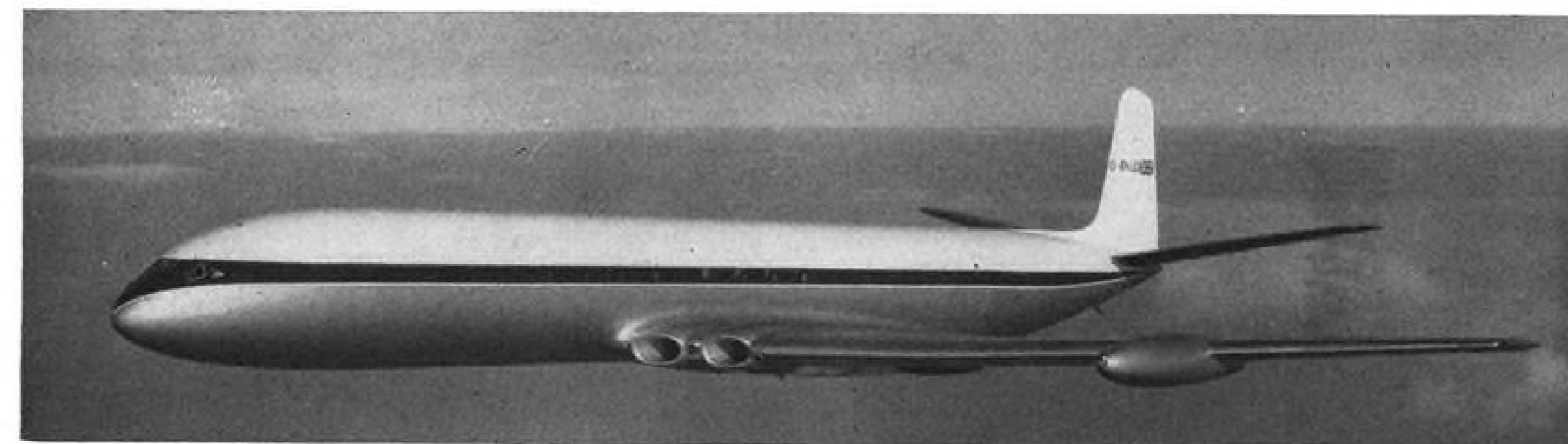
CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

AVIATION'S FAVORITE

CHAMPION

SPARK PLUGS

NEWS DIGEST



DH Comet 3 Jet Transport Makes First Flight

Prototype de Havilland Comet 3 jet airliner is seen aloft on its maiden flight July 19. Powered by four 10,000-lb.-thrust Rolls-Royce Avons, the trans-Atlantic transport seats 58 passengers first-

class or 76 aircoach. It is larger than the Comet 1 and 2 transports. The streamlined protuberance jutting from the leading edge of the jet liner's wing near the tip is an auxiliary fuel tank.

Domestic

Navy's Convair XFV-1 vertical-take-off fighter made its first free flight Aug. 1 at the Navy Air Station at Moffett Field, Calif. On the first flight, the VTO climbed to 20 ft. and on subsequent flights attained 150 ft. Transition to horizontal flight will not be made until the VTO is moved to the Navy auxiliary air station at Brown Field near San Diego, Calif., where it will remain for the rest of its free flight test program.

Air France Super Constellation crashed into a tree and burned last week during a wheels-up emergency landing on rough farmland eight miles north of Preston, Conn. All 37 persons aboard escaped death or critical injury. The transport, on a flight from Paris, was diverted to Boston by bad weather at New York.

Republic Aviation Corp. has purchased Fairchild Engine & Airplane Corp.'s 424,000-sq.-ft. powerplant factory and office building at Farmingdale, N. Y. Republic will use the building, near its own plant, to consolidate engineering and experimental operations. Fairchild's Engine Division plans to relocate in the Long Island area.

John C. Allen's resignation as Assistant Postmaster General in charge of transportation became effective last week.

"Thermal barrier" laboratory has been built by Northrop Aircraft at Hawthorne, Calif., to test new aircraft materials and finishes.

U. S. government has filed suit against Sperry Corp. and Dr. W. L.

Barrow, the company's chief engineer, to recover its alleged share of income from a radar invention it says was developed by Barrow while he was working on government-sponsored research at the Massachusetts Institute of Technology. Barrow later joined Sperry and applied for a patent with five other scientists, assigning rights to the company.

Col. Robert B. Neely has been appointed assistant chief of transportation for Army aviation, succeeding Col. William B. Bunker, who has been assigned as commandant of the Transportation School at Ft. Eustis, Va.

Boeing RB-47E set a USAF speed record for bombers of 662 mph. July 29, flying 157 mi. from Oklahoma City to Wichita in 15 min. 20 sec. The reconnaissance version of the swept-wing Stratojet was powered by six General Electric J47s adapted for water injection.

Financial

North American Aviation, Los Angeles, reports a net income of \$14,525,000 for the nine months ended June 30, compared with \$7,990,000 for the same period last year. Sales and other income totaled \$493,596,107, and backlog June 30 amounted to \$1,076,995,509.

United Aircraft Corp., East Hartford, Conn., had a net income for the first half of 1954 of \$13,266,584, up from \$12,330,314 for the same period of last year. The report excludes earnings of Chance Vought Aircraft, Inc., former UAC subsidiary that was separated from the company July 1 (AVIATION WEEK May 17, p. 16). Backlog at mid-year: approximately \$1,125,000,000.

Fairchild Engine & Airplane Corp. reports net earnings of \$2,228,000 for the first half of 1954, compared with \$2,108,000 for the same period a year ago. Total sales for the six months: \$70,844,000.

Glenn L. Martin Co., Baltimore, has paid off a \$10-million loan negotiated with commercial banks in January 1954 to cancel its V-loan agreement, now is free of debt.

Bell Aircraft Corp., Buffalo, N. Y., had a net income of \$3,419,584 for the first half of 1954, compared with \$1,891,010 for the first six months of 1953. Sales and income totaled \$93,513,372, a 24.8% increase over \$74,932,606 for the same period last year. Backlog July 3: more than \$427 million.

Braniff Airways reports a net income of \$795,871 for the six months ended June 30, compared with \$223,612 for the first half of last year. Revenues were \$21,441,188, an increase of \$2,308,760.

International

Vertical-takeoff projects are being developed by a number of British aircraft companies, Minister of Supply Duncan Sandys reports. Substantial funds already have been spent on VTO research, with the amounts increasing sharply.

Canberra Mk. B-8, a new version of English Electric's long-range bomber, has made its first flight at the company's airfield at Salisbury, England.

Dassault Mystere 4N, now undergoing flight tests, has reached Mach 1 speed in a dive.



American Electronic Mfg., Inc.
9503 W. JEFFERSON BLVD., CULVER CITY, CALIF.

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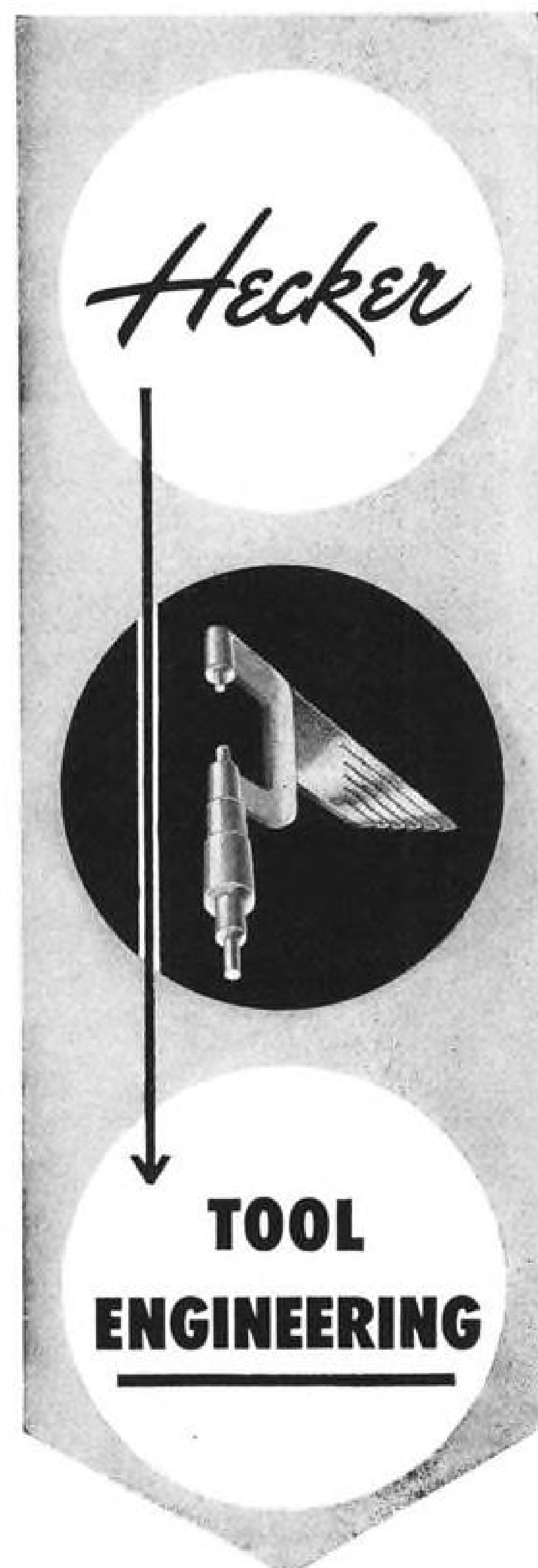
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AVIATION WEEK, August 9, 1954

Washington Roundup

Missile Agreement

Cooperation between the U. S. and Britain on a joint guided missile program initially will be devoted to research and development, Defense Secretary Charles E. Wilson informs AVIATION WEEK. The two countries recently reached an agreement to speed missile development and procurement following visits by British defense chiefs (AVIATION WEEK Aug. 2, p. 13).

Wilson said the U. S. aircraft industry probably will not get any additional contracts as a result of the new agreement until new missiles are in the production stage.

"The important thing," Wilson said, "will be an exchange of information that will speed development. While it is true that the United States probably spends more money than England on this work, the fact remains that everything we get as a result of this agreement would not necessarily come our way without it."

Airline Finances

Expect Air Transport Assn. president Earl D. Johnson to make periodic trips to Civil Aeronautics Board to keep the Board up-to-date on airline finances. Johnson, a financial expert, is known to favor closer association with the Board, particularly in light of last week's denial by the Board of ATA's request to discuss methods of increasing fares and rates (see p. 16).

Balboa to White House

The three-year-old Balboa through-service case has gone to the White House for the fourth time for Presidential decision. CAB reportedly has approved its original decision in the case to tie up Braniff Airways-Eastern Air Lines and Panagra-Pan American World Airways-National Airlines into a dual system of interchanges to supply one-plane service between New York and Balboa, Canal Zone.

Board action came after the proposed merger of Panagra and international routes of Braniff reached an impasse (AVIATION WEEK July 5, p. 90). Eisenhower sent the earlier decision on the case back to the Board for reconsideration months ago in the belief that it needed CAB review since it had lain dormant for eight months on former President Truman's desk until two days before he left office in January 1953 (AVIATION WEEK Apr. 19, p. 89).

Pentagon Information

Secretary of Defense Charles E. Wilson has reaffirmed responsibility of Assistant Defense Secretary Fred M. Seaton for the release of all military news. Wilson's order, warning the services not to duplicate their information functions, was interpreted in some circles as a possible gag, but Seaton has denied this. Actually, the Wilson edict is designed to give Defense Department public information personnel more authority in obtaining news from military officers.

Major internal problem is with individuals who refuse to give information to Seaton's staff on the basis that it is "Classified." This prevents the question from going before the security review branch, where the decision should be made on whether or not the information can be released.

"We need something with teeth in it," says one officer,

"so that the nuts-and-bolts people will stop passing on the security question. There may be good policy or security reasons why a story should be released but we can't know that until we have the facts."

S&WA Certification

Civil Aeronautics Board reportedly has approved the all-cargo certification of Seaboard & Western Airlines (AVIATION WEEK Mar. 1, p. 63) and sent its decision to the White House for Presidential action. Observers last week were expecting prompt approval by President Eisenhower.

Feeder Outlook

Prospect is that the President will pocket veto legislation directing permanent certificates for the 14 existing local service airlines—if it is passed by Congress. Both Commerce Department and Civil Aeronautics Board are firmly against it. They don't want the system frozen for all time.

The local service lines' drive, however, will not have been in vain. CAB was made aware of the overwhelming political pressure for a more liberal attitude in granting renewals, for lengthening the period of renewal, and for granting permanent certificates, when warranted, as soon as possible.

At Senate hearings, CAB Chairman Chan Gurney went so far as to propose that Congress pass a resolution "expressing endorsement of the local service concept in its present general outlines." This, he suggested, would convey the congressional intent of legislation for permanent certificates, but wouldn't force the Board to grant them in the instances that certificates might not be merited.

Certificate Revocation

Congress may act next year to give Civil Aeronautics Board clear authority to revoke permanent certificates. Undersecretary of Commerce for Transportation Robert Murray, and the Department of Commerce, strongly favor this power.

"My feeling and that of the department," Murray told the Senate Commerce Committee, "is that the granting of a permanent certificate should not impose upon the government a constant support, if situations develop which, over a period of years, show that the granting of the certificate was a mistake. I don't think anything ought to be frozen to the extent that it isn't possible at some point to reconsider..."

Tanker Competition

USAF jet tanker competition is the juiciest plum to be dangled before the aircraft industry in several years and competitors are watching every USAF move on the subject with a magnifying glass. Last USAF tanker production award produced contract for close to 800 Boeing KC-97s.

Air Research and Development Command expects to receive design study proposals from the five competitors next month. Meanwhile, Pentagon and Dayton rumors persist that Boeing will get a tanker order for the Model 707 jet transport (see p. 30).

—Washington staff

AVIATION WEEK, August 9, 1954

CESSNA MODEL 310 EXECUTIVE PLANE

Cessna's latest contribution to the growing trend of American Business



Cessna Model 310 in flight. The new executive plane cruises at 205 m.p.h.; has a range of 1,000 miles.

Controls on Cessna operated with Macwhyte "Hi-Fatigue" Cable

The Cessna executive plane—Model 310—has been called the fastest, longest range, lowest cost private plane of its type.

The 310 accommodates a pilot and four passengers. Two wingtip tanks carry one hundred gallons of fuel for the twin 240 horsepower Continental engines. The new executive plane has a range of 1,000 miles, a top speed exceeding 220 m.p.h., and a cruising speed of 205

m.p.h. The all-metal craft has retractable tri-cycle landing gear. Controls on the 310 are operated with Macwhyte "Hi-Fatigue" Cable.

"Hi-Fatigue" Cable is widely used by leading aircraft manufacturers because of its long record of safe and dependable service.

For further information on Macwhyte products for the aircraft industry, ask for Aircraft Catalog A-2.

Fuselage Interior: Showing "Hi-Fatigue" Cable Installation for 310's controls.



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WHO'S WHERE

In the Front Office

S. J. Solomon, chairman of the board of California Eastern Airways, has been elected board chairman of Air Carrier Service Corp., Washington, D. C., and president and chief executive officer of Land-Air, Inc., Chicago.

John C. Redmond is new president and executive committee chairman of Bellanca Aircraft Corp., New Castle, Del.

George S. Trimble, Jr., has been elected vice president in charge of Glenn L. Martin Co.'s new Advanced Design Division, set up by the Baltimore firm to determine new field of production.

Robert J. Trivison has become vice president-operations and production manager of Hydro-Aire, Inc., Burbank, Calif.

E. Finley Carter, vice president and technical director of Sylvania Electric Products, Inc., New York, will join Stanford Research Institute, Stanford, Calif., Oct. 1 as manager of research operations.

Changes

Dr. William Shockley has taken a leave of absence as research physicist for Bell Telephone Laboratories to become research director of the Defense Department's Weapons Systems Evaluation Group.

F. Penn Holter has been appointed assistant to the administrative vice president of Northrop Aircraft, Inc., Hawthorne, Calif.

James E. McGuire has been elected assistant comptroller for Pan American World Airways, and Donald W. Thomson is new chief accountant.

Charles C. Gaudio has been promoted to general manager of the Air Express Division of Railway Express Agency, succeeding P. H. Cummings, who has retired.

Samuel O. Perry, Jr., has become chief of missile design for Chance Vought Aircraft, Inc., Dallas.

Richard H. Frost is general manager of Stanley Aviation Corp.'s new plant at Denver.

Ralph Shelton has been named assistant general manager and sales manager for Aerosmith, Inc., Miami.

Robert M. Challender, formerly with Douglas Aircraft Co., has taken charge of the newly created sales service department of Wiesner-Rapp Co.'s Farnham Manufacturing Division, Buffalo, N. Y.

Larry Ignasiak has been moved up by Flying Tiger-Slick Airlines to chief purchasing agent. Other changes: Joseph Amorelli, manager of domestic material control; Harold M. Bauer, San Diego district sales manager.

L. F. Fenton has been promoted by Trans-Canada Air Lines to passenger service supervisor, and P. R. Heffren is new supervisor of flight service personnel.

Honors and Elections

Prof. Sydney Goldstein, head of the Aeronautical Engineering Department of Technion, Israel Institute of Technology at Haifa, has been invited to serve as visiting lecturer at Harvard University in 1954-55.

INDUSTRY OBSERVER

► General Electric's small jet engine department has a powerplant in design stage aimed at producing about 5 lb. of thrust for each pound of engine weight. Unit may emerge as a 2,000-lb.-thrust engine for commercial as well as military market.

► Air Force has ordered a small number of Republic F-103s, advanced-design, supersonic interceptor.

► USAF's new Cessna XT-37 jet trainer, powered by two 800-lb.-thrust Continental-built Turbomeca Marbore 2 (J69) engines, is scheduled to make its first flight late this month.

► New Grumman F9F-9 Tiger lightweight Navy jet fighter powered by a Wright J65 was scheduled to make its public debut last week at the company's Peconic River, N. Y., assembly plant approximately a week after its first flight July 30. Contracts for the Tiger approximate \$40 million, with production to begin "immediately." The plane is claimed to be supersonic in level flight. First Tiger has no afterburner on its J65, but later planes will be fitted with the thrust-augmentation device.

► Air Navigation Development Board's special committee now evaluating the civil VOR/DME and military Tacan systems has missed its original July 31 deadline and latest estimate by Brig. Gen. Milton Arnold, committee chairman and Air Transport Assn. vice president, is Nov. 1 or "by the end of the year." Committee's recommendations will be presented to Assistant Defense Secretary Donald A. Quarles, ANDB chairman.

► General Electric and Isha Kawajima Heavy Industries Co., Tokyo, are negotiating an agreement, subject to State Department approval, for the Japanese firm to build GE's J47 turbojet. Engine might be teamed in Japan with North American's F-86.

► Navy has let a contract for investigation of underwater soil conditions off the New England coast to determine feasibility of constructing offshore radar picket stations to supplement existing warning network. Present proposal calls for steel towers with a radar dome to house equipment, a shelter for operating personnel and a helicopter landing space.

► Percentage of first-line aircraft in USAF inventory stands at more than 61%; 80% of the combat wings are equipped with jets and 90% will have them by June 1955. Other figures disclosed by Fred A. Seaton, Assistant Secretary of Defense: Defense Department inventory of jet planes has increased 50% in the past year. At present, services have 34,000 planes, a third of them jets; by 1957, U. S. will have 34,000 and half will be jet-powered. For the Navy, figures are 45% modern aircraft in front-line units after expenditure of \$2 billion in past year.

► A study of USAF airfields and airfield facilities with an objective of improving military design and construction practices will be made by a New York architect-engineering firm, Parsons, Brinckerhoff, Hall and Macdonald under Defense Dept. contract.

► Cost of test flying a large transport plane for certification purposes can run as high as \$7,000 per hour. Certification testing program of one large commercial transport cost \$2.5 million and involved more than 900 hours of flying.

► Prototype XF-101 Voodoo, McDonnell Aircraft Corp.'s new long-range escort fighter powered by two P&WA J57s, will be shipped to Edwards AFB soon to start a 12-month flight test program. McDonnell now is transferring 45 engineers and technicians from the St. Louis plant to Edwards by USAF C-46 shuttle.

► Air Materiel Command has awarded Sundstrand Machine Tool Co., Rockford, Ill., contracts for \$10,404,456 worth of alternator constant-speed drives. Firm was chosen because of its ability to produce this complex and highly specialized piece of equipment.

Senate Staff Reports:

U.S. Aid Boosts British Civil Jet Projects

- Military funds free U.K. money for transports.
- Value of RAF bombers, fighters is discredited.

By Katherine Johnsen

U. S. aid of more than \$1 billion to Britain's military aircraft industry has allowed the British government to divert large sums of its own money to developing commercial jet airliners that now compete with American transports, a Senate Appropriations Committee staff report charges.

The report also claims Britain has produced no military aircraft of significant value despite large U. S. contributions.

"The fact is that between 1950 and 1954, during which period the United States has made large contributions to the British military air program and the aircraft industry, the British government admittedly has spent an undetermined but significant amount of public money on the subsidization of civil jet transport development," the committee staff says.

"The pre-eminence which the U. S. has enjoyed in international civil aviation is based upon the initiative and competition generated by the free enterprise system. This position of pre-eminence and the stability of the aviation industry are of paramount importance to this country. They should not be imperiled by contributing to the support of the British aircraft industry."

► **Future Aid**—The staff report makes these two major recommendations on future U. S. aid to Britain:

• "The programing, procurement, and financing of all aircraft required by the mutual security program should be decided and managed by USAF. . . .

"The present procedure, which permits the Foreign Operations Administration to get into the business of programing and financing British aircraft independently of USAF, lends itself to the distortion of military aid by civilian policy makers in an effort to attain political and economic objectives through the use of 'defense support' or 'direct forces support' funds."

Industry Views on Aid to Britain

Staff report on U. S. aid to the British aircraft industry contains these comments from the aircraft industry:

• Gen. Joseph McNarney, president of Convair:

"Obviously our company has been hurt by British competition to the extent that the Viscount turboprop is competitive with the Convair-Liner which is the only two-engine commercial transport currently being produced in the U. S.

"We believe that the question as to whether the United States should support British military aircraft program is a matter entirely of military and State Department policy, the intention of which is the support of the NATO program. As to safeguarding limitations, we suggest that contractual precautions be taken with British manufacturers to insure that funds allocated for military procurement are not allowed to filter into commercial development.

"In particular, safeguards should be imposed which would prevent commercial development being included in general overhead which could then be applied to the direct cost of military procurement. Such safeguards have always been included in government contracts with United States manufacturers."

• Lockheed Aircraft Corp.:

"The offshore purchasing program and the consequent expenditure of United States government funds in large sums with the British aircraft manufacturers has obviously served to strengthen that industry competitively in world markets for both commercial and military types against United States manufacturers.

In 1952, according to a General Accounting Office report, the Secretary of the Air Force declined to have USAF used as the procuring agency for offshore procurement on grounds that the program "was considered a political and economic problem rather than a military one, that the program was not militarily acceptable and that USAF lacked the personnel to carry it out."

• "If high policy decrees that U. S. aid should be continued in support of the British military air budget, it would be desirable to explore . . . the possibilities

"The development, production, and sale of advanced type transports by British aircraft manufacturers has been made possible, to a large extent, only because of the financial support of the British government to these British manufacturers.

"Although it would be difficult to show that United States government activities mentioned above resulted in United States dollars being used directly to support British aircraft manufacturers commercial activities, nevertheless, the providing of such funds does relieve the British government from the necessity of providing comparable funds from the British treasury.

"This results, in effect, in indirect subsidization of the British aircraft manufacturers commercial transport development and sales activity by the United States government, placing the British in competition with the United States aircraft manufacturers who are unsubsidized in this field of activity. . . ."

• E. B. Newell, Allison Engine Division of General Motors:

"We feel that recently placed contracts for British equipment using turbine powerplants have definitely taken business from the American manufacturers who have been serving these customers.

"The British manufacturers have received powerful assistance from their government and it seems out of order for United States funds to be made available and thus further subsidize the British effort. This is to the disadvantage of both American airframe and engine producers."

of supplying the British with the airframes of our latest types of fighters in which British-made engines could be readily installed."

This, it is maintained, would result in truly supersonic fighters far superior to the Gloster Javelin, Hawker Hunter and Supermarine Swift and the U. S. taxpayers' money would be used "to strengthen our own aircraft industry and make jobs for American workers instead of contributing to the British program for civil jet expansion."

Prospect for direct congressional ac-

tion as a result of the staff report is not likely. Although the Senate Appropriations Committee held a meeting on it, members refrained from raising it to the status of a committee report. Defense Secretary Charles E. Wilson defended the aid program and dismissed criticism of it as "hindsight."

► **\$257-Million Aid**—Under various categories—direct support of the Royal Air Force, contributions to NATO forces and economic aid to release British funds for aircraft financing—the U. S. allocated a total \$257 million in fiscal 1954 for support of the British aircraft industry, the report discloses.

The program for fiscal 1955 calls for \$225 million in support. If this is carried out, the total U. S. contribution since 1950 will exceed \$1 billion.

The committee staff comments: "A great nation capable of embarking upon a long-range and costly program largely financed by government to obtain mastery of the air in commercial transportation should be able to produce without foreign aid the military aircraft necessary for its national defense and the fulfillment of its obligations to NATO."

► **Discredited Value**—The military value of the British planes financed by the U. S. is discredited in the report:

• **Bomber force.** Full production of the three aircraft—Valiant, Victor and Vulcan—included in this program cannot be completed in less than three to four years, the staff says. It is "an expensive and inefficient project from the military viewpoint. . . . None of the three types of bombers have been tested, evaluated or approved by the U. S. Air Force."

A USAF general officer, it is said, "raised the question as far back as the fall of 1952 as to why the British should engage in the building of three types of bombers. The development and production of a single type of four-engine jet bomber is a costly enterprise. The designing, engineering, testing, tooling and building of limited numbers of the three versions creates the most serious production and cost problems."

The report notes that Vickers-Armstrong, makers of the Valiant, "are developing jet transport versions of their bomber." A. V. Roe Co., manufacturers of the Vulcan, "are reported to have done considerable work on a commercial version of the Vulcan."

The report observes: "There is no disposition to question the unrestricted right of the British to design and produce any type or quantity of aircraft that they may consider necessary to their national security. It may, however, be doubted whether U. S. taxpayers' money should be used to finance aircraft that have never been evaluated by the U. S. Air Force, may never be committed to the NATO command and may never be produced in sufficient quantity in time to meet the needs of the moment."

• **Fighter force.** The three fighters in this program—the all-weather Javelin and the Hunter and Swift day fighters—are subsonic.

"None are rated as transonic by U. S. Air Force standards," the report says. "None are capable of supersonic speeds at level flight. They are in the same class as, and therefore comparable with, the best of the F-86 series. They cannot be rated on terms of parity with the F-100 and F-102."

Pointing out that all three planes are "in the early stages of production," that full production "under the best of conditions cannot be attained for a long time" and that "complete deliveries of all the planes financed by the U. S. will take even longer," the report says:

"When all the aircraft have finally taken their place in the frontline, the incontrovertible fact is that they will be approaching obsolescence, measured by supersonic standards. They could not meet on even terms any advanced fighter capable of supersonic speed at level flight."

Observing that the F-86 is "combat tested" and that the Javelin, Swift and Hunter still are "in the experimental stage," these questions are asked:

"Is it wise to finance the development and production of unproved planes which, when delivered, will be obsolescent? If it is determined by high policy to provide fighter aircraft for the modernization of the RAF, might it not be wiser to ship from our own production lines some thoroughly tested plane, comparable to the new British fighters, that is in full production and needs no new plant facilities? Might it not even be possible to provide the RAF with the airframes of our more advanced fighters which could be fitted with British-made engines?"

By 1958, the report says, the three British fighters and the F-86 will have been superseded by F-100s and F-102s and, "if the British concentrate upon the construction of the Javelin, Hunter and Swift, they will not have a modern air force at the end of four years."

► **Fighter Status**—On the specific status of the three fighters, the report says:

• **Javelin.** The first production model is scheduled to come off the line in September, and USAF is planning an evaluation of it in October or November.

• **Swift.** Now in limited production. One squadron has been delivered to the RAF but has been grounded "because of defects. . . . Production is reported delayed while certain 'fixes' or modifications are made." The plane never has been finally evaluated by USAF.

• **Hunter.** After a number of modifications, the fighter was approved by USAF and is now in production. "But apparently other difficulties have arisen and it appears unlikely that the first squadron of Hawker Hunters will be

Missile Blasts 'Berg



ICEBERG gives good radar response for cold-weather test of Navy ASM-N-2A Bat missile.



BAT MISSILE drops from under Convair P4Y-2B's wing and is radar-guided to iceberg.



GUIDANCE SYSTEM passes up ice flow en route, keeps Bat heading for iceberg.



DIRECT HIT is made on iceberg by Bat. Test was made during Navy Arctic exercise.

delivered to the RAF until the latter part of the year."

The report also raises the prospect that Great Britain will sell military planes financed by the U. S.

"The British reportedly are continuing to offer military jet aircraft to Latin American countries, including the Canberra, which is one of the planes being financed with U. S. grant-aid. . . ."

► **Intertwined Costs**—On British development of commercial aircraft while the U. S. finances its military program, the committee staff reports:

"As early as 1942, the British began to give attention to the development of civil aviation in the postwar period. Inasmuch as the British did not feel that they could hope to compete with the U. S. in the type of civil planes which we had developed and produced during the war, they determined to focus their attention upon the design and development of aircraft with a new form of propulsion."

The estimate that British government subsidy to the development of civil jet transports up to 1950 amounted to \$400 million never has been "seriously challenged." But the report points to the impossibility of arriving at any true figure of total government subsidy since "the costs of military and civil aviation development are inextricably intertwined."

► **Civil Orders**—This breakdown of orders on the books for British commercial planes is presented:

• **Comet 1 and 1A.** Twenty-one orders—four by the Ministry of Supply and Royal Canadian Air Force and 17 by commercial airlines. The commercial orders approximate \$25 million and are for: British Overseas Airways Corp., 10; Canadian Pacific Airlines, one; Union Aeromarine de Transport, three; Air France, three.

• **Comet 2.** Thirty-four orders—one to the Ministry of Supply and 33 (totaling

approximately \$48 million) to commercial airlines. These are: BOAC, 12; British Commonwealth Pacific Airlines, three; Japan Air Lines, two; Linea Aeropostal Venezolana, three; Panair do Brazil, four; Air France, six; CPA, three. In addition, UAT has an option on an unspecified number; CPA has an option on one additional, and BCPA has an option on three Comet 2s or 3s.

• **Comet 3.** Commercial airline orders, approximating \$20 million, total 10. They are for: Pan American World Airways, three; BOAC, five; Air India, two. In addition, PAA has an option on seven additional, BOAC on five, and Panair on two.

• **Britannia.** Orders for the three versions (Bristol 100, B-300, and B-250), total 40, one of which is for the Ministry of Supply and the others for: Qantas Empire Airways, six; and BOAC, 33 (15 B-100s, 15 B-300s, and 3 B-200s). The orders total approximately \$40 million.

In addition, the report says, "there are reported to be pending negotiations for 51 Britannia 300s and 200s with seven unknown operators, one of which is assumed to be British and the other six foreign companies."

• **Viscount.** Approximately 25 are in operation and "there are more than 100 Viscounts on order, coming off the line at the rate of about two a month." Vickers-Armstrongs has a capacity to produce 100 Viscounts annually and "are presently quoting early 1956 deliveries on new sales."

Known orders, as of May 1: BEA, 26; Air France, 12; Aer Lingus, four; Trans Australian Airlines, six; Trans-Canada Air Lines, 15; British West Indian Airlines, three; Hunting Co., three; Iraqi Airways, three; Indian Air Force, two; Fred Olsen Transport, two; Misrair (Egyptian airline), three; Ministry of Supply, two.

Since then orders for 25 additional

Viscounts have been booked, the report says, including Capital Airlines' order for three with an option to purchase 37 more.

• **Vickers 1000.** This plane, the prototype of which is expected to fly early next year, reportedly will have a seating capacity of 100 to 150 passengers, a cruising speed of about 500 mph., and a range of about 4,000 mi. The report says "one of the largest U. S. airlines" is interested in purchase of the plane.

► **Priority Required**—The committee staff suggests that about \$76 million in "expensive and specialized" machine tools the U. S. agreed to give the British in 1951 are being used in commercial aircraft production.

This was at a time, the report says, when the tools were in short supply in the U. S. "and not available to American industry without priority ratings."

Last of the tools were delivered in March 1954. A total of 3,838, with an average cost of \$20,000, were involved—2,426 for engines, 400 for airframes and 1,012 for components.

"Although this transaction was initiated and the funds committed . . . more than three years ago," the report comments, "the details are still so highly classified . . . that, unfortunately, they cannot be fully discussed."

The report notes that many of the companies to which the machine tools were allocated "are also engaged in the manufacture of civil government-subsidized aircraft. . . . Most of the companies . . . are engaged in the production of both civilian and military aircraft, engines, or components. It is apparent that the American tools are not set aside and reserved for purely military production."

NAL'S Baker Plans To Operate TV Station

Hearings on National Airlines' application for authorization to operate a television station at Miami, Fla., were completed before Federal Communications Commission last week.

G. T. Baker, National president, says he plans to devote up to 75% of his time to operation of the television company, a wholly-owned subsidiary of the airline.

"My interest and that of my associates in television is one of several facets—the least of which is profit," Baker testified. "We are interested in bringing the south Florida and Miami area a first-class television station—free from the influence of politics and the elements which have given our long-adopted homeland an unsavory reputation."

