

# AVIATION WEEK

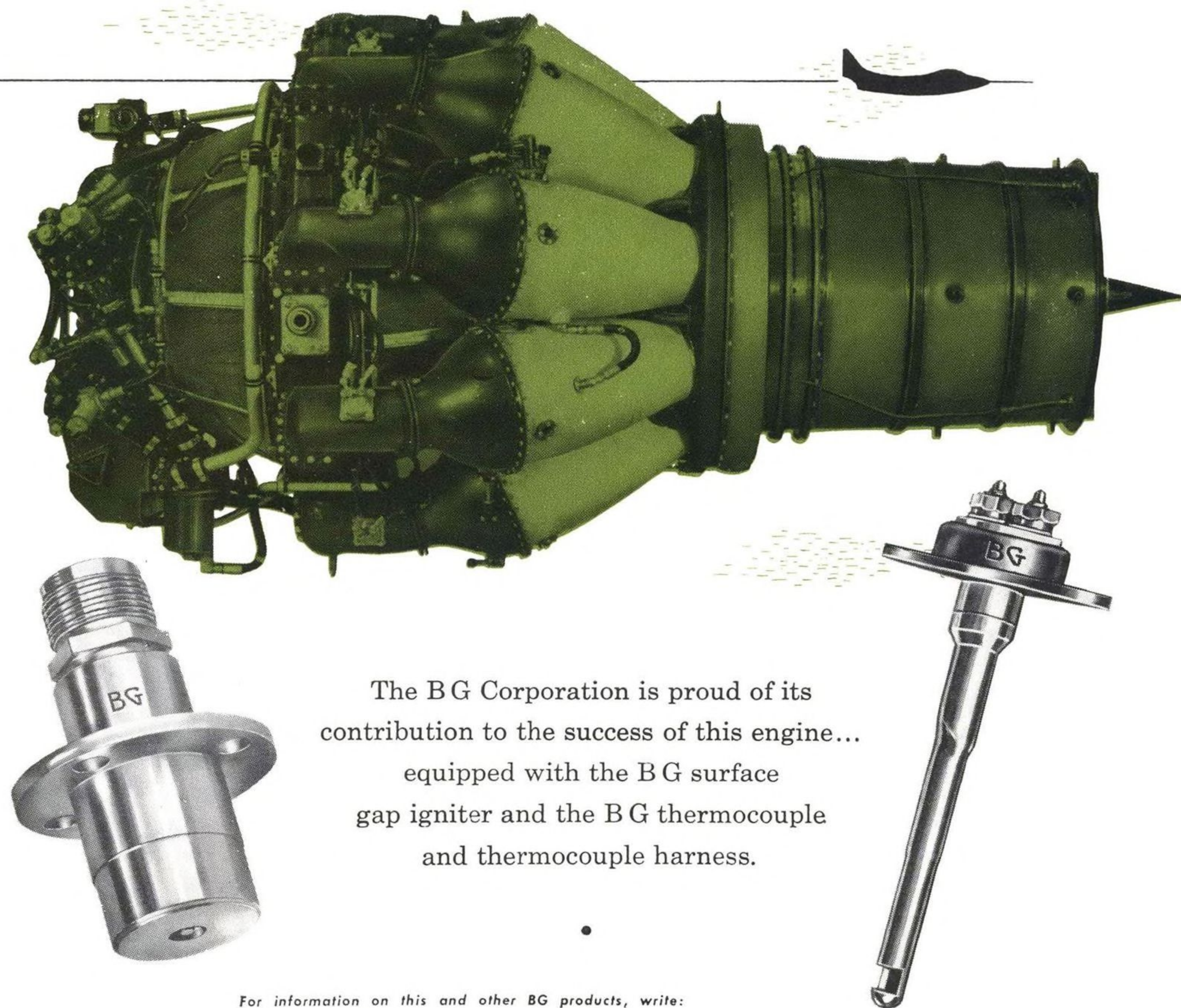
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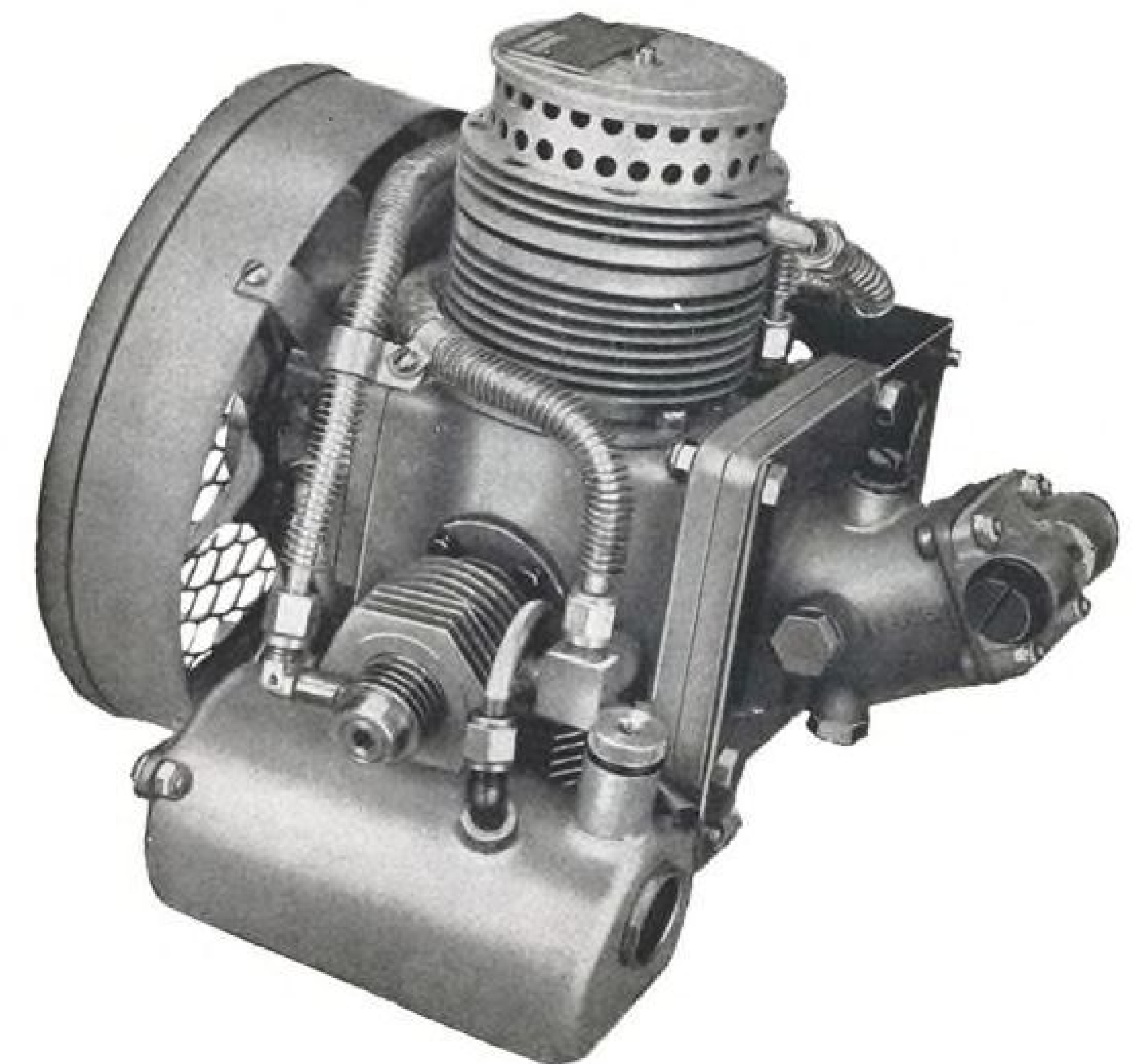
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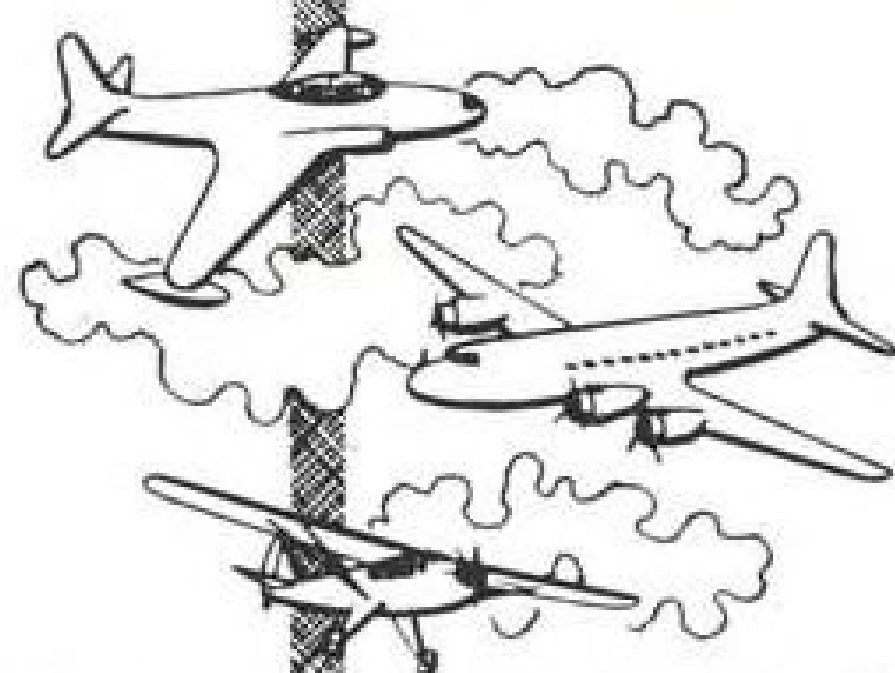
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# Aviation Week



Member



Volume 55

November 26, 1951

Number 22

## Headline News

CAA Blocks U.S. Comet Test.....14  
Senators Weigh AMC Job Charges.....16  
Piasecki's Civil Copter Planes.....17  
Chips Down on Ocean Air Coach.....19  
U.S. Jets Superior in Power, Economy.19  
1953 Procurement at \$10 Billion.....19  
Seen at FSF's Safety Seminar.....20

## Engineering

What We Learned from V-2 Firings...23  
New Carbides Fight Heat, Oxidation...40  
8,000-lb. Load No Bother.....41

## Production

What Chrysler Does for Air Power...45  
Jet Rig Cans Noise, Speeds Tests.....49

## Equipment

Frontier's Low-Cost Overhaul.....54

## Financial

Tomorrow Will Be Still Better.....65

## Air Transport

U.S. Trunk Airlines Earnings.....67  
AA Coach Plans.....69  
Group Urges Standard Visual Aid.....69  
How Many Exits for Air Coaches?....70  
Mexico Sees 10% Air Travel Raise....72  
Short-Haul Copter Need Cited.....75  
Alaskan Airline Gets RFC Loan.....75  
New Italian Line Establishes Routes..75

## Departments

News Digest ..... 7  
Aviation Calendar ..... 8  
Picture Page ..... 9  
Industry Observer .....10  
Who's Where .....10  
Washington Roundup .....13

Our Expanding Industry.....52  
New Aviation Products.....61  
Also on the Market.....63  
Shortlines .....80  
What's New .....80  
Letters .....82

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Robert H. Wood  
EDITOR

Merlin H. Mickel...MANAGING EDITOR

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A. W. Bentz .....News Desk  
Scott H. Reiniger.....Editorial Assistant  
Victoria Giaculli.....Editorial Assistant  
Erwin J. Bulban.....Special Assignments  
Leo T. Tarpey.....Editorial Makeup

Editorial Offices: 330 West 42nd St., New York 18, N. Y., Phone Longacre 4-3000, or (night) 4-3035; National Press Bldg., Washington 4, D. C., Phone National 3414.

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AVIATION WEEK, November 26, 1951

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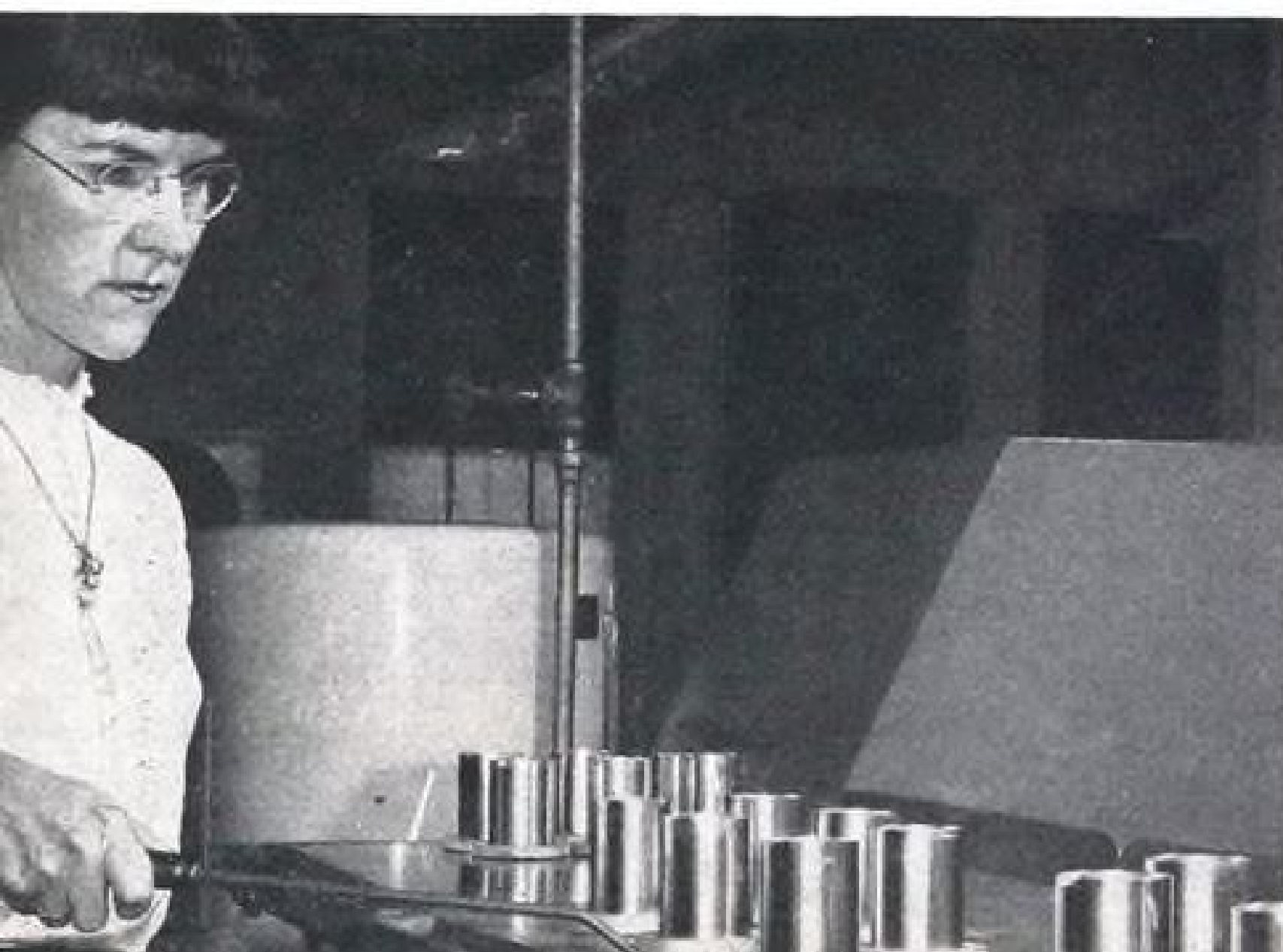
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## NEWS DIGEST

### DOMESTIC

**\$4-million damage suit** has been filed against deposed Air Line Pilots Assn. President David L. Behncke by ALPA's board, alleging illegal acts. The board's complaint also says that Behncke spent \$600,000 in union funds for a new headquarters building although he was said to have been authorized to spend only \$425,000.

**Northwest Airlines** is negotiating with Hydro Aire, Inc., Burbank, for Hytrol antiskid wheelbraking units for its fleet of ten Boeing Stratocruisers. NWA has been service-testing the installation on a Stratocruiser for some time (AVIATION WEEK June 4, p. 49).