The airline will finance the television operation.

House Group Asks R&D Reshuffle

Subcommittee calls for more participation by civil scientists, separation from procurement activities.

Increased participation by civilian scientists in military research and development and a clear separation of research and development from procurement activities is called for in a comprehensive report by the House Committee on Government Operations.

The report, based on investigations by the Military Subcommittee, headed by Rep. R. Walter Riehlman, is additional evidence of congressional apprehension over the conflict between civilian scientists and military officers. The committee points to "military-imposed irritations and frustrations (that) plague research and development programs within the military departments" and that threaten "effective administration."

► **Committee Views**—The House passed legislation authorizing two additional Assistant Secretaries for each of the services—making a total of four—after Defense Department, at the insistence of the Armed Services Committee, agreed to lift direction of research and development to the Secretary level (AVIATION WEEK July 12, p. 17). The legislation has been sent to the White House for the President's signature.

This is the view of the Government Operations Committee on the department's plan:

• **Air Force's plan** to assign an Assistant Secretary to research and development, with no diversionary responsibilities, is applauded. The other two services are urged to do the same.

• **Navy's plan** to have an "Assistant Secretary for Air and Research and Development," with jurisdiction over atomic energy will vest "full responsibilities in the position . . . too great for a single individual to carry out effectively," the report says.

Since atomic energy is primarily a research activity, this Assistant Secretary should be more a Research and Development Secretary than a Secretary for Air.

• **Army's plan** for an "Assistant Secretary for Logistics and Research and Development" is challenged as subjecting R&D to domination by the procurement organization.

Army is urged to appoint a special assistant for research and development as an interim step, until Congress next year could consider creating a fifth Assistant Secretary to take over research and development.

► **Civilian Reinforcements**—The committee says civilian scientists should participate in top military planning. "It was disconcerting," its members declare,

"to find that scientists have not been called in by the Joint Chiefs of Staff."

The strengthening of the Joint Strategic Survey Committee, now advisory to the JCS on overall strategic planning, is recommended—first, by reinforcing it with civilian scientists aware of the possible effects of scientific developments on strategy; and second, by requiring the JCS to submit reports and findings of the committee to the Secretary of Defense.

The Strategic Survey Committee now is made up of three senior general officers. Evidence affirms, the House group says, that these officers in the past "have not been selected . . . for their grasp of strategic problems, their relation to international policy and the implications of new weapons, or for their appreciation of the unified point of view—integrating the plans of the three services."

The House committee reports it has received "some extremely thoughtful testimony from scientist witnesses on the need for serious study of radically new and entirely different weapons systems, the capabilities of which might drastically alter our concepts of both tactical and strategic planning."

The three services also are urged to

organize top-level civilian scientists and technicians from staff levels and operational activities into advisory committees," which would participate with . . . the highest planning councils in considering problems concerning the research and development programs."

► **Separation**—The committee report says research and development tend to be dominated by procurement when the two activities are associated, as in the Army and Navy.

Although there is a physical separation of research and development from supply and logistics in USAF, the committee objects that "Air Research and Development Command activities continue to function under established Air Force procurement regulations and consequently remain under the influence of production-procurement policies."

The committee calls for greater flexibility and priority action in research and development regulations, pointing out that "it is possible to see how much material might be consumed through normal false starts and it is also possible to see how much time may be lost if research people have to wait for materials because of the delays inherent in standard requisitioning procedures."

The committee also objects that the normal budget process, requiring calculations two or three years in advance, is not suited to research and development. It comments: "The situation can become ridiculous if it requires planning for lumber, special types of screws, bolts, nails, and metal paneling for items which are not yet invented."

Army and Navy are criticized for closely relating research and development with procurement activities by pumping them together in technical bureaus.

► **Contract Research**—Major part of military research and development work should be contracted out to industry, universities and other organizations "especially designed to conduct such programs," the committee says in its report.

House group refrains from setting an "appropriate percentage" of work that should be farmed out. It does recommend that "no 'in house' research be conducted solely for the purpose of training and familiarizing military officers . . . to build up capability with the government for qualitative control and assessment of contracted research."

The need for 'in house' research and development is recognized by the committee as necessary if the military is to control contracted work. But, it adds, the 'in house' activity "should be worthwhile as an end in itself. The maintenance of qualitative control capability should be regarded as a valuable by-product."

The report says scientists advised



Cougar Dumps Fuel From Wingtips

Grumman F9F-6 Cougar jet fighter demonstrates how this plane jettisons fuel out the wingtips prior to landing to minimize danger

from fire in event of an accident. Fuel load also is lightened just prior to combat to improve the sweptwing fighter's performance.

that "considerably more research should be contracted for than is currently being done."

Declaring that there is a "serious need," the committee urges the Secretary of Defense to initiate "a systematic program of basic research." Such a program, it observes, might involve projects not particularly applicable to any immediately known military needs . . . but might supply the basic knowledge upon which future weapons and weapons systems could be brought into being."

► **Major Issue**—The report says the Assistant Secretary of Defense for Research and Development should study the advisability of a physical separation of military support activities from military research activities.

The committee declares: "The major issue—whether there shall be a fourth civilian department for research or the present military program—will not abate in intensity unless the military leaders modify stereotyped military organization concepts to the peculiar needs of research and development which is, at the working level, necessarily a civilian activity."

The inflexibility at military R&D installations, "which allows military commanders to rule by command as though they were dealing with a fighting organization," is criticized. The Assistant Secretary of Defense is urged to assign "specific authority and responsibility for technical direction" by civilian scientists throughout all military research and development installations.

The committee says the programs at the installations should be "largely administered by civilian-led units free from the dominating characteristics of large military supporting activities."

USAF's Cambridge Research Center is cited as an example of deterioration under military domination. The committee relates:

From its inception 1945 until February of this year, all technical operations at AFCRC were under the direction of a civilian electronics engineer, J. W. Marchetti, who organized the original program as an Air Force major and shortly afterward became its civilian director.

When the installation was expanded in 1951, Maj. Gen. J. F. Phillips assumed command and appointed Marchetti as his technical deputy. Technical direction was established for the three research directorates—electronics, geophysics, atomic warfare.

"Policies of Gen. Phillips are reported to have created a highly favorable environment for close cooperation between civilian and military personnel. . . . "But the picture changed when Maj. Gen. R. C. Maude took over command in 1953. First, he abolished the position of technical deputy

707 Details

A second exclusive engineering report on Boeing Airplane Co.'s 707 jet transport appears on page 30 of this issue. David A. Anderton, Aviation Week's engineering editor who spent a week at Seattle during the initial flight test program for the 707, presents design details, the history and the evolution of the new jet transport in this second report. First report was published in the Aug. 2 issue, page 63.

and established a "technical director" instead, out of the line of command. Even this post was abolished.

The result: Within a year the three operating directorates resigned.

► **Bold Steps**—Separation of research and development from the Defense Department might become a necessity if "bold" steps are not taken, the House group warns.

The committee says it "feels very strongly that unless the military departments and our military leaders, in particular, choose to correct . . . problems caused largely by military administrative characteristics, the forces of logic and civilian scientific dissatisfaction could well dictate that research and development be rightly considered incompatible with military organization."

Increased civilian participation and authority, the committee says, offers a "practicable solution at the present time" between the extreme of "military control" and the extreme of "civilian control."

It adds: "The effectiveness and performance of such a solution of the issue will depend, in large part, on the initiation and implementation of a bold plan to correct the many organizational and administrative shortcomings in the military . . . programs."

► **Law Barriers**—Should anti-trust laws hampering research and development be changed?

The committee makes no recommendation on this but presents the testimony of Trevor Gardner, Special Assistant to the Secretary of the Air Force for Research and Development, who favored it.

Defense Department wants the technical personnel of guided missile contractors to inspect the facilities of other contractors and exchange of information.

Gardner comments: "For five months now we have been attempting to set this up, but there are laws on the books—anti-trust laws specifically—which make it extremely difficult, if not impossible, for us to cause an ex-

change of information at our contractor level so that, for example, the Air Force contractor at the Falcon plant might take his technical people and visit the Navy Sparrow plant and benefit from another organization working on a very similar problem."

Board Rules Against Joint Action on Fares

Civil Aeronautics Board told scheduled domestic airlines last week that, if they want fare and rate increases, they should file individual petitions instead of through Air Transport Assn. An ATA request to discuss means of increasing revenues was limited by the Board to methods other than boosting fares and rates (AVIATION WEEK June 28, p. 28).

► **Competition Factor**—CAB cited its policy on the issue as stated in the air-freight tariff agreement case of 1951;

"We believe that compulsory discussions of local rates must inevitably tend toward the discouragement of individual rate-making based upon competitive considerations."

"It is also obvious that a forum for the discussion of competitive rates not open to the public nor a regulatory agency presents a situation conducive to the establishment of rate levels by agreement rather than by competitive forces. Such would be the trend whether the discussions resulted in formal agreements or not. . . ."

CAB said last week it saw no convincing reason for departing from its 1951 position.

► **Emergency Exception**—"In essence this policy means that as a general rule we believe that the public interest will be better served in this industry if basic fare and rate policies reflect individual carrier initiative rather than concerted industry action," the Board said.

However, CAB stated that "in certain emergency situations where the need for basic changes in fare or rate structures or level was acute and individual action to obtain such change was impracticable, there might be a departure from our general policy. . . ."

The Board previously granted ATA's request to extend its fare discussions through July 30 in order to permit the circulation of its discussion results for industry consideration. In its latest order, CAB extended the period to Aug. 31. ATA officials indicated, however, that the severe limitations placed on the airlines as to what they could discuss precluded any results of sizeable consequence.

In its petition of reconsideration filed last month, the association said denial of its request would mean the rate-making procedure established by CAB will be "unworkable."

Cessna for '55

• **New four-engine 620 to be pressurized.**

• **Business plane will seat 8-10 passengers.**

Prototype of a new 8-10-passenger business transport plane, featuring a pressurized cabin, will be flown early next year by Cessna Aircraft Co., Wichita, Kan., a company spokesman says.

Design work on the new plane, designated Model 620, has been completed and tooling is the next step. Early reports indicate that the 620 is a firm production article. A complete mockup is available for inspection at the factory and Cessna currently is running a nation-wide market survey expected to be completed by the end of the year.

► **Product Range**—Philosophy behind the Model 620 is to present Cessna distributors with a complete sales package covering virtually every line. In addition to the four-engine transport, dealers will have the new Cessna light helicopter, that has been flying since mid-July, the twin-engine 310 light transport and the single-engine 170, 180 and 195 types.

The distributors got their first look at the new four-engine 620 at the company's mid-year management meeting in July at Wichita.

► **Model 620 Layout**—The new 620 basically is a low-wing, tricycle landing gear configuration with a single rudder. Engines are six-cylinder geared and supercharged Continental GSO526s delivering 320 hp. each and turning the new three-blade Hartzell constant-speed full-feathering props.

Although the company is not announcing detailed specifications and performance data, the 620 is understood to be a 250-mph. airplane with full operational performance at more than 18,000 ft. With one prop feathered, service ceiling will be approximately 23,000 ft. The engines are designed to deliver their rated 290 maximum continuous horsepower up to 15,000 ft.

► **Cabin Details**—The cabin will be large enough to handle the numerous luxury appointments demanded by today's flying executives. Picture windows of 16-in. x 30-in. size will be featured. Seats can be spaced readily in various arrangements, since they can be fixed in two-inch increments along the cabin floor. If desired, they can be unhooked and reversed in flight. Seats and flooring are designed to take 10-G loads.

The cabin is designed to take a buffet, icebox, food locker and other items usually demanded by business

plane operators for maximum comfort. Headroom is approximately six feet. Luggage compartment in the rear, opposite a full-size washroom, is the walk-in type and also is pressurized.

The 620's cabin pressurization unit was designed specially for this airplane, Cessna says. Maker is AiResearch Manufacturing Corp. The unit requires no external power for supplying pressurization, air conditioning and heating.

► **Safety Features**—For safety reasons and to give optimum handling conditions, 62% of the Cessna 620's gross weight is located below the passenger compartment. Additional safety features are placement of the full 400-gal. fuel load outboard of the inner engines. Wing panel tanks will be of the crash-resistant bladder-cell type and wingtip tanks also are fitted.

Cockpit windshield and supporting structure is designed to meet Civil Aeronautics Administration bird-proof requirements. Landing gear has a wide tread and wheel base for easy maneuverability and good stability on the ground. It carries oversize tires taking 65 lb. of air pressure for operating in and out of undeveloped or small airports.

► **New Copter**—The new Cessna CH-1 light copter is nearing CAA certification. Grossing approximately 3,000 lb., it is powered by a supercharged Continental FSO470 delivering 260 hp. to the transmission with all accessories operating. Engine is mounted ahead of the cockpit similar to a conventional lightplane layout. It has a single main rotor with all-metal blades.

ARDC Reassigns Six Top Officers

New assignments for six top officers in Air Research and Development Command were ordered last week by Lt. Gen. Thomas A. Power, ARDC commander.

Brig. Gen. Leighton I. Davis, director of development at ARDC headquarters, will replace Col. Donald Ostrander as commanding officer of Holloman Air Development Center, Alamogordo, N. M. Col. Ostrander will take over Gen. Davis' post at Baltimore.

Brig. Gen. Marvin C. Demler, vice commander of Wright Air Development Center, Dayton, Ohio, will be assigned to headquarters as assistant deputy commander for technical operations. His immediate superior in the new post is Maj. Gen. Floyd B. Wood.

Brig. Gen. Howell Estes has been named director of weapons systems operations at WADC (AVIATION WEEK Aug. 2, p. 9). Gen. Estes recently was commander of Task Force 7.4 in the Eniwetok hydrogen bomb tests in the Pacific.

Deputy to Gen. Estes in his new job will be Col. Homer A. Boushey, former director of weapons systems operations.

Col. Don D. Flickinger, who filled two positions as director of research and an assistant deputy commander, will devote his full time to the research post.

Drag Chute Fails, Vulcan Damaged

(McGraw-Hill World News)

LONDON—Britain's strategic jet bomber program suffered another setback when the landing gear of the delta-wing Avro Vulcan collapsed when the plane swerved off a runway to avoid hitting a group of workmen.

The accident occurred only a few weeks after RAF lost its one and only Handley Page Victor scimitar-winged jet bomber as a result of tail failure during low-altitude speed tests (AVIATION WEEK July 19, p. 7). The two accidents, following troubles with the DH Comet and Bristol Britannia, make this a black year for British aviation. The Vickers Viscount turboprop is the bright exception.

What actually happened to the Vulcan is shrouded by official secrecy, but this much is obvious: Coming in for a landing at Farnborough, the braking parachute was released, but failed to open. The pilot was unaware that the chute was inoperable until he had too little runway left to take off again. The end of the runway was occupied by workmen.

It was a choice between hitting the men or possibly washing out the big bomber. The pilot made the latter decision. He swerved the plane off the runway onto the grass, soaked by days of rain. The Vulcan's undercarriage dug into the soft ground, one landing gear leg failed, the bomber ground-looped and settled on its belly.

Though damaged, wings, engines and fuselage suffered no major failures. The Vulcan is not a total loss, although it is doubtful this particular airplane will be present at the Society of British Aircraft Constructor's annual display at Farnborough next month. Avro has had two of the big, long-range Vulcans flying for some time.

Observers were surprised that the British would risk one of their new super-priority, highspeed strategic jet bombers to run tests on a runway that is effectively only a little more than a mile long. Even if the entire strip—officially listed at 2,000 yd. long—is available, there virtually is no margin to handle a minor failure or miscalculation.—SH

Air Defense

- **Wilson forms new overall Continental Command.**
- **USAF to be responsible for Army, Navy units.**

Air Force last week was given complete responsibility for the country's air defense, with authority over Army and Navy units used in the defense mission.

The Department of Defense will activate Sept. 1 a new Continental Air Defense Command headed by Gen. Benjamin W. Chidlaw, who also will continue to act as commander of USAF's Air Defense Command. Headquarters of CADC will be in Colorado Springs, home of ADC.

► **JCS Decision**—The new unified command was recommended by the Joint Chiefs of Staff to:

- Provide for the development of co-ordinated plans and requirements for the continental air defense mission.
- Insure effective control and utilization of all available military strength—Army, Navy and Air Force—in time of emergency.

- Provide a single military agency to co-ordinate with the Federal Civil Defense Administration and other state and local agencies holding responsibility in case of an air attack.

Practical effect of the change will be to give Gen. Chidlaw a direct channel of communication with JCS. After Sept. 1, Chidlaw will determine requirements for all three services. As commander of ADC, he had the responsibility for air defense but no authority over participation by the Army and Navy.

► **New Weapons**—In announcing the change, Defense Secretary Charles E. Wilson declared that centralized control was made necessary "by the advent of new weapons and increased forces available for continental air defense."

The Secretary cited new and faster interceptor planes and improvements made in the electronic field that will make air defense both more complicated and more efficient. He said it is important for the United States to be ready for prompt action if it is to take full advantage of new developments.

In order to do this, Gen. Chidlaw will have authority to move troops and ships, similar to the power given to a theater commander in time of war.

The general was appointed commander in chief of CADC to act for USAF as the executive agency. He will be responsible to USAF's Chief of Staff and Secretary Harold E. Talbott.

► **Improved Operation**—Wilson made it

clear that creation of the new command will not alter the size of the nation's air defense machine but will improve its operation.

"This is not a radical thing," Wilson said, "it is an organizational improvement." He added that some additional money will be spent on air defense, but no figures are available.

Co-ordination of air defense activities by the three services in the past has been effected only by mutual agreement. If USAF believed that Nike missile stations or picket ships were needed at certain points, it could only ask the Army or Navy to provide them and final decision rested with the other service.

Under CADC, the request will go to JCS if necessary to get action. Conversely, Army and Navy responsibility has been increased to produce the men and weapons demanded by Chidlaw.

Army element of the new joint command will be the Anti-Aircraft Command headed by Lt. Gen. John T. Lewis. The Navy has not designated an admiral to command Naval forces participating in air defense.

McDonnell's Missile Backlog: \$12 Million

McDonnell Aircraft Corp., St. Louis, has a backlog of \$12 million in contracts for development and production of guided missiles, the company reports. Total backlog for missiles and airplanes is \$441,371,868.

Missile projects include ground-to-air, air-to-air and air-to-ground weapons, the St. Louis firm says. A major project calls for participation in development and production of the Talos missile system.

Talos is one of a family of missiles developed originally at the Applied Physics Laboratory, Johns Hopkins University, under a Navy Board Section T contract with the project name of Bumblebee.

Prime contractor for the Talos production is Bendix Aviation Corp.'s missile division; McDonnell's participation in the project may be in the role of a subcontractor to Bendix.

► **Sales Decline**—McDonnell also reports total sales of \$123,091,691 for the year ended June 30, down 7.82% from the previous fiscal period. The decline was attributed to completion of the F2H-3 Banshee contract and production stretchouts ordered on the F3H Demon and F-101 Voodoos. McDonnell built 895 Banshees for the Navy.

Earnings after taxes were \$3,621,417, or \$5.03 a common share.

The report also reveals:

- Deliveries continue on the Navy's F3H Demon and are scheduled to run

through 1955 and 1956. Beginning with the 61st airplane, improvements in airframe and equipment will be installed, including the Allison J71 jet engine with 9,500 lb. thrust. This version of the Demon will be designated the F3H-2N. Present version was grounded for three months due to engine difficulties.

- The Army-Air Force XV-1 convertiplane is undergoing flight test, and research is continuing on the XHCH-1 cargo unloader or flying crane for the Navy.

- The company nearly has completed a new building with 502,937 sq. ft. of space. It will house a 10,000-ton hydraulic press.

New Assistant USAF Secretary Nominated

Lyle S. Garlock, deputy comptroller in the Defense Department since 1951, has been nominated by President Eisenhower to be Assistant Secretary of the Air Force (Management).

Garlock would fill the immediate vacancy left by the resignation last month of H. Lee White (AVIATION WEEK June 28, p. 17). Under the USAF reorganization plan approved by Congress, the post will be divided into two new jobs. Pentagon observers assume Garlock automatically will be named Assistant Secretary (Financial Management) under the new setup.

Other duties covered by the present office will be vested in a new Assistant Secretary (Manpower, Personnel and Reserve Forces). There have been no indications who will be named to fill this post.

Garlock, 47, is a native of Walnut Grove, Minn. Employed in the defense department since 1948, his entire career there has been devoted to Budget Division problems.

Firestone Plans New Guided Missile Plant

Los Angeles—Firestone Tire & Rubber Co. plans to build a \$2-million plant here to increase production of the Army's Corporal guided missile.

The 350,000-sq. ft. plant will be adjacent to the Firestone tire factory and will be used solely for missile production. Plans call for the building to be completed in about five months.

Leonard K. Firestone, president of the California Division of the company, describes the Corporal as a surface-to-surface missile capable of carrying either atomic or high-explosive warheads. It is an electronically directed weapon fired from a mobile launcher.

The missile already is in production at Firestone's present plant here.



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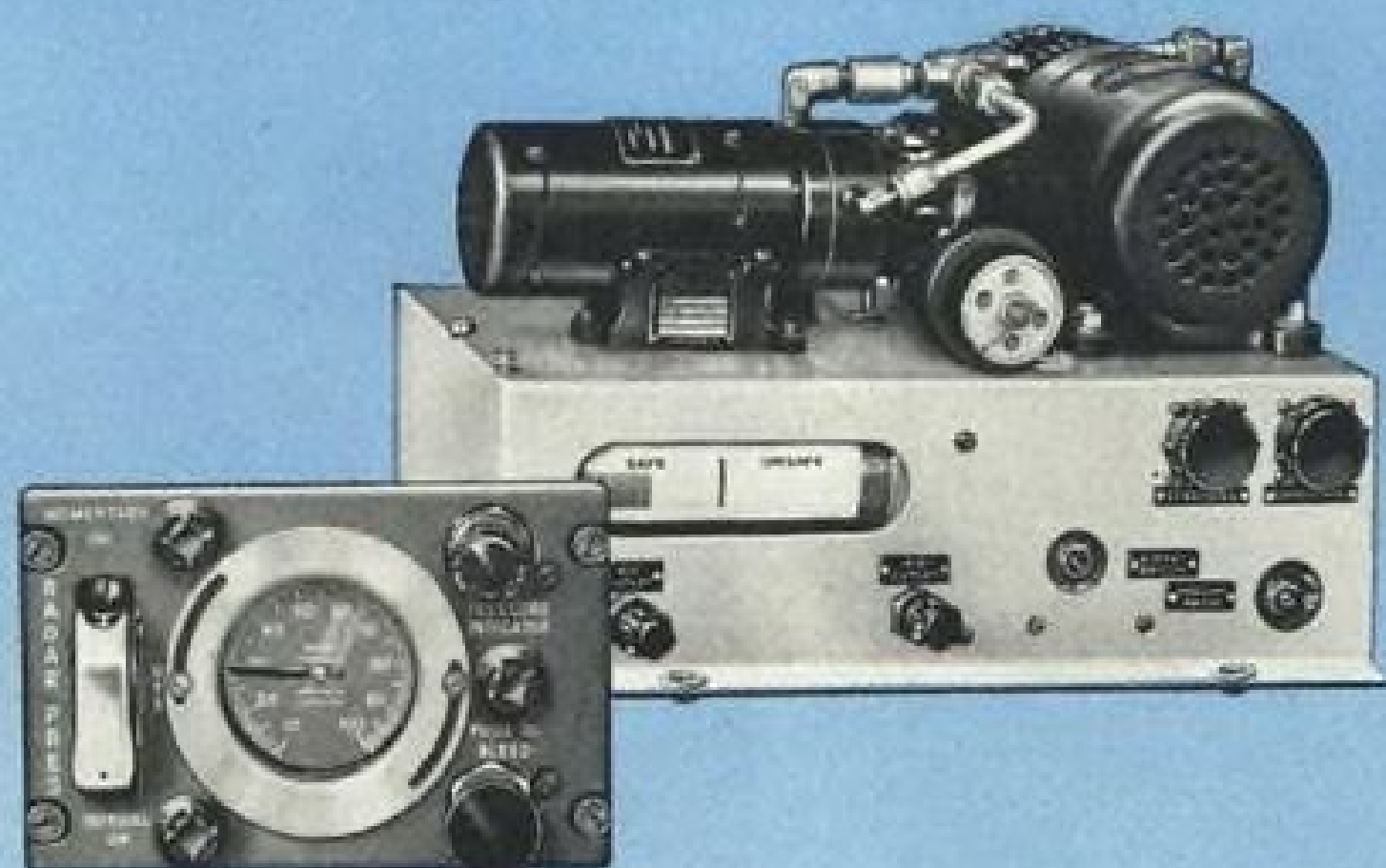
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Is F-104 Mature Light Fighter?

Prototype's high performance indicates it represents a fully grown version of the lightweight concept.

By William J. Coughlin

Los Angeles—Unveiling of Lockheed Aircraft Corp.'s prototype XF-104 has brought to light an interesting new Air Force slant on the lightweight fighter concept, a subject debated hotly not only within USAF headquarters and the industry but before the public in a number of national magazines.

The few details available on the F-104 (AVIATION WEEK July 12, p. 15) indicate it could be the compromise of the lightweight concept that one high Air Force officer feared during the Korean war, when he said:

"Under our present methods for getting new fighter aircraft through the design stages and into combat there will evolve a lightweight air-to-air fighter that will fail to live up to the new concept.

"Somewhere in the design and production program, our all-weather requirements, our safety programs, our way of designing a fighter for more than one operational function and our insistence upon multiple emergency systems will compromise the so-called lightweight concept. The result will be a 1954 F-86."

Since it is 1954 and the XF-104 checks in at just about the same combat weight as the F-86E, his remarks seem to be most timely.

► **Full-Grown Concept**—But those same details also indicate that the F-104 might be a lightweight fighter which, although it is not a stripped-down hotrod, has performance so high that it represents the lightweight concept grown to its full maturity.

Its potential performance is said to be almost double that of present fighters of the Korean vintage.

The new Lockheed aircraft is not the hotrod many Korean fighter pilots were lobbying for after their return home. The man responsible for its design, Clarence (Kelly) Johnson, Lockheed's chief engineer, never was a believer in the stripped-down school.

If the F-104 proves as successful as the Burbank company believes, however, the new aircraft could bring radical changes in U.S. fighter strategy as well as production techniques.

One thing is certain: The Lockheed entry must prove itself to both sides of the lightweight controversy—those who do not believe in the lightweight concept under any circumstances and those members of the "strip it down" clan who fear any compromise.

► **Combat Born**—The controversy was born in the swirling air battles in MiG Alley during the early days of the Korean fighting. U.S. fighter pilots returned to report that Russian-built MiG-15s were outperforming their F-86 Sabres in several important combat characteristics. The MiG, they said, could fly higher and climb faster.

The reason: The Sabre was two tons heavier. Too many gadgets were adding weight and complexity to U.S. fighter planes, they said. Heavy items like electronic gunsights were cutting down the performance of the Sabres and then failing to operate at crucial moments.

Their combat experience was echoing what some U.S. aircraft designers had warned in the fight against complexity.

Despite the 15-to-1 superiority of the Sabre over the MiG, the Pentagon was besieged by returning veterans of the Korean air war. They bombarded Air Force brass with demands for a stripped-down fighter which could climb higher and faster than a MiG-15 and which could outperform it in all respects.

These demands for a hotrod aircraft boiled over into public view in such articles as Look magazine's "Red Jets Can Rule the Skies" and Collier's "Safety Gadgets—Do They Kill Our Fighter Pilots?"

One of the leaders in the movement was one of America's most respected aces, Col. Francis Gabreski. His views were supported by other top aces.

► **ARDC Blows**—The argument carried implications far beyond the purely military dictates of the Korean war. The Air Research and Development Command considered the assault on such items as the radar gunsight a direct attack on its research and development theories and an indirect blow at the philosophy under which ARDC was set up as a separate command.

And at least one officer was quoted as saying: "The big problem is to get a good plane design past the Air Materiel Command. It almost seems the AMC automatically thinks a design is no good unless it is loaded down to the wheels with gadgets."

In general, those who argued for a lightweight fighter wanted to cut down both the weight and complexity of our combat fighter aircraft. This is what they wanted:

- **Superior performance.** Higher Mach, higher service ceiling and higher rate of climb than a MiG-15.

- **Ease of maintenance.** Elimination of such complex features as the AICM and A-4 electronic gunsights.

- **Capability of inexpensive, swift mass production** to meet Russia's expected swarms of MiG-15s and improved MiG types.

- **Ability to operate from forward landing strips—short field performance.**

Fighter pilots from the Fourth and 51st Fighter-Interceptor Wings in



Rocket Copter Can Be Flown With One Hand

Small Rotor-Craft RH-1 "Pinwheel," one-man copter powered by tip-mounted rocket units, is piloted with only one hand to demonstrate its stability. Latest view of the RH-1 shows some changes over pictures previously carried in Aviation Week (July 12, p. 9). A small adjustable horizontal stabilizer

has been added for trim purposes and braces from the rotor hub support post to the extremities of the landing gear struts have been removed. Support post has been beefed up to compensate for deletion of braces. Removal of struts resulted in an important weight saving and simplified the structure.

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Korea talked of a lightweight fighter in terms of perhaps 10,000-lb. fighting weight, a speed of slightly more than Mach 1 and a fighting altitude of 50,000 ft.

► **Versatility Need**—The critics of this lightweight philosophy had one answer for this: "You are asking for a plane designed to fight against a specific aircraft in a 100-mi.-wide strip of air just south of the Manchurian border.

"The U. S. cannot afford to build a plane that is specialized. We must be prepared with aircraft versatile enough to fight anywhere in the world against anything the enemy can put up against us."

These critics also pointed to the terrific kill-ratio of the F-86 over the MiG and asked: "How do you explain that in view of your arguments? The MiG is two tons lighter and is losing the war."

► **Ready Answer**—Fighter pilots of the Fifth Air Force, plugging for the light fighter, had a ready answer.

"This superiority has been gained in spite of, and not because of, the equipment," they said. The enemy was consistently misusing his airpower by failing to exploit his numerical advantage and the high-altitude performance of his equipment.

Besides, there could be no question about the superior ability of U. S. fighter pilots in Korea, particularly against the Red second string which was using Korea as a training ground.

► **Future Threat**—"The F-100 and its successors may provide, for the first time in history, the opportunity for an American fighter pilot to look down at the enemy," said one high-ranking officer. "However, the limited number that can be produced because of their great cost and complexity cannot possibly satisfy our global commitments. We cannot complacently assume that 100 fighters can always successfully contain 1,000.

"To meet this threat to our future security, we must be prepared to match the enemy not only in quality but in quantity. We must avoid unrealistic specifications that provide multi-purpose fighter aircraft. We must build a great force of supercharged hotrods, instead of a few hand-tooled, custom-built machines. This can only be done by the adoption of a simple, low-cost, mass-produced, high-performance fighter."

► **MiG Match**—These men did not underestimate the ability of the Russians to turn out aircraft of exceptionally high performance. But for the next 10 years, the bulk of the Red air force would be made up of MiGs and improved MiG types in great numbers.

Certainly the U. S. needs aircraft of high quality to meet the Russian "first team" aircraft, but it also needs an aircraft that could match in quantity

the swarms of MiG types, it was argued. This was to be the lightweight fighter.

The concept was condemned as too marginal. "It doesn't pay to design and produce an aircraft which is superior to a MiG by a few miles per hour and only a few thousand feet in ceiling," the opponents said. Any attempt to lead U. S. designers down the path to building improved MiGs would be fatal to U. S. air strategy, they warned.

► **Gunsight Handicap**—The arguments often centered on the F-86 radar gunsight, both because it was complex and because it was vulnerable. There could be no question that inadequate logistic support, poor maintenance training and lack of pilot familiarity made the radar gunsight more of a handicap than a help in early days of Korea.

It was no surprise that early returnees from the Far Eastern combat theater pleaded for a return to the "chewing gum on the windshield" type of gunsight. The percentage of missions on which the gunsights were inoperative was so high that what really was surprising was the fact that demands for their removal were not successful.

But the gunsights stayed in. Gradually, an all-out training and logistic effort resulted in a high in-commission rate that made the sight very acceptable to fighter pilots in the latter stages of the Korean conflict. In the last year of the Yalu River fighting, it was hard to find a pilot in Korea who would argue against the A-4 gunsight—even in a lightweight fighter.

► **Concept Shift**—Although some of the lightweight advocates continued to argue against such items as the radar sight on the basis of its poor performance in the early part of the war, it became apparent that some shift in the lightweight concept was inevitable.

If the lightweight fighter was to be mass produced, it would require a mass-produced pilot. These obviously could not all be natural-born fliers who could score in supersonic combat with "chewing gum on the windshield." Even the lightweight aircraft would have to be one in which an average pilot successfully could accomplish his mission.

It is interesting to note that the F-104 contains a radar gunsight. This alone will be enough to make some of the lightweight philosophers unhappy.

► **Compromises**—An aircraft design is a series of compromises. Weight is in direct ratio to such factors as armament, pilot safety, range, performance and others. So some changes occurred in the USAF lightweight concept.

Those changes are embodied in the F-104, built by a firm that never believed in the stripped-down philosophy to start with. Lockheed's "aluminum silver" is designed to handle the best the Russians are expected to produce in the years just ahead. This is not an

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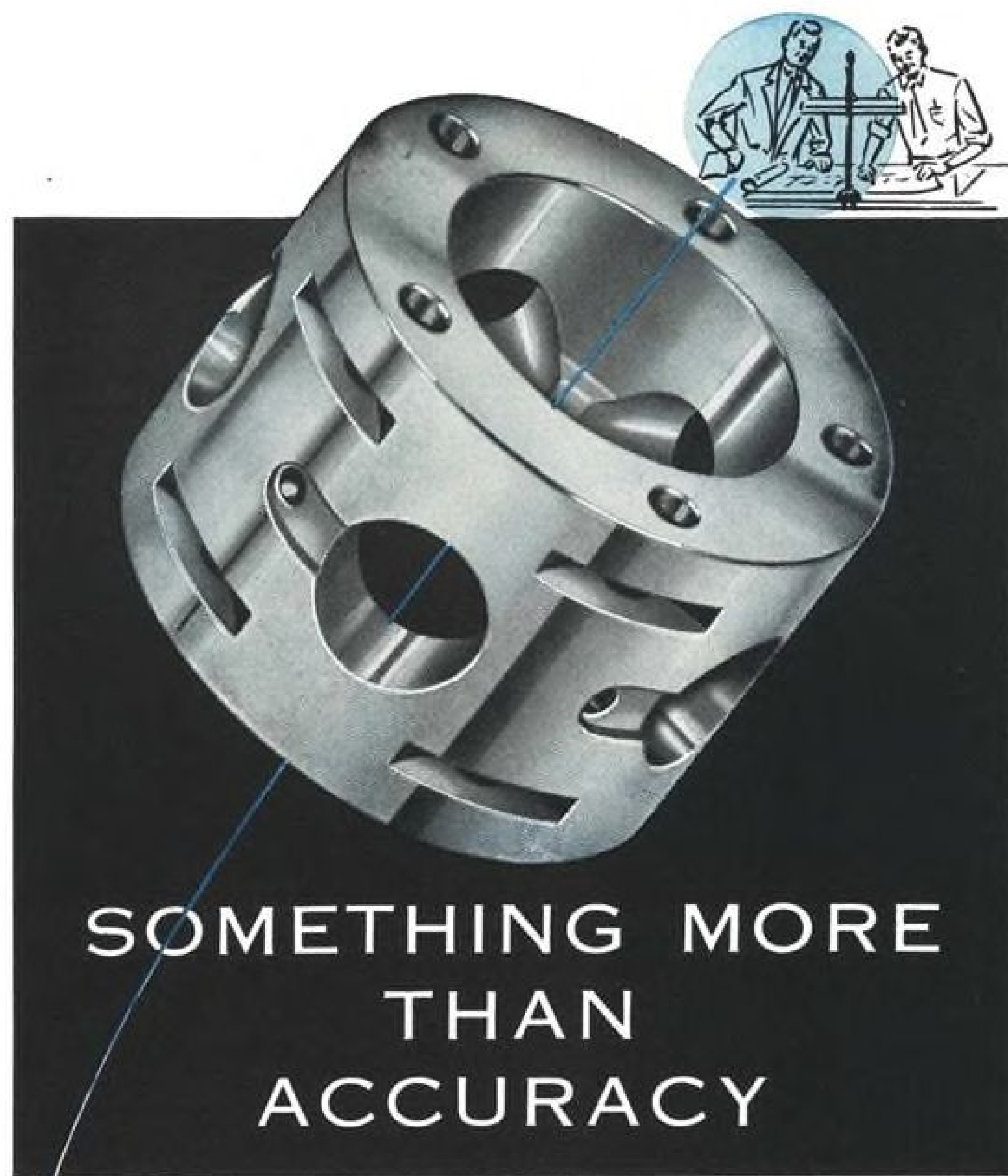
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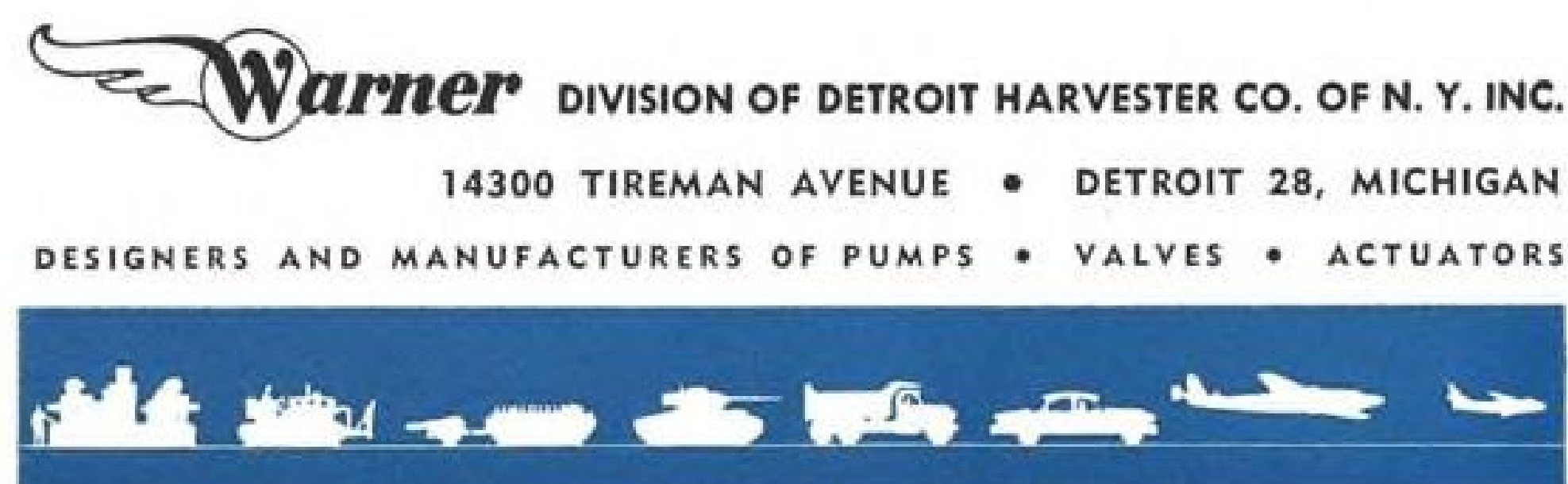


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aircraft aimed at the Red "second team."

The XF-104 is not a stripped-down aircraft, although it is lightweight in comparison to its performance capabilities. This is expected to be a firstline fighter, with high kill probabilities due to its superior performance.

Estimates of its speed capability vary from 1,000 mph. to 1,500 mph. There can be no question that with its ultimate engine it will be well over Mach 1, perhaps near Mach 1.5.

"This aircraft won't have to take a back seat to any of the big jobs in either performance or firepower," predicts an Air Force source.

► **Double Strength**—At the same time, the lightweight concept of inexpensive, simple mass production has been retained.

Depending upon the size of the production order, the F-104 could cost less than half of what some of the heavy-weight fighters cost, according to one source. This could mean double the fighter strength for the same budget expenditure.

Before you nod your head at that, consider a question already troubling some Air Force officers: How could USAF fit so many aircraft into its present wing structure?

► **'24-Hr. Fighter'**—The XF-104 contains the usual features for pilot safety, such as an ejection seat, although reduced in weight in many instances.

It has been described as a "24-hr. fighter," so some thought has been given to all-weather operation. The instrument panel, although small and simplified, has provision for instrument landing equipment. Range and armament are said to be better than those of U. S. fighter planes that fought in Korea.

In appearance the XF-104 slightly resembles the missile-shaped Douglas X-3 research aircraft, a resemblance emphasized by its stubby thin wings and long spear-nosed fuselage. The wings are placed so far back that from the cockpit it is possible to see only the tips.

The aircraft's appearance indicates it probably will require a field-length close to that of present fighters despite the increased thrust available at comparable weight.

► **Radical Changes?**—The XF-104, heavier than other lightweight proposals, is neither fish nor fowl in terms of the lightweight argument that raged during the Korean fighting.

It will be interesting to see how it stacks up performance-wise, not only against such heavyweight aircraft as the F-100, but against such hotrods as the Douglas A4D.

The answers could result in some radical changes in the U. S. fighter picture.

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Flying an Indo-China B-26 Strike

Correspondent rides with a French mission before the cease-fire, reports FAF hit Reds only half the time.

By A. W. Jessup
McGraw-Hill World News

Haiphong, Indo-China—French Air Force found no positive use for airpower against Communist Vietminh troops despite nearly eight years of jungle fighting in Indo-China.

FAF's striking force of World War II aircraft killed some Reds and destroyed some Vietminh supplies. But the air strikes also damaged loyal Vietnamese, destroying villages and killing families of soldiers fighting alongside the French. **► Lonely Mission**—Shortly before the cease-fire became effective, I flew with the French on a bombing mission against a battalion of Vietminh rebel regulars holed up in a village a few miles from the Communist headquarters at Vinh. We did some good.

It was a lonely mission: a single B-26 carrying eight 260-lb. fragmentation bombs.

We took off from FAF's Cat Bi base on the outskirts of Haiphong and struck south across the delta into Red-held territory. One hour after takeoff, we completed the third and final dive-bombing run on two key points in the tree-shrouded village. As we swung around, two or three secondary explosions shook the village, indicating we probably had touched off a small Communist fuel or ammunition dump.

► Pulverized Village—The day before, it was different. My pilot, Capt. George Golay, who won France's highest decoration flying with the Free French forces in World War II and who learned his dive bombing technique last year at the U. S. Air Force's base at Sidi Slimane in Africa, led a flight of 20 bombers against a small, supposedly Vietminh-held village smack in the middle of the delta.

The village was only five miles from the city of Hai Duong, about halfway up the railroad to Hanoi. From it, the Communists were believed to be raiding the railroad.

Twenty bombers flattened the village. There were no secondary explosions. Only a small cloud of dust and a few small fires remained of a mud and straw town. The pilots believed they had pulverized one more quiet village in the delta.

► Evasive Target—Pilots say they hit Communists only half the time. The trouble was that the French and Vietnam ground forces were unable to hold the Reds within easily definable target areas.

The delta, for example, consisted of some 6,000 villages. More than half

were held by the enemy, and another group was neutral.

But no one was sure from one day to the next which villages held Reds and their supplies.

► Safe Strike—Bombing missions in the delta or to the south around Vinh were simple and safe.

The single B-26 strike did not climb above 4,000 ft., and for a long way across the delta we stayed around 3,000 ft. The 20-bomber mission was flown about the same way. The bombers went across the target at 2,000 ft.

Transports were hit with light arms fire in the delta area, and some light liaison aircraft were shot down by Communist ground forces.

On the rim of the delta west and north of Hanoi, the danger was greater. The Communists had moved more than 100 37-mm. anti-aircraft guns into this area from Dienbienphu.

Red gunners shot down one B-26 and four Bearcats during the next to last week of fighting. The B-26 went down only 10 miles from friendly troops, but the French were so short of helicopters that it was impossible to pick up the survivors.

► No Push—In addition to three B-26 squadrons split between central and north Vietnam, the French used two squadrons of F8F Bearcats, assisted by Fleet Air Arm squadrons of F6F Hellcats and SB2C Helldivers.

On good days, each squadron mounted 25 sorties. Usually, however, the number was much less. There was no push and drive here or at Bach Mai, near Hanoi, comparable with that of the U. S. fighter groups in Korea.

It took close to two hours to get a



B-26 mission aloft, and nearly an hour for a Bearcat flight to get away. This did not include the regular standby flight of F8Fs on 15 minute alert.

► **Haphazard Operation**—Target selection appeared to be haphazard at the high command echelon. At the air base, air intelligence officers seemed to know something of what the job was but were frustrated by orders that directed air operations with little if any relationship to a coordinated battle plan or military objectives.

One operation that failed was the chopping up of the mountain roads over which Communist supplies funneled down from the China border. The bombers kept after 100 to 150 key points. The results were negligible.

During a six month period, 170 tons of bombs were dropped on one twist of mountain road called Vermicelle. Despite this, the road was good as ever when fighting stopped. From time to time, the Reds were forced to slide supplies across a broken stretch, with trucks shuttling back and forth on each side. However, the Reds were able to mobilize almost unlimited amounts of manpower to offset the inconveniences placed in the way of their mechanical transport.

► **Munitions**—Bombs used by the French included 500- and 1,000-lb. high explosive and 260-lb. fragmentation types. Some five-in. rockets also were fired from the air.

One weapon that was most useful in Korea—napalm—was “not too effective,” according to French Air Force officers.

Dropped in the jungle, it usually burned out in the tree tops without harming personnel and supplies underneath. In the open, the Vietminh dug small foxholes; when napalm was dropped, they pulled their heavy straw hats over the hole and frequently, according to French intelligence, escaped injury.

All munitions were American made.

► **High Losses**—Bearcats were used as fighter-bombers and for photo recon-

naissance. The latter missions had a high rate of loss. Seven of 10 aircraft were lost in six weeks.

Pilots liked the F8F except for two characteristics, both associated with its design for carrier-based operations:

- Brakes frequently caught fire. The brakes were not designed for non-arrested landings requiring fairly long brake application, but for short, quick application on carriers.

- In bad weather operations, the short Bearcat was extremely sensitive to controls. Several fighter pilots are believed to have lost control while flying through heavy weather.

► **Jet Question**—Everyone would have liked to have had jets for the Dienbienphu operation. With F-84s or Banshees, they say FAF would have suppressed the flak that damaged so many C-119s and C-47s (AVIATION WEEK July 26, p. 24).

A problem would have been where to base jets. This strip was inadequate, and Bach Mai was even less qualified. Tourane might have been used, but it would have been a long haul to the fighting front.

Communications facilities also were inadequate for jet operations. In fact, it was almost impossible to coordinate the fighter support with the transport missions as it was.

Jet operations call for up-to-date navigational aids and for radar control equipment, none of which were available in Indo-China.

Committee Scores AF Transceiver Contract

The House Military Subcommittee of the Committee on Government Operations has criticized USAF for its purchase of \$100 million in RCA transceivers “of untested, revolutionary design.”

The subcommittee says it is not critical of the \$240,000 study contract awarded in 1945, the development con-

tract let three years later nor the start of production of the prototype AN/ARC-21 high frequency transceiver.

Chief point of criticism is the fact that USAF did not cancel the contract until June 28, “although long before it had decided to adopt commercial equipment” (Collins 18S-4 and 618S-1 transceivers).

► **Navy vs. AF**—USAF bought the AN/ARC-21 model for Military Air Transport Service, Tactical Air Command and Strategic Air Command. The subcommittee says Navy, on the other hand, spent approximately \$1 million on the development of the AN/ARC-26 model by Collins Radio Co., Cedar Rapids, Iowa, before it decided the model was not feasible and canceled the contract.

The House subcommittee recommends:

- USAF conduct intensive tests on the AN/ARC-21 as soon as possible and the model be re-evaluated by application engineering supply and logistics and comptroller of the Office of Assistant Secretary of Defense.

- Navy make an operational suitability test on the AN/ARC-21.

- USAF make a study to determine if further deliveries should be made by RCA before all known fixes and redesigns have been incorporated into the set.

Air Force explained to the subcommittee it decided to go ahead on production of the AN/ARC-21 because of the Korean war, when supplies of an earlier model were depleted. Further production of the former model, the AN/ARC-8 used in World War II aircraft, would have required retooling by manufacturers.

► **Contracts**—USAF's first production contract for the AN/ARC-21 totaled 3,915 sets costing \$54,021,975. The second production contract, let in April 1953, called for an additional 1,843 sets plus spare parts, test equipment and maintenance data at an estimated cost of \$38,297,638.

“The record doesn't support Air Force ordering more and more radio sets of untested revolutionary design to the extent of \$100 million. Nor does the record support Air Force's complete reliance on an untested model to fill its critical needs and its failure to make timely provision for substitute equipment so that men and planes might be provided with vital necessities of long-range radio communication,” the subcommittee says.

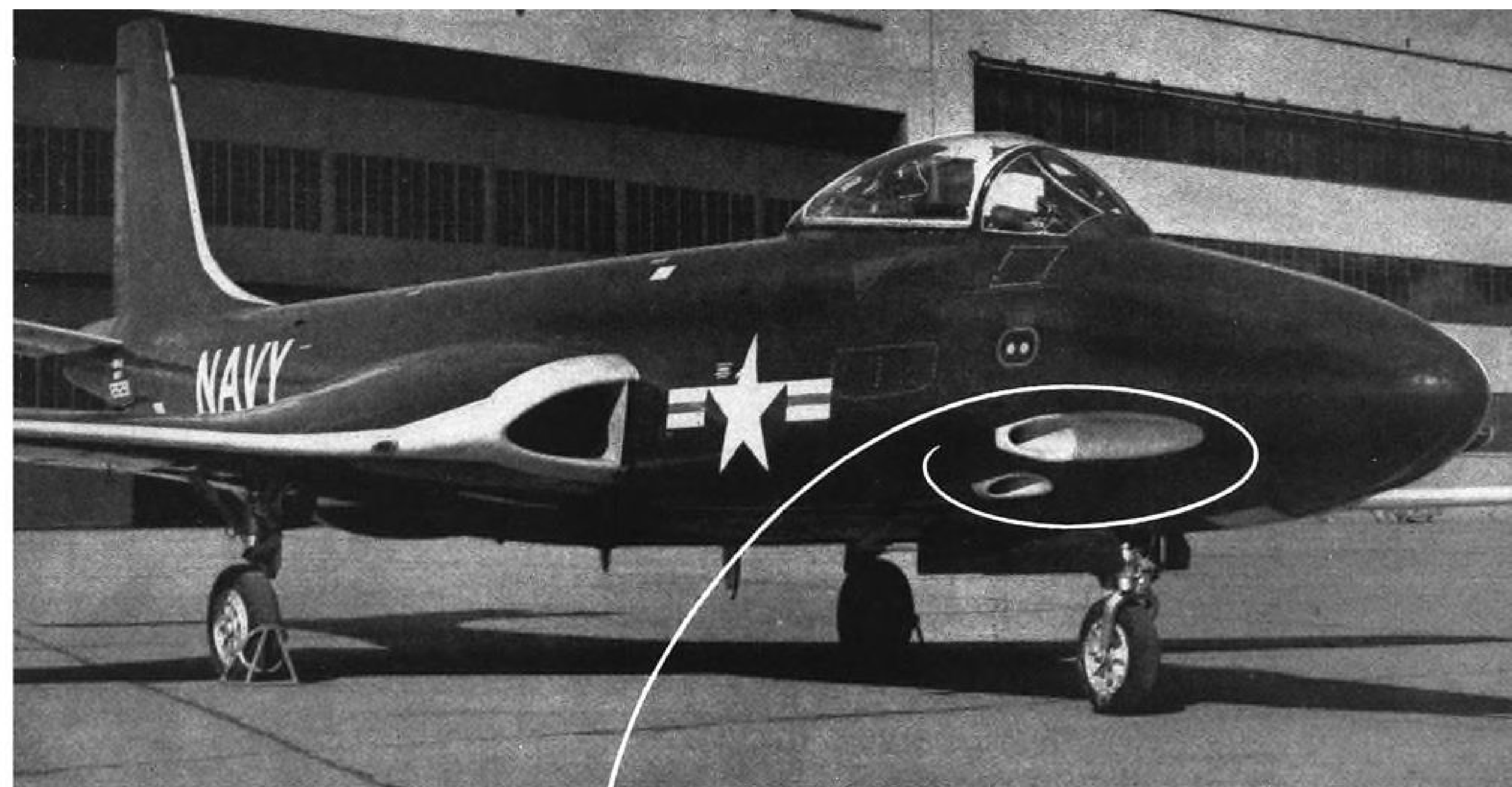
“USAF's procedures are particularly deficient with respect to re-evaluation of the program as contrasted to Navy's somewhat comparable experience where the re-evaluation of a developmental program for comparable models brought about a decision not to enter production.”

Ontario, Calif. Although they weigh nearly two tons when loaded, the auxiliary tanks do not appreciably affect the Scorpion's speed, Northrop says. They can be ejected by firing an explosive cartridge. F-89Ds are with Air Defense and Alaskan Air Commands.



Scorpion Tanks Extend U.S. Air Defense

Large auxiliary jet-fuel tanks suspended from pylons beneath the wings of the all-weather Northrop F-89D materially “deepen” the area of U.S. defense against enemy bombers. The nearly 15-ft. long tanks now are being fitted on Scorpion production models at



National Seamless Tubes “back-up the blast” of Navy Jet's guns

NATIONAL USS Stainless Seamless Tubes are being used as gun blast tubing on the F2H-3, a McDonnell jet interceptor. The actual gun openings shown on the photograph are castings. But directly behind them, mounted over the machine guns' muzzles, are the gun blast tubes.

The job of the blast tube is to restrain high pressures caused by the firing of the gun, and to prevent the backflow of muzzle gases into the plane itself. These gases are highly explosive, and must be kept from the inside of the plane.

Previously, the 1 1/4" OD x 1 1/8" ID gun blast tubes were machined from bar stock. National Seamless Tubing, however, pierced from solid billets of USS Stainless Steel affords the absolute uniformity of wall strength required for such a heavy-duty application.

Shelby Seamless Tubing, made by National Tube, is ideal for all types of aircraft applications—landing gears, engine mounts, wing spars, longerons, fuselage struts, tail assemblies, etc. Shock-absorbent Shelby Seamless combines to the highest degree the desirable qualities of strength, safety and workability. It is uniform throughout and dimensionally accurate, possessing excellent machining and superior welding properties. Available in a wide range of diameters, wall thicknesses, various shapes and steel analyses, Shelby Seamless is produced to exacting standards by the world's largest manufacturer of tubular steel products. Bring your tubing problems to our engineers. They are here to help you.

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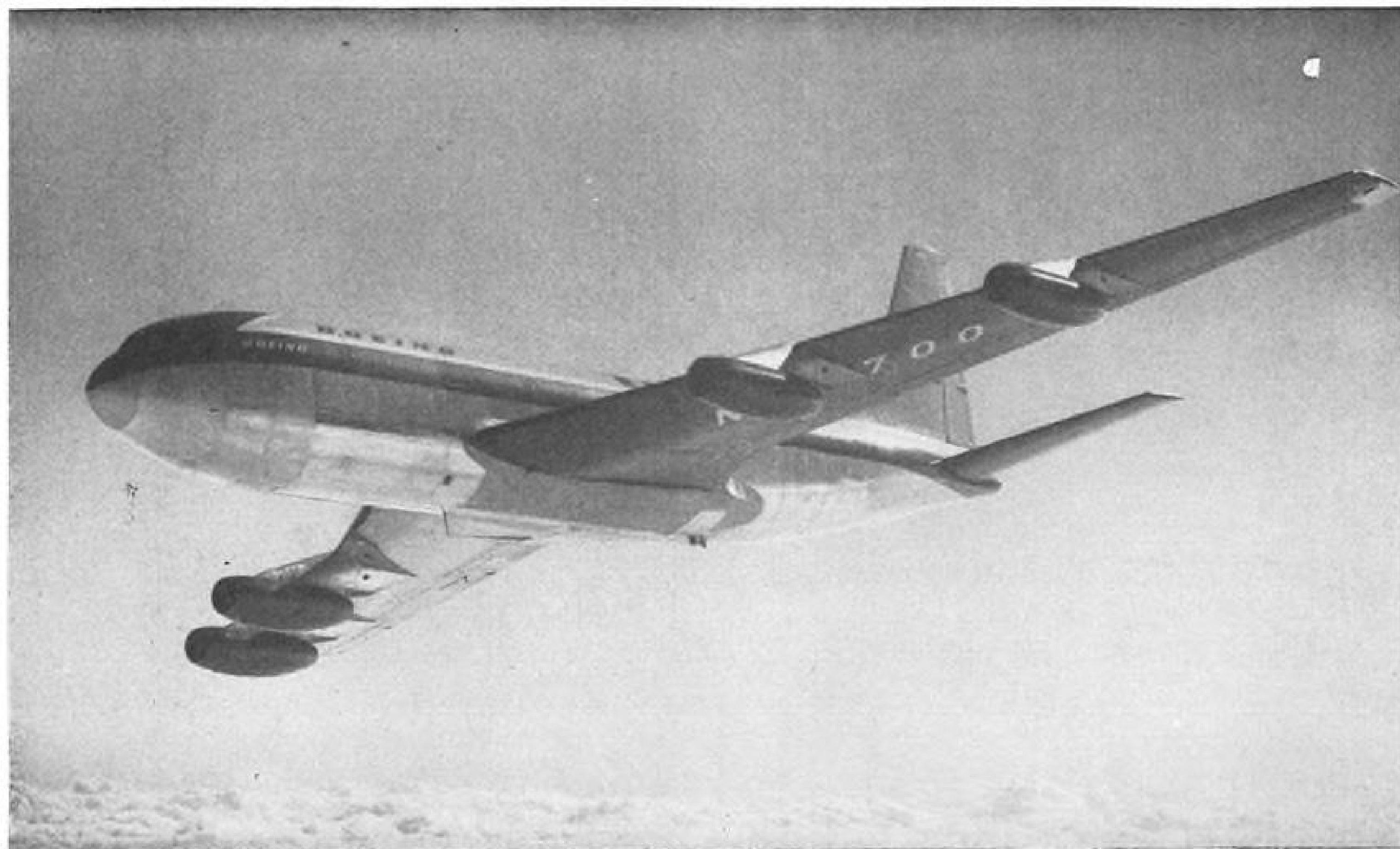


SHELBY SEAMLESS Aircraft Tubing



UNITED STATES STEEL

AERONAUTICAL ENGINEERING



BOEING 707 PROTOTYPE, in yellow, brown and silver, has reached 42,000 ft., exceeded 550 mph. in early stages of flight test program.

Final Cost to User Influenced 707 Design

By David A. Anderton

Seattle—Low maintenance and operating costs were the ultimate goals of the engineering that produced the Boeing 707 jet tanker/transport prototype.

Wherever there was a fundamental design decision to be made, it was resolved on the basis of final cost to the user of the plane.

For this reason, the basic design of the airframe is simple in aerodynamics and structure. The layout is conventional; the airframe is built like the 10-yr.-old Stratocruiser.

But careful integration of engineering effort plus the tremendous Boeing background on large jet aircraft has produced a modern transport with the performance of many contemporary military aircraft.

► **Examination**—If you walk around the airplane with the intent of studying its technical composition, you are continually distracted by the biggest eye-catcher of all: the color scheme.

The airplane is colored in canary yellow, silver trim and what has kindly been called chocolate brown. (It is more of a browned copper-bronze to these eyes.) Completely justified by the sight



AT THE CONTROLS—L. A. Binegar mans flight engineer's station of new Boeing jet transport prototype as pilot "Tex" Johnston and co-pilot Richard L. (Dix) Loesch look on.

of the plane against clouds or sky, the color scheme apparently was disliked by many of the Boeing people at first. It has since grown in their favor.

Wellwood Beall, senior vice president, explained it this way:

"The engineers decided the plane had to be painted to protect against corrosion. We felt it ought to have a light-colored top for good reflectivity. We also wanted to avoid all the standard color combinations of white top with red or blue trim, we didn't want to pick an airline's color scheme, and we wanted the final result to photograph well in black-and-white and color. So we talked to Walter Dorwin Teague and some of our own specialists, and we kept coming out with yellow and brown."

It might be pointed out that Boeing's new flight test hangar has several of its offices and conference rooms painted with brown walls and yellow ceilings and overhead structure as a result of studies made by Boeing interior specialists.

Plane Details

The immensity of the fuselage interior is emphasized by its current emptiness. The 90-ft. cavern has a completely clear floor, and there are no structural bulkheads protruding inside the inner contour. Just aft of the flight engineer's position, a photopanel and other flight-test instrumentation is fixed to the floor. Positions for three test engineers are directly behind the photopanel.