**Donald Webster**, Washington insurance man, has been appointed general manager of National Aeronautic Assn., following his resignation as president of NAA at a recent directors' meeting at Omaha. Joseph T. Geuting, manager of the Aircraft Industries Assn. Personal Aircraft Council, who had been an NAA vice-president, will serve as acting president until a successor to Webster is picked at a meeting in January.

**Overseas National Airways C-54** crashed, killing crew of three, after collision with California Eastern Airways C-54 near Oakland Airport Nov. 17. Cal Eastern's plane landed safely. No passengers were aboard either plane.

**Maj. Gen. Joseph Smith**, former director of Air Force Plans, HQ., USAF, has been named commander of Military Air Transport Service, succeeding Lieut. Gen. Laurence S. Kuter, who has been assigned to USAF Headquarters as Deputy Chief of Staff, Personnel.

**Robert C. Northington**, vice president of Piedmont Aviation, Inc., Winston-Salem, N. C., was elected president of the National Aviation Trades Assn. at the Ft. Worth annual meeting. He succeeds John Griffin, who was made vice president-training activities. Joseph Hance and Harland Herrin were also named vice presidents; David Finger was made treasurer; Charles Parker was re-appointed executive director.

**Dr. Harold E. Mehrens**, supervisor of CAA's aviation development education program, has been announced as 1951 winner of Frank G. Brewer Trophy for contributing most "development of air youth in the field of educa-

tion and training." Award will be made Dec. 17 at Aero Club dinner at Hotel Statler, Washington, D. C.

**Carrol B. Vickers**, 56, aviation and automotive devices inventor, died Nov. 7. He once operated the Vickers Mfg. Co., Benton Harbor, Mich.

### FINANCIAL

**Solar Aircraft Co.**, San Diego, has declared a regular quarterly dividend of 15 cents a share and an extra dividend of 5 cents on its common stocks, with payment Jan. 15 to stock of record on Dec. 31.

**Philippine Air Lines** reports a net profit of \$1,211,030 for the first nine months of 1951, a 375% increase over the same period last year. Operating profit for the current period was \$11,366,299.

**Kellett Aircraft Corp.**, Camden, N. J., reports a consolidated operations profit of \$185,692 for the nine months ended Sept. 30.

**United Aircraft Corp.** had a \$8,497,370 net income on sales of \$288,511,291 during the first nine months of 1951. Net income for the third quarter was \$2,189,378 on sales of \$103,290,719. Backlog as of Sept. 30 was about \$1.3 billion. A quarterly dividend of 50 cents on UAC's common stock was declared, payable Dec. 10 to holders of record Nov. 23.

**Colonial Airlines** reports a net profit of \$405,000 for the first nine months of this year compared with a loss of \$167,000 incurred during the same period last year.

**Republic Aviation Corp.** has declared a 75-cents-a-common-share dividend payable Dec. 14 to holders of record Nov. 30. A 25-cents-per-share dividend was paid in April.

**Western Air Lines** reports earnings of \$1,185,323 during January to September—an 80% gain over the same period last year despite loss of nearly \$1 million in revenues during a 15-day mechanics strike.

### INTERNATIONAL

**A. V. Roe Canada Orenda** jet engine is to be fitted with an afterburner made by Solar Aircraft Co. The Orenda is unofficially reported to give over 7,000 lb. of thrust normally.

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WITH CP AIR-FRAME TOOLS

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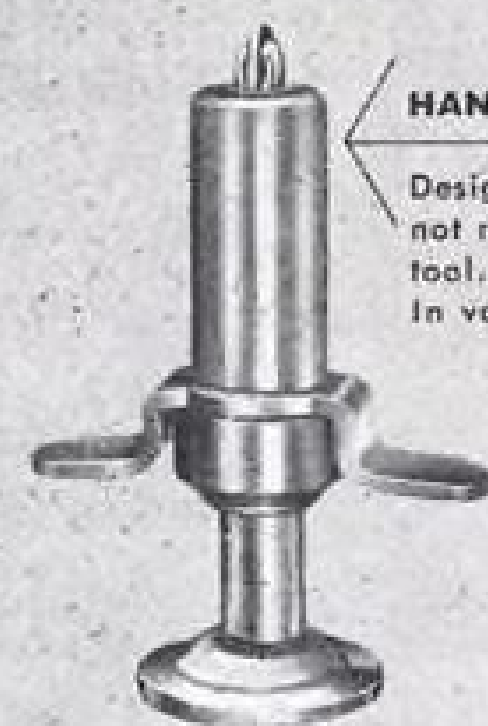


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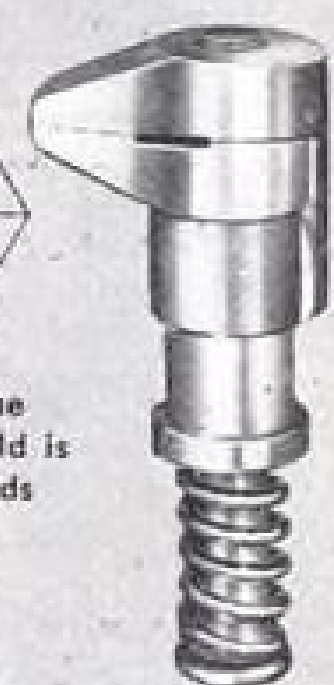


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## AVIATION CALENDAR

Nov. 26-30—Meeting of the American Society of Mechanical Engineers, Chalfonte Haddon Hall, Atlantic City, N. J. For information write: Ernest Hartfort, 29 W. 39 St., N. Y. 18, N. Y.

Nov. 27-30—Aviation Distributors and Manufacturers Assn. meeting, Waldorf-Astoria Hotel, New York.

Nov. 28-30—National convention of the American Rocket Society, Atlantic City, N. J.

Dec. 4-5—Transport aircraft hydraulic accessory and system conference, sponsored by Vickers Incorporated, Hotel Sheraton, Detroit.

Dec. 6-7—Feedback Controls System, Chalfonte Haddon Hall, Atlantic City, N. J.

Dec. 17—Wright Brothers Lecture, sponsored by the Institute of the Aeronautical Sciences, U. S. Chamber of Commerce Auditorium, Washington, D. C.

Dec. 17—Wright Memorial Luncheon, principal speaker, Major Alexander P. de Seversky, Hotel Carolinian, Nags Head, North Carolina.

Jan. 5-6, 1952—Annual Miami Air Show, sponsored by the Florida Air Pilots Assn., Opa Locka Airport, Florida.

Jan. 6-8—Annual Cessna Distributors Meeting, Allis Hotel, Wichita, Kansas.

Jan. 28-Feb. 1—20th Annual Meeting, the Institute of the Aeronautical Sciences, Astor Hotel, New York.

Jan. 29-31—114th National Meeting of the American Meteorological Society, Roosevelt Hotel, New York.

March 3-6—Institute of Radio Engineers, Waldorf-Astoria Hotel & Grand Central Palace, New York.

March 17-19—Second Midwestern Conference on Fluid Mechanics, to be held at Ohio State University.

March 17-22—American Society of Tool Engineers, International Amphitheater, Chicago, Ill.

April 21-24—National Aeronautic Meeting and Aircraft Engineering Display, Society of Automotive Engineers, Hotel Statler, New York.

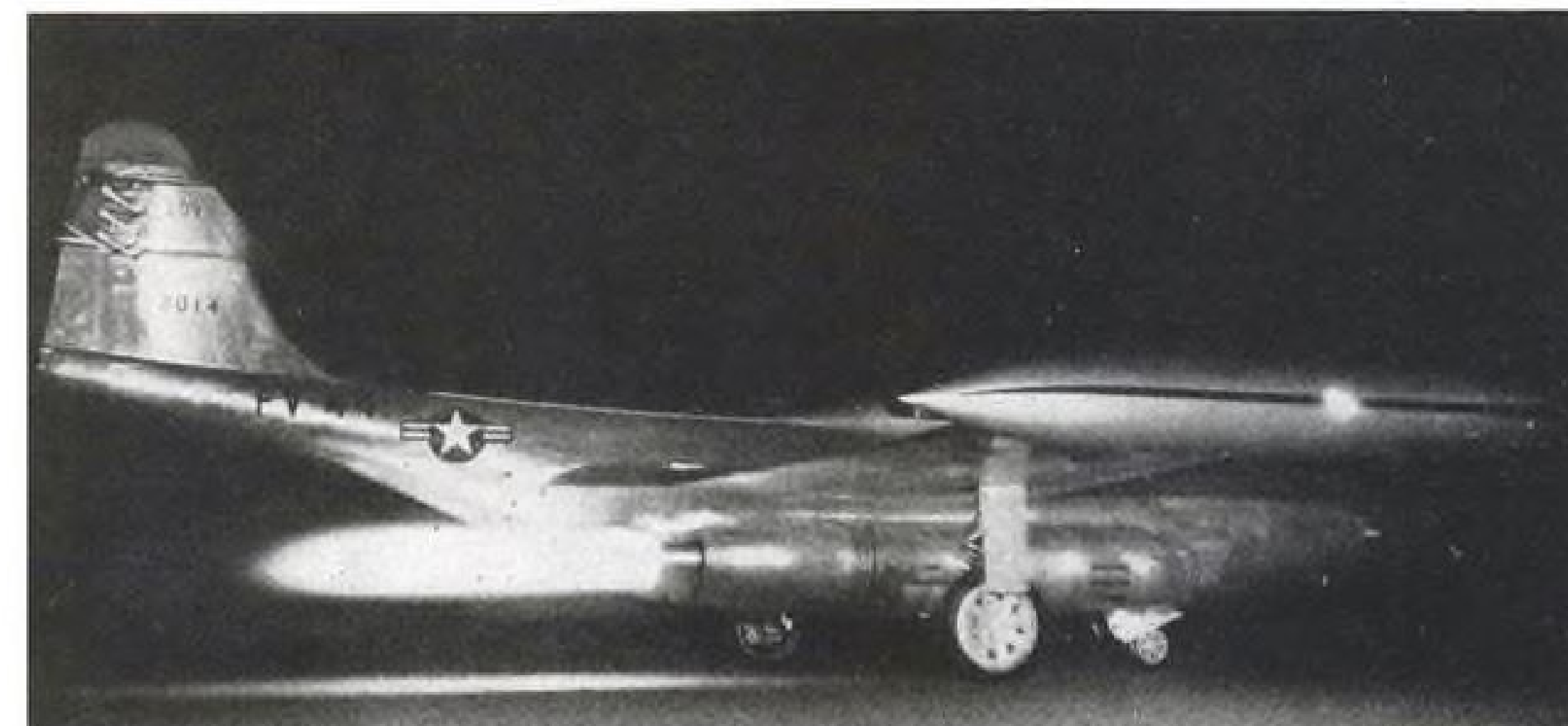
## PICTURE CREDITS

9—(D.9, D.111) Howard Levy; (Scorpion) Northrop Aircraft; (P2V-5) Lockheed; (Troopmaster) Douglas Airview News; 16—C. F. Moore; 17—Piasecki Helicopter Corp.; 18—Combine Photos; 20—Wright Studios; 22—Wide World; 41—USAF; 49—Lockheed; 70—CAA.



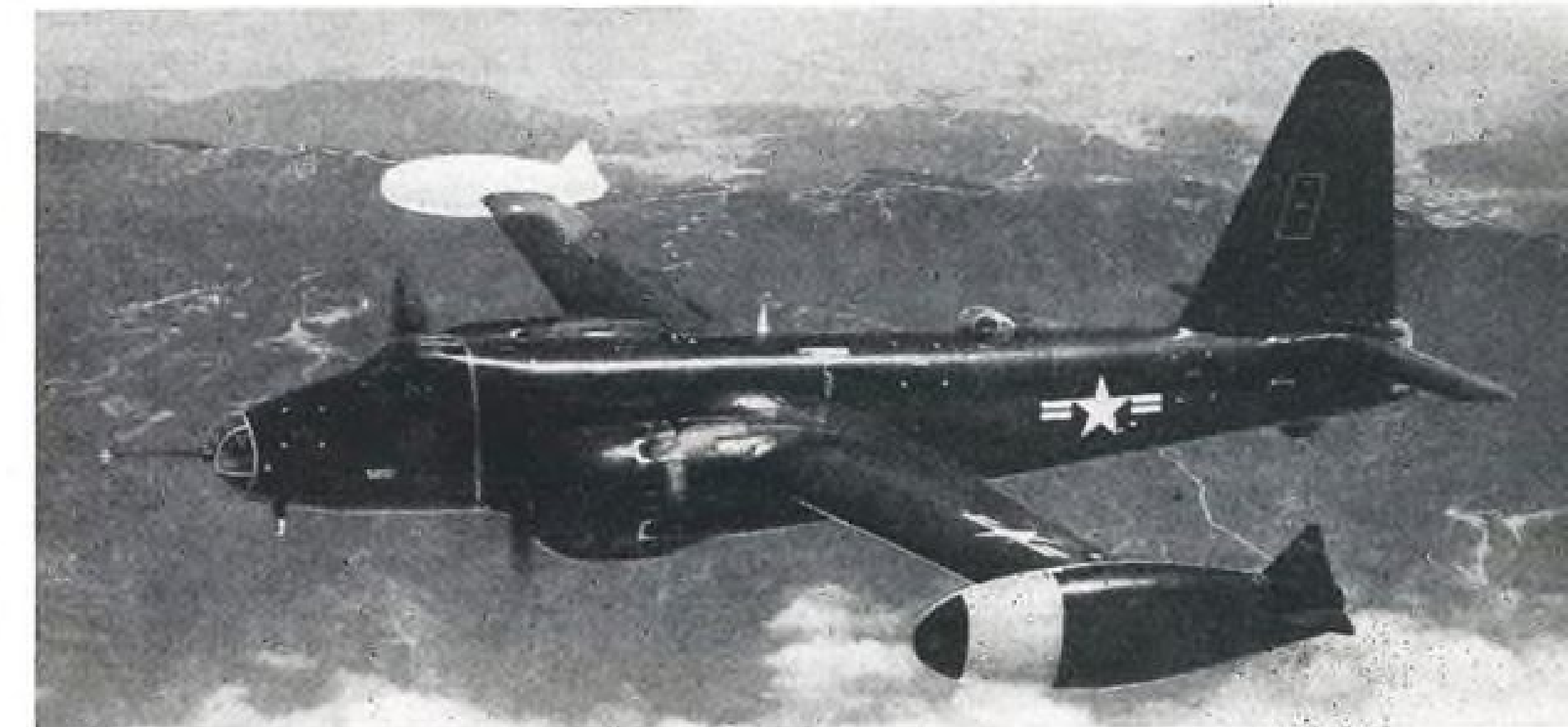
**FRENCH ULTRA LIGHTS**—Trim lightplanes above, the D.9 (left) and the D.111 (right) are products of Avions Jodel. Single-seat D.9 has 34-hp. ABC Scorpion, weighs 594 lb. gross; later, two-place D.111 has 75-hp. Minie. Both are designed to be built from kits.

## Picture Highlights of the Week



**SCORPION FIREWORKS**—Spectacular view (left) of Northrop F-89 Scorpion resulted when pilot switched on afterburners fitted to plane's Allison J-35-21 engines. Flame extends about 15 ft. behind the tailpipes. The big two-seater uses the afterburners to boost takeoff, climb, and for short burst of speed during combat. In the 600-mph. class, the Scorpion carries six 20 mm. cannon, can climb to over 40,000 ft. Several F-89 squadrons are in service with interceptor units on the West Coast.

**NEW TIP TANK STYLE**—Lockheed P2V-5 (right) sports recently developed, finned, center-mounted wingtip tanks which are said to improve the Neptune's stability. The fins are designed to guide the tanks free of the plane upon release. Tanks shown are test models; production versions will house fuel, radar gear or a searchlight. The bright paint scheme aids tracking when tanks are dropped during tests. Lockheed put in about 2,300 engineering man hours in developing these units.



**DOUGLAS "TROOPMASTER"**—Long column of soldiers streams from open nose of a Douglas Globemaster II. One flight carried 210 men, with helmets, field packs, sidearms, rifles, barracks bags, suit bags and chutes, plus 4,800 gal. fuel. Gross weight was 182,600 lb.