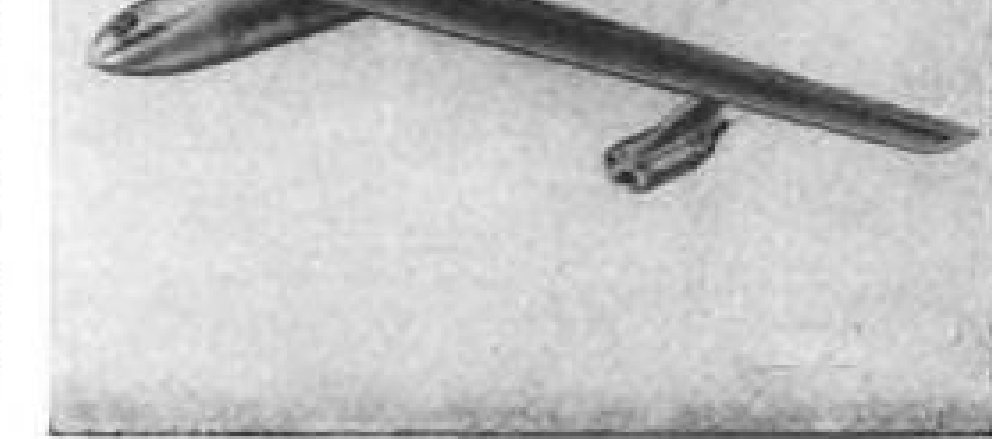
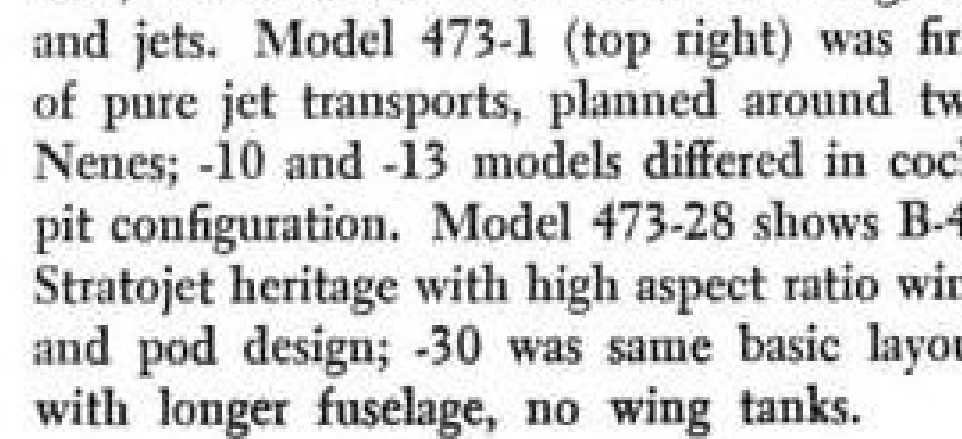
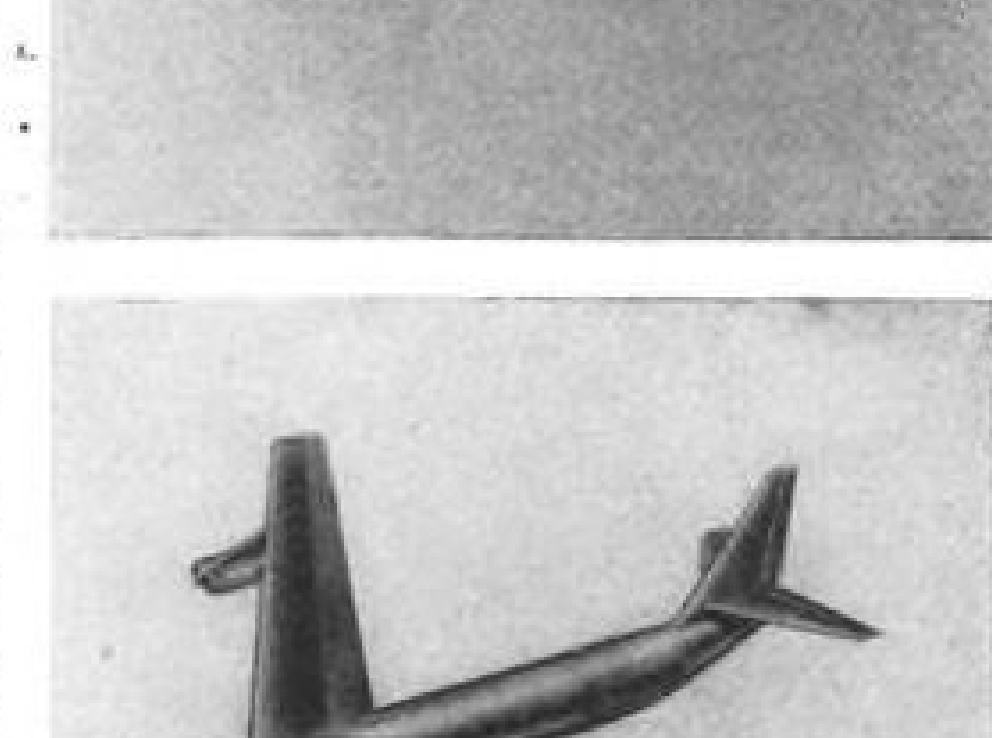
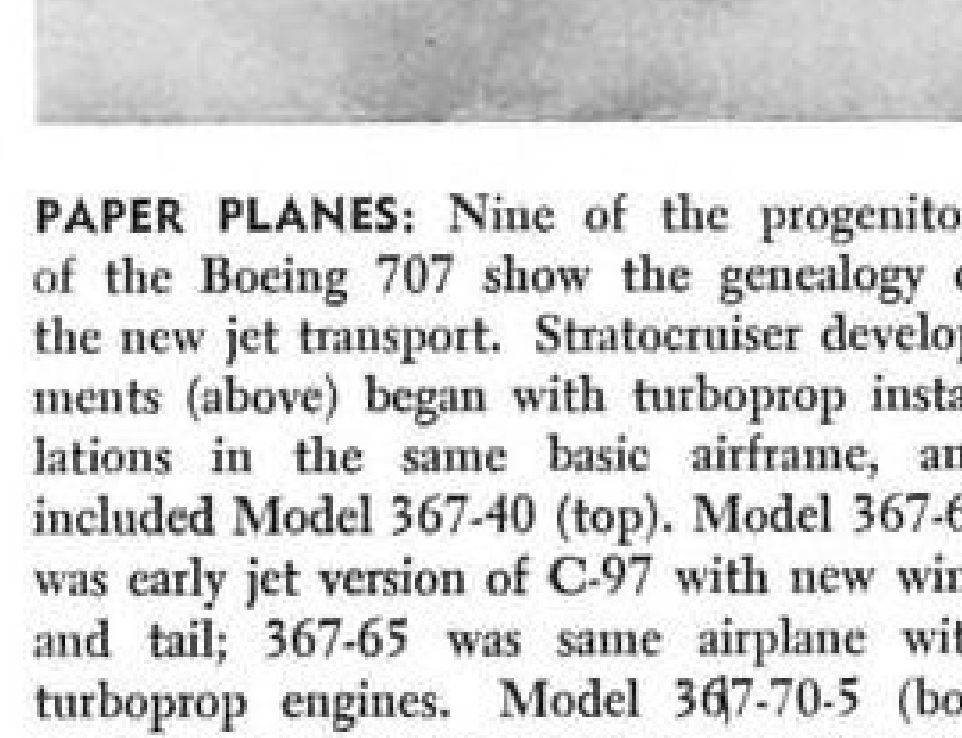
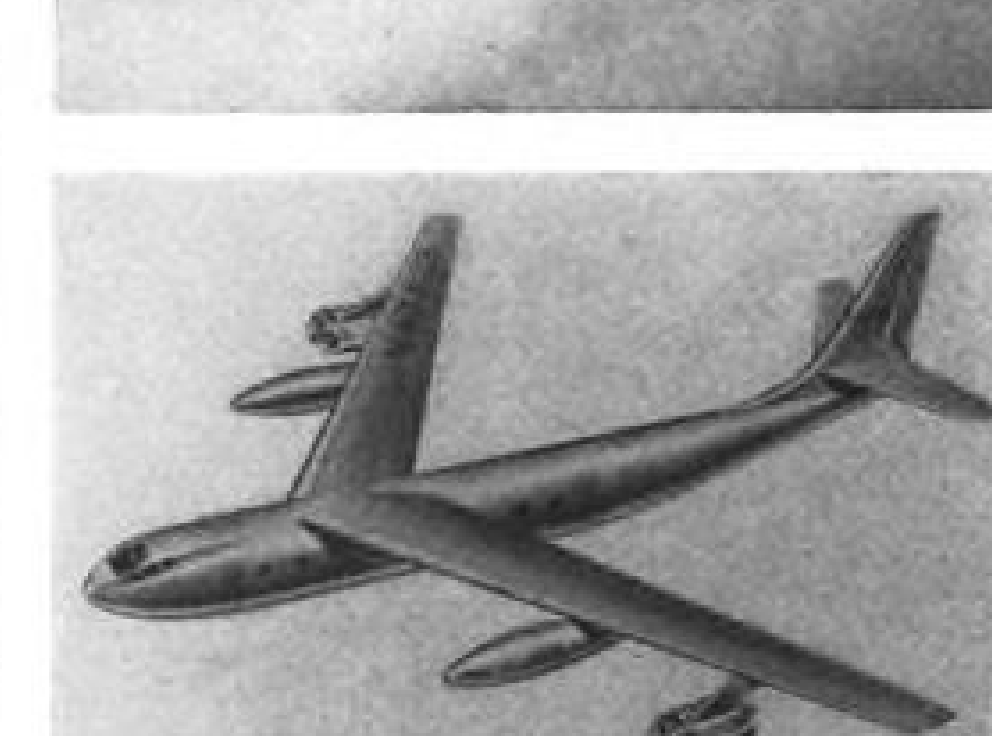
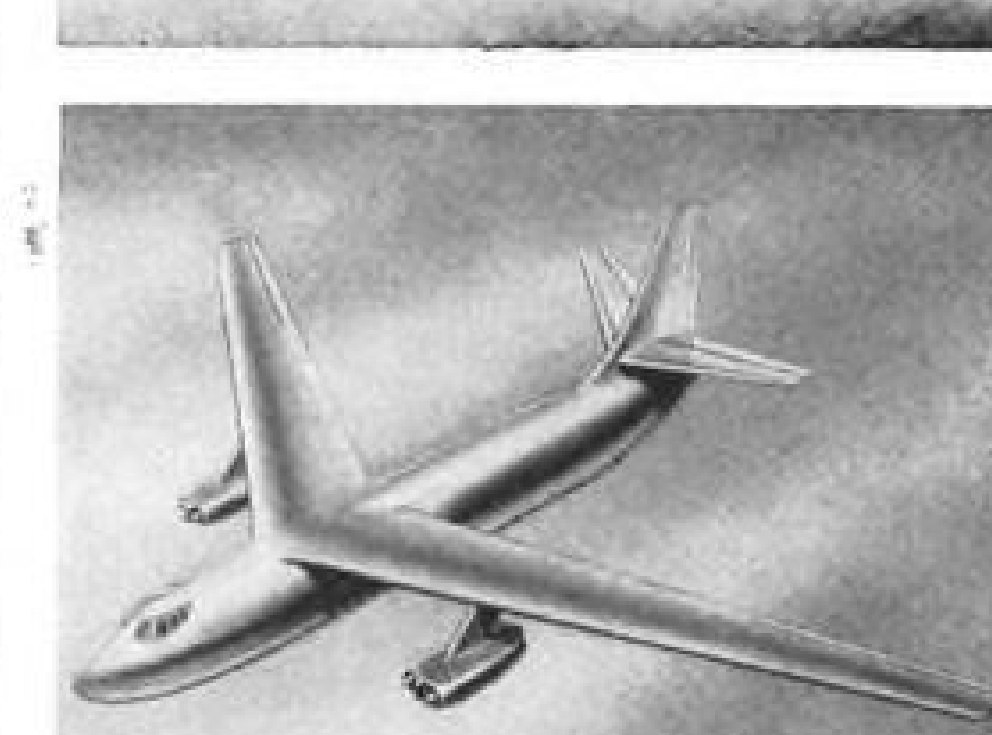
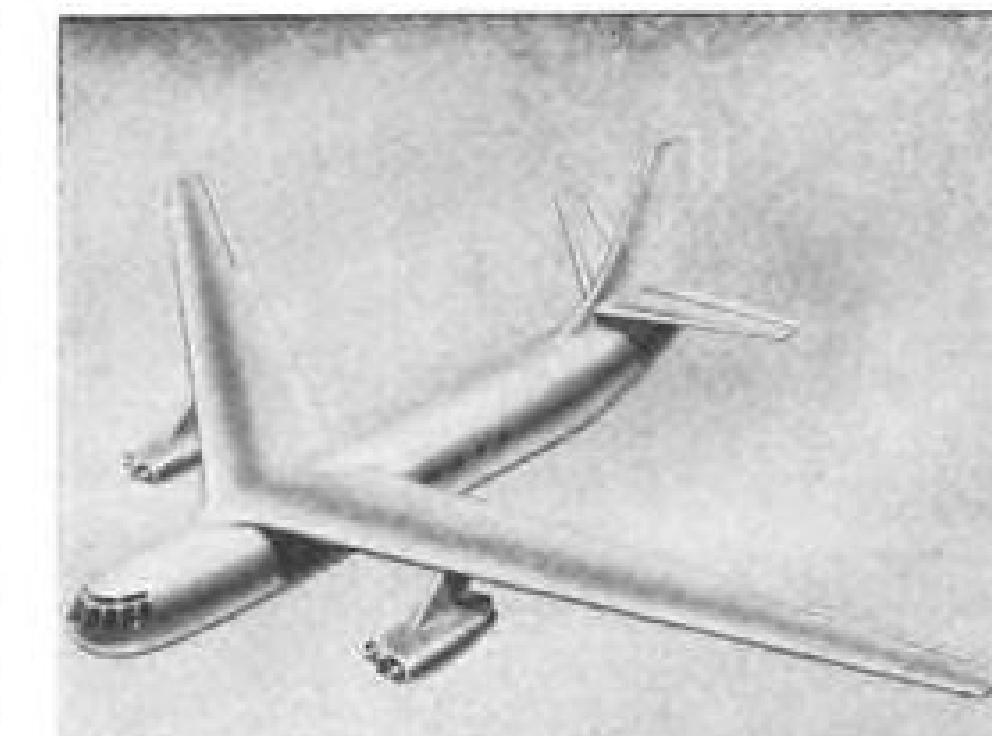
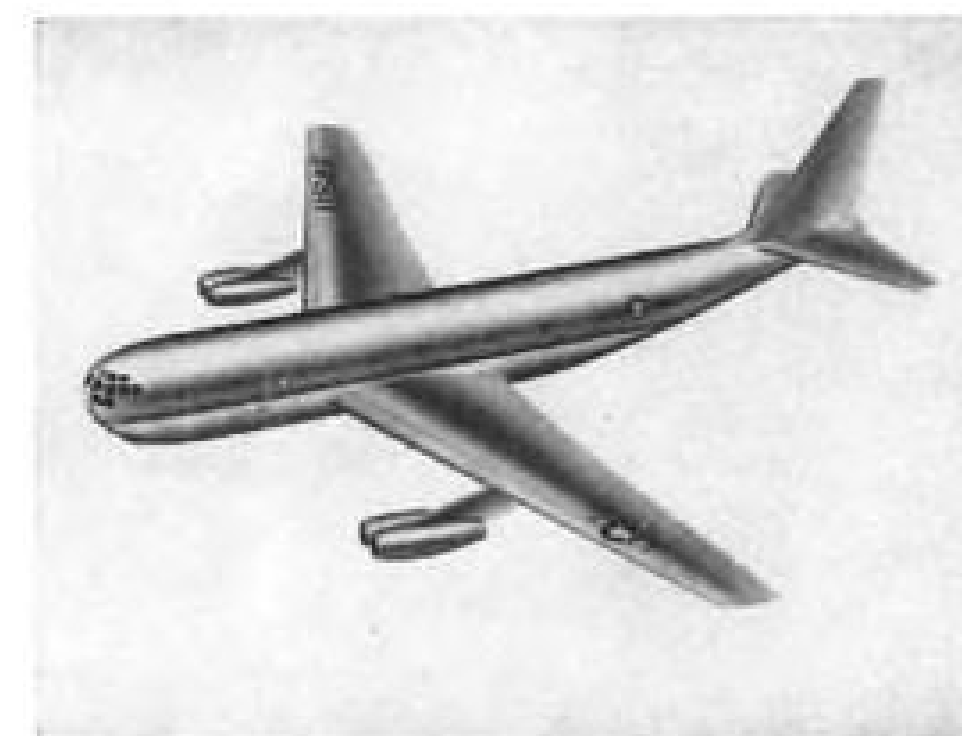
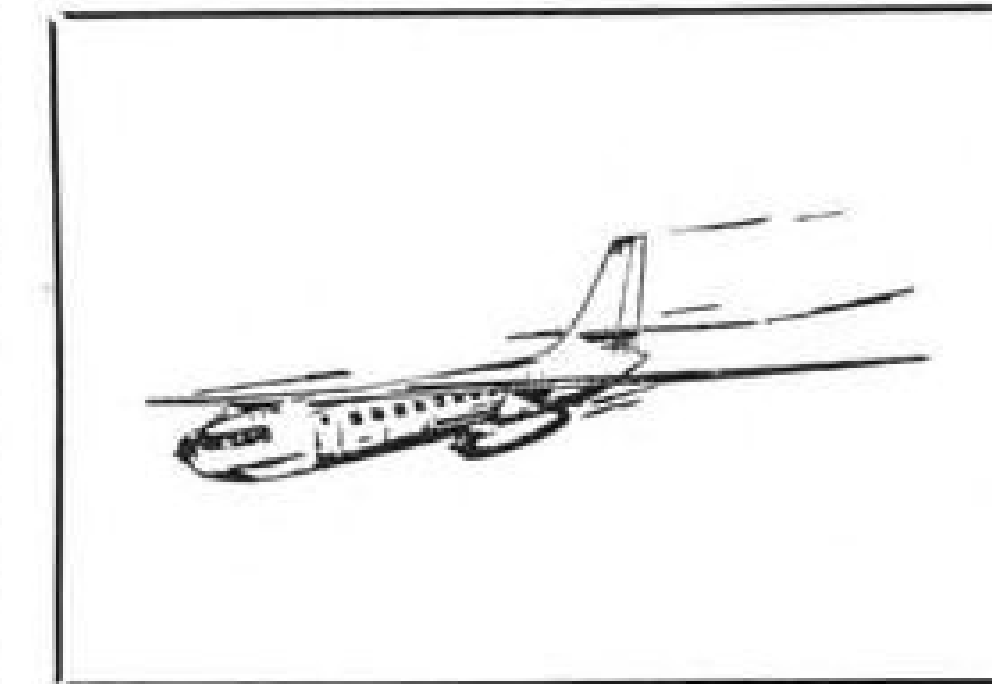
Soundproofing and a light grey-beige interior fabric have been installed. There are a few tiny windows "... just to keep the flight test boys from getting claustrophobia."

Boeing's intention for production airplanes is to install a long strip of many windows along each side of the fuselage. This way there will be at least one window by each outside seat, regardless of the spacing used in the interior arrangement.

► **Fuselage**—Fuselage cross-section is composed of two circular arcs of different radii and centers, faired into a smooth contour. Floor line is below the center of the upper lobe, which places the maximum width just about at a level with passengers' elbows. Floor width is greater than the Stratocruiser's, but the ceiling height is less.

Fuselage structure is a framework of simple rings and stringers, says George Martin, Boeing chief engineer. The floor is supported on simple I-beams, which also provide additional structure to take the pressurizing loads.

Below the floor level are cargo compartments, with about four feet of headroom. In a tanker/cargo job, this space would presumably be taken up



PAPER PLANES: Nine of the progenitors of the Boeing 707 show the genealogy of the new jet transport. Stratocruiser developments (above) began with turboprop installations in the same basic airframe, and included Model 367-40 (top). Model 367-64 was early jet version of C-97 with new wing and tail; 367-65 was same airplane with turboprop engines. Model 367-70-5 (bottom) was reworked C-97 with new wing, tail and jets. Model 473-1 (top right) was first of pure jet transports, planned around two Nenes; -10 and -13 models differed in cockpit configuration. Model 473-28 shows B-47 Stratojet heritage with high aspect ratio wing and pod design; -30 was same basic layout with longer fuselage, no wing tanks.

TOMORROW'S AIRCRAFT: *One step closer*

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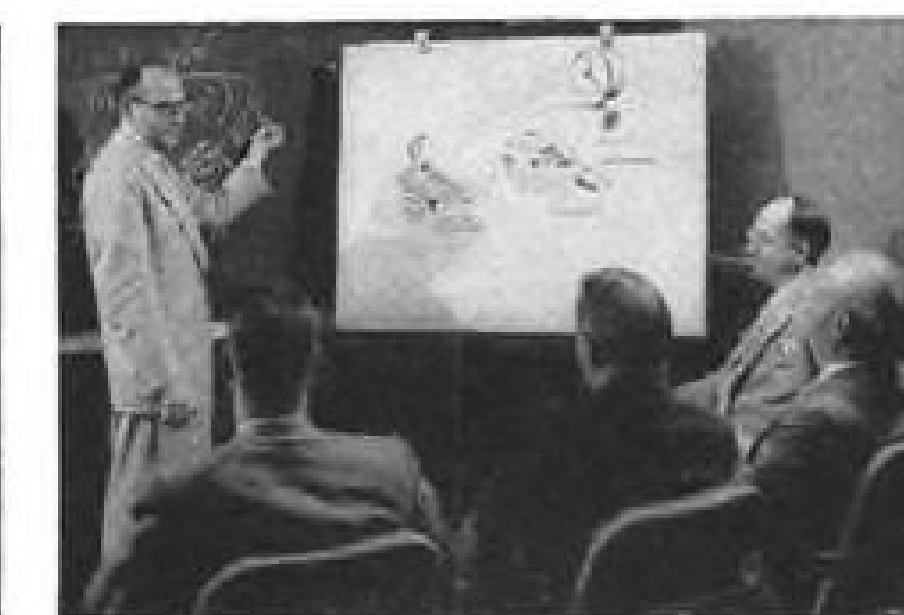
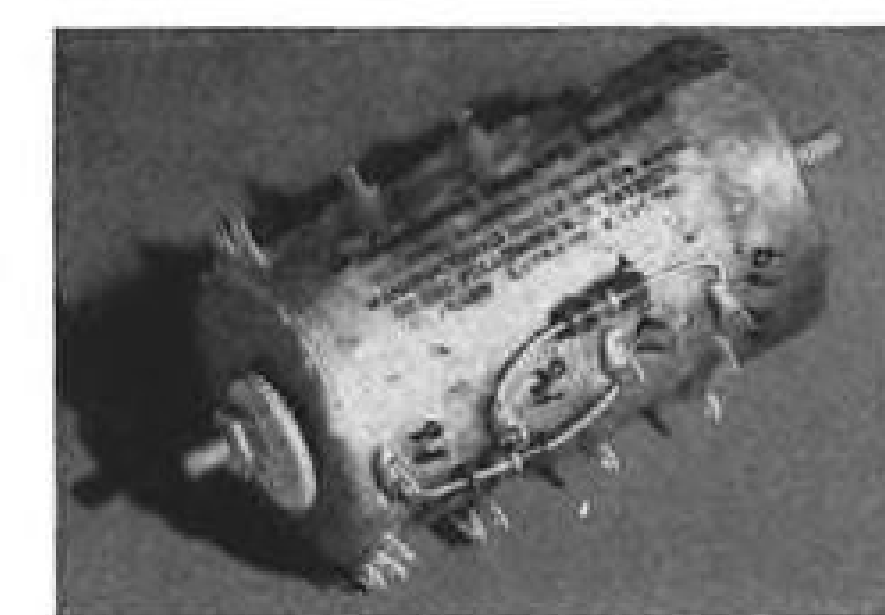
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This "package-engineering" results from intense Air Arm development and close Air Arm association with the special problems of airframe design and operational requirements. Such achievements in electronic-mechanical design are typical of Air Arm's efforts to bring simplicity and increased reliability into airborne systems, thus bringing tomorrow's aircraft—One Step Closer. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

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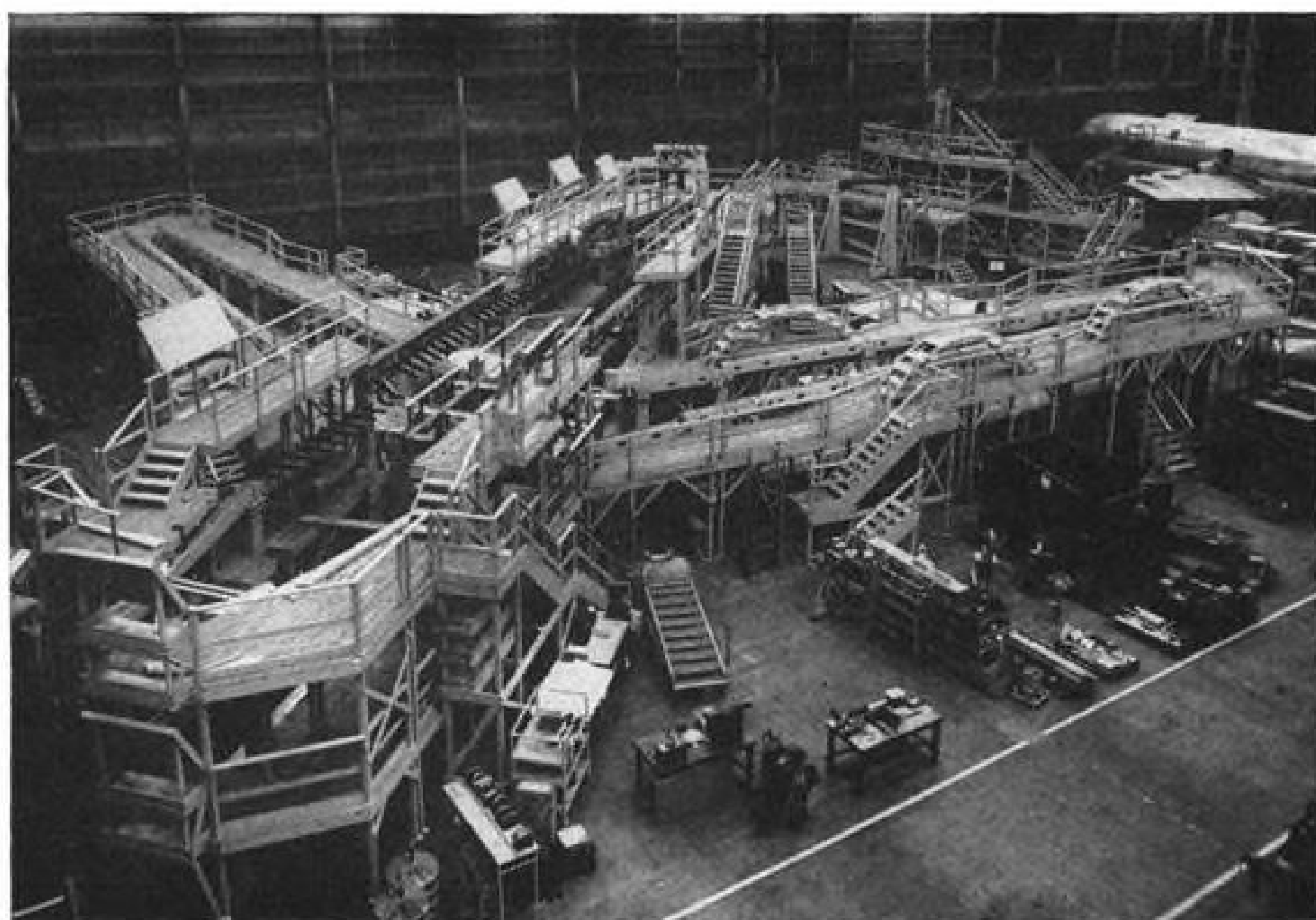
MAGAMPS typify the "package-engineering" which Air Arm applies to airborne systems. Simple and reliable as iron and copper, they are a rugged replacement for vacuum tubes. Wherever such packaging is used, maintenance is reduced, circuitry is simplified and systems are far more dependable.

The most advanced state-of-the-art is always brought to bear in Westinghouse design, evaluation and improvement of airborne systems. For example, human engineering studies help technicians perform tasks quickly, simply and surely—thus building the greatest amount of dependability into the system.

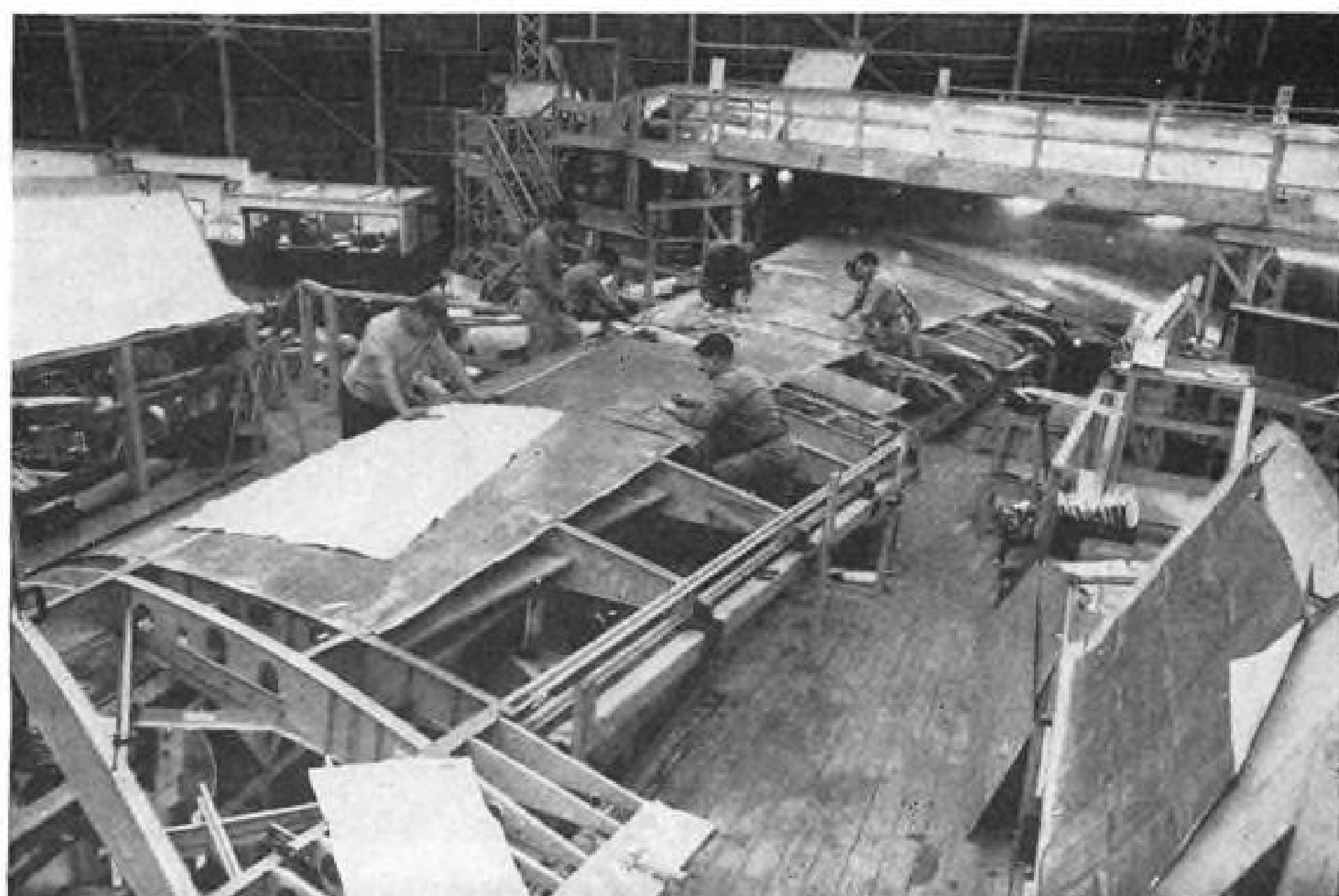
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ASSEMBLY FIXTURES for the 707 were designed for construction of one airplane in one place. Stairways and walkways facilitate movement of workers over entire building area.



WING TAKES SHAPE in assembly jig. Diagonal rib (left) is wingtip; cutout section at trailing edge is for aileron. Curved tracks for wing flaps are further inboard.

by fuel, saving the space above the floor for additional cargo.

► **Wing Plan**—Built with 35 degrees of sweep at the quarter-chord point, the wing panels of the 707 have a tip chord of 9 ft. 4 in. and a root chord of 28 ft. Thickness ratio increases rapidly near the root. Semi-span of each panel is 65 ft., but the 7-degree dihedral makes the overall span 129 ft. 8 in. Nacelle centerlines are at 26 ft. 3 in. and 45 ft. 3 in. outboard of the airplane centerline.

Total wing area is 2,400 sq. ft.

The wings are built around a simple two-spar structure, Martin told AVIATION WEEK. Spars are as far apart as possible to get maximum space for fuel, carried in two integral tanks in each panel.

Center section of the wing is continuous through the fuselage and contains space and provision for additional fuel in bag-type cells.

Flaps are in two spanwise sections, and are a double-slotted type of very large chord. The flap travel is aft and down, so that considerable area extension is obtained, as well as increased effective camber and controlled airflow through and over the flap. A section of the wing underskin just ahead of the flap swings upward to fair in the surface when the flaps are deflected.

► **Lateral Control**—The Boeing-developed lateral control system seems to have all the answers to the problem of control over a very wide speed range.

• **For highspeed flight**, where aileron deflections could twist the wings enough

to cause complete reversal, the designers have specified inboard spoilers.

• **For lowspeed flight**, where the ability to pick up a wing positively and quickly with the stick is greatly to be desired, wingtip ailerons have been provided. They only operate with the flaps extended.

"Feelerons," small surfaces located well inboard between flaps, operate like ailerons, and exist to trim the plane and to feed stick forces back to the pilot.

During the approach, the spoilers can be fully extended to act as airbrakes; control functions are taken over by the ailerons.

Near the wingtips on the under surfaces of each panel is an NACA flush type of duct inlet, with a screen over the actual inlet. This is the vent for the integral tanks, and the design is such that the inlet supplies positive pressure on the vent.

Emergency fuel dump chutes are retracted in the wing, and are actuated by their aerodynamic shape which pulls them out of the wing once the cockpit control is moved.

► **Drivers' Seats**—The cockpit layout and appearance is about as simple as can be remembered for a transport type, and it owes this uncluttered appearance to careful planning and design. Recommendations of the Society of Automotive Engineers subcommittee on cockpit standardization were closely followed. The result is a neat, attractive, spacious appearance more reminiscent of twin-engine planes than of a four-engined one.

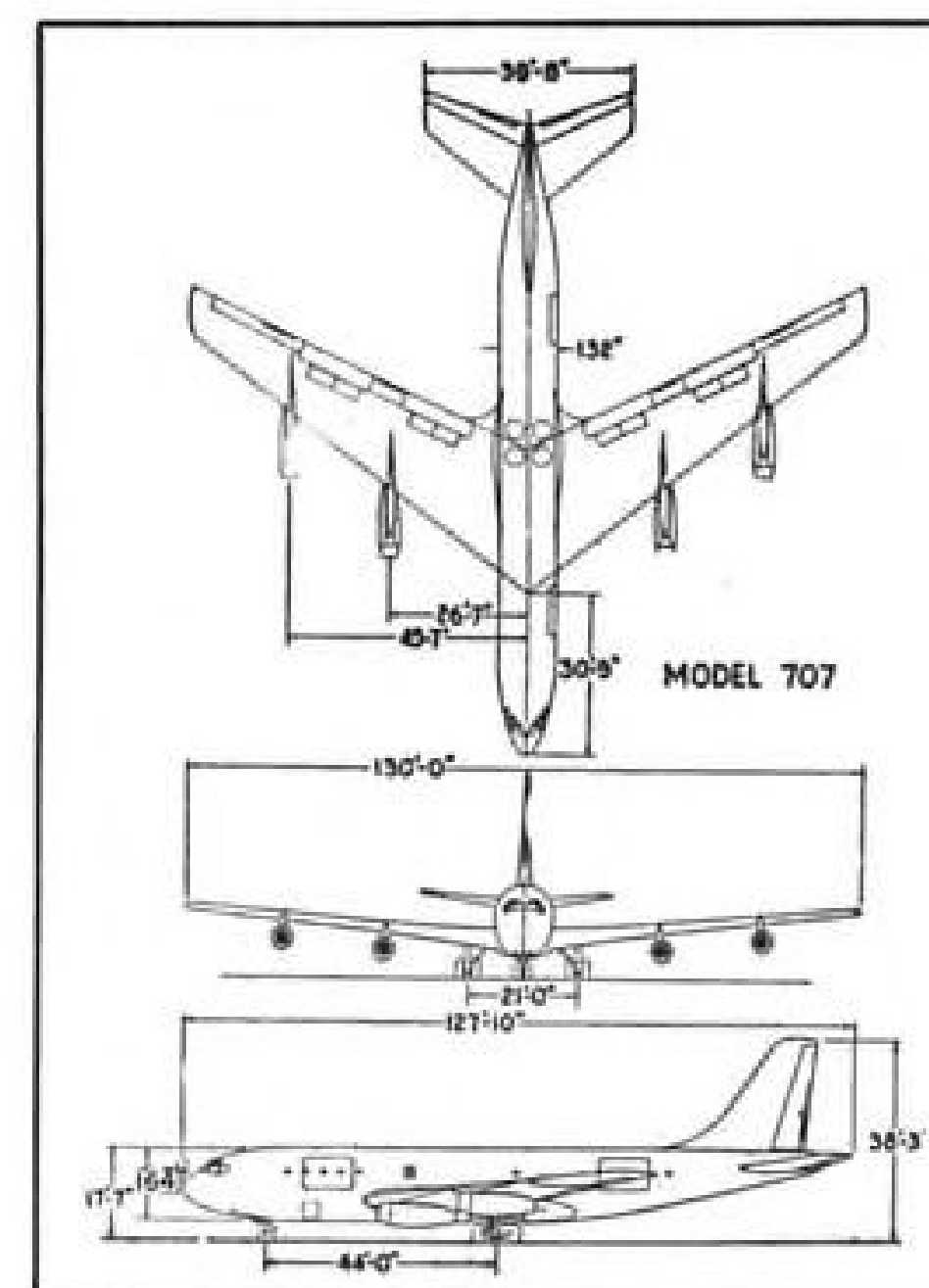
There is one non-standard installation: the Boeing foot-rest, which has become a cockpit trademark since the B-17. It's a simple transverse bar above the rudder pedals, and has been received so well in the past that Boeing felt the SAE wouldn't mind this time.

Behind the co-pilot's position is the flight engineer's panel, which can be operated either by an engineer seated at a facing chair, or by the co-pilot, in which case the panel can be swung around a vertical pivot to become more accessible to the co-pilot.

Emergency bailout door on the prototype is in the fuselage side just below and behind the pilot's position. Side panel is blown off by pressurized nitrogen, and the crew can escape through a hatchway and well.

Visibility from the cockpit positions is very good; both engines on a side can be seen. Down-vision over the nose is comparable to contemporary transports and perhaps a little better than some.