## INDUSTRY OBSERVER

► USAF is preparing to switch over to a new intermediate vapor pressure fuel, designated JP-4, for jets. It will replace JP-3, currently used, when present contracts run out next year. JP-3 has a higher vapor pressure and is prone to boil off at altitude. Use of the new fuel will require only minor adjustments to engine.

► American Airlines probably will be the first of several airlines to give a commercial tryout to Shell Oil's tricresylphosphate, new fuel additive, which is designed to lessen sparkplug fouling. The new compound has been tested by military services for the past eight months, apparently successfully.

► Douglas Aircraft Co.'s supersonic, high-altitude X-3 research plane, powered with a Westinghouse J-40 engine is already rolled out, and is due to fly in January. At the controls will be Bill Bridgeman, who recently piloted the D558-II Skyrocket, Navy research plane, to new altitude and speed records. He now is studying the X-3, preparatory to first flight. It is estimated that its performance will exceed considerably that of the D558-II.

► Ford, General Motors and Hudson reportedly are feeling their way toward entry into the helicopter business as licensees for the whole machines or subcontractors for principal assemblies. This indicates big-scale production, well beyond the modest capacities of present helicopter plants, may appear in the military picture soon. Principal subcontractors now are Goodyear Aircraft and Twin Coach Co., who are making fuselages for Piasecki's H-21 and HUP copters.

► First joint military specification for a synthetic lubricant for aircraft gas turbines is designated MIL-L-7808. The lubricant is designed to withstand operating temperatures from minus 65 to plus 500 deg. F. At the low temperature, it is described as about one-third the viscosity of the best petroleum-based lubricants. And at the peak temperature, it is about 1/20th as volatile as petroleum base lubricants. Initial development work on the lubricant is credited to the Naval Research Laboratory, followed by a joint BuAer, Air Force and Industry Research program. Cooperating were Rohm and Haas, Emery Industries, du Pont, Ohio Apex, Harsco Chemical Co., Carbide and Carbon Chemicals Corp., Standard Oil Development Co., Texas Co., Shell Development Co., and California Research Corp. Lubricant base is an aliphatic diester, to which are added phenothiazine and tricresylphosphate. Its high cost and relatively short supply will prevent widespread commercial use. It is not expected to replace petroleum products, except where military application requires its lubrication characteristics. Nor is it likely to be available for reciprocating aircraft engines.

► Two principal remaining producers of small aircraft, Cessna and Piper recently have accepted responsibility from CAA for testing and certification of their own planes in a class which weighs not more than 5,000 lb. and carries not more than 5 persons. The arrangement has been sought by industry for several years, but has been delayed because of disagreement over terms under which CAA would remove its own testing and certification representatives and let the manufacturers stand back of their own products, under a system of delegating the manufacturer's employees to supervise testing and certification for CAA.

► Prototype studies on future local service airplanes have reached a stymie point, some sources close to CAA report, because U. S. manufacturers don't think such a plane can be built at a profit at 1951 cost levels. It boils down to the fact that the depreciated Douglas DC-3 still does a good enough job for short hauls so that it is hard to beat per seat mile, especially at a competitive purchase price. Further exploration by military interests into new airplane types, such as assault transports that might be converted to commercial use, appears about the only immediate hope for a new local service plane development. This is especially true since future prospects for large helicopters are cutting into the fixed-wing local service plane's potential utility.

## WHO'S WHERE

### In the Front Office

W. B. Anderson, former manager of Westinghouse Electric's Gas Turbine division, has been appointed assistant to the executive vice president, defense products. His previous post is being filled by Frank L. Snyder. R. C. Bergvell was named manager of engineering, defense products; B. M. Brown has been made sales manager, and M. A. Dotterer has been designated manager of production in this department.

Gardner (Dick) Carr has been made assistant to the president of Marquardt Aircraft Co. Carr one-time vice president at Glenn L. Martin and executive vice president for McDonnell Aircraft, has aviation experience dating back to 1917.

Charles E. Haneline, manager of station ground services for United Air Lines at Chicago since 1948, has been named assistant to the vice president-transportation services, and will headquarter in Denver.

### Changes

Henry J. MacDonald has been appointed production manager of Kaman Aircraft Corp.

Ronald S. Gall has been appointed manager of public relations for Curtiss-Wright Corp. and its divisions. He previously had a similar post in C-W's Propeller division.

John N. Eustis, formerly president of Henry A. Greer, Inc., Philadelphia, has joined Piasecki Helicopter Corp. as sub-contracts manager.

N. E. Rowe is leaving British European Airways Corp., where he was controller of research and special development, to join Blackburn & General Aircraft Ltd., as technical director.

Maurice Harp has joined Lenkurt Electric Co., San Carlos, Calif., as applications engineer on development of FM and single-sideband space-carrier equipment.

Charles E. McCuan, former Saval sales manager, has joined Hydraulic Research & Mfg. Co., Burbank, to handle customer relations.

Price Phelps has been designated assistant sales manager for Air Associates' Aircraft Products division at Teterboro, N. J.

Alexander G. Duguid has been appointed sales manager for Field Aviation Co. Ltd., Oshawa, Canada, aircraft servicing and supply firm.

Francis C. Jones has resigned as chief administrative officer for Philippine Air Lines in the U. S., to engage in other interests of the Anzor Corp., headed by Col. Andres Soriano, president of PAL.

Robert L. Webb, Jr., has been named acting state director of aeronautics by the California Aeronautics Commission, until a successor to Warren E. Carey, former director, is chosen.

### Named to the Board

Bernard W. Ford has been named to the board of directors of Hiller Helicopters. He is also a director and vice president of Blyth & Co., Inc., and a vice president of Pacific Lighting Corp.



39 out of the 46 Boeing Stratocruisers now in service or on order for U. S. airlines depend on Hamilton Standard Hydromatic propellers. In fact, Hydromatics now are specified for 98% of all U. S. transports.



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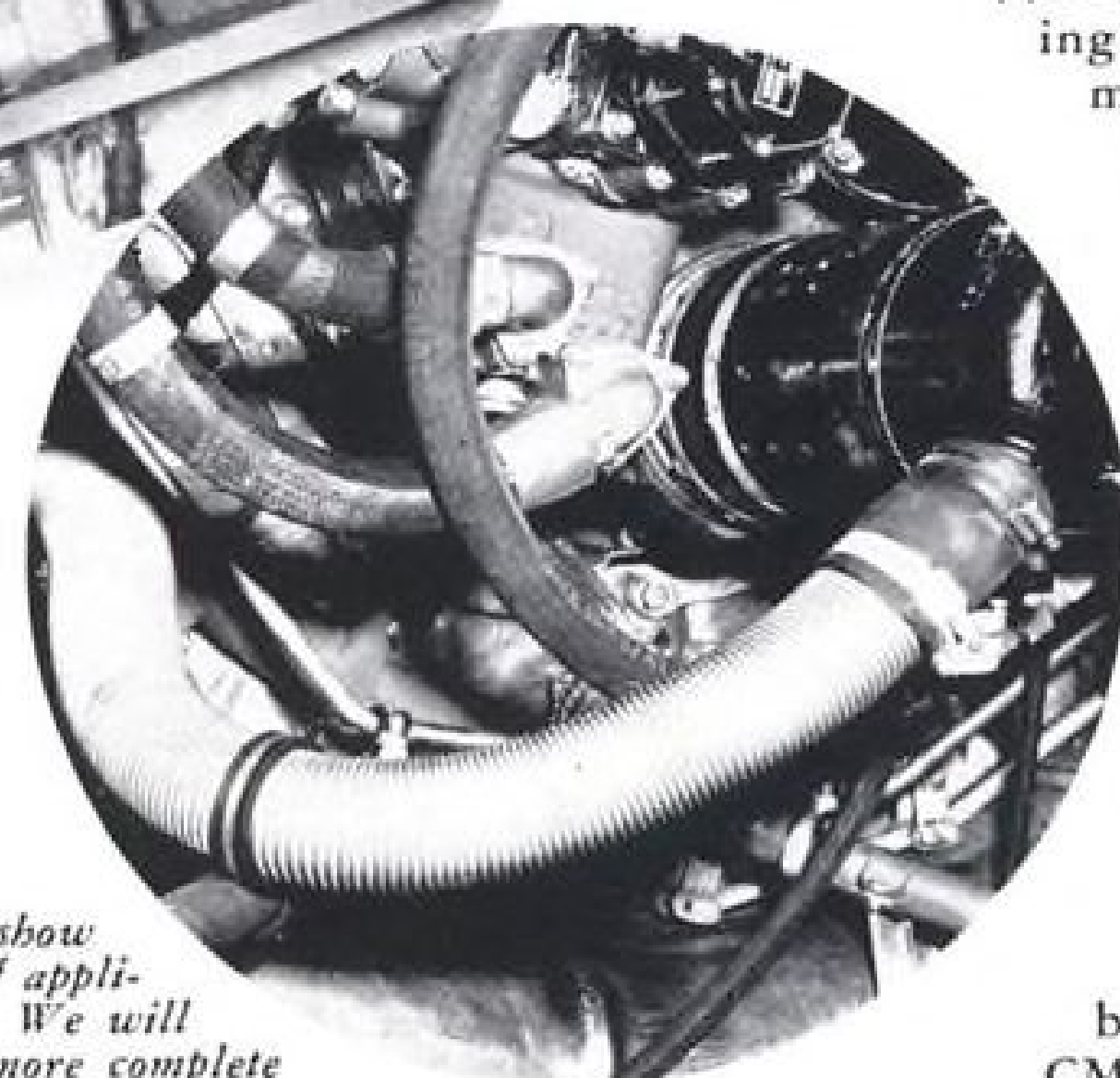
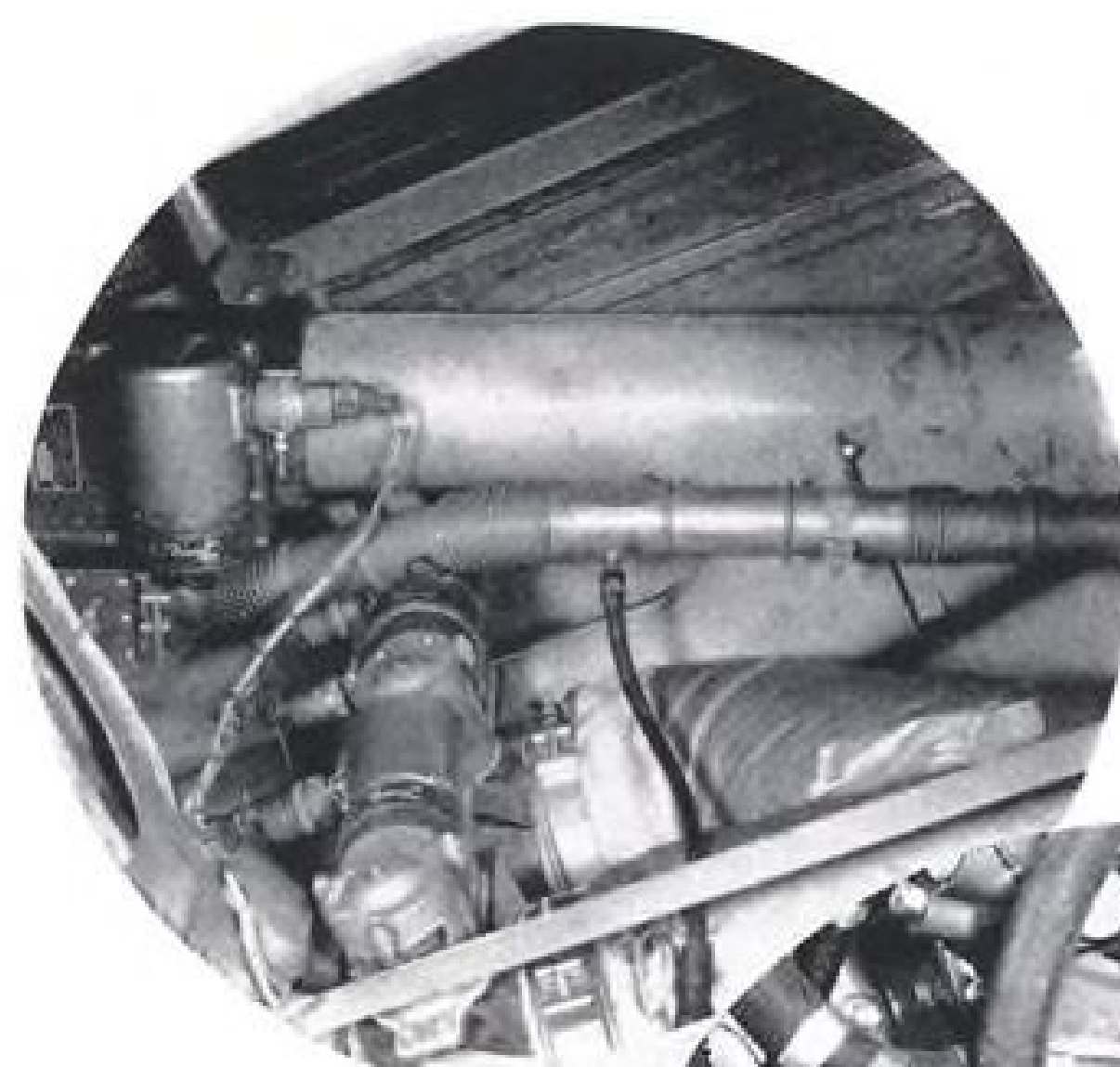
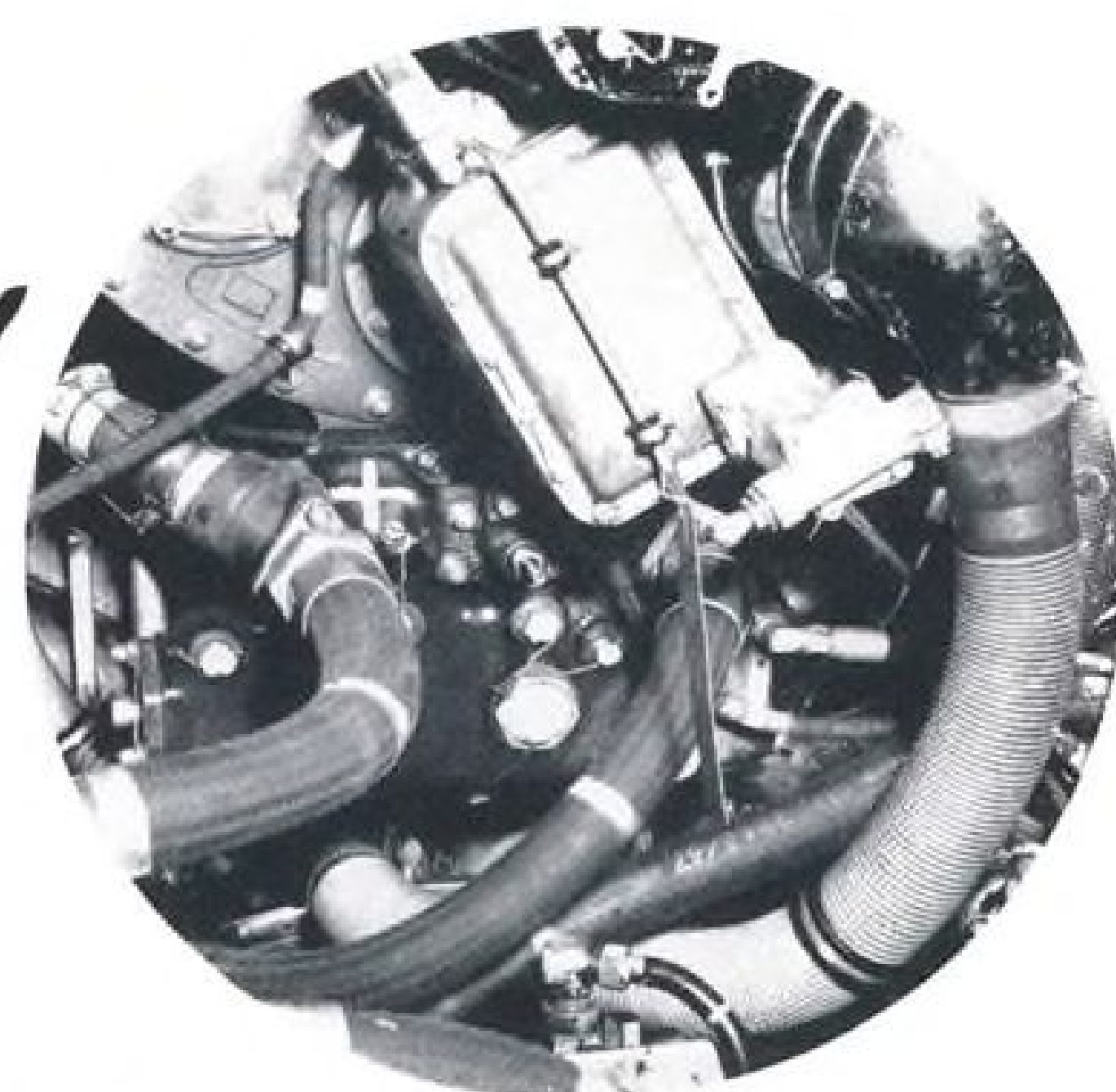
# CMH

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## Washington Roundup

### Global Air Navy?

Navy is trying to make a comeback bid as the U. S.' "first line of defense"—not as a seafaring battleship navy defending two oceans, but as an air navy blanketing the globe.

The two factors behind Navy's new bid:

- **Adm. William Fichteler** who recently took over the helm as Chief of Naval Operations.
- **Tactical A-bombs** multiplying the striking power of the Naval air arm. They are ending the brief era in which the U. S. has relied solely on the strategic air arm to deliver atomic retaliation. In a few years, Navy will be operating 1,700-mi.-radius-of-action (carrier-based) planes off the Forrestal able to make an atomic thrust at any point on the globe. Navy already has other atom-bomb-carrying planes in service.

This is how the Navy's top command views the situation:

"In any all-out war, Naval air would bear the initial brunt. Before we can project the full impact of U. S. strategic air might and land power to an enemy, the skies and seas—which make up seven tenths of the earth's surface—must be cleared. And that's the Navy's mission. Only after the skies and sea lanes are cleared, largely by a global air Navy, can overseas bases and troops continue to get logistic support."

But the top Pentagon brass doesn't see it that way: It counts on Air Force to bear the initial brunt of air defense and offense.

Navy's meager success, so far, in convincing the military command is evidenced in the build-ups that seem likely:

- A 50% boost in USAF's strength—from 95 to 143 wings.
- Only a 15% boost in Naval air strength—from 14 to 16 or 17 air carrier groups, plus a "slight" increase in patrol wings, a modest build-up of Marine aviation from 2½ wings to 3 wings. Navy only this year regained the 14 carrier-group strength it had in 1949. It had dipped to nine carrier groups in 1950. Navy wanted at least 20 groups, the Marine Corps at least four wings.

This means Navy's air arm will still spread thin around the globe:

- With 100 planes to a group, there will be only a 1,600-plane Naval air striking arm.
- With 216 tactical planes to a wing, Marine Corps will have only a 648-plane force to meet aggression at any point on the perimeter of the Russian-dominated land mass.

### Outlook on Naval Aviation

• **Production:** clear sailing in a year? The Naval aircraft program is about four months behind schedule. BuAer's chief, Rear Adm. Thomas Combs, estimates bottlenecks in engines and electronics will not substantially ease until next summer or fall.

By then, BuAer expects to have capacity to meet its requirements working one-shift. Aside from expansions already underway, only some expansion in facilities for components production will be necessary to meet this goal.

• **Atom-powered plane.** Navy men think the nuclear aircraft engine is "a natural" for a flying boat. But the model Consolidated Vultee Aircraft Corp. is building

for the Air Force will be of the land-based variety.

• **Guided missiles.** Navy, which is developing two of the three types given the green light for procurement for service testing by the Pentagon, looks on them as still "off in the wild blue yonder." Ground was broken only a few months back on manufacturing facilities for the missiles. Production and service testing will take "years," Navy believes.

### A Jet Transport?

Industry support is building up for Sen. Pat McCarran's "construction differential" plan to open the way for U. S. production of a jet transport for international service. He's going to push the proposal when Congress opens in January.

This is how it would work: An international airline would tell CAB what type of plane it wanted to buy. CAB would okay the project for a subsidy. The manufacturer would build the plane on a cost-plus basis: The airline would pay the manufacturer the price it would have to pay a foreign manufacturer for a comparable plane; the government would pay the rest. The international carriers couldn't use their government-subsidized aircraft in competition with domestic lines.

It's comparable to the ship program that has been in operation for the Merchant Marine for a decade and a half.

• **Air Transport Assn.** is casting a friendly eye on the McCarran plan, making a detailed study of it and the Merchant Marine plan of tax-exempting reserves set aside for construction. In the past ATA has been antagonistic to it.

Reason for the new outlook: With Congress carefully watching pennies on any civilian project, McCarran's proposal seems to be the only hope for government assistance in commercial jet development. It's felt that with a push, the Administration and Congress could be convinced to apply the same policy to international air that's being applied to shipping.

• At least two major aircraft manufacturers report they favor the McCarran plan: Boeing Airplane Co. and Douglas Aircraft Co. But several others are vehement against it. There's little likelihood a common industry position will be reached at the meeting of Aircraft Industry Assn.'s Board of Governors Nov. 30. The split is too wide.

### What to Watch For

• **Buy Canadian.** Look for Air Force to increase sharply purchases from Canada—particularly in fighter and transport aircraft and jet engines.

The purpose is to balance the trade between the two countries, promote production dispersal. Over the past 15 months, Canada let orders with U. S. firms for over \$220 million in planes and aeronautical equipment. U. S. over the same period contracted for only \$14 million in aeronautical equipment from Canadian firms.

• **Cargo planes for lease.** Look for Air Force, which already finds itself with some extra cargo aircraft not in regular use now—and more coming off the production lines regularly—to propose leasing such planes to airlines, with a stipulation that they be returned promptly when and if national defense requires.

—Katherine Johnsen



## Comet Over the U.S.—Weight and Cost Data

Overseas National Airways believes it could make money flying Comets on U. S. routes. These figures worked out in cooperation with de Havilland for routes such as New York-Los Angeles or New York-Miami, show why.

### Direct Airplane Costs per Hour

Fuel .....	\$157.50
Airframe maintenance .....	50.00
Engine maintenance .....	65.35
Crew .....	46.50
Landing fees .....	9.55
Obsolescence .....	50.12
Insurance .....	27.16
<b>TOTAL .....</b>	<b>\$406.03</b>

### Weight Assumptions

Gross weight (varies with route) .....	100,000 lb.
Basic plane weight (lbs.) .....	51,000 lb.
Crew of 2 pilots, engineer, 2 stewardesses .....	1,000 lb.
Passenger service .....	500 lb.
Payload of 44 passengers and baggage .....	10,000 lb.
<b>Operating weight .....</b>	<b>62,500 lb.</b>
Taxi fuel after landing .....	350 lb.
Reserve fuel 45 min. at 1,000 ft. ....	5,750 lb.
Fuel for alternate airport 150 mi. all legs .....	4,000 lb.
<b>Landing weight, summer .....</b>	<b>72,600 lb.</b>
Ice allowance .....	1,600 lb.
<b>Landing weight, winter .....</b>	<b>74,200 lb.</b>

## CAA Delay Blocks U.S. Test of Comet

- Large nonsked, ready to spend \$3 million operating jet transport here, tries to order two planes.
- But CAA hasn't accepted British certification, so de Havilland sells last three to Air France.
- And elaborate plans to test craft in various uses must be shelved unless DH expands facilities.

Britain's four-jet Comet transport could probably be operated at a profit in U. S. domestic service, but it may be 1955 or 1956 before any of the planes are available to American customers.

That's what one U. S. airline operator found when it undertook an extensive study of U. S. jet transport operation. The company was ready to gamble \$3 million to operate two Comets.

But CAA's delay in accepting the Comet's certification resulted in the U. S. operator's negotiations for pur-

chase being superseded by firm orders for three Comets to de Havilland from Air France.

► **Waiting List**—Unless DH steps up production schedules, the next Comet delivery dates available are late in 1955 or 1956, the prospective U. S. buyer was told. However, London observers, noting the new Tory government's promise to increase British aircraft production and dollar earnings, say de Havilland might be encouraged to expand facilities and try to sell the Comet

in this country at an earlier date. Just as in the case of air coach service it is a nonsked which is ready to pioneer the new field.

The operator, Overseas National Airways, largest U. S. nonscheduled airline with a CAB exemption, was negotiating with de Havilland this month for two Comets with spares and equipment at a price of less than \$3 million. ONA figured it would cost \$3 million by the time the plane was earning revenue.

But ONA could not clinch the deal because CAA refused to accept the British certification of the plane.

Then while negotiations were awaiting possible change of the CAA attitude, Overseas National president George Tompkins received a cable from de Havilland informing him of sale of the last three available Comets, followed by a letter which said:

► **Strong Demand**—"Owing to delay in (CAA) acceptance of the Comet's certification we have had to accept a firm order for the last two Series I (Ghost

engine) aircraft that had been laid down, and also one additional one (all from Air France), and already we have further strong enquiries for Series I's, which we shall be unable to complete. We dare not continue further with Series I Comets, since to do so would affect deliveries already promised for Series II's (Avon engines).

"I know that you will appreciate our position, and that you will understand it is necessary for us to decide on our future programme at a much earlier date than would be possible if we awaited CAA's decision."

In the same letter the de Havilland official made observations about the politics involved in the proposed transport sales to U. S. airlines:

► **Sound Sense**—"What we cannot get over is making an aircraft available for prototype testing by CAA. We cannot expect BOAC to fall over themselves to help us introduce the Comet into service with their American competitors, for there is a school of thought there that claims that BOAC can eventually earn more dollars operating their Comets than could be gained by selling them to American operators.

"There is sound enough sense in this argument which rather weakens our claim that dollar sales of aircraft should take priority over any other business.

"As I said in my last letter we are fully appreciative of CAA's responsibility to the public and to Congress, and we can quite understand the official point of view. The characteristics you mention are, I assure you, completely international!"

An earlier de Havilland letter to Tompkins dated Oct. 11 revealed more of the de Havilland position regarding U. S. sales possibilities and the political problems involved:

► **CAA vs. ARB**—"You have certainly maneuvered extremely skilfully, even to the extent of invoking what we know in this country as the 'prototype bill' . . . I never . . . thought it did not exclude foreign aircraft.

"During all the time that has elapsed since the war, this country has been relying mainly on the American manufacturers to supply their transport aircraft. The British Air Registration Board has accepted, 'carte blanche' the CAA certification of American aircraft and . . . feel very strongly that they are an equally competent body to judge airworthiness of an aircraft . . . and that the American authorities should recognize their competence in the same way as we recognize theirs.

"Naturally the CAA will want to know more detail about the requirements for British jet transports, but we do feel that the CAA could obtain these from our Air Registration Board and that they should be accepted as sound and reasonable.

"However, there is no unwillingness on our part as manufacturers to submit to CAA evaluation trials. . . . Our difficulty has been that we have not got the flying or technical staff to deal with such further tests and requirements. Also, above all, there is no aircraft available to undergo such tests. . . .

► **BOAC Ready**—"No. one Prototype is a very different aircraft to the production model. . . . No. two prototype still remains in the hands of BOAC. . . .

"In the meantime, BOAC are clamouring to start regular services with their own aircraft. . . . Regular scheduled runs start early in the new year. . . .

"After April BOAC will be extending the routes on which the Comet will operate as quickly as they can get deliveries of aircraft and these extensions are fully planned up till August, 1952, and can only be operated if we keep to our delivery programme."

As to U. S. sales of the Series II Avon-powered long-range Comets, an earlier de Havilland letter, dated Aug. 15, stated:

"On the present production programme the earliest delivery of Series II aircraft would be April, 1955."

► **Could Exploit Lead**—While these correspondences indicate that de Havilland has apparently made no real effort to sell Series I Comets in the U. S., the company says, "There is nothing we should like better than to pour Comets into the United States market . . . given the production facilities to do so, in other words, a relaxation from the needs of rearmament, we could exploit our lead in a big way during the next few years. We indeed hope that we shall still find a good market in your country with the Series II. . . ."

► **Plan to Pioneer**—President Tompkins of nonsked Overseas National Airways believes he can make money on his \$3-million gamble in buying two Comet jet transports. He believes his pioneer operation would lead the way for the scheduled airlines just as nonsked airlines have also led the way for the scheduled airlines in air coach.

Tompkins' gamble in buying jet transports for U. S. operation is planned to pay off in any of several ways:

- Flying U. S. trunk routes.
  - Prestige to Overseas National name and conventional DC-4 service.
  - Lease Comets to scheduled airlines.
- Tompkins, for instance, is a close personal friend of National Airlines President G. T. Baker, who has long vowed he would love to scalp competitor Eastern Air Lines on the New York-Miami run with jet transport service. PanAm and TWA might also be interested—to enable them to meet British-French jet competition.

- Lease operation for Air Force.
- Prototype testing contract for Civil Aeronautics Administration. CAA has sought congressional money to test a B-45 jet bomber on "simulated transport operations" to learn about airways, airports and aircraft operations of the coming jet era. CAA Administrator Charles Horne and Commerce Undersecretary Delos Rentzel last month co-operated with Tompkins to try to swing it with Tompkins' Comets but the idea came up too late in session for Congress to consider it.

In short, Tompkins is confident the American operator with the only proven jet transports available could lease them or operate contract service even if difficulties arose on his own planned domestic trunk operations. He might even sell them back to the British or to Air France, both of whom have less Comets than they would like to have.

But most of all, Overseas National studies with de Havilland indicated ONA could make money operating Comets itself.

► **U. S. Route Pattern for Comet**—In cooperation with de Havilland, Overseas National worked out a U. S. pattern especially featuring New York-Los Angeles via Tulsa and New York-Miami. These Overseas National studies, since used by Air Transport Assn. also, show that the Comet may operate at plane-mile cost lower than the Boeing Strato-cruiser. Estimates show direct flight cost of \$1.03 a mile or \$464.18 an



**EASTERN'S FIRST SUPER CONNIE**

This Super Constellation, just off Lockheed's assembly line, is Eastern Air Lines' first. It was slated for delivery last week.

Big transport already has flown, and two others also flying in Civil Aeronautics Administration certification tests, are EAL.



hour on the New York-Los Angeles route.

Most extensive research was done on the longest-stage route contemplated—New York-San Francisco via Tulsa—because if fuel requirements were met on that, the shorter stages would be easy. New York-Miami was carefully studied, too, because of the likely attraction of the Comet for super-service on that lucrative run.

New York-San Francisco block-to-block time via Tulsa comes to six hours and 45 minutes. New York-Miami service would take two hours, 41 minutes.

Overseas National has planned, if it could get the Comet, to get high utilization by flying combinations of these route schedules: New York-Miami; Miami-Houston; Houston-Los Angeles; Los Angeles-New York-New York-San Francisco.

Study of the routes planned indicates the Comet can carry full 10,000-lb. payload with required fuel reserve for alternate airports and holding patterns. Only Tulsa airport is marginal on takeoff if high headwinds are anticipated on a flight to San Francisco (1,460 miles) and airport temperature is over 90 deg. Then the plane's rocket boost might be needed to assist takeoff. Chicago is not considered as the west-bound runway is too short for routine Comet take off.

► **Cost to Fly Comet in U.S.**—Direct flight cost to operate the four-jet Comet on transcontinental and New York-Miami routes is shown in table on p. 14. Here is how Overseas National Airways estimated these costs, with help of de Havilland aircraft.

• **Fuel \$157.50 per hour.** Stage length round trip 7,418 miles; fuel 132,873 lbs. or 19,773 gal.; roundtrip time 18 hours, 51 min.; consumption 1,050 gal. per hour; times 15 cents per gal. for kerosene equals \$157.50 fuel cost per flight hour.