► **Powerplants**—The four Pratt & Whitney JT3 turbojets are housed in single-unit pods whose design is based on that of the B-52. Centerline of the strut is perpendicular to the wing chordal plane,



707 LINES shown in three-view drawing.

so that the engines have an odd, tilted look when the plane is on the ground.

Mechanics working on the engines between flights needed only standard five-step ladders to get all around the higher outboard pod. The inboard pod mounts the engine a little above eye level, and most of the accessories can be reached without having to use any kind of a ladder.

Engines installed in the 707 are actually designated JT3P on their nameplates. Pratt & Whitney says the commercial designation for the J57 engines is correctly JT3L, but that the specific engines shipped to Boeing for the 707 were marked as P models for convenience in bookkeeping.

The only design change which required a policy decision after the 707 was well underway centered around the powerplants. Originally Boeing engineers called for dual-engine pods, modeled after the B-52 and B-47 units. Two reasons caused them to change their minds:

• **Possible contamination of a good engine** by the bad one in the event of a single engine failure in a dual pod. This has happened in the past with at least two military aircraft—one is, of course, the B-47—when one engine failed.

• **Airlines' desires for all-around accessibility** to the engines for maintenance.

Weights engineers figured the added weight attributable to the extra nacelle and strut would be about compensated for by the decreased wing structural weight coming from the better distribution of static loads and the reduction in wing bending moment caused by the outboard nacelle.

Some of the airplane's systems have been left off the prototype, but will be installed and tested when the time is right. The prototype systems, too, are

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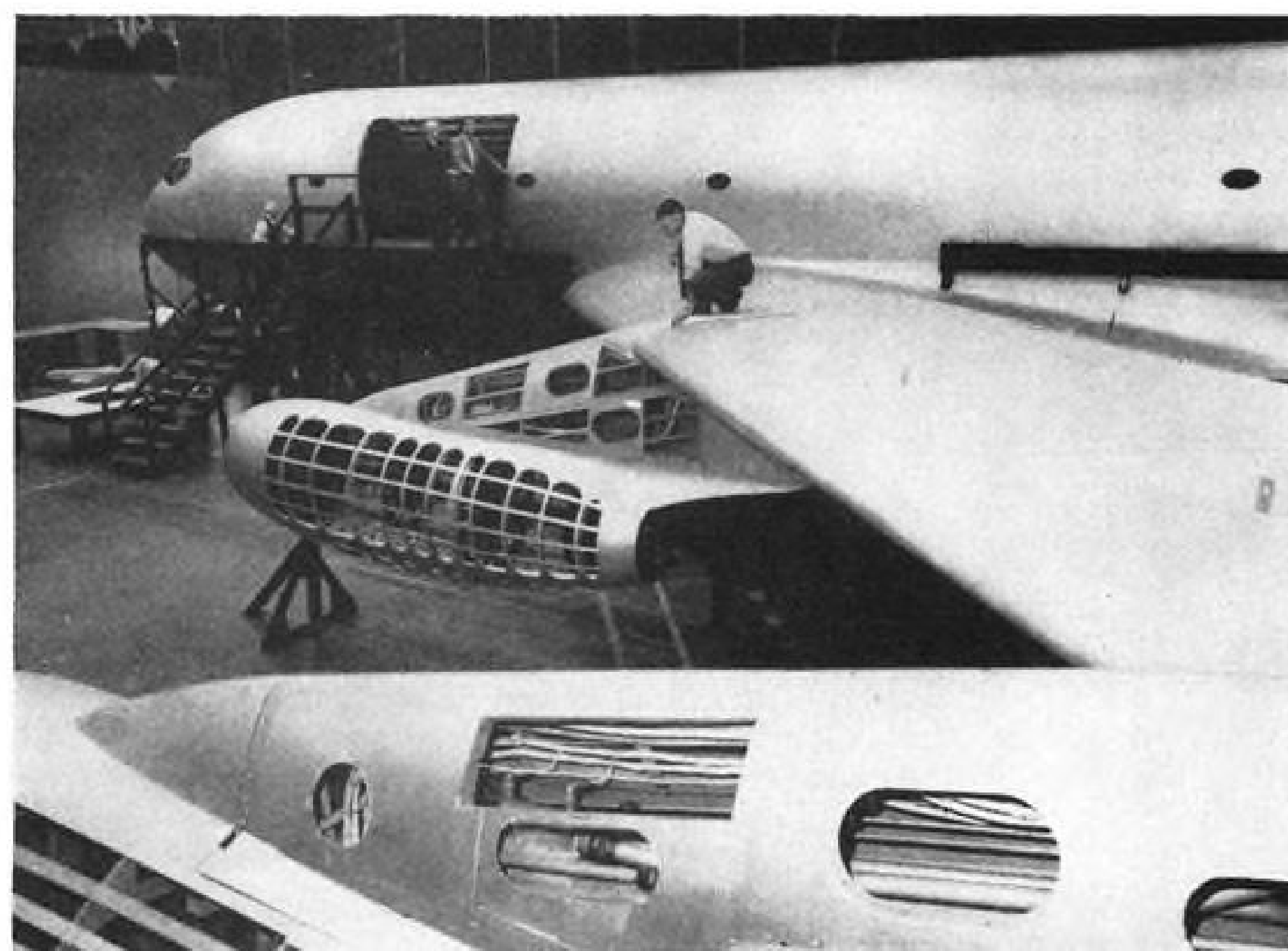
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MOCKUP of 707 transport is shown in late construction stage at Renton shop.



EARLY DESIGN STUDY of the 707, based on B-52, reached windtunnel stage. Note similarity of pods, wing and horizontal tail.



FLUTTER MODEL of the 707 used in high-speed tests is focal point of interest for some of Boeing's top engineering officials.

considerably different from possible finalized production systems.

Reverse thrust, now about ready for static tests at Boeing, will be installed in the not-too-distant future. Boeing's development of this type was described in AVIATION WEEK Apr. 19, p. 28.

Yaw damping, required on many contemporary aircraft, has been provided for in the 707. The top movable surface on the rudder trailing edge is hooked to a simple inertia system which actuates the tab in opposition to the swinging of the tail during yaw cycles. Flight tests so far have not shown the need for any yaw damping on the airplane, and there is a good chance that this system will never be installed.

► **Flight Crew**—No story of the 707 would be complete without a mention of the colorful "Tex" Johnston, Boeing's chief of flight test from Emporia, Kan. Tex has been in the pilot's seat for the 707 program, the sixth set of first-flights in his flying career.

There is, incidentally, a story going around at Seattle that after Tex had gone through the routine of the first flight and the ordeal of being photographed, interviewed and mobbed, he retired to the pilots' ready room to take a shower. Still elated from the first flight, he strolled into the shower absent-mindedly with his cowboy boots on.

The third test flight was a check of the stamina of "Dix" Loesch, co-pilot on the 707. It was a tryout of emergency procedures, and Dix had to run around the airplane operating systems and cranking things up and down by hand. "He was one tired boy when he got back," said a Boeing engineer.

► **Crew Importance**—George Schairer, chief of technical staff, and Maynard Pennell, chief project engineer, aircraft, agreed that engineering test pilots were the most valuable asset a program could have. "It just isn't possible to get some of the reactions of an airplane through instruments," said Pennell. "A competent pilot hears and feels and smells

things that instruments could never pick up."

Schairer added that one trouble with flight test instrumentation was that it was generally used after the fact instead of before. "We put them in after the pilot has detected something and given his opinion, and then we check the flight data and find out that he was right after all," he said.

By the fourth flight, Tex and Dix had added other members to their crew; A. L. Binegar, project flight test engineer, and two other flight test engineers were the first passengers—working ones, nonetheless—to ride in the new transport.

Binegar estimated that by mid-September they would have 50 hr. of time on the 707.

Windtunnel Work

Part of the design backlog on the Boeing 707 is an extensive windtunnel test program that cost the project in the neighborhood of one million dollars.

John Russell, Boeing's chief of wind-tunnel, said the 707 models had been in the tunnel for a total occupancy time of 1,357 hr., of which probably more than half was actual running time. The rest was accounted for by model mounting, set-up time and other incidentals.

This is actually a small amount of testing compared to the 7,800-hr. mark of the B-52 tests and 7,600 hr. on the B-47, but that earlier experience paid off in reducing the number of cut-and-try windtunnel solutions necessary during the 707 design.

Four basic test models were built and one was later extensively modified, so that in effect, five models were tested:

- **Low-speed model of conventional construction** for general stability and control tests and determination of some aerodynamic parameters.

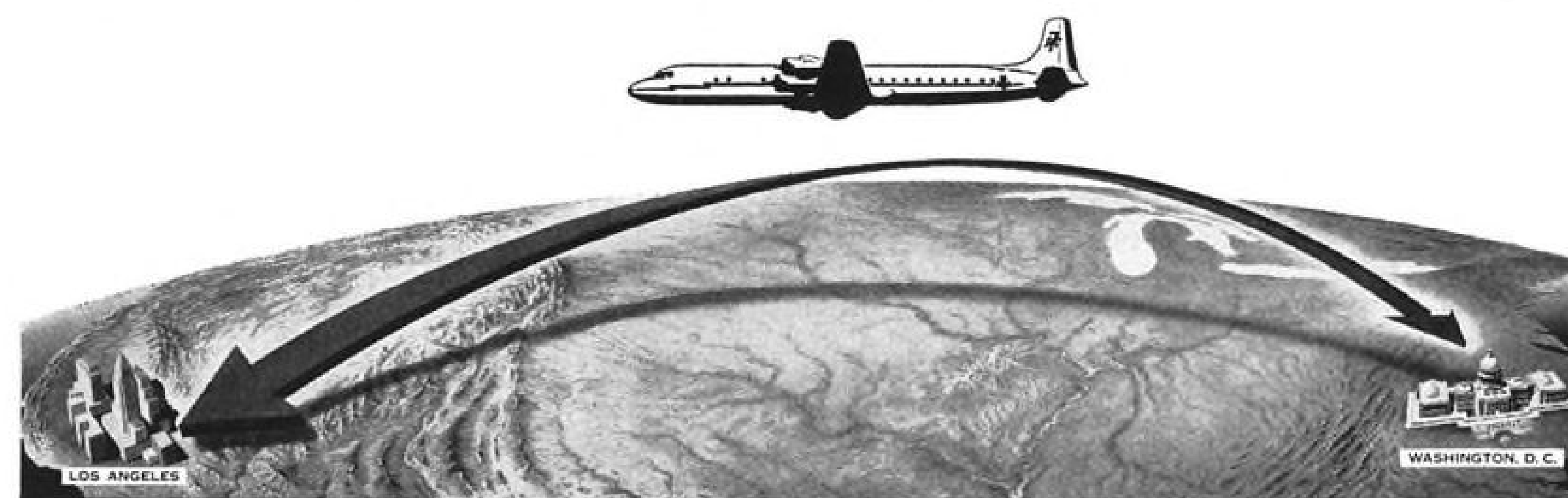
- **High-speed model of conventional construction** for tests in the Cornell Aeronautical Laboratory. This model, of about 4-ft. span, was painted in the brown and yellow of the 707 for later exhibition. The model was supported at the tail cone with a sting balance, so that some modification of the external lines had to be made.

- **High-speed model built around a steel core** for tests in the Boeing transonic tunnel. Wings of this 7-ft. model are largely solid steel. Controls are actuated remotely from outside the tunnel. It is mounted on a very thin and long "island" mount rather than on struts or a sting.

- **High-speed model with pressure-distribution instrumentation**, the same model as above with an extra set of wing panels for pressure distribution tests. More than 200 tiny holes were drilled into the wings at desired points

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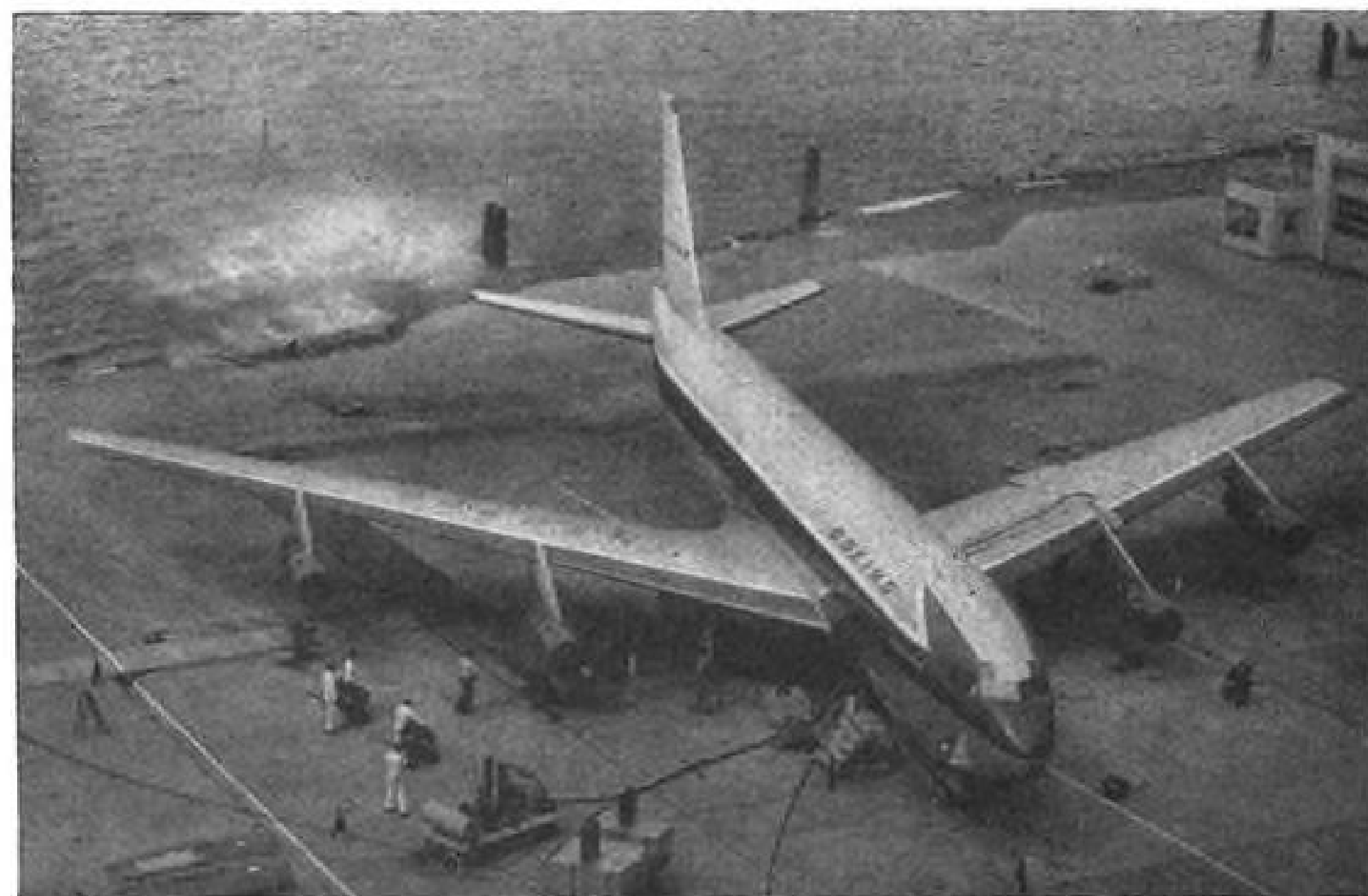
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BLOWING UP A STORM—Inboard starboard nacelle whips up Lake Washington water.

and connected through tubes to manometers to read the pressures.

• **Flutter model, made of aluminum and balsa** for lowspeed flutter tests. This model has complete dynamic similarity to the full-scale airplane, achieved by the use of internal weights and methods of simulating stiffness.

In spite of the great differences in model size, complexity and construction, they all cost about the same. About 5,000 shop man-hours are invested in each model, with about the same time credited to engineering and design. Total model investment was estimated by Russell and Philip Whitener, head of the model design group, at about \$100,000.

► **Model Design**—Whitener explained some of the design details used by his group in the construction of windtunnel models.

The highspeed model for transonic testing is built around a rugged steel core, with model sections of mahogany and light metal fairings. The wing panels, which must take a total lift load of as much as 7,000 lb., are all-steel construction, and nearly solid.

It is possible to measure hinge moments and the deflection angles of surfaces by remote instrumentation; a strain-gage balance system is used for the hinge moment tests. They are also able to make pressure measurements in the cove on the underside of the "feeleron" for example, but on a limited scale. Most of the pressure-distribution data comes from the modified model with special wings.

For tests in the Boeing 8x12-ft. transonic tunnel, which has an NACA ventilated throat with modifications credited to George Schairer, the island mount was developed. It is a thin sheet of metal which follows and fastens to the under contour of the model being tested, then is mounted to the tunnel

floor in the test section. Boeing engineers say such a mount has very low interference in the transonic regime.

► **Flutter Models**—A sectional model is built for the flutter tests, made at low speeds in the nearby University of Washington tunnel. Wings and tail are divided into separate strips, built up of balsa and fastened to an aluminum spar. Each section can react independently under dynamic conditions which impose flutter on a model. Instrumentation and highspeed photography are used to study the behavior of the model under test.

Small weights can be inserted in the hollow strip sections to simulate varying structural stiffness or fuel distribution in the wing tanks.

Whitener showed AVIATION WEEK a "lattice" spar, used in models where the full-scale wing torsional stiffness is too great to simulate with solid spars of rectangular section. A continuous series of diagonal stiffeners is milled into the sides of the spar to increase its stiffness. Whitener said that they had been able to hit the scale stiffness within 5% on design of the model. In the case of the 707 model, the body spar is built that way, but the wing is not.

Whitener's group is about 19 people, backed by about 100 technicians working in a large and excellently equipped model shop. Another separate group of 15 engineers handles electrical instrumentation for the windtunnel tests. These figures are current full strength, and all the men were obviously not assigned to the 707 design.

► **Boeing Tunnel**—Boeing's transonic tunnel, largest private facility of its type in the world, was recently modernized and has a future potential for super-sonic development.

Unique feature of the tunnel is the use of laminated glass-plastic blades on

the 24-ft.-diameter fans which stir up the wind.

Models can be tested on any of the conventional types of supports: sting, island plate, two, or three-strut and rod for free-flying models.

Most of the tunnel time is occupied in transonic testing or subsonic testing in the highspeed range; lowspeed work is generally farmed out to the U of W tunnel.

Boeing has not yet succumbed to the automatic data collection and reduction machinery featured in many tunnels. Instead they work in the traditional fashion, reducing and plotting data points by hand. They run continuous plots for checking as they test.

Current tunnel operating costs are estimated between \$600 and \$1,000 per testing hour, less for occupancy time.

► **New Technique**—Boeing has developed a method of building aeroelastically similar models out of metal, scaling down skin thicknesses and the strength of rivet patterns. Whitener said that the staff knew of no other work in this area, and felt they could claim a Boeing "first".

Metal bonding techniques are used for fastening the model together. But before the model can be glued, the strength of each rivet pattern has to be determined and correlated with the strength of the proposed glue bond area.

None of the 707 models has been built in this way; the technique has been applied to another Boeing aircraft.

Design Approaches

One of the largest efforts during the entire 707 program was directed by Boeing staff members at the airlines, the military, pilot and flight-engineer groups and Civil Aeronautics Administration.

► **Two-Way Street**—This quickly became a two-way interchange of information as Boeing consulted these groups; they asked for opinions on just about every phase of design and operations, and gave their own ideas in return.

One of the first projects was a general document prepared by Boeing engineers on the characteristics of jet transports. It was basically a study of performance at various gross weights and other parameters without tying that performance too specifically to a particular airplane.

Some assumptions had to be made, otherwise the document could never have been lifted. The basic idea was to assume a constant ratio of thrust to wing area (T/S). Wing sweepback was assumed to be about 35 deg., there were to be four 10,000-lb. engines and the wing area was around 2,500 sq. ft. True, this does sound like the 707, but at the time of the document, the de-

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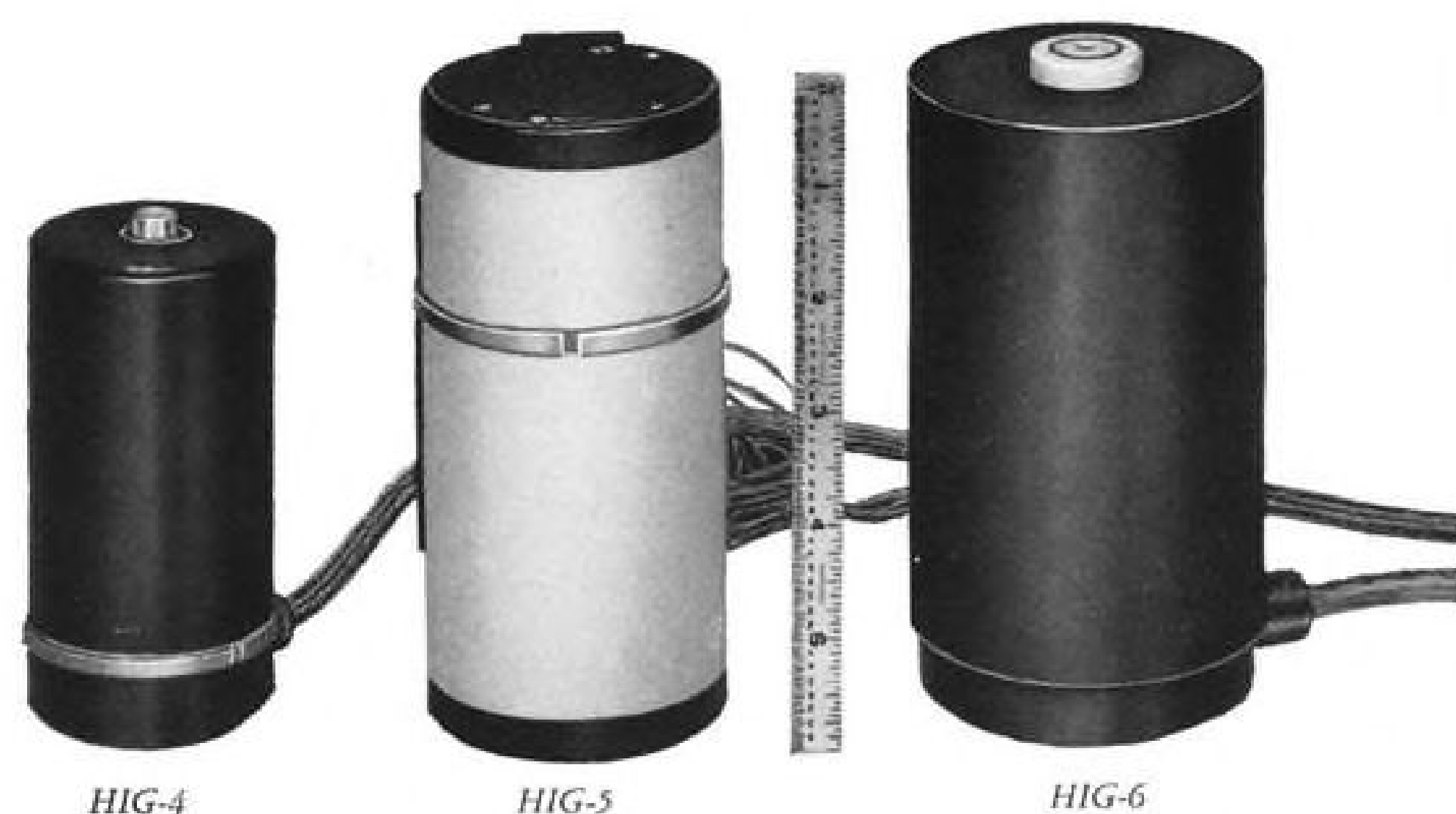
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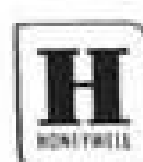
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Threshold	1° per hr	.2° per hr	.01° per hr
Trimmed Drift Rate	5° per hr	1° per hr	.05° per hr
Maximum Precession Rate	5 radians/sec	1 radian/sec	.1 radian/sec
Characteristic Time Constant	3.5 millisecc	2.8 millisecc	3.1 millisecc
Damping Ratio—			
Output Axis/Input Axis	1 to 1	1 to 1	2.1 to 1
Torque Generator Scale Factor	1 or 10 dyne-cm/ma ²	2.5 or 35 dyne-cm/ma ²	.025 or 1 dyne-cm/ma ²
Signal Generator Scale Factor	25 volts/radian at 100ma 400 cps	34 volts/radian at 100ma 400 cps	25 volts/radian at 50ma 400 cps
Spin Motor Excitation	10 volts, 2 phase	10 volts, 3 phase	115 volts, 3 phase
Weight	1.5 lbs.	2.75 lbs.	4.5 lbs.

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sign of the airplane had not been finalized, and Boeing engineers were trying to be as objective as possible.

Performance curves were calculated for this generalized transport for an extreme range of gross weights, and presented as charts. Among the items covered were takeoff, flight path on climbout, climb after takeoff, cruise, endurance, landing, and one-engine-out and two-engines-out flight.

In February 1950 the study was completed and turned over to the airlines for discussion. Boeing engineers were available to go deeper into any of the perplexing points.

"It seems funny now," said Ralph Bell, Boeing's director of sales, "but in 1950 there wasn't much jet experience, and this kind of information—as far as we knew—just wasn't available to any prospective users of jet transports. We had begun checking the airlines for their opinions as far back as 1948; we asked about everything from major assemblies right down to the fine points of interior design. We're still doing that, too".

► **Design Genesis**—With the final lines of the 707 committed to metal, Boeing's design staff could look back at about 150 "paper" airplanes that were the progenitors of the new transport.

Some of these models got off the drawing boards and into the windtunnel stage. Some were hardly drawn before being obsoleted by new ideas. But taken together they form an integrated background picture.

Engines were the critical design parameter all along. Boeing layouts were built around every kind of imaginable turbojet from Nenes to J47s to advanced Olympus engines. All the turbo-prop engines came in for consideration as well, and the swing of Boeing design ideas with time reflects the contemporary standing of both of these engine types.

Said one Boeing engineer: "Up until a few years ago, it looked as if the turbo-prop was going to be the only economical engine. Then the turbojet began to gain and I'd judge that the economic crossover point was reached about two years ago."

One of the big design considerations in the early proposals was that Boeing felt obligated to keep the C-97 line going as long as possible. Original objectives were to keep as much of the C-97 tooling as possible in any new design; looking back on it now, the engineers believe in all fairness that the percentage of tooling saved would have been quite small.

► **Two Approaches**—For these reasons, the design thinking that led to the 707 followed two distinct lines, one drawing on C-97 parts and the other making a clean break and starting afresh.

These were some of the C-97 milestones:

- **Model 367-31-43**, proposed in March 1950. This design planned to keep as much of the C-97 wing and tail as possible, but the fuselage diameter was increased greatly to accommodate increased cargo capacity. Powerplants were to be four Wasp Majors (R4360) plus a pair of Westinghouse J34 turbojets.
- **Model 367-41**, proposed in September 1950, was a C-97C turboprop conversion.

- **Model 367-42** was basically the same airplane with a new wing.

- **Model 367-41-47** was proposed in December 1950 as a turboprop version of the C-97E and F models. It would have been feasible to make a retrofit on all the piston-engine C-97s. This version was designed for cargo; a 361-48 tanker version was proposed at the same time.

- **Model 367-60**, proposed in January 1951, was a four-turboprop design with a new wing and tail, but with the basic C-97 fuselage.

- **Model 367-64-1**, proposed in September 1951, was a four-turbojet dual-pod C-97 with new sweptwing and tail.

First of the present 707 series was the Model 473, originally proposed in October 1950. It was laid out around two Nene engines, and was a high-wing,



INSIDE THE FUSELAGE of the 707 looking forward. Fuselage cross-section and floor position are arranged to give maximum width at passengers' elbow height.

medium-sized job. It set the stage for the many pure-jet designs to follow, and finally reached its ultimate in the 707.

► **Company Policy**—Although officials of the Boeing company had gone on record as far back as 1949 in favor of government financial aid, they did get tired of waiting for somebody to do something, along about 1952. They still feel strongly about government aid, and be-

lieve that it is in the national interest to have support of jet prototype construction.

Boeing president William M. Allen outlined a series of questions in a memo to division heads on Mar. 26, 1952. The questions, specifically directed at each person, asked for an a yes-or-no answer on the ability of that individual's staff or division to contribute to a jet transport design without detracting from the heavy workload of military obligations. The questions asked for answers on manpower availability, on materials, on timing, on insurance, on the potential market.

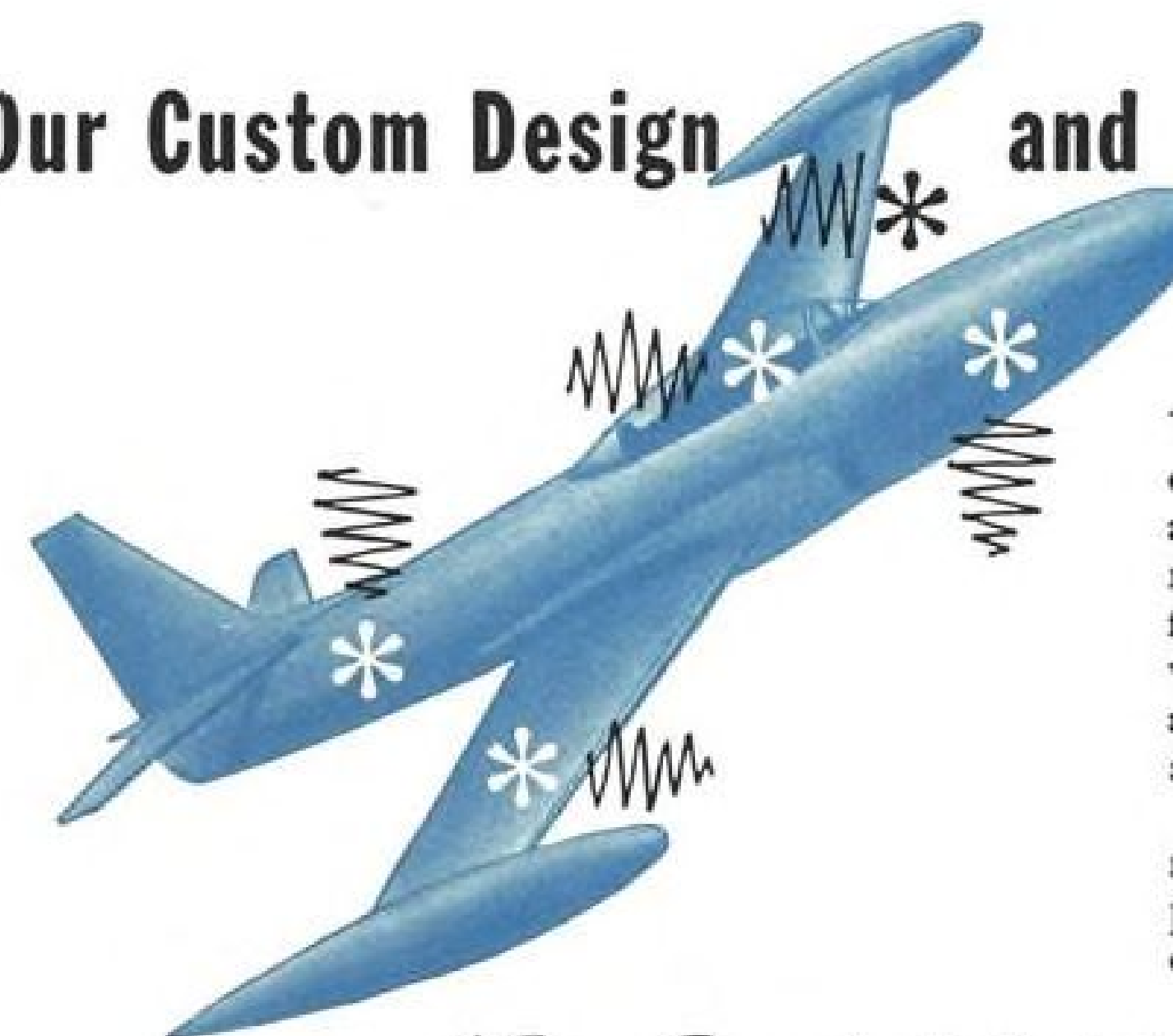
In less than one month, a group of division heads made a presentation to the Boeing board of directors, then retired to chew fingernails while the board weighed the facts. It was well into the evening before the board gave its consent, after considerable deliberation.

► **Independent Group**—Immediately a project planning group was set up, with a management committee to ride herd on its decisions.

At a later date this group became the project coordination committee, and first met on May 20, 1952.

The 707 was designed to a very complete work statement, which said among other things, that economics of the eventual airplane was to be one of the

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governing design factors. Maintenance simplicity was another.

Economic goal for the design was to be an operational cost not to exceed the lowest current seat-mile figures shown in the CAB reports.

"Management kept its hands off the project," said one Boeing spokesman. "They just told the boys how much money they had, and what they were supposed to produce with it. From then on the project was on its own."

In record time, Boeing employees rolled out the big jet and got it into the air for its first flight (AVIATION WEEK, July 26, p. 14).

Weldable Titanium Alloy Sheet Available

A weldable, high-strength titanium-base alloy sheet has been announced by Rem-Cru Titanium, Inc., as a production item. The new sheet alloy—Rem-Cru A-110AT—contains 5% aluminum and 2½% tin.

Said to be readily welded with the same techniques used for commercially pure titanium, the alloy is reported to have excellent ductility in fusion-welded joints. The manufacturer says the grade has a minimum tensile strength at room temperature of 115,000 psi., maintaining this at high temperatures better than any other titanium-base alloy.