• **Crew \$46.50.** Anticipating Air Line Pilots Assn. demands for jet transport

crew pay, Overseas National used the same pay and distance formula now used on the DC-6. Pilot pay of \$17.50 an hour was figured, comparing with ONA's pay of \$10.00 an hour for C-54 flying. Other crew increases are similarly figured: co-pilot \$12.50; engineer \$8.50 and two stewardesses \$8.00, making total crew \$46.50 an hour.

• **Maintenance of airframe \$50.00.** With little airframe maintenance data available yet for the Comet, ONA uses the DC-46 estimate of about \$50 an hour.

• **Maintenance engines \$64.35.** This is taken from de Havilland "Report on Fixed Hourly Running Costs of the de Havilland Ghost 50 Civil Turbojet Powerplant." But ONA then increases it for higher U.S. pay scales and for line mechanic inefficiency compared with de Havilland. Life cycle of 375 hours is used including No. 2 inspection, which is kept anticipating CAA requirements although it has been cropped by de Havilland. Line maintenance cost is figured at \$25.52 per hour; overhaul cost at \$3,500 per engine or \$14,000 for 375 flying hours equals \$37.33 per hour; shipping cost is \$2.50 per hour, making total of \$65.36 per hour.

• **Obsolescence \$50.12.** ONA figures a life of eight years with 20% residual value, making total of \$50.12 per hour depreciation. ONA believes the Comet may be another DC-3 of long useful life, in that it is the first modern plane of an era and most simple in design; while later jets five or more years from now may be more efficient, they will be costlier and more complex.

These are preliminary estimates made by ONA. A top Air Transport Assn. official, after visiting de Havilland has reported informally to ATA members with similar conclusions, partly drawn from the Overseas National study available at de Havilland.

► **About Overseas National**—ONA is currently flying its five DC-4s exclu-

sively on the Pacific airlift under MATS charter, at a low figure of under \$1.20 a plane mile. It believes it has the lowest charter cost of any Pacific lift carrier. It has been on the lift since its start and is the largest nonsked to get an individual exemption from CAB.

## Senators Look Into AMC Job Changes

**Dayton**—While no further federal grand jury action on alleged Air Force procurement irregularities at Wright-Patterson AFB is indicated until after the first of the year, there have been other developments:

• Senate investigations veered off on a new tack—probing the exodus of procurement officials into high-salaried positions in private industry.

• Two persons indicted for alleged manipulation of contracts have been arraigned.

• Another company involved in alleged contract irregularities has been identified.

• Four additional companies have had contracts suspended.

► **Better Salaries**—Sen. Lyndon B. Johnson's Armed Services Preparedness subcommittee, which is scanning military purchasing procedures, has turned its attention to buyer resignations.

Sources close to the subcommittee indicated that at least four instances in which former buying personnel have accepted position with firms holding AF contracts are scheduled to be studied.

Investigative example: A buyer resigned his \$5,600-a-year position at Wright-Patterson to accept a \$10,000-a-year post with a contractor. What the subcommittee wants to know: Was the fact the buyer had vested \$2 million in contracts with the firm a factor in his appointment to the new job?

► **Two-year Restriction**—Such situations were partially anticipated when Air Force Regulation No. 30-30 was drawn June 18, 1948:

"Former personnel and retired officers of the aforementioned (armed) services will not be permitted to deal with the Department of the Air Force in a representative capacity in any matter, including claims, if the individual concerned personally considered the matter or gained personal knowledge of the facts thereof while connected with these services.

"The same restriction is applicable to a person who is not included among such former personnel if he is directly associated in the particular matter involved with a person who is covered by the preceding sentence."

A Nov. 26, 1948, amendment further provides:

"The provisions of 18 U.S.C. 284-A) make it unlawful for former personnel,

within two years after their incumbency, to prosecute or act as counsel, attorney or agent for prosecuting any claim against the United States which involves any subject matter directly connected with which the individual concerned was employed or performed duty."

► **Dodging Regulations**—These provisions have been circumvented in the past by a simple expedient, which also is under investigation at Air Materiel Command. An electronics buyer, for example, could resign and become a representative for a textile firm. He submits an executed affidavit to AMC and is cleared for representative work.

Once he has that clearance in hand, he can assume a position as a representative with one or more of the electronics firms with whom he has been doing business as a buyer—thus evading the two-year limitation.

All representatives have been requested by AMC to file a complete list of companies they represent, together with the effective dates for each.

Meanwhile, counsel for Lawrence A. Razete, head of two electronics companies in Cincinnati, has been given until Dec. 5 to present arguments for dismissal of federal indictments resulting from charges Razete gave gratuities to Luther M. Kratz, former buyer of electronic equipment at AMC.

► **Pleads Innocent**—At his preliminary arraignment, Kratz entered a plea of innocent. Both men were indicted on five counts, four in connection with alleged gratuities and the fifth for conspiracy.

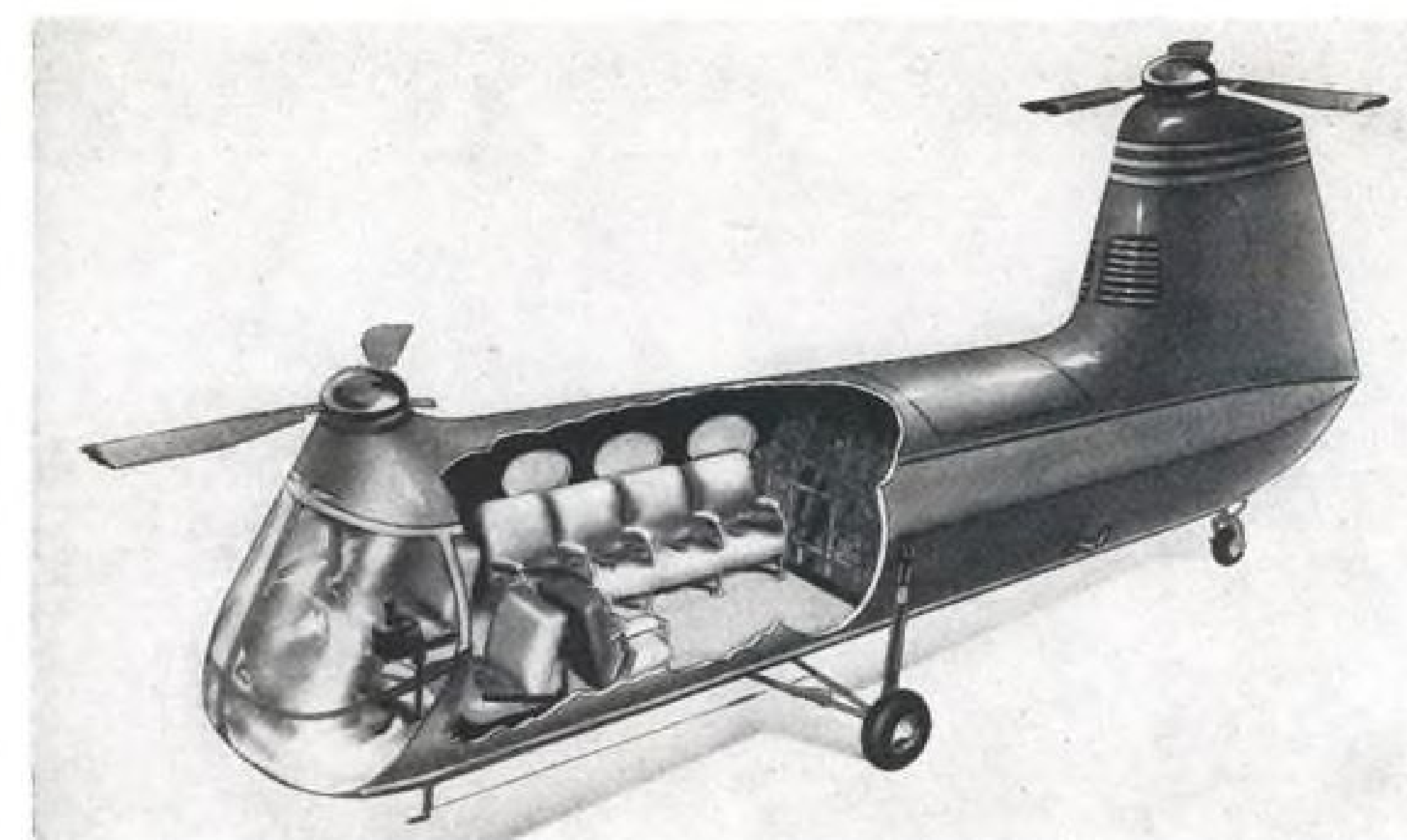
Among late developments in the alleged irregularities was Air Force announcement that approximately 40 contracts with a face value of nearly \$19 million and involving six firms have been canceled during the past six months.

One of the firms involved is Cappel-MacDonald Co., Dayton, and two others are Razete companies.

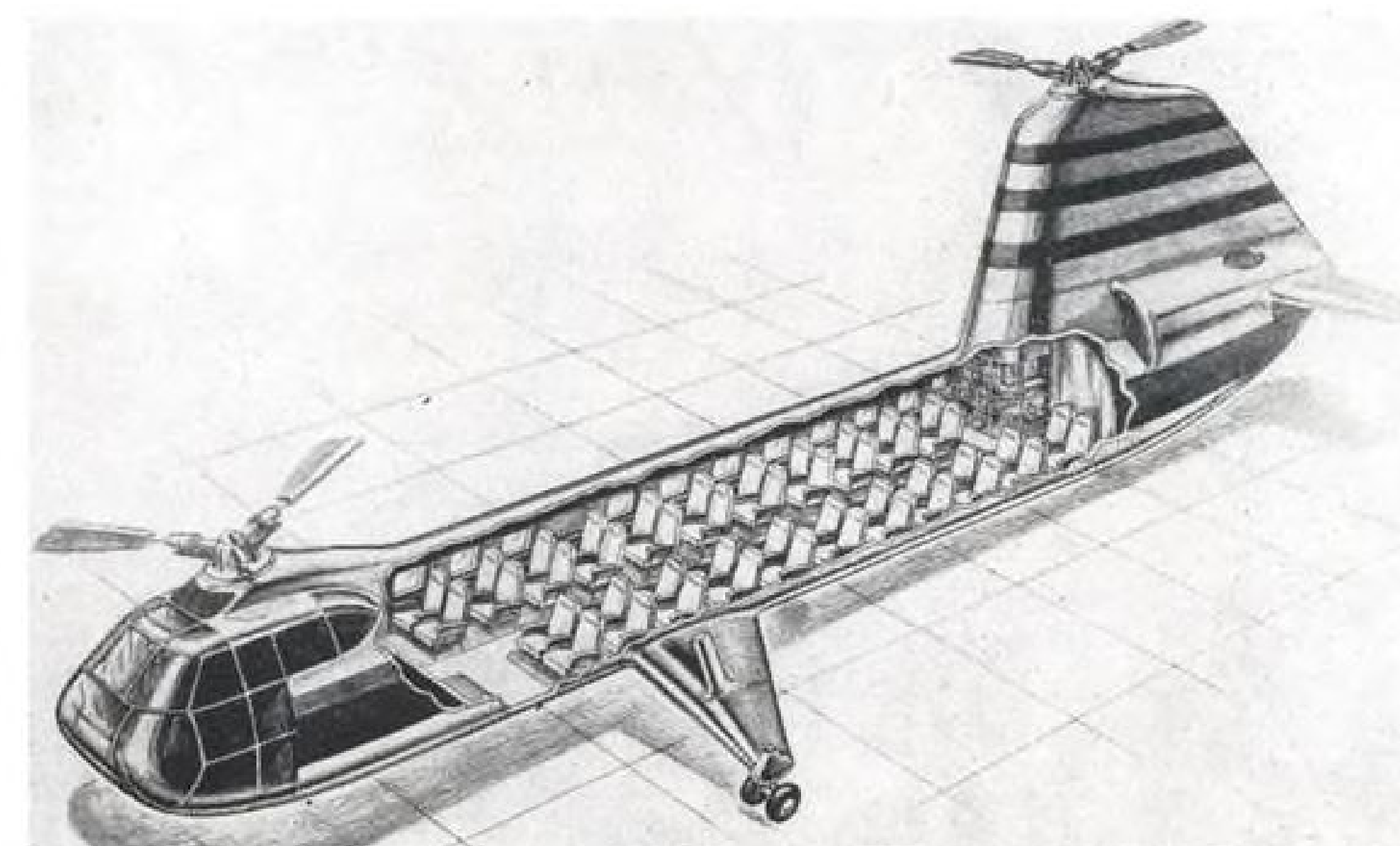
The announcement indicated AF canceled a \$3-million contract with the Dayton firm after an investigation of changes in specifications on survival kits.

► **Linked with Buyer**—The company announced it has suspended a vice president, Adam Cappel, pending completion of the investigation, details of which have been turned over to the Senate subcommittee. Cappel's name was linked with that of Robert G. Hollifield, former employee in the Aero Medical Laboratory of Wright Air Development Center.

Further grand jury action before year's end is not likely, Ray O'Donnell, U. S. District Attorney for Southern Ohio, said, because the jury is scheduled to meet only two more days this year.



COMMERCIAL version of the HUP(PD-18), five passenger tandem rotor copter and . . .



44-PASSENGER H-16 tandem are two of three civil transports in Piasecki future plans.

## Piasecki's Civil Copter Plans

Three tandem-rotor military versions fit expected demands for future commercial transports.

By Alexander McSurely

Three tandem-rotor transport helicopters developed for the military services by Piasecki Helicopter Corp., Morton, Pa., are designed for civil helicopter transport conversions, whenever the present urgent military requirements permit. (See AVIATION WEEK Nov. 12 p. 13)

Tentative Piasecki plans to take advantage of the expected commercial helicopter transport boom of the near future center around:

• **The twin-engine H-16** Air Force and Army transport, which will carry 44 passengers in a cabin about the size of a DC-4 fuselage.

• **The middle-sized H-21**, also ordered

by Air Force and Army as a rescue, assault and troop-cargo transport.

• **The smaller Navy HUP-2** (Army H-25, already in volume production, which will carry five passengers and is currently assigned to rescue and utility military roles.

Here is how Piasecki plans the future commercial roles of these aircraft:

► **Feederline Operations**—For off-peak schedules and low volume passenger routes, the five-place HUP; for higher passenger traffic, the H-21, which in one version will carry as many as 21 passengers, seated streetcar fashion in row seats facing across a narrow center aisle.

► **Airline Connections**—For smaller cities, the five-place HUP as an aerial



### HARDIER NORSEMAN

Latest version of the Norseman transport, made by Canadian Car & Foundry, Montreal, is the Mk. VII, which in this view shows its new all-metal wings and redesigned, slabsided fuselage. The all-metal wing is said to be lighter than the former wood-and-fabric construction, has more area

—369 sq. ft. compared with 325 for previous wing. Span is the same, 51 ft. 8 in., but length has been increased by two feet to 36 ft. 4 in. Gross weight has been held to 7,400 lb., but empty weight is up from 4,250 to 4,482 lb. Powerplant is still a P&W R-1340-AN-1 rated at 550 hp.



taxi; at major air terminals the larger H-21 as an aerial limousine bus.

► **Short Haul Airlines**—For very high-density routes, whether airline connection service or interurban short range transport, the 44-passenger H-16.

► **Industrial Uses**—For hauling supplies or equipment to and from locations hard-to-reach by surface or other air transportation, the H-16 takes a flying crane or aerial truck role, capable of carrying eight to 10 tons in operations of 50 to 100 miles.

Both HUP and H-21 types have had preliminary CAA certification work up to flight test stage, with models not available for the flight tests because of military needs. The manufacturer estimates that "since military specifications equal or exceed those of CAA," it is believed that certification on either could be accomplished in four months.

► **High-Powered Version**—Since the large H-16 has not yet flown, Piasecki is not making any definite statements as to certification plans for it, at this time.

The middle-sized H-21 while it has not yet flown in its present version, is developed from two forerunners of approximately the same size and configuration, the Navy's all-metal HRP-2 and the steel-tube fabric-covered "flying Banana" HRP-1, world's first tandem transport 'copter.

Cockpit of the PD-22, civilian version of the H-21, will have complete standard instrumentation for night flying, with automatic pilot, optional. Main cabin will be separated from pilots cockpit with lockable door. Pas-

senger cabin will be air-conditioned and sound-proofed, and will seat 11 passengers in deluxe airline type seats, 15 in bus-type seats, or 21 in subway-type seats.

► **Maximum Ranges**—A convertor version has a moveable bulkhead to separate passenger compartment from mail and cargo section, with quick release fittings for removal of seats. With 11 passengers, it will have a range of 150 mi. with 30 min. reserve; with 15, it will have 100 mile range with 15 min. reserve, and with 21 passengers it will have 75 mi. range with 15 min. reserve.

A touchdown area of 50 ft. in diameter, with a surrounding 50-foot circle of clear area would be required for heliport use for the PD-22; for multiple landings, a minimum distance of 100 ft. between edges of touchdown areas, to eliminate hazards of air currents produced by rotors of two or more copters operating simultaneously.

► **Operating Costs**—A price-tag of \$170,000 has tentatively been placed on the PD-22 Piasecki calculates that direct operating cost of the PD-22 would be from 68.6 cents a mile for block distance of 7.5 mi. down to 58 cents a mile or 65 mi. block distance.

Seat mile costs shown would range from 4.6 cents for 15 seats, at 7.5 mi. to 2.7 cents for 21 seats, at 65 mi. cost per helicopter hour ranges from 65.90 down to \$62.80, depending on block distance shown. While estimated cost of replacement parts in basis of 25% spares is shown at \$4.04 per helicopter hour.

Comparison of operating figures of the PD-18, commercial proposed version of the HUP, shows seat mile costs run considerably higher as would be expected because of the smaller capacity. However, it is estimated that first cost of the machine would be \$150,000, only \$20,000 less than for the much larger PD-22. Seat mile cost is set at 5.9 cents for a seven-seat version and helicopter hour cost is set at \$37.26.

► **The Details**—The smaller craft is powered by a Continental 975 engine, with 550-hp. takeoff rating, driving two 35-foot diameter tandem rotors.

Long center of gravity loading, 22½ in. for the HUP and 43 in. for the H-21, is cited as an important consideration for in-flight movement of passengers and cargo.

Comparable details on costs and performance are not yet available on the bigger XH-16 transport copter, but the manufacturer points out that obviously the larger passenger capacity would tend to mean lower passenger mile costs.

Operating speeds of the two smaller machines are quoted for the PD-22 at 120 mph. cruising speed at 60%. Rated power at sea level with 11,500 lb. Normal gross weight, and 139 mph. maximum speed; for the PD-18, a maximum speed of 114 mph., with cruising speed not shown. The larger craft will have a 14,000 ft. service ceiling with 1,750 fpm. maximum rate of climb with normal power, as compared to 10,850 ft. and 1,030 fpm. for the PD-18.

## Chips Are Down On Ocean Air Coach

International scheduled airlines this week will buckle down to decide on the fare they will charge for their first trans-Atlantic air coach service. They meet at Nice, France, Nov. 27 to make this historic decision.

Pan American already has run full-page ads in the newspapers to announce the coming of coach service for a European vacation "at a price you can afford."

Observers, including British Overseas Airways Chairman Sir Miles Thomas, forecast agreement on a New York-London roundtrip of \$477 to start next spring. This compares with first-class fare of \$711.

► **Ask United Front**—Pan American has contended that \$477 may still be too high to tap the mass travel market. CAB, however, has told Pan American that agreement on \$477 is the most diplomatic move this year. BOAC, Air France and TWA already have come a long way from above \$500 toward meeting PanAm's demand for a price range of \$405-\$450 round trip.

Pan American had even threatened to break the International Air Transport Assn. rate structure to get the lower fare. But CAB told PAA and TWA to work together at Nice.

The fare will probably come out of the Nice conference at \$265 one way—only \$15 higher than the PAA-recommended maximum. That means \$477 for a round trip instead of PAA's 6%-lower rate of \$450.

► **In Agreement**—Pan American has won a major battle in bringing down the major carriers to within only 6% of its drastic price-slash recommendations.

Even this month, some international carriers were saying coach should not start until fall of 1952 and should be priced over \$500. Then, after the Tory election, BOAC came out for \$479 a roundtrip. CAB settled on \$477. TWA, BOAC and Air France agreed.

Other questions before the Nice conference this week are:

• **When should coach start?** Air France says July 1, PanAm says April 1.

• **What should winter coach fare be?** CAB recommends \$397 in the "off" season compared with \$477 "on" season. Air France doesn't think it can stand that rate.

• **Regular winter service January-March, 1952.** CAB takes no stand, but says it does not oppose TWA's plan for special 17-day regular service round-trip in winter of \$434.50.

• **Regular winter service thereafter?** CAB says it can see no point in lower winter rates on regular first-class planes when coach service is available.

• **Sleeper plane fares?** CAB reaffirms its

position that the minimum New York-London extra charge for sleeper service should be \$50 each way—or \$75 for double berth. CAB says: "The Board recognizes that the configuration of the Boeing 377 permits the addition of sleeper accommodations without the displacement of passengers . . . (but) the advantages of the Boeing . . . are more than offset by its high seat-mile operating cost."

As to other type planes, CAB says fitting them as sleepers "results in a loss of approximately 50% of the seating capacity."

CAB urges "substantial increase" in sleeper fares on other routes also.

• **Sleeperette charge?** CAB also urges an extra charge of \$14 for sleeperette seating.

• **Discriminatory rates?** CAB will veto any proposal that special rates be given to passengers of the airline's own nationality, or any other type discrimination.

## U.S. Jets Superior In Power, Economy

U. S. concentration on the development of axial-flow types of jet engines while the British still were trying to coax more power from centrifugal types definitely has pushed this country ahead of Britain in the jet field, according to Frederick B. Rentschler, chairman of the board of United Aircraft Corp.

At the end of the war, Britain was "ahead of the field in basic jet engine knowledge and experience," Rentschler told a news conference in New York. But that was with the centrifugal type of engine. In 1946, U. S. engine designers had started exploitation of the axial-flow configuration. Such engines were quickly put into production and service.

"Today," said Rentschler, "the results are beginning to show." While the British have the 6,500-lb.-thrust Avon and 7,200-lb. Sapphire, UAC's Pratt & Whitney Aircraft division has developed the 10,000-lb.-thrust J-57, and other U. S. companies have engines coming along in the same power class. Only drawback is that the J-57 is "perhaps not quite so far along the road to full production as the Avon and Sapphire."

But the P&W engine is far superior to the British engines in power and fuel economy—it is 25 to 30% better in fuel consumption—and Rentschler hopes his company will be able to overcome the production time lag in a short time.

As one indication of the J-57's fuel economy, Rentschler said it is the first engine that offers hope for an all-jet intercontinental bomber.

## 1953 Procurement Set at \$10 Billion

Aircraft procurement is scheduled to get a \$10-billion slice of the approximately \$52-billion military budget which Congress will be asked to approve for fiscal 1953, a Washington source disclosed last week.

This does not include Mutual Defense Assistance Program arms aid aircraft expenditures, which are expected to add another \$5 billion to \$6 billion to the \$52 billion, but for which there has been no aircraft breakdown made available.

Three quarters of the 1953 aircraft funds will go to Air Force. The Army wants about \$100 million for helicopters and planes, and the balance will go to the Navy air arm.

► **More Later?** Overall hard goods procurement for 1953 will be just below \$22 billion, a sharp reduction of over \$7 million from 1952 funds. Primary reason for this given in Pentagon circles is that the long leadtime items have already been financed in advance. So for next year, they say, funds will be just an additional 12-to-18-months financing of already established programs.

So far, the long-heralded 143-wing Air Force has not shown up in the calculations for next year's money. Chances are that the expansion money for this step will be included in a supplemental request sent to Congress some time after the original budget is submitted and the session is well underway.

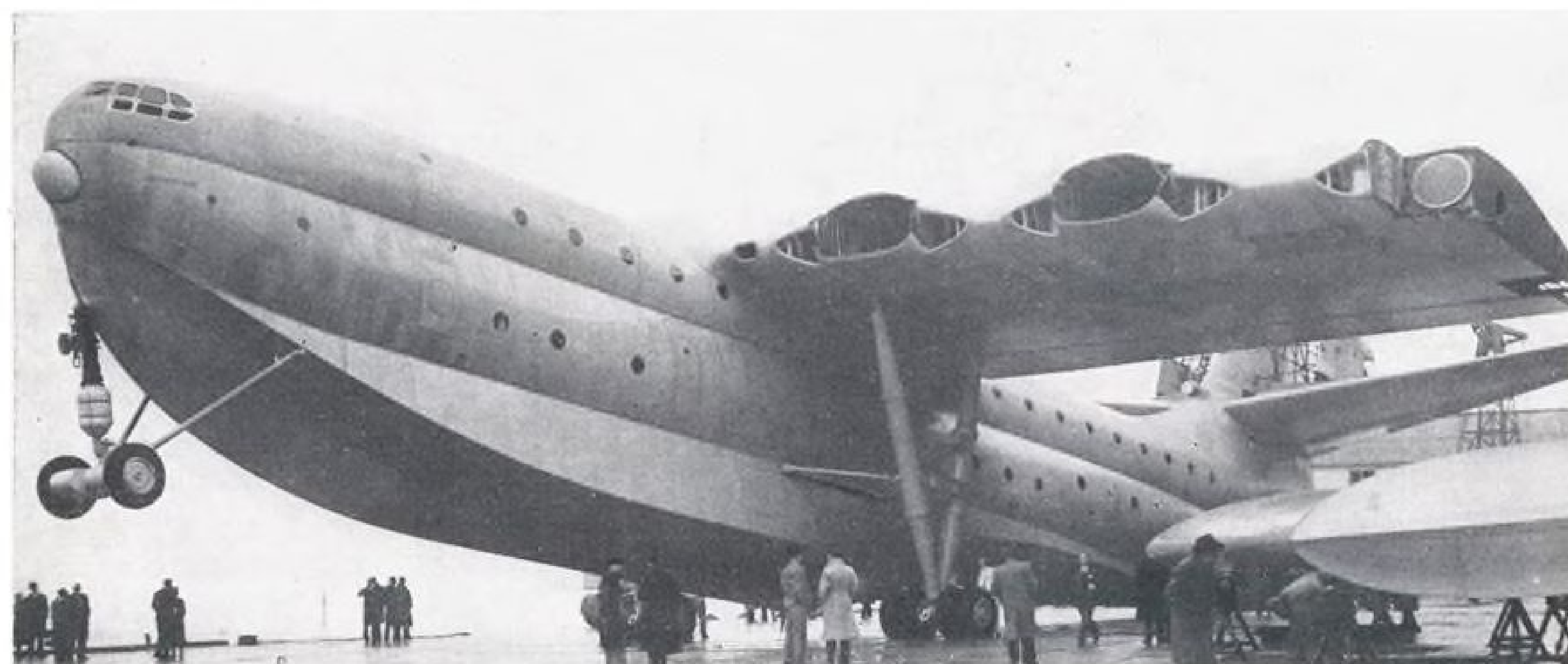
Despite the reduced appropriation request in the main 1953 budget, the build-up in military spending will continue next year. This year the Defense Department is spending about \$44 billion, and next year, the figure is expected to be raised even higher—up to \$55 billion.

► **Peak in 1953**—But contract letting will slow down during the balance of fiscal 1952 and will drop off appreciably during fiscal 1953. Defense procurement spokesmen say that contracts for work that cannot be performed for some time are already piling up at defense plants.

Rather than risk future cancellation of contracts in wholesale lots, as was done during World War II, the slowdown is being put into effect now, they say.

Sometime in fiscal 1953, the contract-letting curve will cross the spending curve.

Barring an all-out war soon, aviation manufacturers may expect the peak of contract letting by spring of 1953. For a while during fiscal 1954, according to present outlook, deliveries will exceed spending.



MAMMOTH PRINCESS ROLLED OUT

The partially assembled main structure of the huge Saro Princess flying boat provides an impressive sight especially when compared with the bystanders viewing the big plane outside its hangar at the Saunders-Roe plant, Isle of Wight. At right foreground is

one of the craft's outer wings, with retractable tip float attached, ready for installation. The Princess yet lacks its ten 3,500-hp. Bristol Proteus turboprop engines. When complete, the flying boat will weigh about 140 tons and will carry more than 105 pas-

sengers at a cruising speed of 380 mph. Note the configuration of the multi-decked hull, which will be pressurized. The nose has been raised to permit the tail to clear the top of the hangar as the plane was rolled out. Three Princesses are being built.



## Seen at FSF's Bermuda Safety Seminar



E. S. CALVERT, Royal Aircraft Establishment, received FSF plaque for developing center line and bar approach lighting.



E. A. CUTRELL, American Airlines, was honored for sponsoring adoption of center line system over other types.



JOHN GILL, Eastern Air Lines, was given FSF award for work on sequence flashing condenser discharge lights.

Fire fighting was the Number One topic at Flight Safety Foundation's safety seminar at Bermuda Nov. 14-16, attended by top airline, industry, government and military engineers and executives from the United States, England and Canada.

► **Safety Awards**—A highlight of the convention was presentation of the FSF's safety awards donated by AVIATION WEEK to E. S. Calvert, E. A. Cutrell, John Gill and Dr. Ross Gunn, pictured on this page.

The sessions included talks, films and demonstrations of fire prevention, control and methods of fighting blazes, and air-sea rescue techniques.

Also discussed were cockpit information presentation, precipitation static; lightning; approach and landing problems; fatigue; crash survival; morale and safety; use of CW Doppler radar in preventing collisions; condensed-warning instrumentation; and mid-air collisions under VFR conditions.



OTTO KIRCHNER, AA operational engineering director, and RICHARD MOCK, Lear president, exchange some comments.



JERRY LEDERER, FSF director, with Weather Bureau's DR. ROSS GUNN, honored precipitation static research.

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## AERONAUTICAL ENGINEERING

### What We Have Learned From V-2 Firings

• Failures, successes give valuable information.

• Main lesson: simplicity is key to missile research.

The German V-2 rocket, precursor of a new means of warfare, has been serving the United States as a research workhorse during the last five years. And those firings have shown that failures can furnish as much useful data as successes.

► **The Lessons**—A study of the 68 test firings reaffirms these three basic engineering truths:

- Simplicity equals reliability.
- Reliability of the whole is less than that of any part.
- There is no magic—fundamental principles still apply.