The Midland, Pa., manufacturer also announces new flatness tolerances for titanium sheets of .025-in. thickness and over:

- **Commercially pure.** 36 in. wide and under, (2%); over 36 in. to 48 in., (5%).
- **Alloy.** 36 in. and under, (3%); over 36 in. to 48 in., (5%).

For sheet under .025 in., the com-

pany has announced these tolerances:

- **Commercially pure.** 36 in. and under, (3%); over 36 in. to 48 in., (4%).
- **Alloy.** 36 in. and under, (3%); over 36 in. to 48 in., (8%).

OVERSEAS SPOTLIGHT

BEA Likes U.S. Copters

LONDON

Two large helicopters flying in the U.S. come very close to meeting British European Airways' specifications for a passenger rotorcraft, says Lord Douglas of Kirtleside, according to the Manchester Guardian.

"America is ahead of us in this field," says BEA's chairman, "so it may well be that we shall have to buy American to get started."

BEA wants a 40- to 50-passenger copter, with at least two engines for safety, and a speed of 150 mph. The U.S. craft he is referring to would appear to be the Piasecki H-16 and the Sikorsky HR2s.

In three or four years, Lord Douglas expects Continental competitors, who will want to bring large copters into London, to force BEA to offer similar service. Present copters are too small to be economical, he says.

Copters for Australia?

MELBOURNE

The proposed policy of weakening the Australian fleet air arm in favor of the RAAF is encountering strong opposition here and probably will be reexamined in the near future, AVIATION WEEK has learned.

Need to strengthen anti-submarine defense will be stressed, with accent on

the purchase of new anti-sub aircraft and helicopters. Decision to use copters against submarines would necessitate purchase abroad, as Australia has few of the rotorcraft.

New U.K. Avgas Plant

LONDON

Isopentane, an important constituent of aviation gas, is to be produced for the first time in the United Kingdom in a new \$1.4-million plant Shell Petroleum Co. is building in Cheshire. Until now, Britain has imported its isopentane requirements.

The plant is scheduled for completion early next year.

How Fares Compare

MONTREAL

Air fares in Australia are among both the lowest and the highest in the world, according to the International Civil Aviation organization. At the low end of the scale are fares of 3.7 cents per passenger-mile; but some services down under charge four and five times that amount.

The world's average is 6.3 cents, probably because of the effect of the U. S. contribution—half the world's scheduled passenger-mileage. U. S. average, combining first class and tourist, is 5.8 cents per passenger-mile.

Gipsy Queens Live Longer

LONDON

British authorities have extended the overhaul period for Gipsy Queen 70-3 and 70-4 engines to 1,000 hr. from 800 hr., according to the British publication, Modern Transport.

More than 1,600 Gipsy Queens have been built, of which 1,200 are installed in de Havilland Doves. Plans are underway for also extending the overhaul life of the Gipsy Queen 30 Mk. 2 which powers the Heron.

Italian Aviation Imports

ROME

Preliminary figures published here show that Italy imported \$9.5 million worth of aviation products in 1953 while exporting \$2.5 million worth.

Sycamores Go to Congo

LONDON

Belgian Air Force has ordered three Bristol Sycamore copters, the Financial Times reports.

The copters, intended for movement of wounded and for rescue operations, will be sent to the Congo base at Kamina, Belgium's chief military establishment in Africa.

The Sycamore is powered by a 550-hp. Alvis Leonides engine; rotor has 48-ft. 6.5-in. diameter.

AVIONICS

Avionic Heat Problem Becomes Critical

- **Mechanical cooling hikes airplane weight, cost.**
- **Airframe makers weigh redesign, repackaging.**

The problem of cooling avionic equipment in highspeed aircraft has become so critical that airframe manufacturers may be forced to redesign and repack equipment received from avionic manufacturers. Such a move could have far-reaching effects.

This warning, sounded by E. W. Cornwall of Douglas Aircraft Co. at the recent Institute of the Aeronautical Sciences meeting in Los Angeles, is no idle threat. For its tiny new A4D attack-bomber, Douglas repackaged a UHF transceiver, automatic direction finder, and IFF into a pressurized container (shown right, rear) for air-blast cooling, and redesigned where necessary to eliminate duplicate circuitry.

The result was that avionic equipment weight was cut from 175 lb. to 121 lb., volume was cut from 9,290 cu. in. to only 5,500 cu. in., Cornwall said.

► **Alternatives**—The alternatives, which Cornwall outlined, are for avionic manufacturers to:

- **Provide more thermal data**, sooner, on their equipment under a variety of operating conditions.
- **Improve thermal design** of equipment for better cooling.
- **Increase electrical efficiency** to reduce power consumption, cut heat losses.
- **Raise maximum operating temperature** of equipment.

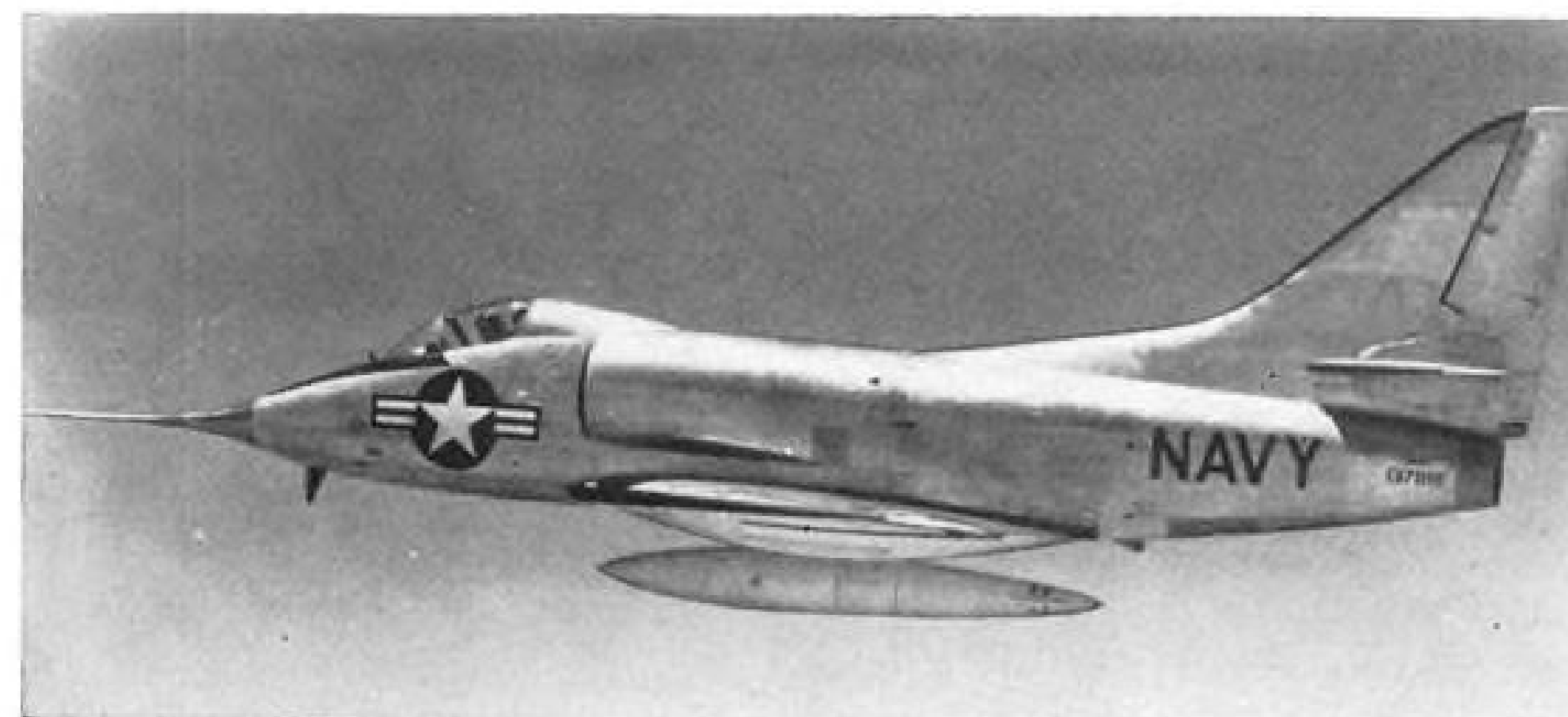
Cornwall reported that USAF and Navy are investigating the problem of getting more data on thermal characteristics of avionic equipment for aircraft manufacturers.

► **The Problem**—The amount of self-generated heat which must be removed from avionic equipments has grown with their pyramiding numbers and higher powers.

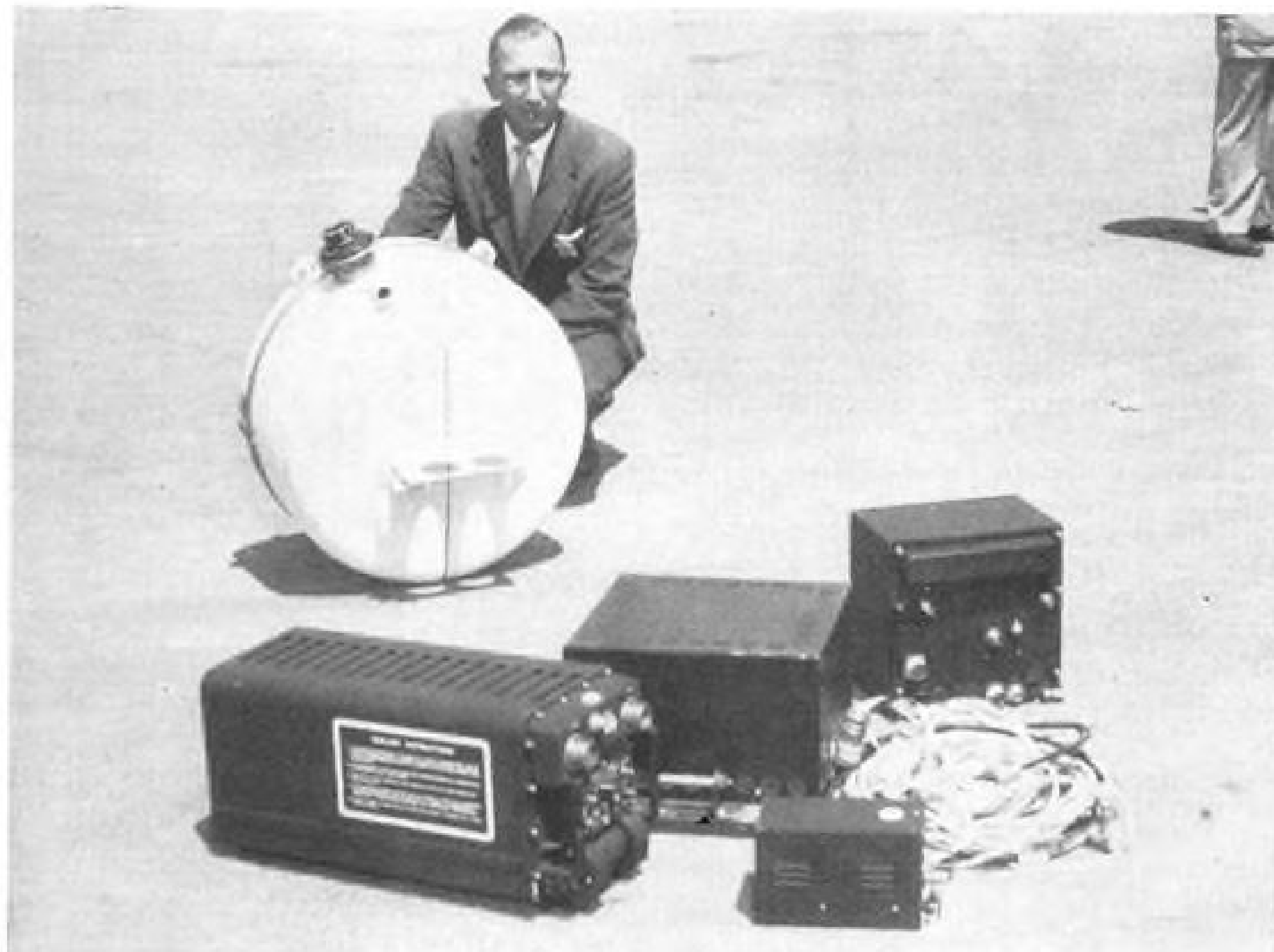
Approximately 96% of a device's electrical input power is dissipated as heat, Cornwall said. An added problem in single-engine aircraft is that avionic equipment is frequently exposed to jet engine heat.

Meanwhile, aircraft speeds have reached the point where ram air is no longer an effective coolant. At sea level, ram air temperature is 200F at Mach 1; 340F at Mach 1.5.

► **Stiff Price**—The obvious solution—re-



TO HELP KEEP A4D LIGHT, Douglas redesigned avionic equipment and packaging.



PRESSURIZED CONTAINER beside which engineer Ed Heinemann kneels is Douglas-designed package replacing "black boxes" in foreground. Weight saving: more than 50 lb.

frigerated cooling air—does not come cheaply. Cornwall reported a Douglas analysis which showed that for a small, military, Mach 1 jet, each kilowatt of avionic heat which must be removed requires:

- **15 lb. of cooling equipment.**
- **10.6 lb. of extra engine fuel** per hour to power the cooling system.

The direct weight penalty for a small jet with six kilowatts of avionic heat and one hour's flight endurance is (15 + 10.6) times (6), or 154 lb.

► **Add the Growth Factor**—Whenever equipment is added to the basic airframe, either the plane's performance is compromised or its gross weight must be increased to maintain the same capability. Douglas studies of this

growth factor show that it varies between a value of four, for older prop-driven aircraft, to as high as 16 for some jet fighters.

Using an average growth factor value of 10 for the above-cited jet, the addition of 154 lb. of cooling equipment increases airplane gross weight by 1,540 lb., Cornwall said, if the same performance is to be retained. Based on an airframe manufacturing cost of \$40/lb., this increases airplane cost by approximately \$60,000.

Douglas El Segundo designers believe this cost is much too high, Cornwall said. Here are some of his suggestions for solving the problem:

► **More Data Needed**—At present, aircraft engineers who must determine cor-



New Douglas Design Center

Douglas Aircraft Co.'s new \$2-million aircraft design center at El Segundo, Calif., features a rooftop heliport which will be used to transport engineers to surrounding test areas

and other Douglas plants. The 210x330-ft. steel and concrete building is the new home of chief engineer Edward Heinemann and his 1,500-man team.

rect cooling system capacity have only limited data on the thermal characteristics of avionic equipment which must be cooled. Present information consists only of input power, physical dimensions, and the fact that the equipment may meet the ambient temperature requirements of military spec AN-E-19 "when tested under unknown lab conditions of air velocity and radiation," Cornwall said.

Some of the additional data which Douglas would like avionics manufacturers to provide on their equipment include:

- **Cooling requirements** as a function of operating altitude. High altitudes normally impose most rigorous conditions on both the avionic equipment and the cooling system.
- **Temperature rise** of critical elements versus time and ambient thermal conditions.
- **Life expectancy** of critical elements as a function of ambient thermal conditions.

The last two items above would enable the aircraft designer to balance cooling system capacity compromises against avionics equipment life.

A more detailed list of thermal data which Douglas would like avionics manufacturers to provide is contained in Cornwall's paper, copy of which may be obtained for 35 cents from IAS, 2 East 64th St., New York 21, N. Y. Paper is identified as IAS Preprint No. 489.

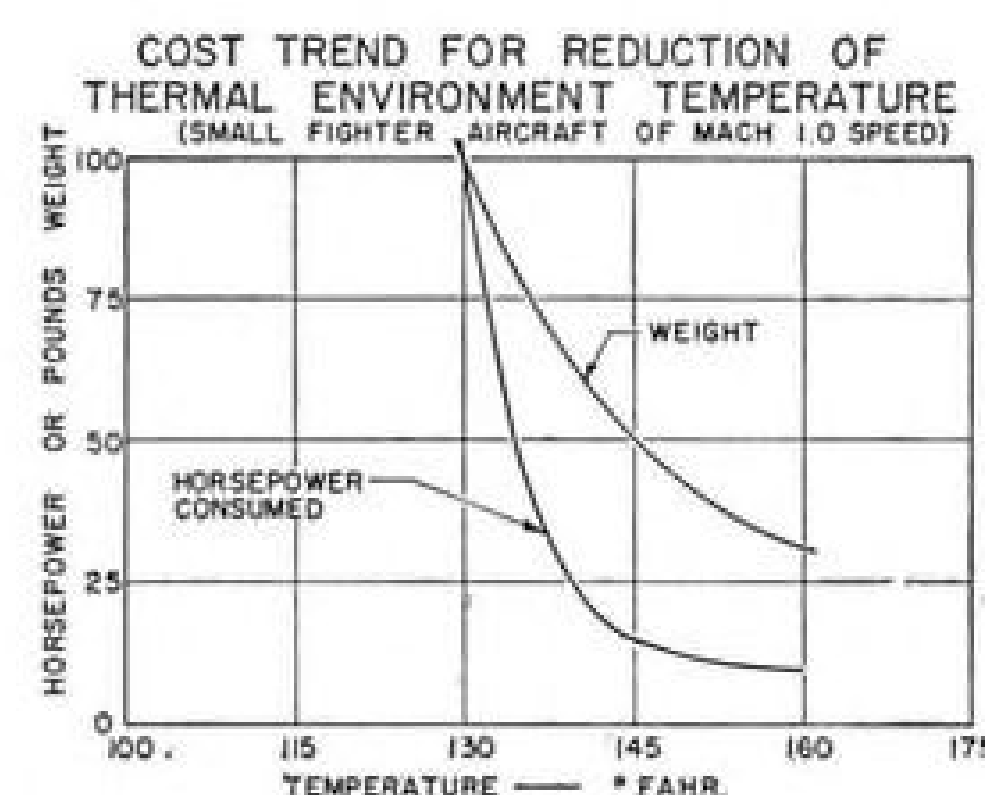
► **Timing Critical**—In many instances, the design of the aircraft and its cooling system are progressing in parallel with the design of avionic equipment. This makes it impossible for avionics designers to furnish final thermal test data in time, Cornwall admitted.

The only solution to this problem is close and continuous liaison between aircraft and avionics manufacturers' engineers, to permit educated engineering "guesstimates."

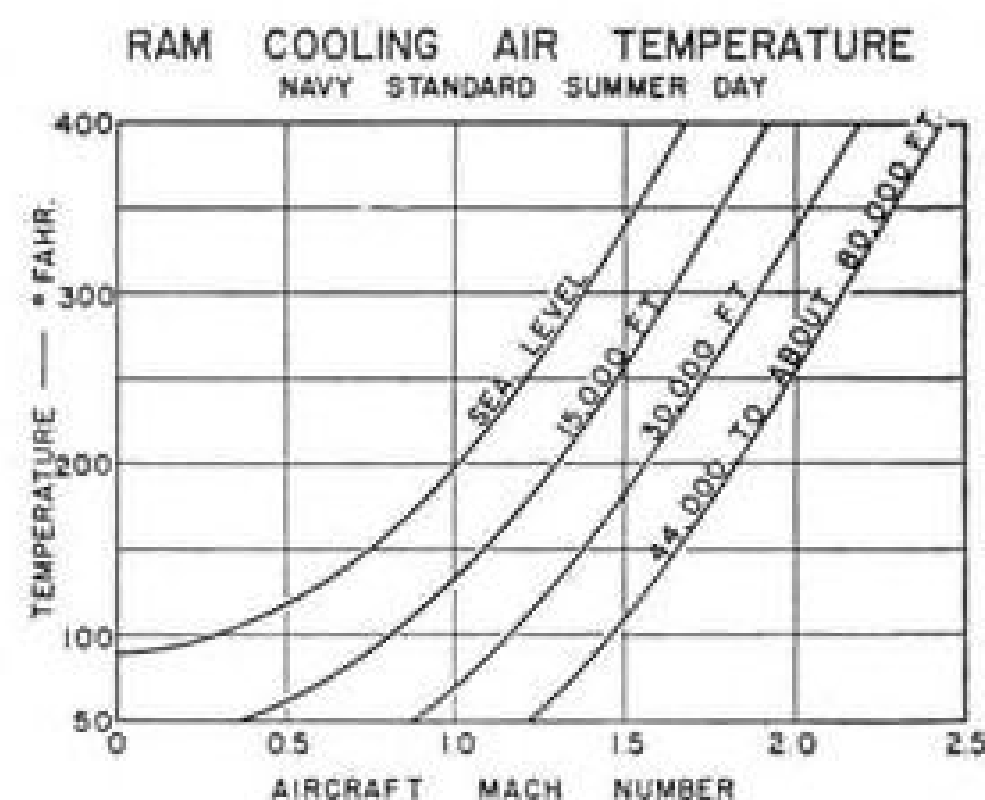
► **Better Thermal Design**—Avionics engineers, struggling to improve equipment performance, cut size and weight, increase reliability, do not devote sufficient effort to the thermal design of their black boxes. As a result, Cornwall says, their devices do not make best possible use of cooling air.

Avionics equipment boxes should be designed so that cooling air (or other cooling fluid) can be "introduced directly to the hot element surfaces with as high a velocity and as great a turbulence as can be maintained with reasonable pressure drops," Cornwall said.

► **What Kind of Cooling?**—Air-blast cooling appears to be the most practical and economical technique for conventional military aircraft operating at speeds up to Mach 1.5, with ceilings below 70,000 ft., Cornwall says. For higher speeds and altitudes, evaporative



THE LOWER the coolant's temperature, the higher the cost in pounds and power.



RAM AIR TEMPERATURE rises rapidly with increased speeds, making it unsatisfactory for avionic cooling.

liquid coolants (probably expendable), will likely be used, he said.

Another possibility at extremely high altitudes is a metal conduction-to-airframe-skin radiation-cooling system.

Where air blast is used, the cooling air may be exhaust air from the cabin (at 80-90°F), diverted from an oversize cabin refrigeration unit, provided by a special equipment refrigeration unit, or a combination of several of these sources, Cornwall reports.

► **Increase Electrical Efficiency**—Electrical efficiency, all-important criterion in the design of industrial electrical equipment, has taken a back seat in avionic equipment design priority to such things as performance, small size, light weight.

In the past, the penalty of poor electrical efficiency was only the added generator capacity and added fuel consumption. To this must now be added the weight of cooling equipment and extra fuel, all multiplied by a growth factor of 10.

In some types of circuits, particularly computing circuits, engineers should seek to operate with lower voltages and currents, Cornwall said. This will pay double dividends in reduced equipment size and weight, as well as reduced power and cooling system load.

One attractive solution suggested by industry observers is the use of transistors in place of tubes. But this is still several years away. Transistors need no filament or heater, a big source of avionic heat. They also operate at much

lower voltage and current levels.

► **Higher Operating Temperature**—Possibly the greatest saving in cooling load can be achieved by raising the maximum allowable surface temperature of avionics packages, reducing required cooling capacities Cornwall says. This can be accomplished in two ways:

- **New materials and design principles**, such as the use of silicones and fluorides in place of wax paper and rubber; use of high-temperature ceramics in place of glass and metal, in some instances.
- **Careful layout** of avionic package interiors so that each component operates at temperatures close to its maximum allowable. Cornwall admits that this involves considerable thought and test time to find the optimum interior arrangement. For assistance, he recommends AF Technical Report No. 6579, entitled "Thermal Evaluation of Air Cooled Electronic Equipment."
- **Call for Cooperation**—"At the moment, from a specification standpoint, the electrical equipment designer is responsible only for the weight of his equipment," Cornwall says.

"The aircraft designer is responsible for the weight of the cooling and power supply systems. Actually, it is . . . (both) which affect the total weight, cost, and performance of the overall airplane. . . . A split responsibility such as this requires considerable cooperation and an understanding of the overlapping design problems.

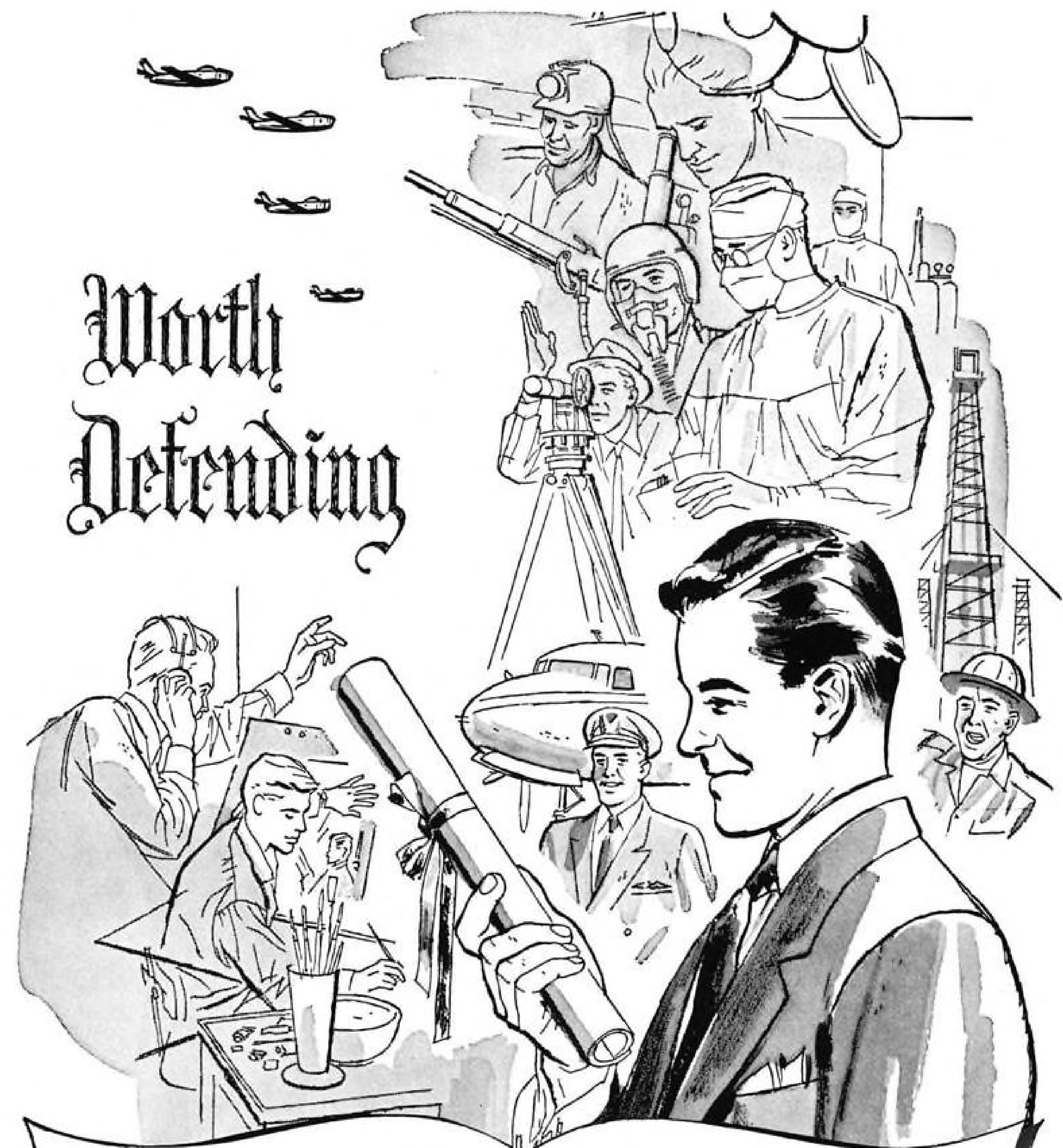
"Actually, Douglas El Segundo prefers to design the aircraft rather than electrical components. (However) if such cooperation is not forthcoming from the electrical industry, then the aircraft manufacturers themselves will be forced by competition to redesign and/or repackage electrical accessories to save weight and space and to achieve better cooling characteristics," Cornwall warns.

—Philip Klass

Avionic Bulletins

Recently announced avionic bulletins:

- **Filters** for antennas, RF noise suppression, and distortion elimination, are described in three data sheets. Ortho Filter Corp., 196 Albion Ave., Paterson 2, N. J.
- **Transformers**, filter chokes, and magnetic amplifiers are described in Bulletin No. T354 (2 pp.). Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif.
- **High-voltage resistors**, 45 different types, including specs and application data, are covered in Bulletin G-1 (8 pp.). International Resistance Co., 401 No. Broad St., Philadelphia 8, Pa.
- **"Branching and Balanced Duplexers"** is the title of Tech. Bulletin T-2200 covering design theory and applications of microwave duplexers (6 pp.). Airtron, Inc., Dept. A., 1103 W. Elizabeth Ave., Linden, N. J.
- **Germanium diodes**, Bulletin GD-1A, lists specs and ratings. International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif.
- **"Switches for Industry"** is title of new 20-page Catalog 101, listing 258 different switches, actuators and enclosures. Micro Switch, Freeport, Ill.



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FILTER CENTER

► **Avionics Editor Goes West**—We suspect that there are many interesting "Cinderella" stories behind the mushrooming avionics industry on the West Coast. A couple of smart engineers hit upon an idea, build a prototype in a basement machine shop, get some financial backing, and soon are in business. During the last two weeks of August and first week of September, AVIATION WEEK's avionics editor will be on the West Coast and would like to hear from new companies who feel they have a Cinderella story to tell. Write to Philip Klass, AVIATION WEEK, 1111 Wilshire Blvd., Los Angeles.

► **Stacked Tube Test**—New Sylvania ceramic stacked tubes (AVIATION WEEK June 28, p. 61) may get a service shake-down test in a limited number of selected equipments where their performance can be carefully monitored. Navy is presently considering such a program using stacked 6J6 tubes.

► **Reliable Mag Amps**—Availability of Westinghouse W-3A autopilot on F-94Cs is reportedly running between 85% and 95%, a company survey of USAF bases shows, which speaks well for the reliability of mag amplifiers used in the W-3A.

► **High-Power Silicon Rectifier**—A high-temperature silicon rectifier rated at more than 1,200 watts has been developed by Westinghouse Electric.

► **Transistorized Digital Computer**—Bell Telephone Labs have constructed an experimental all-transistor (except for clock power supply) digital computer, called Tradic, under USAF sponsorship. Machine operates in serial fashion at a 1-mc. pulse rate using 16-digit binary numbers. Tradic can add and subtract in 16 microseconds, divide and multiply in 300 microseconds. Total power consumption is under 100 watts, an important factor insofar as cooling is concerned.

► **Tradie Proves Reliable**—In two months of continuous 24-hour-a-day operation, Bell Labs' Tradie (transistorized digital computer) suffered only two transistor failures of the catastrophic type, no failures of resistors, capacitors, transformers or any of its 13,000 diodes. J. R. Harris told the recent Dayton airborne electronics conference. Eight transistors were replaced during this period as a result of preventive maintenance. This good record indicates that transistors and their low-voltage circuits hold considerable promise for improving computer reliability. —PK

NEW AVIATION PRODUCTS



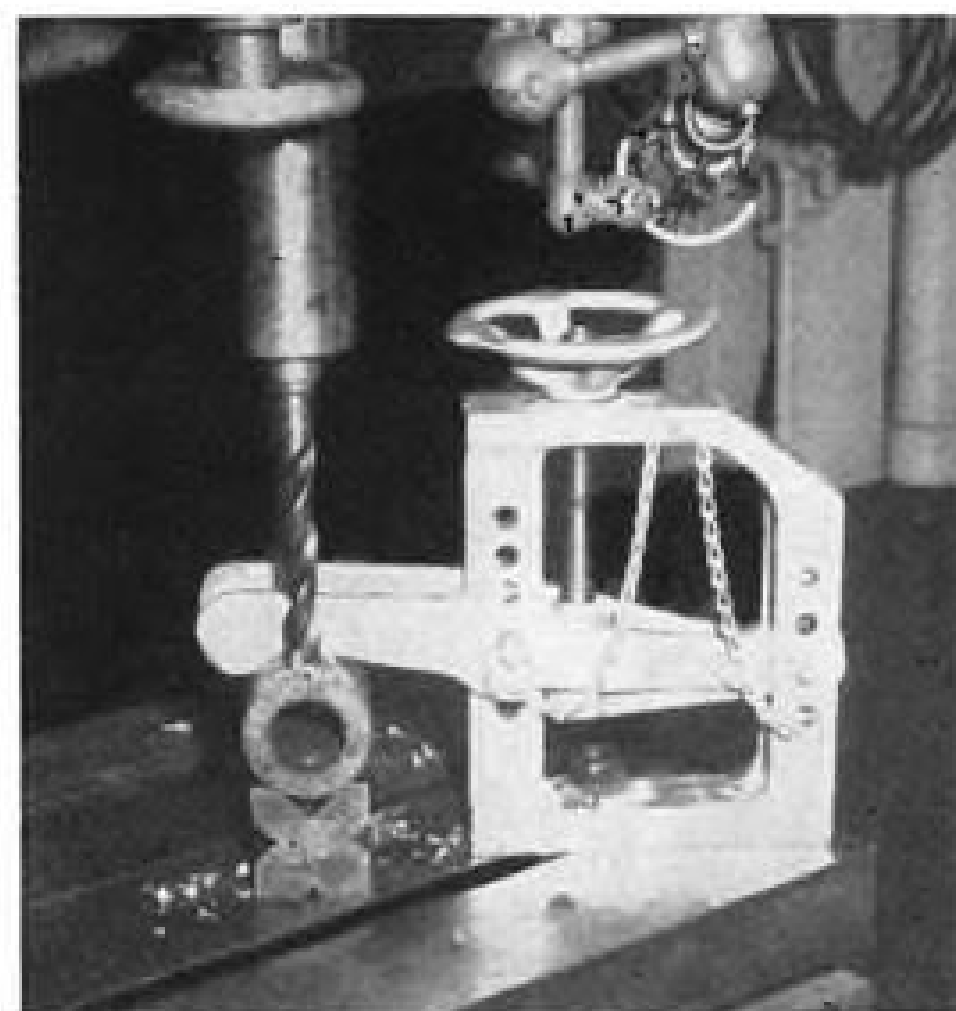
MACHINE sands augmentor tube fairing die used in Aero Commander cowl.