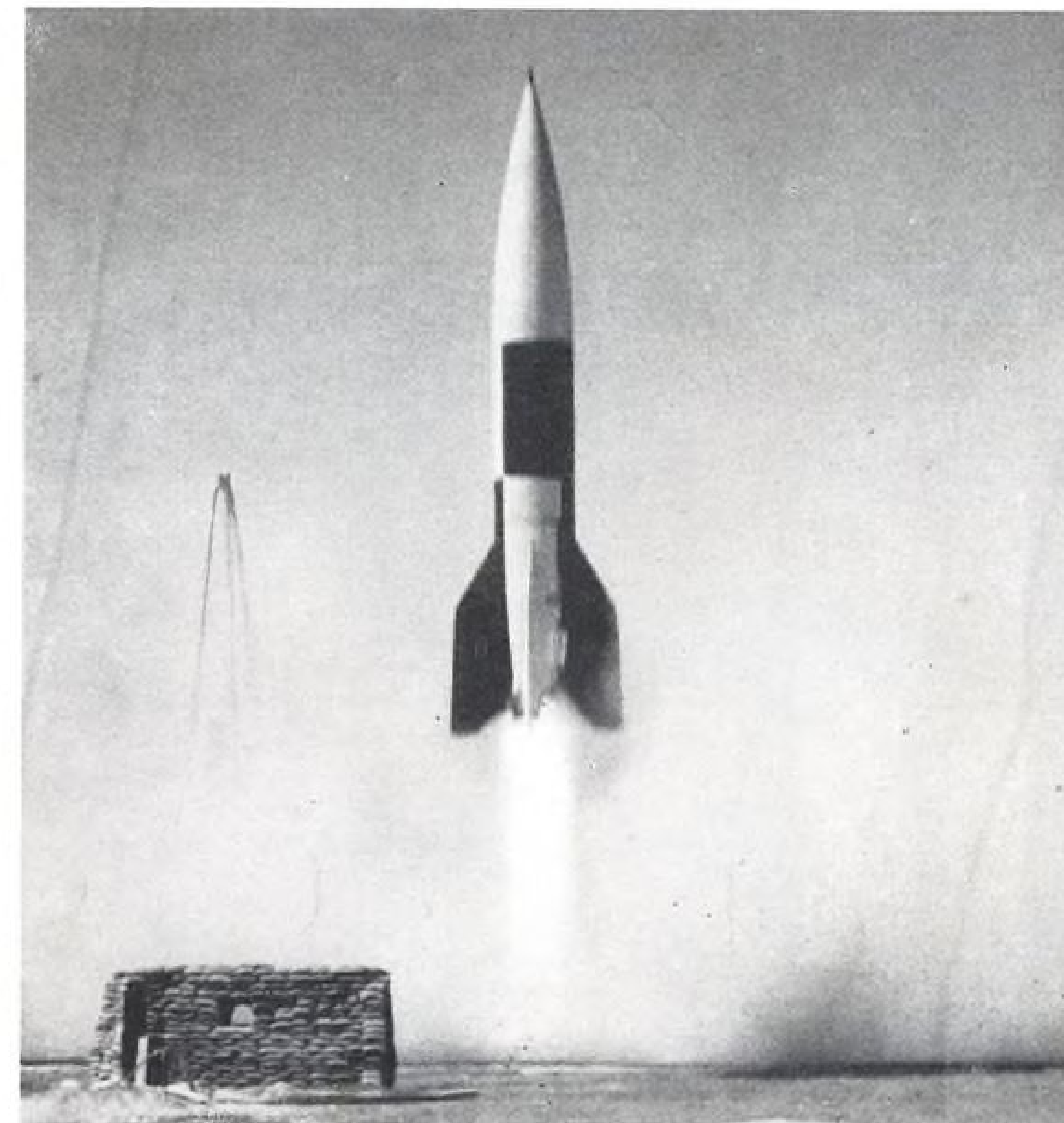
A summary of positive and negative results of the V-2 test firings was given by Dr. Richard W. Porter at the recent meeting of the New York section of the American Rocket Society. Dr. Porter directs Project Hermes, a joint General Electric-U.S. Army Ordnance guided missile project.

He said that 45 rockets performed successfully—that is, they accomplished the test purposes for which they were intended. Thirty-two of those 45 rounds showed absolutely no malfunction of the rocket. The remaining 13 produced useful test data although rocket performance was inferior. In addition there were 23 unsuccessful firings.

In spite of the age of the rockets, and the fact that firing crews had to accumulate experience as they went along, the overall performance of the big missiles was better than normally obtained by the Germans in field firings; and the ratio of good to bad rounds set by U.S. crews was above that predicted by German scientists who were interrogated at the start of the program.

► **Historical Sidelight**—The whole story of how the V-2 rockets got to the United States is a wild adventure. Technical intelligence teams (which included Dr. Porter and several other GE personnel who were the nucleus of Project Hermes) ranged through Germany on the heels of the American army.

They first made direct contact with scientists working on the V-2 program



SUCCESSFUL firings of V-2 rocket as well as failures give scientists important data.

at Darmstadt, site of one of the greatest aeronautical schools in Germany. At Garmisch-Partenkirchen they found the scientific staff of the German rocket experimental test station at Peenemuende, which had moved south into the Bavarian Alps when the Russians moved across the top of Germany.

► **Underground Line**—At Nordhausen and Bleicherode (now in the Russian occupation zone) the teams found the great underground production lines which turned out the V-2 in quantity. The rockets sent to the United States were gathered in this area by crews working without parts lists. They grabbed everything they could lay hands on which looked like part of a rocket.

Added to the problems of collecting rockets were those of collecting documents and personnel. Carloads of reports, notes, correspondence and photos were found and evacuated. The families of the scientists were rounded up on

short notice and moved out with what they could carry on their backs.

So the technical teams had to find scientists and rockets and documents, organize convoys and trains, transport household goods and children and office files and servomotors.

And this all had to be done against a tight time schedule and in the face of a Russian advance across the area.

It was done, and parts and equipment for about 100 rockets were corraled and shipped to the United States.

► **Firing Program**—The first round fired at White Sands was a check run of the rocket motor. On Mar. 15, 1946, the New Mexico desert reverberated to the thunderous roar of the V-2's 56,000-lb.-thrust motor. The huge rocket was fired on a static test stand set into the side of a mountain, with a concrete flame pit below to receive the jet blast of the motor.

About one month later, on Apr. 16,



the first American flight of a V-2 was successful.

The entire firing program stretched over a five-year period following that first test flight. It terminated June 30 this year. And it achieved a number of major accomplishments.

► **Well-Laid Plans**—But it's doubtful whether or not such signal successes could have been reached without some overall planning. That was the responsibility of the V-2 panel, an informal organization representing interested agencies which wanted to get certain kinds of information from the V-2 flights.

The panel set up the general firing

program, and assigned rockets to each participating group. Once assigned, the rockets became the "property" of that group, and theirs was the responsibility for the instrumentation and firing. The group decided whether or not to proceed with the firing and accepted responsibility for delaying a shoot.

### What They Studied

As a result of this carefully planned program, eleven major sets of data were gathered. The V-2's, Dr. Porter said, provided badly needed information on:

• How to fire a two-stage rocket. The reference was to the Bumper series of

eight firings, which set an altitude record of 250 mi. and a speed record of about 5,000 mph. Bumper was a two-step combination of a modified V-2 carrying in its nose a greatly modified WAC Corporal. At V-2 burnout the WAC was fired, adding the total energy of the V-2 to its own.

• **Aerodynamic data.** Experiments were made which uncovered basic information on heat transfer, boundary-layer transition and drag due to base pressure distribution.

• **Atmospheric properties.** Pressure temperature and density of the upper atmosphere were measured by the V-2. As one example, an exploring probe was used to measure the position of the shock wave at the V-2 nose. This determined the Mach number of the vehicle, and the true velocity was determined from the Doppler record. Knowing true velocity and Mach number, it is possible to calculate the temperature of the surrounding air.

Incidentally, this investigation gave results which differed significantly from the NACA standard atmosphere—but only for the particular time of year and the atmosphere over White Sands.

• **Atmospheric composition.** Sampling bottles were used in these experiments to find the percentage composition of the atmosphere. Mass spectrometric equipment was also carried aloft in the V-2 nose for the same purpose.

• **Atmospheric ionization.** Direct measurement of ion densities was possible in the E1 and E2 layers of the atmosphere. Radio propagation tests were also made.

• **Radiation phenomena.** The earth's albedo—measure of its ability to reflect light—was investigated. Cosmic radiation and soft X-ray radiation were measured, the latter by counters behind "windows" of different materials such as aluminum and beryllium. The corona temperature of the sun was also measured during these flights.

• **Earth's magnetic field.** This work is also being done by altitude firings of Martin's Viking rocket, but was pioneered by the V-2 program.

• **Parachute design.** Studies were made of parachute techniques at supersonic speed, where generated temperatures are enough to melt nylon chutes.

• **Atmospheric meteor content.** Sensitive microphones, broadcasting back to ground stations were used in one phase of these fascinating experiments. With all noise-producers in the rocket shut off, observers on the ground listened for the pinging sound of collisions between the rocket and bits of meteors. Polished plates were also uncovered at altitude to measure the effect of meteor dust collisions.

• **Photography.** Color and black-and-white photographic techniques were studied; the earth was photographed

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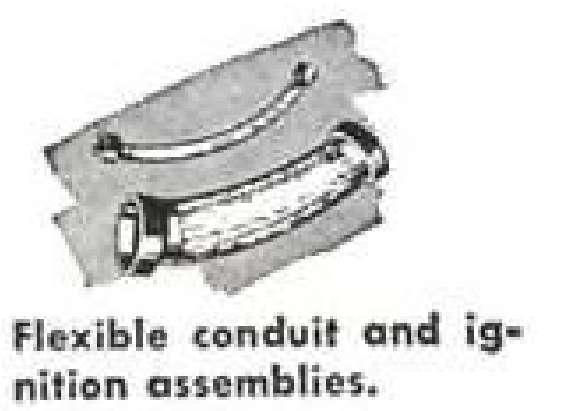
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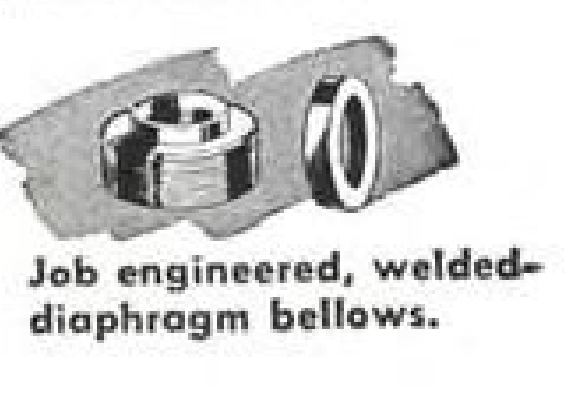
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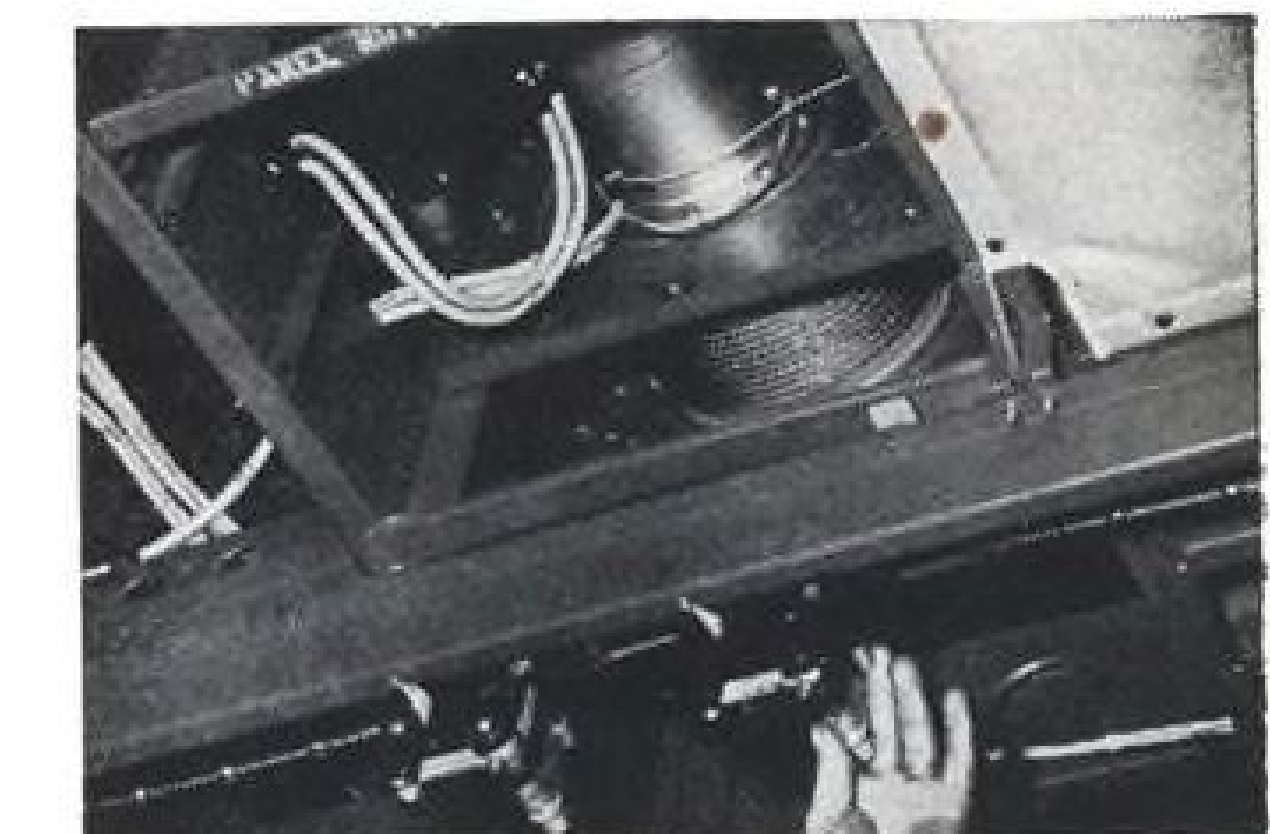
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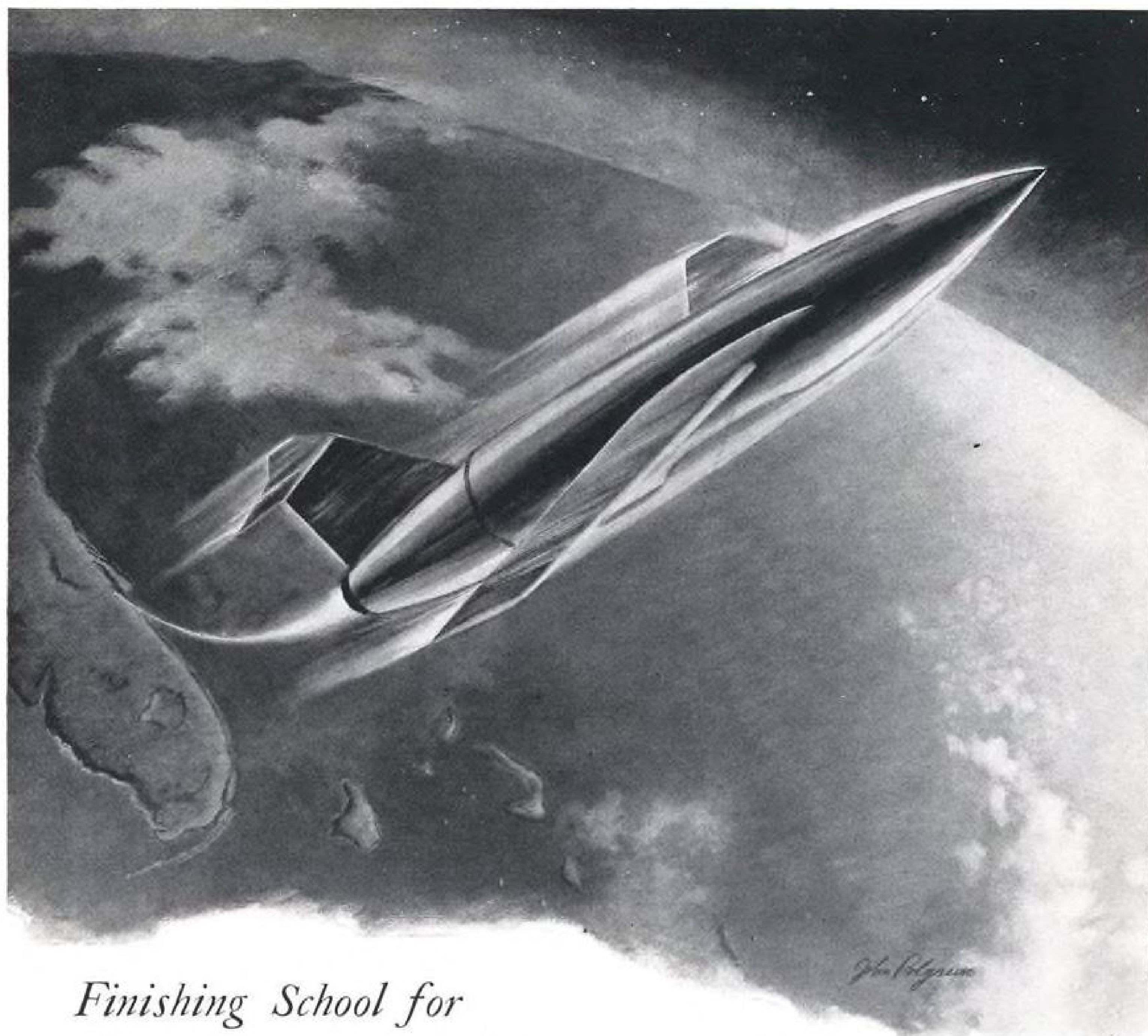


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A pilotless bomber roars away from its launching stand, picks up speed, zooms into the blue. Setting its course for a far-off target in the ocean, it rockets over a chain of tiny islands where men and machines check its flight, its behavior, the operation of its guidance and control systems. It's a vital part of our air power of the future—aeronautical research and development laying the foundation for continued U. S. air supremacy!