Flexible Shaft Machine Sands, Grinds, Drills

New truck-mounted flexible-shaft machine may be used by aircraft operators for sanding, buffing, wire-brushing or grinding welds. It can also be used for drilling in wood and steel.

The C-50 is mounted on large wheels for easy movement over rough ground. The ½-in. flexible shaft is 6 ft. long. Unit comes with either a ¾ or 1-hp. motor, and can operate at 1,150, 2,100, 3,450 or 5,750 rpm.

Stow Manufacturing Co., 443 State St., Binghamton, N. Y.



CLAMP speeds machine setup time.

Adjustable Holding Clamp Easy to Work With

An adjustable hold-down clamp that fastens simply to a T-slot table for either precision or production work speeds setup time and gives operators greater flexibility than other types of clamps, its maker says.

The accompanying photo shows a 12-in. clamp (price, \$45) being used in connection with a vertical drilling operation. In addition to drill press work, it can be used with milling machines, boring mills, etc., and can be

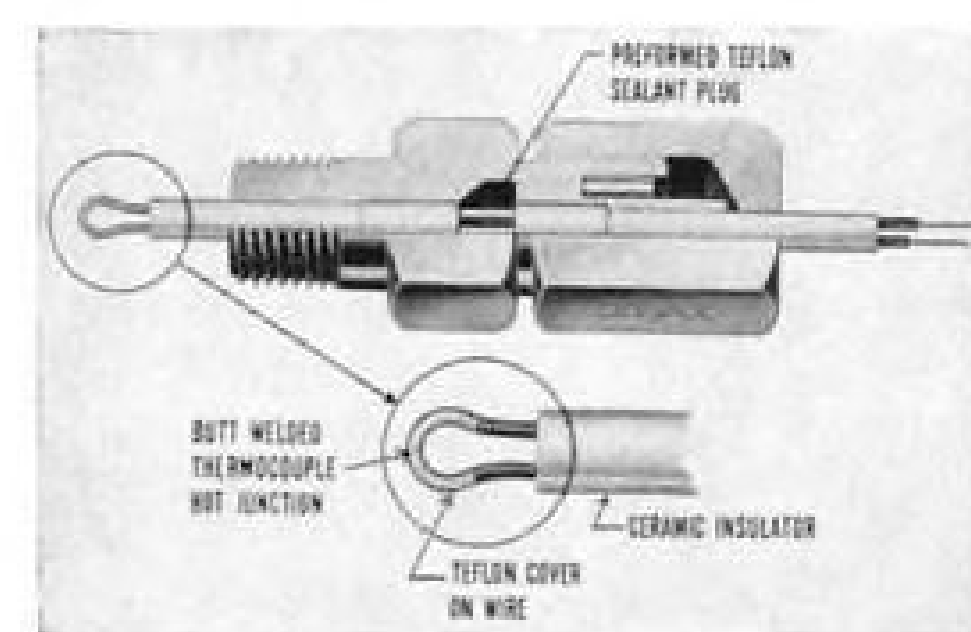
attached to the side as well as the top of the machine.

The clamp is said to give 8,000-psi. equalized pressure by means of the leverage wheel.

Safety-Adjustable-Hold-Down Clamp Co., 600 Albany St., Brunswick, Ga.

New Thermocouple Gland Made Corrosion-Resistant

A new thermocouple gland incorporates a butt-welded thermocouple covered by a thin-walled Teflon tube. The tube is said to provide protection against corrosion.



TEFLON TUBE covers thermocouple.

The new gland—Model TC-14T—offers the corrosion-resistant properties of Teflon in a fast-responding thermocouple (with average thermal-time constant of 4.5 seconds), for pressures up to 5,000 psi. at temperatures from -90°F to 500°F.

Conax Corp., 4515 Main St., Buffalo 21, N. Y.

ALSO ON THE MARKET

New X-ray inspection unit is lightweight, self-contained and portable. Norelco MG 60 is designed for continuous operation and is said to be ideal for mass-production applications. X-ray tube has a small (1-mm.) focal spot.—North American Philips Co., Inc., Research and Control Instruments Div., 750 S. Fulton Ave., Mt. Vernon, N. Y.

Spirally striped Teflon wire for color coding and circuit identification is now available in production quantities. It meets military and commercial specs for color coding, which is available in 819 different combinations, using black, brown, red, orange, yellow, green, blue, purple or grey on neutral or white insulation. Finished wire is supplied in conductor sizes from No. 26 to 10 awg. Teflon insulation meets military spec for Type E wire rated for operation at 600 v. and 250°C.—Tensolite Insulated Wire Co., Inc., 196 Main St., Tarrytown, N. Y.



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The BEECHCRAFT Twin-Bonanza is the new favorite with those who want to go faster with more comfort and more luxury. BEECHCRAFT quality is apparent from the first glance, and that's real assurance of extra value, the ultimate of air travel.

Travel is most restful in the big, six-passenger, roomy, extra-quiet cabin with its built-in visibility and all its stretch-out roominess...and you go when and where you want to go! Its *earning power* makes the new Twin-Bonanza a profitable investment in today's race for business expansion.

At full 6,000-pound gross load this newest twin-

engine BEECHCRAFT has a cruising speed of 192 miles per hour at 10,000 feet, a rate of climb of 1,450 feet per minute, a service ceiling of 20,000 feet, a range of up to 1,088 miles, and outstanding single-engine performance.

Business leaders, like the military, have adopted this new Twin-Bonanza as the 1954 personnel transport...it's a proved aircraft with a long-standing reputation for top performance. Investigate the Twin-Bonanza way of faster personal travel toward more business and more pleasure. See your BEECHCRAFT dealer or distributor, or write Beech Aircraft Corporation, Wichita, Kansas, U. S. A.



BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

AIR TRANSPORT

CAB May Revamp U.S.-Alaska Routes

- Proposed change would cut number of airlines.
- Examiner's findings also would reduce subsidies.

U.S.-Alaska air route pattern will be tightened and subsidies to four airlines reduced if Civil Aeronautics Board adopts recommendations submitted by chief examiner Francis W. Brown.

Brown suggested some realignment in the present route structure and airline integration in line with Air Coordinating Committee's report (AVIATION WEEK May 3 p. 12), which called for elimination of "uneconomical-duplicate service."

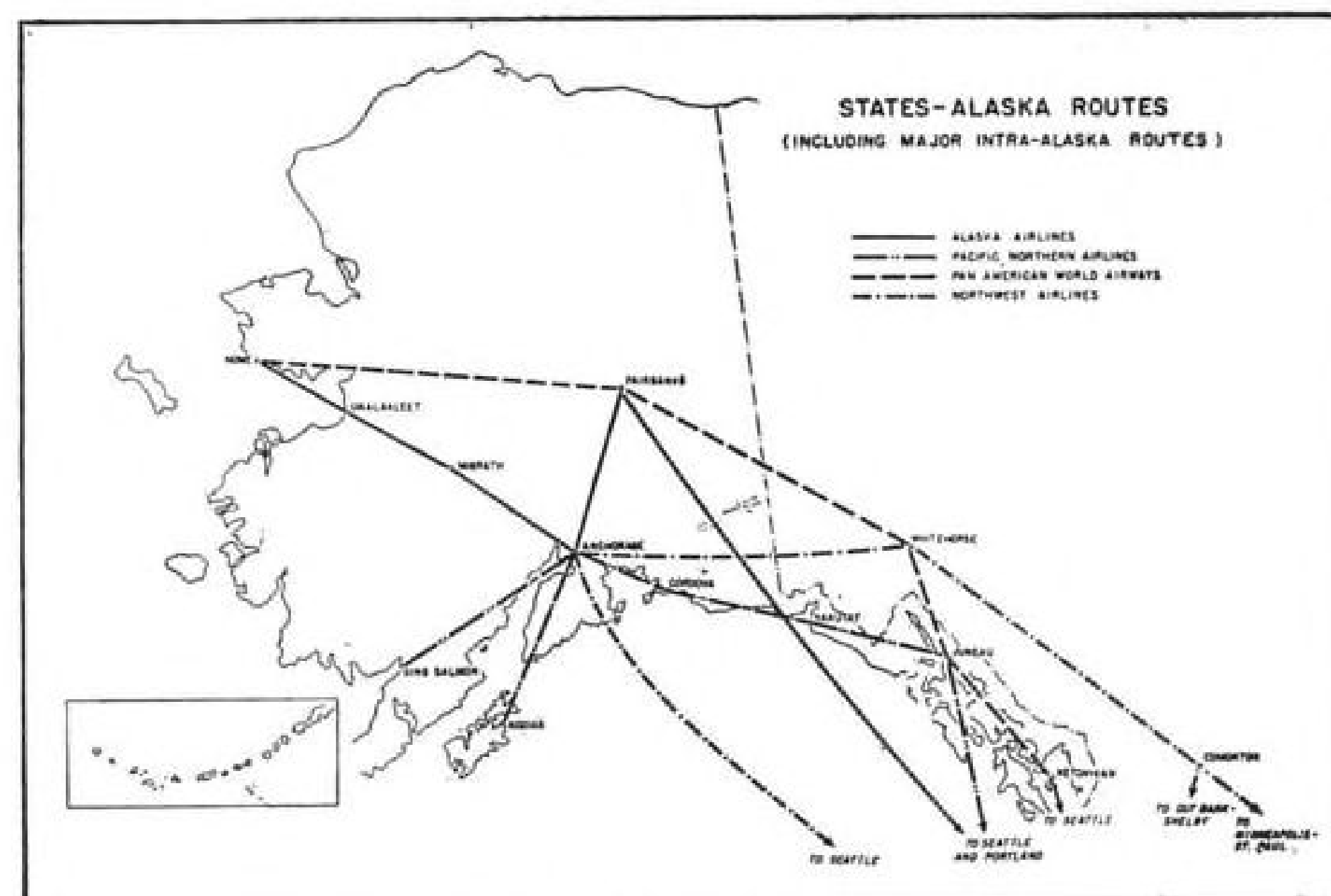
Involved in the lengthy States-Alaska case are:

- **Alaska Airlines**, seeking renewal or issuance of a permanent certificate for its Portland/Seattle-Fairbanks route, designation of Seattle as Seattle/Tacoma, and addition of Skagway-Haines and Anchorage as intermediate points.
- **Pacific Northern Airlines**, seeking a 10-year renewal or permanent certificate covering its Portland/Seattle to Juneau-Yakutat-Cordova-Anchorage route; addition of Fairbanks as a co-terminal; addition of Kodiak, Gustavus and Ketchikan as intermediate points and elimination of the restriction in its present certificate requiring that flights serving Seattle and Juneau originate or terminate in Anchorage.
- **Pan American World Airways**, seeking designation of Anchorage as a co-terminal with Fairbanks on its route from Seattle via Ketchikan, Juneau and Whitehorse and addition of Skagway/Haines/Gustavus as an intermediate point between Juneau and Whitehorse.
- **Northwest Orient Airlines**, seeking renewal of its States-Alaska routes; redesignation of Seattle as Seattle/Tacoma, and abandonment of Whitehorse.

This case also includes the petitions of Northern Consolidated Airlines and Wien Alaska Airlines, which ask suspension of authorizations of Alaska and Pacific Northern to the extent that they duplicate the service of Northern Consolidated and Wien, and suspension of Pan American between Fairbanks and Nome.

Examiner Brown made the following recommendations to CAB:

- Pacific Northern's temporary cer-



PRESENT SETUP affords "fertile field" for subsidy reduction, CAB examiner contends.

tificate should be renewed for seven years, authorizing operations between Seattle and Anchorage via Juneau, Yakutat and Cordova on condition that flights serving both Seattle and Juneau originate and terminate in Anchorage.

• Northwest's authority to serve Anchorage should be renewed on an unrestricted basis, provided NWA's Orient authority is renewed.

• Alaska Airlines' authority to operate between Fairbanks and Seattle/Portland should be discontinued.

• Pan American should not be permitted to serve Anchorage unless Northwest's authority is terminated. If this happens, PAA should be allowed to serve Anchorage as an alternate co-terminal point for a seven-year period.

• Pacific Northern and Alaska Airlines should be granted in interchange at Anchorage to facilitate movement of traffic to Fairbanks during peak periods.

• Pacific Northern and Alaska Airlines systems should be integrated.

• Proposed loss of intra-Alaskan routes by airlines operating to the States should be deferred for consideration with the intra-Alaskan investigation.

• Additional service to Ketchikan is not required.

• Pacific Northern's request to serve Kodiak on direct flights from the U.S. should be deferred for consideration with intra-Alaskan investigation.

• Northwest's authority to operate between Anchorage and Minneapolis via Whitehorse and Edmonton is not required unless NWA's authority to conduct Orient flights over this route is

renewed, in which event Whitehorse should be deleted from the certificate.

• Certification of all-cargo service, proposed by Air Transport Associates is not required.

► **Subsidy Jumps**—Mail pay in the States-Alaska market has jumped from \$1,657,486 in 1949 to \$5,655,417 in 1953, Brown says. Total bill in providing air service to and within Alaska in 1953 was \$12,352,035.

"Clearly, this proceeding and the pending intra-Alaska investigation afford a fertile field for reduction in subsidy payments," the examiner said.

Bureau of Air Operations has said competition is desirable in the States-Alaska market but recommends the number of airlines providing service be reduced from four to two and that these two carriers be authorized to serve each of the major markets of Alaska.

"It is the bureau's contention," Brown says, "that such a service pattern will provide the necessary competition and can be operated at a substantial reduction in subsidy. The bureau's plan contemplates that nonstop flights to Fairbanks will be eliminated in the off-peak months with operations being conducted via Anchorage."

The plan has considerable appeal, says Brown, since it would reduce the number of carriers operating in this relatively small market to two and yet would retain the advantages of competition.

► **NWA Elimination**—"In addition, the bureau plan would eliminate Northwest from the Anchorage market, which that

carrier has served since 1946," the examiner says. "Northwest has made substantial investments in Anchorage both in physical facilities and in developmental activities which would be lost under the bureau proposal."

"While it is true that Northwest was slow in penetrating the market and that the Board found it necessary to certificate an additional carrier to meet the traffic demands, it has increased its service to a point at which it now carries a major part of the traffic."

"Pan American with its world-wide system can be expected to provide a good service with modern equipment to the territory through its Alaskan Division as can Northwest on its International Division. However, because of the strategic importance of Alaska, its possibilities for further commercial development and its dependence upon air transportation, it would be desirable to continue at least for a further experimental period one Alaskan carrier operating between Anchorage and Seattle."

Thus the examiner recommends that the temporary certificate of Pacific Northern to operate between Seattle and Anchorage via Juneau, Cordova and Yakutat be extended. This will result, he says, in a direct competitive service to the most important Alaskan traffic point.

► **New Pattern**—The route pattern suggested by the examiner will:

• Eliminate direct competition in the Fairbanks' market where traffic is marginal and where it is difficult to justify even a minimum of daily roundtrip service during the winter months.

• Continue direct competition to Anchorage, the major traffic center of the territory and the only market in which such direct competition can be supported.

• Continue operation to Alaska by two major airlines with widespread interests and aircraft fleets available to meet emergency situations.

• Continue service to the States by one airline also serving points in Alaska and whose existence is dependent upon its ability to develop the traffic potentials of the route. The authorization also should make possible other integrations and modifications more properly to be considered in the pending intra-Alaska investigation.

• Eliminate Alaska Airlines from the States-Alaska market for which that carrier has received mail pay of \$2,756,882 in the slightly more than three years of its operation.

New Copter Service

New York Airways inaugurated the first scheduled helicopter commuter service Aug. 3, operating two flights daily from Trenton, Princeton and New Brunswick, N. J., to New York.

Nonsked 'Pools'

- CAB official says big irregulars break rules.
- Board's limited power to enforce law is cited.

Less than half of the 55 letters of registration granting economic operating authority to large irregular airlines are being used by the owners for legitimate purposes, according to Robert L. Griffith, chief of Civil Aeronautics Board's Office of Compliance.

Several are inactive, he says. Several more are used by the "combines" for "pooling" purposes; others, are suspected of being owned by the "combines" as insurance against revocation of one or more of the operating certificates.

Griffith makes the estimate in a letter requested by Sen. John W. Bricker, chairman of the Senate Committee on Interstate and Foreign Commerce, in connection with hearings on the McCarran omnibus bill.

► **Civil Penalties**—"The enforcement program of the Civil Aeronautics Board could be made more effective were the Board to be granted the power by the Congress to impose civil penalties against those found to be in violation of the act or of the Board's economic regulations," Griffith says.

As presently constituted, CAB's powers limit enforcement of the regulations to the cease-and-desist order, suspension or revocation of a letter of registration or certificate of public convenience and necessity, he reports. And, in the case of a certificate, "even the grounds under the act for suspension or revocation are extremely limited."

"Many infractions or violations go uncorrected or unpunished because the Board does not have the power to impose civil penalties."

► **'Ingenuity'**—One reason for ineffectiveness or delay in the institution and prosecution of some enforcement proceedings can be traced to the "ingenuity of certain segments of the large irregular carrier industry," the compliance chief says.

"They can shift letters of registration through transfer of stock ownership of the corporation holding such letter; they can change corporate officers and partnership members; they can buy, sell, lease, and sublease aircraft; and they can do all of these things faster than the facts can be ferreted out and faster than the legal processes of a democracy can be brought to bear."

► **Combine Example**—Griffith points to the North American Airline operation as a good example of a "combine" of

nonsked airlines. Hearings in the enforcement proceeding against North American have ended and briefs are expected by Sept. 2 from CAB's compliance attorney and the airline lawyer.

"The Board's economic regulations prohibit a single large irregular carrier from making flights between the same points on the same day or days of successive weeks; from making two or more flights per week between the same points in successive weeks without a break therein; or from any other operations comprising a regular and consistent pattern," Griffith explains. "Thus, by pooling the permissible frequency and regularity of each of the five large irregular carriers presently utilized in the combine."

"North American is able to provide regular scheduled daily service without any single one of the carriers seeming to violate the law."

"Operation of North American combination is conducted by means of a partnership: Republic Aircoach System, which handles the bookkeeping and accounting functions, and North American Airlines Agency Corp., also known as North American Aircoach System, Inc., which, with the exception of Kansas City, maintains all of the sales and ticket offices and handles all of the advertising functions."

► **Officers Listed**—"... Stanley D. Weiss, Jack B. Lewin, James Fischgrund and Ross R. Hart are the partners in Republic Air Coach System and the stockholders in the agency corporation," Griffith says. "In addition, their partnerships—Twentieth Century Aircraft Co., California Aircraft Co. and Standard Airmotive Co.—are used as vehicle to hold title to the aircraft operated by the combine."

"Holders of letters of registration as large irregular carriers under the authority of which the combine purports to conduct its operations . . . are Trans-

National Airlines, Inc., Trans American Airways, Inc., Twentieth Century Air Lines, Inc., also known as North American Airlines, Inc., Hemisphere Air Transport and the Unit Export Co., Inc."

Griffith adds that "all flights are operated simply as 'North American' flights without reference to the names of the actual holders of the letters of registration."

► **'Hollow Gesture'**—In testimony before the Senate committee, Griffith said the Compliance Office's chief problem is that if it is successful in convincing the Board that either a cease-and-desist order or a suspension and revocation sanction is proper in such a case, then the sanction becomes meaningless "because the combine or pool simply drops that letter as an operating carrier and picks up one in its bottom drawer . . . and starts operating under that new name so

that our sanction then is just a hollow gesture."

Former Sen. Joseph O'Mahoney, a North American attorney, told the Senate committee in previous testimony that "North American has had an efficient operation; it has had a safe operation; it has a profitable operation and all we ask is a permit to continue to do that."

In reply, Griffith said: "I may be mistaken but I conceive the Civil Aeronautics Act to say that before engaging in something someone must obtain a certificate of convenience and necessity, not that they go ahead and do it for a number of years and then come and say, 'We want a permit to continue' because, in my opinion, the requirements for a certificate are absolutely meaningless if all they are for is to allow somebody to continue to do something. . . .

"I will categorically deny that the Office of Compliance is persecuting the nonskeds as a category," he said. "I am certain that there are owners of large irregular carriers and their counsel who would tell you that that is not the fact; that we try to exercise good judgment in overlooking minor and purely technical violations."

"Perhaps the best refutation of that charge is the fact that since June 1, 1953, our office has commenced approximately nine or 10 formal proceedings against certificated carriers; we have commenced two against so-called nonskeds; we have commenced one against a ticket agency."

► **Cites Violation**—The compliance chief said his office has information that some of the irregulars are collecting transportation taxes on tickets without turning the tax over to the Internal Revenue Service.

Some run into hundreds of thousands of dollars, he added.

One large irregular—"I don't want to mention names in this connection"—that operates between New York and Puerto Rico lists many of its passengers as tax exempt, he said.

"Their tickets are stamped with a validator indicating a city in Puerto Rico," said Griffith, "and we have checked through on some of those passengers and find that they have been long-time residents of New York City. It is therefore difficult for us to see how those tickets could have been purchased and validated in Puerto Rico."

"Approximately a year ago I attempted to work out a working arrangement with the Internal Revenue Service whereby information of that character that comes to our attention is simply turned over to them," he said. "Obviously that is not our business. But we have turned over to the Internal Revenue Service passenger manifests where the plane carried 48 or 54 passengers and some 38 or 40 of them were listed as tax exempt."

American Sues Pilots For Strike Losses

Strike of 1,200 American Airlines pilots threatened last week to cost the Air Line Pilots Assn. more than \$1,250,000 plus individual pilot salary losses.

American filed a damage suit in Southern New York District Court, \$1 million of which is for "compensatory damages" as a result of ALPA's strike and \$250,000 "for illegal activity on the part of the union and its leaders to induce the individual pilots in the company not to fulfill their obligations under the contract."

ALPA ordered the protest strike July 30 over waiver of the eight-hour non-stop flight limit after negotiations between American and the union reached an impasse at National Mediation Board. The Board relinquished its jurisdiction, but NMB member Leverett Edwards said last week it could get back into the middle "in five minutes if needed."

► **\$750,000 Daily Loss**—C. R. Smith, American president, said the suit would be amended as the strike continued and as American lost money as a result of the walkout. AA reported it was losing about \$750,000 a day to United, Trans World, Capital and Eastern Air Lines, as well as to a number of railroads.

Meanwhile, rival airlines were scheduling extra sections in order to help meet the increased passenger, mail and cargo loads brought about by American's grounding.

At a news conference in New York, Smith said: "We believe we have a valid contract with the Air Line Pilots Assn. We believe the association deliberately and willfully violated its contract and that the strike has seriously damaged the business and reputation of the company, has endangered the employment and livelihood of the company's employes and will continue to do so."

Clarence Sayen, ALPA president, said of American's suit: ". . . In the final analysis the pilots have made no demands on the company and are legally free to work or withhold their services as they see fit. Any demands which have been made have been made by the company. American can relieve its self-imposed damages and self-generated losses at any time by withdrawing their unilateral and arbitrary demands that the pilots forsake a flight limit rule of 23 years standing or be discharged."

► **New Strikes**—ALPA indicated it would not strike United or TWA even though the pilots of both airlines also voted to strike on the eight-hour flight limitations, because the union would not chance a national transportation tie-up by grounding three major airlines.

Meanwhile, some 20,000 ground crew members of Capital, Eastern National, Northwest, Trans World and United Air Lines threatened last week to walk out. National Mediation Board was meeting with the AFL machinists union and representatives of the six airlines involved in an effort to solve the dispute over increased wage rates.

Airlines did not seem concerned about a ground crew walkout, claiming it appeared more a threat to insure increased wages rather than a full-scale strike.

Colonial Offers New Plan to Speed Merger

Colonial Airlines has asked Civil Aeronautics Board to establish a voting trust "to remove any shadow of control" that Eastern Air Lines allegedly holds in CAI to speed its merger with either National Airlines or EAL.

Chief issue in the proposed integration of Colonial with either of the two larger airlines is that of Eastern control, which President Eisenhower said was sufficient to warrant veto of an EAL-CAI merger last February (AVIATION WEEK Mar. 8, p. 51).

National has asked CAB to refer the matter of Eastern's premature control of Colonial to Justice Department for prosecution (AVIATION WEEK July 19, p. 19).

► **'Independent Trustee'**—The proposed voting trust suggested by Colonial last week "would authorize an independent trustee to vote stock in favor of an integration of Colonial with the purchaser who makes the best offer."

Colonial asked CAB to designate an independent trustee or, as an alternative, designate an eligible list of persons acceptable to the Board as trustees to carry out this responsibility without delay.

The airline promised to request new offers from both Eastern and National as soon as possible if CAB would expedite its action on the matter.

► **'Confusing Situation'** — "Colonial's management owes a fiduciary responsibility to its approximately 9,000 stockholders to make sure any integration proposal provides the best possible terms for Colonial's stockholders," the airline told the Board.

CAI said CAB's order that an NAL merger with Colonial would be in the public interest (AVIATION WEEK June 28, p. 12) did not specifically restrain Colonial from negotiating a new agreement with Eastern.

"This has created such a confusing situation as to cause Colonial management to be apprehensive as to what action CAB would take if Colonial went forward with negotiations with National and Eastern," said CAI.

AIA Urges Planning for Heliports

Copter industry group advises against building now but says cities should be ready for quick construction.

The helicopter industry says it is too early for local communities to start building heliports but, at the same time, warns them to have advance preparations ready in order to move quickly when the time comes to construct facilities.

In a report released last week by the Helicopter Council of the Aircraft Industries Assn., an industry committee declares there are too many unknown factors, particularly in regard to the performance of future transport helicopters, to warrant investment in construction at this time.

However, the possibility of fast progress between now and 1960 makes adequate planning necessary, the report says.

► **Market Check**—Most important items for communities to check are the potential market for helicopter transportation and physical or legal obstructions that might impede progress when the aircraft are ready.

In a conservative evaluation of the "state of the art," the committee says such things as performance criteria, navigation aids and real operating experience still are lacking.

Until more information and equipment are available, the group finds it impossible to draw up sound and complete recommendations as to where heliports should be located, what devices they must have or how big they must be.

► **Commercial Prototypes**—On the subject of transport helicopters, the report lists the aircraft at present certificated by Civil Aeronautics Administration, largest of which is the 12-passenger Sikorsky S-55. None have two engines.

The report also lists several military helicopters, indicating that some will serve as prototypes of commercial helicopters to be certificated by 1959. Included is the twin-engine Sikorsky S-56 that will carry 35-40 passengers.

Others in this classification are the single-engine Sikorsky S-58, the Piasecki H-21, Kaman's HOK and Bell Aircraft's HSL. Piasecki's twin-engine H-16 is suggested as a 50-60 passenger aircraft when powered by Allison T56 turbo engines.

There are engineers both in this country and abroad who believe the tandem design is optimum for transport use, but the only tandem helicopter certificated by CAA is the two-passenger McCulloch MC-4C. The Bell HSL and Piasecki H-21 and H-16 also are tandems but now are used only by the military.

Heliport Future

Since World War II, many communities have underestimated their airport requirements and found their relatively new facilities inadequate. In addition to the fast growth in air travel, airplane performance has increased rapidly and brought the demand for longer and longer runways.

The Helicopter Council says communities probably will not repeat this experience with heliports. The council believes landing places built to take transport helicopters of 1960 will serve equally well for all future copters.

Design trend for big rotary-wing transports is to increase disc loadings and lighten power loadings. In the future, copters may have three or four engines and be capable of hovering with one engine out.

Major piece of equipment that may be needed for rooftop heliports: a crane device to move an out-of-service copter to the airport for repairs.

► **Design Question**—The committee anticipates that a helicopter of roughly the H-16 dimensions and gross weight—140 ft. long and 45,000 lb.—will enter commercial service between 1955-60.

In the following five years, 1960-65, copters of 60-passenger capacity will make their appearance. They will be 160 ft. long and gross 50,000 lb., the report estimates.

It is this question of future helicopter design, the report says, that has the greatest single bearing on how heliports should be built. Because design still is in a state of flux, communities are advised by the industry to "avoid unnecessary financial commitments or excessive regulation at this time."

Other recommendations:

- In planning, focus attention on downtown sites, where the helicopter can be of greatest utility.

- Study local traffic flow inside and outside the area to learn the helicopter potential.

- In considering a possible heliport site, weight should be given to flight approach paths because the pilot flying at minimum authorized altitude always must be able to make a safe landing in case of power failure.

- Community planning, zoning, building regulations and other laws may need changes to protect future availability of heliport sites.

- Guard against aviation laws and regulations that will impede helicopter and heliport operations.

- Optimum size for an interim heliport to serve present certificated machines is 250 ft. in diameter.

- It is not necessary to plan on equipment for instrument landing and take-offs until more progress is made on the avionic equipment for this purpose. Meanwhile, an illuminated wind direction indicator will suffice. It will be 1960 before satisfactory electronic equipment will be in service.

- A heliport at ground level is preferable to a rooftop or other structural type. If a structure is designed as a heliport, it should be less than 100 ft. and not more than four floors high. If it is going to be used after 1960, it should be stressed to hold copters weighing 50,000 lb.

- A heliport should be designed to permit quick unloading and loading of passengers and baggage. At the same time, services should be kept as simple as possible.

► **Experience Factor**—In its discussion of the heliport problem, the committee emphasizes that only practice will make it possible to answer many questions raised by local aviation officials. Until more experience is gained, the report says, "it appears that each location should be studied individually with an eye to both immediate requirements and future needs. . . .

"Ideally, passenger heliports should be located as nearly as possible to the center of the passenger generating area. . . . This is a requirement of both public convenience and transportation economics. . . . However, such locations will frequently be in heavily built-up areas and many considerations—safety, zoning restrictions, acceptable noise levels and high land values—must be adjusted. . . ."

The report cautions against unnecessary elaboration of ground equipment at heliports. Eventually, it says, helicopters will need lighting, radio aids to navigation and electronic traffic control. But communities that go overboard in providing these things will menace the operation with high heliport operating costs.

Other observations by the committee:

- Fact that a heliport in most cases should be in a downtown area does not rule out the possibility that a flight path can be worked out along which the pilot would have landing spots to use in case of emergency. Parkways, waterways, railways and industrial areas usually can be followed into the center of traffic sources.

- In general, federal, state and local governments so far have not passed laws governing the operation of helicopters and heliports. No step should be taken in this direction until airlines



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have had experience with the reliability and limitations of the helicopter.

- Industry anticipates wide use of helicopters by private owners, particularly commercial concerns, and the establishment of private heliports at such places as factories and hotels. Local planning and regulations should take this into consideration.

- For the future transport helicopter, presumably a twin-engine aircraft, safety will demand that the pilot on takeoff always be in a position to continue flight or land safely if one engine fails.

Because a helicopter requires 65 to 90% of available power to hover, it is clear that it cannot hover with one engine out at normal gross weight. This means the pilot must have forward speed to stay in the air and under control. To have forward speed on takeoff, he must be able to fly over a clear access path. He cannot take off straight up and hurdle high nearby obstructions without endangering his passengers.

- Based on limited experience to date, it appears that obstruction lights, an identification beacon and lights to mark the touchdown pad will be needed for night operations.

- Single-engine helicopters will not be allowed to fly under IFR conditions. For multi-engine operations, some type of radio aid will be needed to mark the access path to a downtown heliport. In addition, there must be a localizer to help the pilot find the landing spot. It must be more accurate than present airport equipment.

Chairman of the helicopter council committee that compiled the report is John P. W. Vest of the Sikorsky Division, United Aircraft Corp. Other members: Hans Weichsel, Bell Aircraft Corp.; L. S. Wigdortchik, Piasecki Helicopter Corp.; George C. Neal, Pogue & Neal; Don Ryan Mockler and Jean Ross Howard, both of AIA.

EAL, NWA Propose Interchange Service

Eastern and Northwest Orient Airlines are seeking Civil Aeronautics Board approval for an interchange to provide one-plane service from Minneapolis/St. Paul to Milwaukee, Atlanta, Tampa and Miami.

Northwest would use its equipment during the winter months and Eastern during the summer months, thus overcoming the seasonal variation in their traffic by making maximum use of their equipment.

The two airlines want to use Chicago as the interchange point. The only existing single-plane service between the two areas now is the National-Capital interchange, which uses Washington, D. C., as its connecting point.

BOAC Agrees to Buy UAL Stratocruisers

British Overseas Airways Corp. has agreed to buy six Boeing Stratocruisers from United Air Lines and is expected to put the replacements for its grounded Comet 1 jet transport fleet on trans-Atlantic flights early next summer (AVIATION WEEK July 26, p. 19).

The six transports made up UAL's entire Stratocruiser fleet.

The British airline now is turning to final negotiations with Pan American World Airways for two additional Stratocruisers.

- **First 749**—In London, BOAC has taken delivery on the first of four Lockheed Constellation 749s purchased from Qantas Empire Airways. It probably will go into service this month on routes to Africa and the Far East.

The airline also has bought one Connie from Lockheed Aircraft Corp., Burbank, Calif.

- **No Sellers**—But BOAC has not been able to find an airline that will sell three additional 749s needed to supplement its fleet until the Comets are put back into service and Bristol turboprop Britannias on order are delivered.

The British air carrier plans to resell its Connies as Comet 2s and 3s are delivered or if its grounded Series 1s are cleared to resume service. The Stratocruisers will be replaced by Britannias.

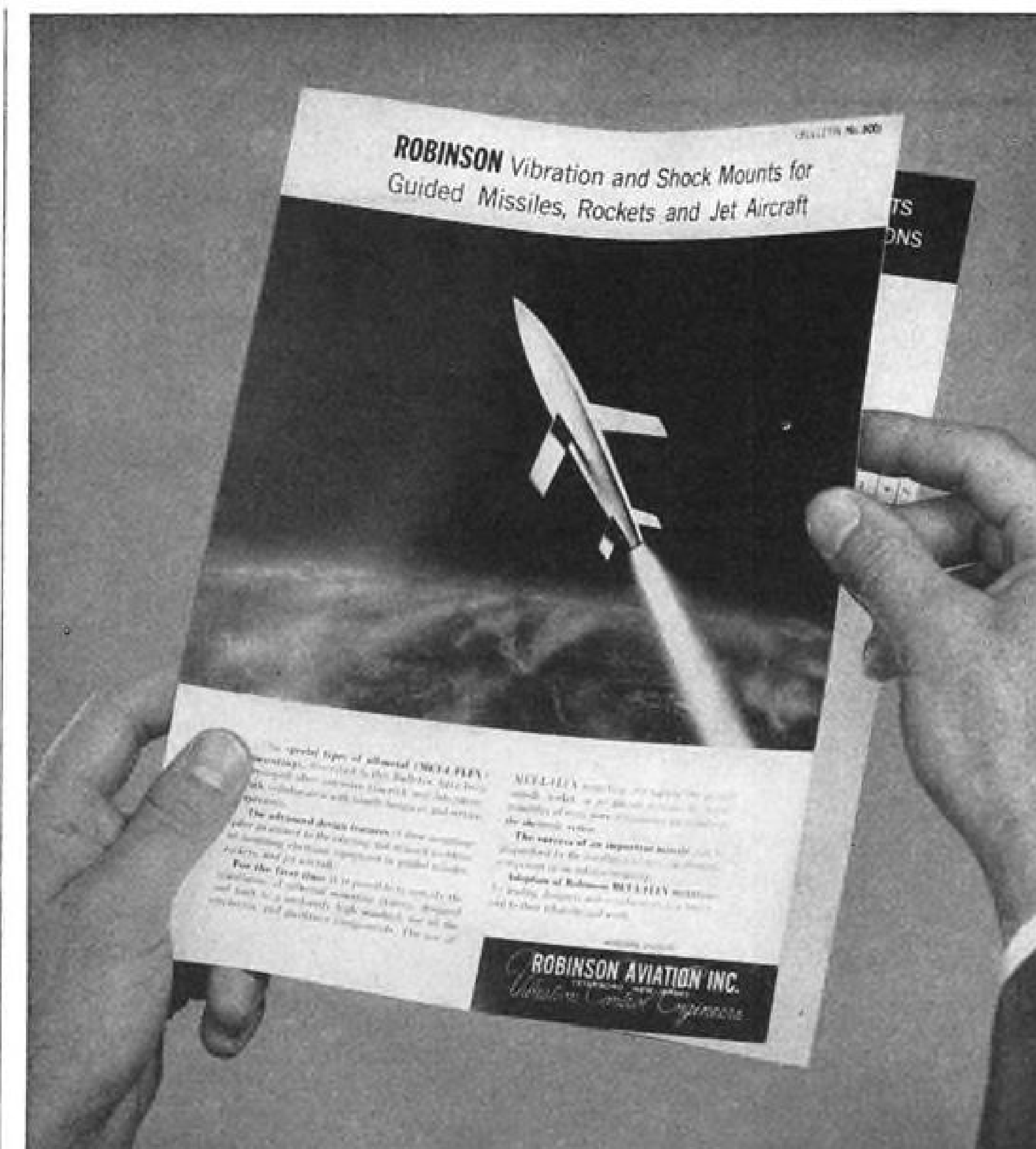
EAL Asks Approval Of Mexico City Route

Eastern Air Lines wants Civil Aeronautics Board to issue a "declaratory order" affirming the validity of EAL's New Orleans-Mexico City route, in question since 1952.

Filed in the proceedings on American Airlines' application for nonstop service between New York and Mexico City, Eastern's petition contends that none of the parties concerned in the nonstop service proceedings can determine what type of case to present until the issue of the validity of EAL's Mexico City route is resolved.

Eastern has been authorized to serve Mexico through New Orleans since 1946. But because of the failure of U. S. and Mexico to work out a reciprocal air transport agreement, Eastern has been unable to begin its service.

President Truman in 1952 revoked EAL's Mexican authorization by letter. Eastern has refused to recognize such revocation on the grounds that the specific language in the Civil Aeronautics Act prohibits cancellation of a certificate for foreign air transportation without cause and without notice and hearing.



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CAB ORDERS

(July 21-27)

DENIED:

Bonanza Air Lines' motion for reconsideration of prior orders denying consolidation of certain dockets in Southwest Airways' application for renewal of its amended certificate of public convenience and necessity.

Aircoach Transport Assn.'s reconsideration petition that asked additional operational authority for its members and other airlines similarly situated.

APPROVED:

Intercompany arrangements between Northwest Orient Airlines and Lake Central Airlines and various other air carriers.

Fare increases voted by Traffic Conference 2 of the International Air Transport Assn. between Pan American World Airways and various other domestic and foreign airlines.

GRANTED:

Transocean Air Lines an exemption to operate 10 roundtrip flights from Guam to Tokyo, carrying U. S. military personnel and civilian workers.

Mohawk Airlines a temporary exemption to permit helicopter operations through two, rather than one, heliports in serving Liberty-Monticello, N. Y.

Flying Tiger-Slick Airlines an exemption to operate one flight from Stockholm, Sweden, to New York Aug. 17 and three flights from Munich, Germany, to New York Aug. 24, Sept. 14 and Sept. 21 under contract with Intergovernmental Committee for European Migration.

ORDERED:

Frontier Airlines' certificate amended by extending Route 73 from Billings, Mont., to Bismarck/Mandan, N. D., via the intermediate points of Miles City and Glendive, Mont., and the alternate intermediate points of Sidney and Wolf Point, Mont., and Williston and Dickinson, N. D., until Mar. 31, 1955.

SUSPENDED:

S. S. W. Inc., individual exemption as an irregular airline unless the carrier files before Aug. 10 certain delinquent reports required for the first quarter of 1954.

SPECIAL NOTE:

CAB June 16 said it was issuing an order suspending exemption of Stewart Air Service, Hawthorne, Calif., as an irregular airline, effective July 1. On June 28, however, the company filed Schedule F of CAB Form 242 for first quarter of 1954, which had been delinquent since May 20. CAB did not, therefore, suspend the exemption as planned. No order was issued to this effect and none will be.

CORRECTION

A CAB order relating to Purdue Aeronautics Corp appearing in AVIATION WEEK July 26, p. 83, was incorrect. It should have read:

Extended: Purdue Aeronautics Corp. ex-

emption to operate charter trips until 60 days after Board reaches decision on Purdue's application for a certificate of public convenience and necessity as a charter operator. AVIATION WEEK regrets the inaccuracy.

SHORTLINES

► **American Airlines** reports a company record of 366,649,000 revenue passenger-miles for June, topping by 14.5% the June 1953 mark of 320,079,000 and well ahead of last May's total of 325,065,000. Airfreight increased 9.6% over June 1953 to 4,679,450 ton-miles, but air express dropped 19.6% to 66,550.

► **British European Airways'** chief executive, Peter Masefield, predicts the number of BEA aircraft flying in and out of London Airport will equal the combined total of all other airlines by the summer of next year.

► **British Overseas Airways Corp.** will begin operating a new luxury Strato-cruiser service Sept. 4, flying one roundtrip a week between New York, Montreal and Cairo via London and Frankfurt, Germany.

► **California Central Airlines** is selling first-class and aircoach tickets on a "budgetair" credit plan.

► **Delta-C&S Air Lines** flew 29,560,000 revenue passenger-miles during June, a gain of 4.8-million miles over the same month last year. Available seat-miles increased 20% to 45,149,000.

► **Eastern Air Lines** reports its "pay now, play later" package vacation plan sales have increased 162% over last year, expects trips to total 50,000 before Dec. 15.

► **Ozark Air Lines** reports it gained \$4,221 in passenger revenue from Jefferson City, Mo., traffic between June 15 to July 15, first 30 days of service.

► **Pan American World Airways** reports 34,960 aircoach passengers were flown on Caribbean routes during June, an increase of 24% over the same month last year.

► **Resort Airlines** says its summer air cruise business is more than 60% ahead of last summer's volume. The carrier plans to continue its cruises this fall at no increase in rates.

► **Scandinavian Airlines System** expects to open its "over-the-pole" route from Europe to Los Angeles Oct. 1.

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(Continued on page 56)

AVIATION WEEK, August 9, 1954

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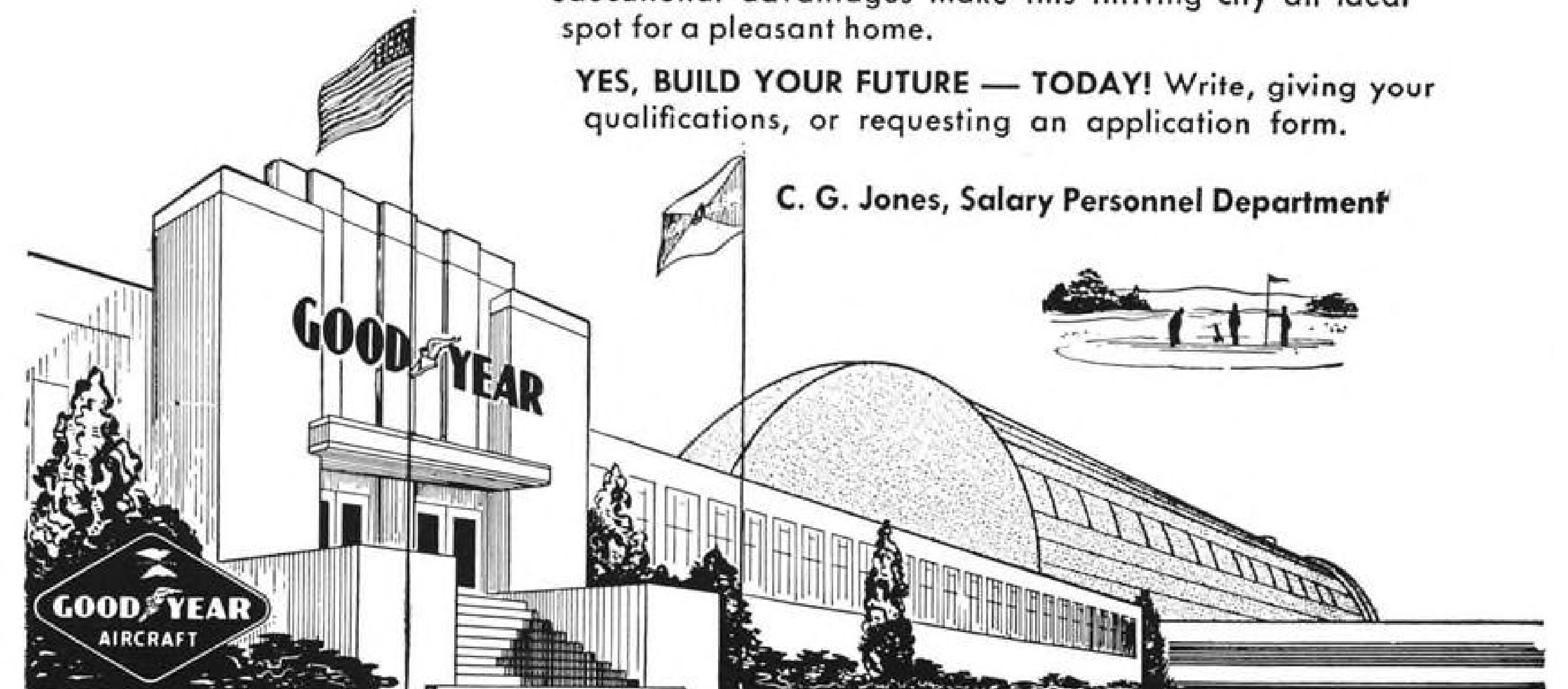
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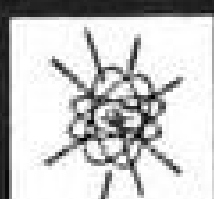
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News Sidelights

More than 3 million gal. of plane fuel has been transferred in midair by the 305th Air Refueling Squadron, MacDill AFB, Tampa, Fla., operating Boeing KC-97 Stratofreighter tankers.

A wide range of tariff reductions on technical goods has been proposed to the West German cabinet by Fritz Schaeffer, according to a German newspaper. Aircraft and parts would be included in such a reduction.

Carrier pigeons are given tourist users of Keith Messenger's charter flying service when he drops them off at isolated lakes in the Sault Ste. Marie, Ont., region so that the fishermen can contact with the operator if they suddenly need medical care or run short of groceries.

As part of its program to educate people living near major New York-New Jersey air terminals on their operations, a new pamphlet answering most frequently asked questions in non-technical terms is being distributed by National Air Transport Coordinating Committee on request. Titled, "What Every Airport Neighbor Should Know," the pamphlet is being distributed because air traffic noise is more noticeable during summer.

Multi-engine rating has been granted to 73-year-old William T. Piper, president of Piper Aircraft Corp., Lock Haven, Pa., after being checked out in the company's new twin-engine Apache light business plane. According to Civil Aeronautics Administration, he is the oldest person to have earned a multi-engine rating. Piper learned to fly at 50, flies more than 40,000 mi. yearly solo.

History of U. S. military aviation is being gathered on film by the AF Technical Museum working at Wright-Patterson AFB. Editors are going through more than 70,000 ft. of movies in addition to stills, which they will boil down to about 2,000 ft.

Some three years and 9,000 hours of accident-free flying have been completed by a unit of the Thailand air force attached to USAF's 374th Troop Carrier Wing at Tachikawa, Japan. The Thai outfit operates three Douglas C-47s and includes 15 officers and 14 airmen. The unit participated in Korean combat operations.

Maximum stage distance of new Fokker Friendship turboprop transport has been increased from 810 to 1,000 statute miles by structural development making possible increase in wing fuel capacity from 845 to 981 gal.

Small aircraft gas turbine engines currently being considered by General Electric include copter, turbojet, turboprop and ducted-fan types, a new bulletin being issued by the firm indicates. Possible uses for these engines listed in the bulletin cover liaison planes, supersonic fighters, utility and light cargo planes, air-to-surface and surface-to-surface missiles, assault, utility or cargo copters, advanced supersonic trainers and other types. The illustrated bulletin, designated GEA-6115, is available from General Electric at Schenectady 5, N. Y.

Stanford Research Institute has been named one of three national industrial information depositories for unclassified atomic energy information. Other depositories are Atomic Industrial Forum, New York, and John Crerar Library, Chicago. Stanford (Calif.) has received the initial batch of material and will supply industry with atomic energy reports and engineering drawings as they become available.

Jet endurance flight of 25 hr. 19 min. has been set by a six-jet Boeing B-47 Stratojet medium bomber attached to the 306th Bomb Wing, MacDill AFB, Fla. Carrying a normal bomb load and full combat equipment, the B-47 flew 12,000 mi. and was refueled six times aloft by Boeing KC-97 tankers. Previous B-47 nonstop mark was 24 hr. 1 min.

AVIATION CALENDAR

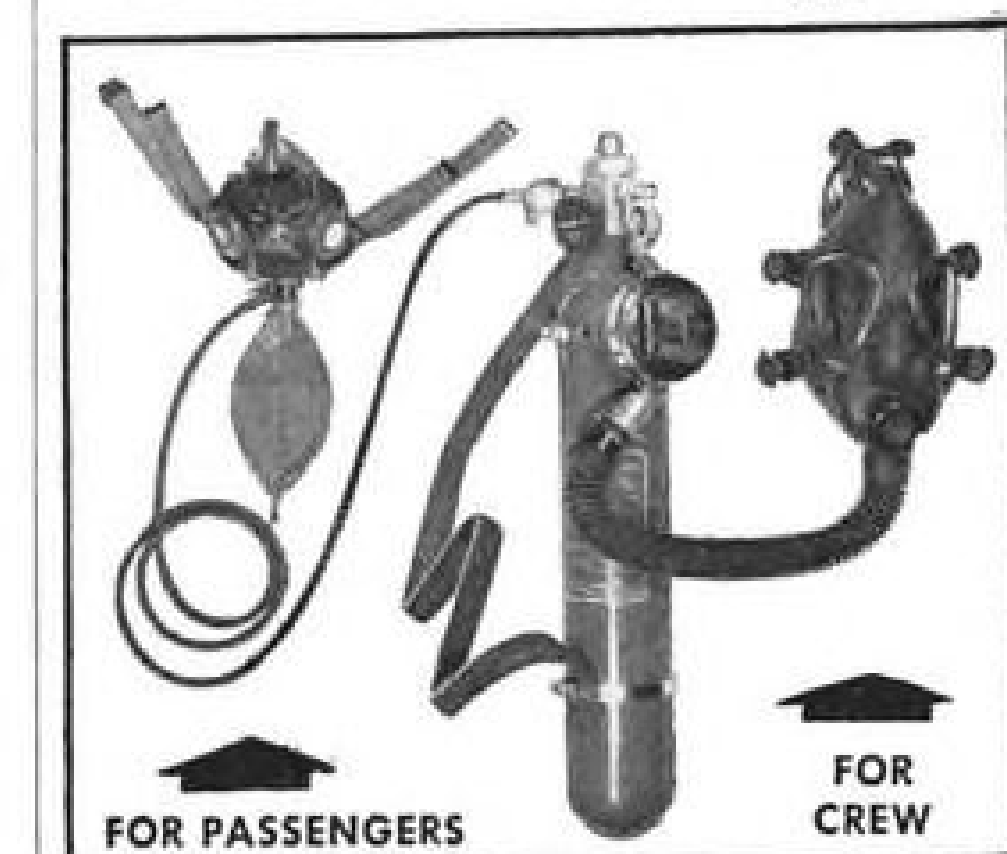
- Aug. 19-22—Air Force Assn., national convention, Omaha, Neb.
- Aug. 25-27—Western Electronic Show & Convention (WESCON), sponsored by West Coast Electronics Mfg. Assn. and Institute of Radio Engineers, Ambassador Hotel, Los Angeles.
- Sept. 4-6—1954 National Aircraft Show, James M. Cox Municipal Airport, Dayton.
- Sept. 6-12—Aviation week, dedication of new air terminal and Jaycee air show, Amarillo, Tex.
- Sept. 7-12—Society of British Aircraft Constructors, 1954 Flying Display, Farnborough, England.
- Sept. 8-11—Symposium on propagation, standards and problems of the ionosphere, sponsored by National Bureau of Standards, Central Radio Propagation Laboratory, Boulder, Colo.
- Sept. 13-19—Civil Aeronautics Administration, first postgraduate course in civil aviation medicine, Ohio State University, Columbus.
- Sept. 13-24—Instrument Society of America, first International Instrument Congress and Exposition and third annual Analytical Instrument Clinic, Philadelphia.
- Sept. 19-21—International Northwest Aviation Council, 18th annual convention, Hotel Vancouver, Vancouver, B. C.
- Sept. 21-23—Society for Experimental Stress Analysis annual meeting and exhibition, Bellevue-Stratford Hotel, Philadelphia.
- Sept. 30-Oct. 1—Radio Technical Commission for Aeronautics fall assembly, Washington, D. C.
- Oct. 4-6—Tenth annual National Electronics Conference, Hotel Sherman, Chicago.
- Oct. 5-7—Champion Spark Plug Co., 10th annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.
- Oct. 5-9—Society of Automotive Engineers, National Aeronautic Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles, Calif.
- Oct. 14-15—Tenth annual National Conference on Industrial Hydraulics, sponsored by Illinois Institute of Technology, Sheraton Hotel, Chicago.
- Oct. 17-22—International Union of Aviation Insurers, annual general meeting, New York.
- Oct. 18-22—National Safety Council, Aeronautical Section, Conrad Hilton Hotel, Chicago.
- Nov. 1-5—American Welding Society, fall meeting, Sherman Hotel, Chicago.
- Nov. 4-5—Society of Automotive Engineers, national fuels and lubricants meeting, The Mayo, Tulsa, Okla.
- Nov. 8-9—National Aviation Trades Assn., annual convention and meeting, Biltmore Terrace Hotel, Miami Beach, Fla.
- Nov. 8-10—Air Industries & Transport Assn. of Canada, annual meeting, Chateau Frontenac, Quebec City.
- Nov. 9-12—Air Line Pilots Assn., convention, Sheraton Hotel, Chicago.
- Nov. 15-17—Aviation Distributors and Manufacturers Assn., 12th annual meeting, Mayflower Hotel, Washington, D. C.

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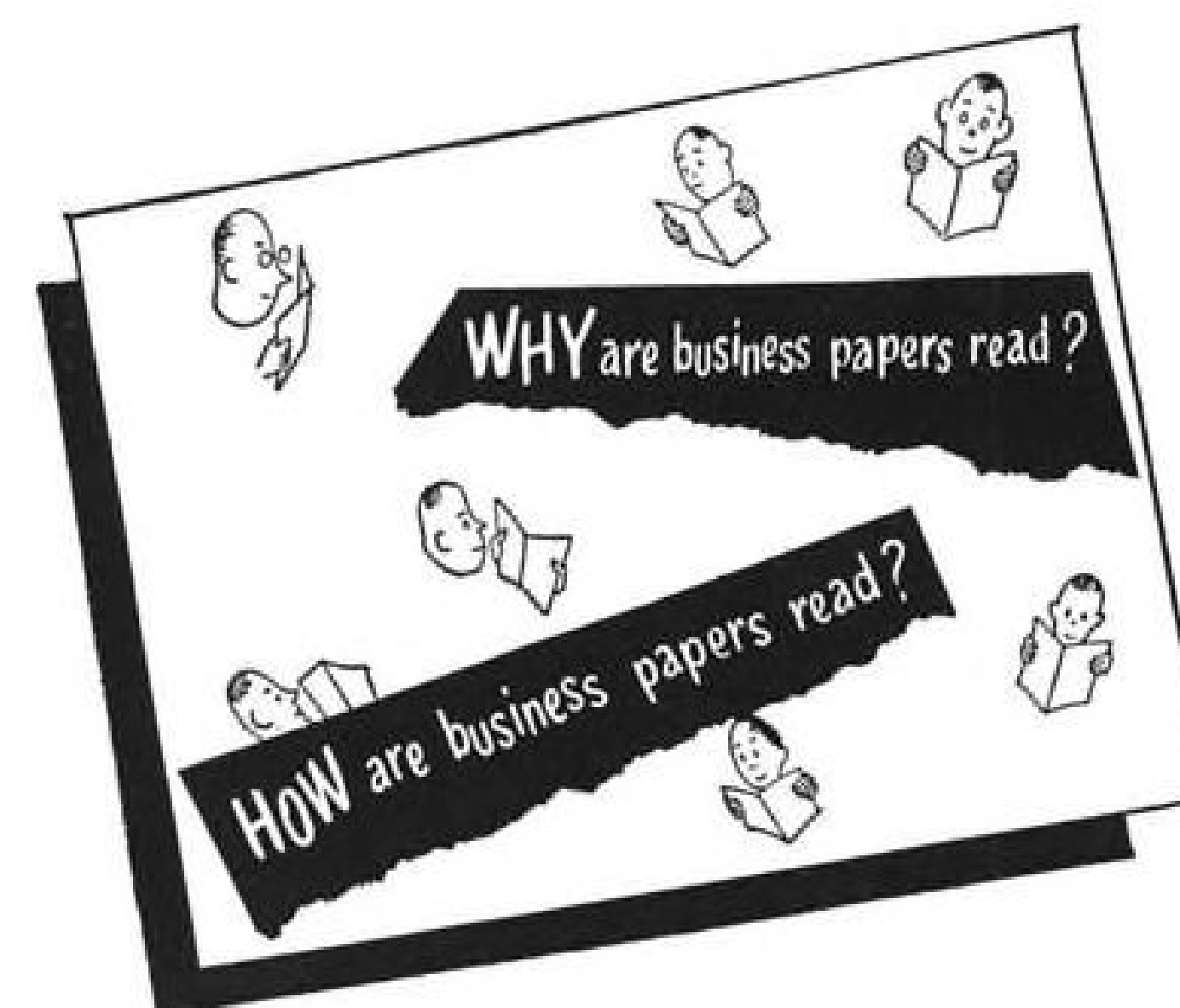
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EDITORIAL

Intercity Travel 'Saturation'?

Note to aviation statisticians:
Thinking of the future strictly in terms of the past? It's almost as misleading in aviation as painting the future in terms of the present.

So please be careful in computing those saturation points in intercity travel and shipping. Some of your forebodings are encouraging airline people to propose higher fares, to talk about a little more subsidy here and there, to pass the buck from the sales departments almost anywhere else, discouraging healthy competition where a little more might be in order, to increase cargo rates where competition will permit, to cut them where competition is tough. Some fare increases will come, and may be necessary, but it's a dangerous move that may discourage needed new customers.

Your forebodings about saturation points on travel obviously encourage the theory that no matter how much selling and sales promotion commercial air transport puts forth, the result will be some pre-determined and theoretical total of new business and that's all! So why try too hard!

Technical developments and salesmanship are important keys to public acceptance of commercial flight. The dusty files of Civil Aeronautics Board are filled with conservative prognostications of traffic that would fly between important cities if service were permitted. Many a statistic for air was based mainly on the historical traffic by rail between the same points, and a modest supposition that air might capture some of this haul. In most cases the airlines have not only siphoned a big chunk of the railroad business, but they have created traffic the statisticians never dreamed of.

There were about 15,000 motor cars in this country in 1901 and there was plenty of opinion (and statistics to prove it) that expecting anything to come out of the horseless carriage movement was foolishness. Obviously, intercity travel had reached its zenith!

In 1912, the plan for a 50,000-mile national system of highways was interpreted widely as a frivolous expenditure of public funds for the benefit of a few wealthy pleasure seekers, "since for long-distance freight transportation it is impossible for haulage over any road surface to compete with the low cost of hauling on a railway," as the respected Engineering News-Record said at that time.

Now there are millions of autos and trucks in this country and TWA's president Ralph Damon recently cited an estimate of passenger miles traveled in private cars in 1952 at something like 390.7 billion, which was a gain of 59% from as recent a year as 1940!

Public mobility has reached a fabulous stage because the motor car brought inexpensive, dependable and comfortable transportation, and cars were competitively manufactured, sold and promoted by the vigorous auto industry. The motor car created travel on a scale that would have been unbelievable 25 years ago.

Now, again, we are beginning to hear the statisticians dolefully talking about saturation points of intercity travel but very little consideration is being given in these statistics to the impetus of hard selling and technical improvements.

Statistics alone are not enough; imagination and optimism and faith in free enterprise are needed, too. A Twentieth Century Fund survey, made in 1947 by J. Fredric Dewhurst & Associates ("America's Needs & Resources") says it well:

"Lack of imagination has characterized most pronouncements concerning the future of transportation, but even accurate forecasts of future changes were met with universal incredulity. At best, then, there is the difficult choice of being considered feeble-minded now or later." The statisticians cautiously allow the future to take care of itself.

Mr. Damon, one of the hard-boiled optimists in this business, must have known last January TWA soon would be operating about half of its mileage in promotional air tourist schedules in a bold drive to capture new customers from competitors on the ground or in the air, or to create new business where none had existed before. The industry's recent excess of seats available over seats sold, due to rapid deliveries of big, new transports, also was anticipated by Mr. Damon. This he put in its proper light in his forecast last January, when he promised we would have "a temporary case of equipment indigestion." Mr. Damon obviously is not ready to listen to theories on intercity travel saturation. "We in this industry are going to rock a very lousy baby during 1954," he reported. So far, he is very, very right, and this is no time to start singing the blues or stop striving to broaden the base of our market and attracting new customers.

ALPA's Mistake

No other aviation publication has reported so fully the views and activities of the Air Line Pilots Assn. No other aviation magazine has expressed so much hope in the present administration of ALPA under Clancy Sayen. No other air magazine devotes space to a regular column written by an ALPA member. But AVIATION WEEK can find little sympathy for ALPA's strike against American Airlines, either in aviation or among the public. We disagree with ALPA.

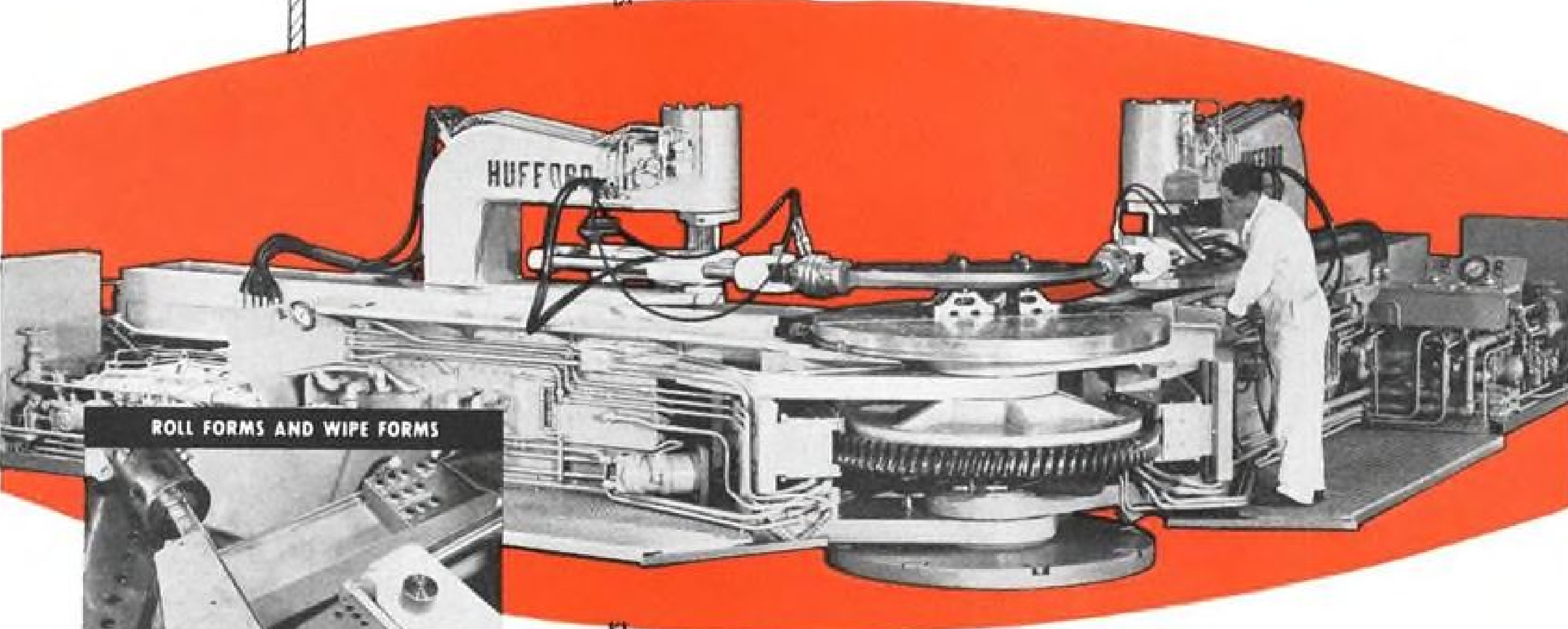
Any union must combat what it considers a chipping away of its benefits. But the eight-hour rule became effective about 1931, and it seems to us that the vast improvements in working conditions and salaries of airline pilots since then merit some special consideration by ALPA for unusual circumstances such as those involving westbound nonstop transcontinental flights. There must have been ways to protect ALPA, as well as American Airlines. There must have been other alternatives short of a strike. Editorially, our view is that the American strike was unnecessary at this time, and a major mistake.

—Robert H. Wood

AVIATION WEEK, August 9, 1954

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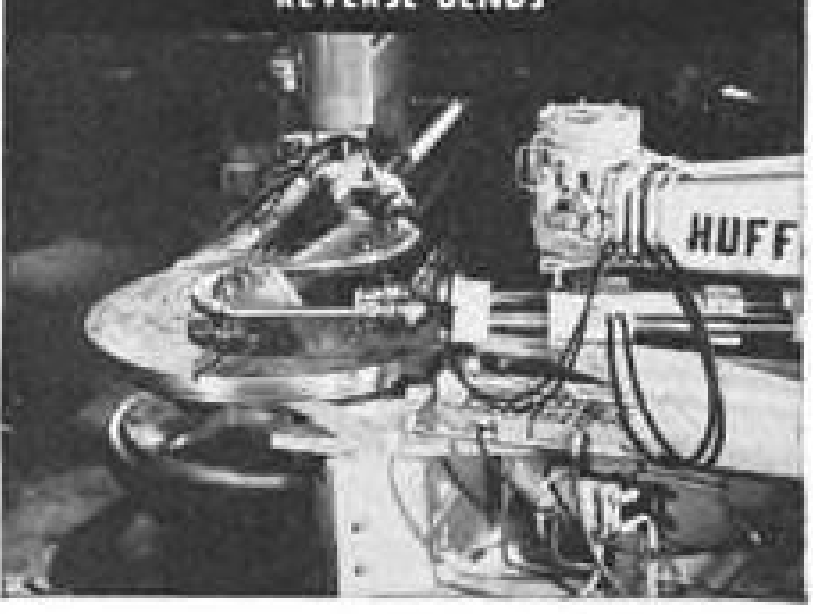
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