Operated by the USAF's Air Research and Development Command, the Missile Test Center is geared up to test the wide variety of missiles, rockets and pilotless aircraft vital to modern air power. It reached its full stature with the recent completion of down-range observation stations. And the dramatic B-61 pilotless bomber, the Matador, designed and produced by Martin as part of its diversified missiles program, was the first to use the completed range. THE GLENN L. MARTIN COMPANY, Baltimore 3, Maryland.

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Navy Viking high-altitude research rockets • Air Force XB-51 developmental tactical bomber • Martin airliners • Guided missiles • Electronic fire control & radar systems • **LEADERS IN** Building Air Power to Guard the Peace, Air Transport to Serve It.

Illustration is artist's conception of Air Force B-61 Matador pilotless bomber.

from extreme altitudes for the first time.  
• **Television transmission.** The Air Force experimented with a 275-line screen. Fifteen of the lines were used for data transmission, and the remainder for a picture.

All this was learned when things went well and the rockets performed correctly. When something let go, the story was different.

### Misfires

Each round fired was the subject of several reports, including one from the firing crew which told the procedure and whatever trouble-shooting was necessary.

A very careful analysis was made when anything did go wrong.

These analyses, Dr. Porter said, taught more about the design and use of rockets than could be learned in any other way.

It was possible to say, in the case of six of the 36 "bad" rounds, exactly what happened, in what sequence and with what results. For another 14 rounds, the analysis showed what happened, but not why it happened. And for 16 rockets, the general area of trouble was known.

Causes for misfires were split about evenly between the propulsion system and the steering system.

► **Propulsion System Faults**—A total of 15 misfires was attributed to faults in the propulsion system by the firing crews.

And the total breaks down to these individual causes:

• **Ignition of pump bearing** (one failure). The bearing on the liquid-oxygen pump is bronze, lubricated with liquid oxygen. Apparently an eccentricity in the bearing alignment caused rubbing; frictional heat plus the presence of liquid oxygen was enough to ignite the bearing.

• **Loss of thrust** (one). Probable cause was a loose plug in one of the electrical circuits which shut down the motor.

• **Malfunction of relay** (three). A relay, operated by an overspeed switch on the turbine which drives fuel and oxidizer pumps, cuts off the motor when the turbine exceeds full-load rpm. On three rounds, the relay cut the motor (for reasons unknown) even though the turbine was at normal revs.

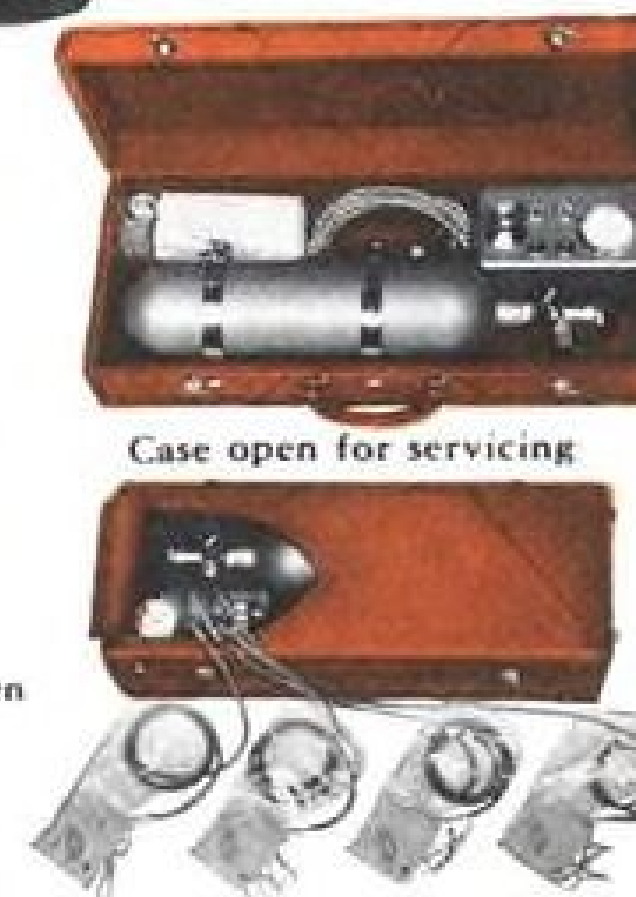
• **Insufficient peroxide** (one). Hydrogen peroxide and calcium permanganate react in a stream-generating unit which supplies energy to drive the propellant-pump turbine. Apparently a personnel error was made in the tanking process for the peroxide, and that tank was not filled completely. As a result, the turbine lost power and was not able to pump the fuel tanks dry.

• **Premature closing of alcohol preliminary valve** (one). This and the follow-

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heaters are connected by ducts to a common plenum located beneath the cabin compartment from where heat is directed to the wing and tail surfaces. Eastern and TWA, like most airlines, have had long experience with Janitrol combustion heaters which led them to specify "Janitrol" with full confidence in their dependability, performance, and economy. Consult your Janitrol representative on any problems concerning heat—wherever you want it.

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## OLD TWIST

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ing two faults require an explanation of the V-2 firing procedure.

The lines which carry liquid oxygen and alcohol from tanks to combustion chamber contain valves which are known as main oxygen valve and main alcohol valve. Each valve has two positions—preliminary (partial flow) and main (full flow). In starting the rocket motor, the valves are opened by remote control to the preliminary position and propellants flow under gravity to the motor. When the operator is satisfied that the fire is going, he pushes the button which opens the valves for main stage. For some reason, the alcohol valve closed during preliminary stage instead of opening to full.

- Intermittent closing of alcohol main valve (two). Again for reasons unknown, the main valve in the alcohol line closed and opened several times during the firing.

- Premature closing of oxygen main valve (one). Cause unknown.

- Alcohol leaks (four). Any leaks in the alcohol system tend to flood the tail compartment of the rocket with explosive vapor. Either a fire or explosion results, with resultant damage to the propulsion unit and loss of the rocket.

- Subnormal oxygen flow (one). The exact cause behind this misfire remains unknown even after careful analysis. It must have been one of the most startling sights in rocket history.

After the motor fired in preliminary stage, the operator was satisfied with the appearance of the flame and gave the signal for main stage. The main-stage flame looked correct, but the rocket did not rise off the stand. The operator then pushed the ground cutoff button, but nothing happened. Shortly after, the rocket had lost enough weight to take off. During the next five seconds, it rose majestically to a height of only 12 ft. The rocket continued until it ran out of fuel, but with greatly reduced performance.

► **Steering System Failures**—Faults in steering system components accounted for 16 bad rounds. In addition, experimental guidance systems caused four failures. This is the way they broke down into causes:

- Broken jet vane (one). There are four jet vanes mounted at the base of the rocket. These vanes are partially submerged in the exhaust blast from the motor, and steer the rocket by moving the blast around. Because of the temperature encountered, the vanes are made of pure graphite, which is very brittle. Apparently a vane had been cracked during machining, and broke, with consequent loss of steering ability. Quality control eliminated later troubles on this count.

- Vane hard over (one). One of the jet vanes received a false signal which caused it to go to full deflection and

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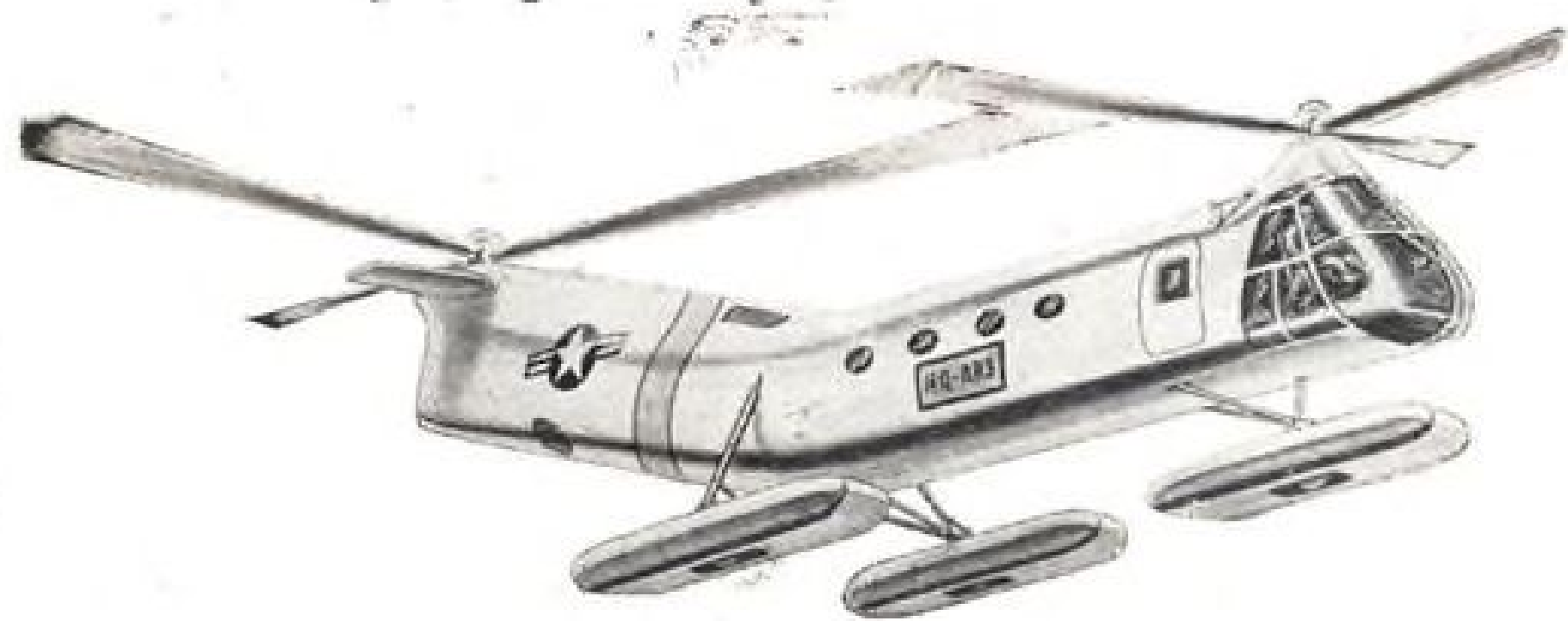


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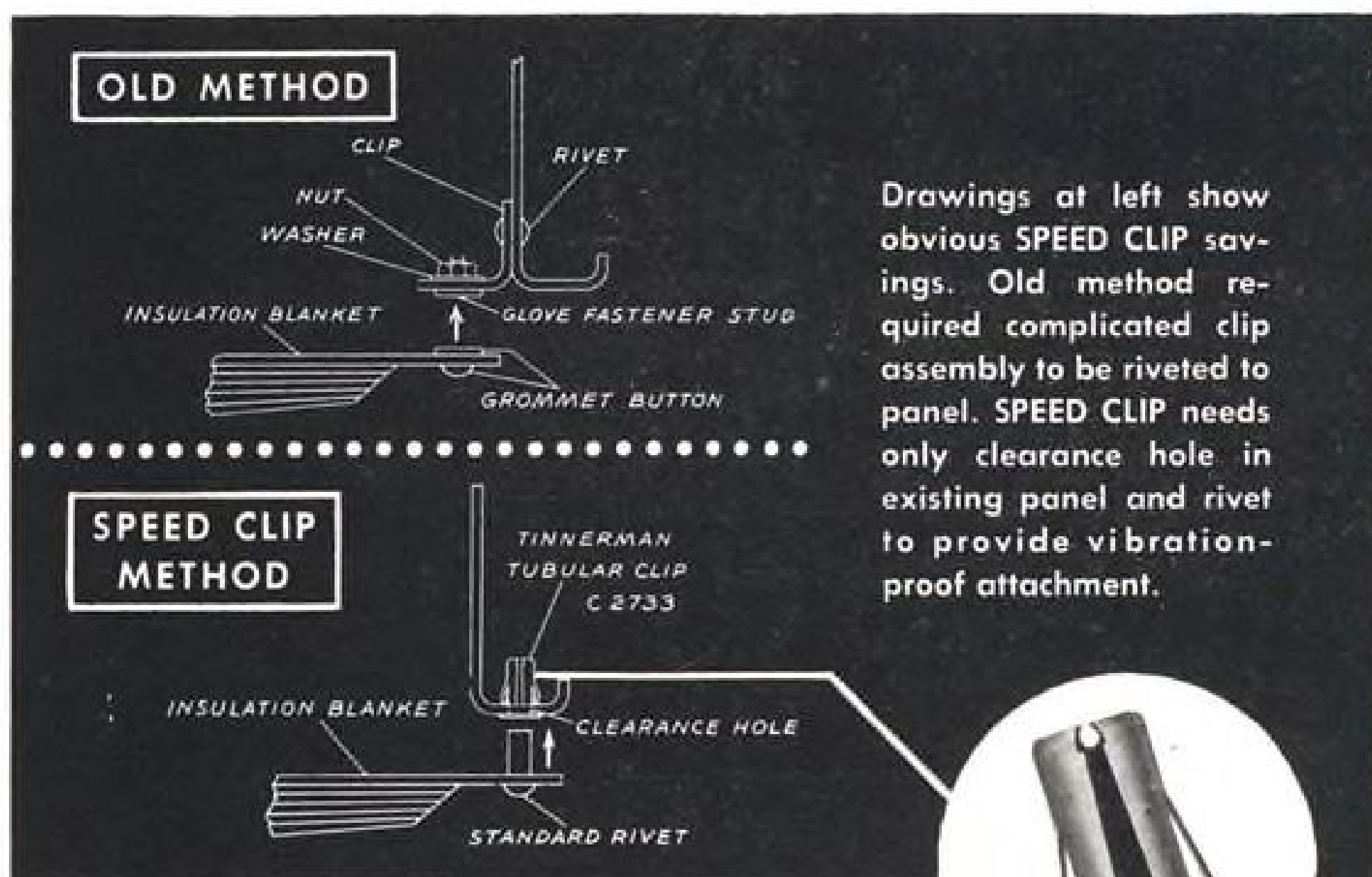
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FASTEST THING IN FASTENINGS®

stay there, with the resultant loss of the round.

- **Gyro or amplifier (two).** This round was lost because of a failure in either the amplifier (which translates error signals received from the gyros into steering signals to the vanes) or one of the gyros.

- **Loss of electrical power (three).** Reasons unknown.

- **Loss of control (one).** This was traced to a small electrical system fire.

- **Vane to center (one).** The exact cause for this remains unknown, but it could possibly have been a power loss. Whatever the cause, a jet vane stayed at dead center, did not answer course-correction signals, and the rocket was lost.

- **Vane balance circuit pickup (one).** A pickup is the term given to a signal produced by the extraneous generation of a voltage within the missile. Balance circuits are used to balance the zero point of each pair of vanes so that the resulting steering force is uniform in the steering plane. A pickup will upset the balance and can cause the loss of a rocket, as happened here.

- **Pitch input circuit pickup (one).** This circuit carries the pitch angle data from gyro to amplifier. A pickup in this circuit gave wrong information to the steering system, and the rocket was lost.

- **Radio control input circuit pickup (two).** Ground-based radio control equipment was not used during the firings at White Sands, but the apparatus was never removed from the rocket. It malfunctioned and two rounds were lost.

- **Continued erection of the gyro (three).** Before takeoff, torque motors erect the two steering gyros, one to a true vertical and the other to a true horizontal. At those positions, the motors cut out. But for three of the V-2 rounds, the motors did not cut out, and instead continued to align the gyros with missile axes instead of space axes. When this happened, the rockets went into a tight turn from which they did not recover.

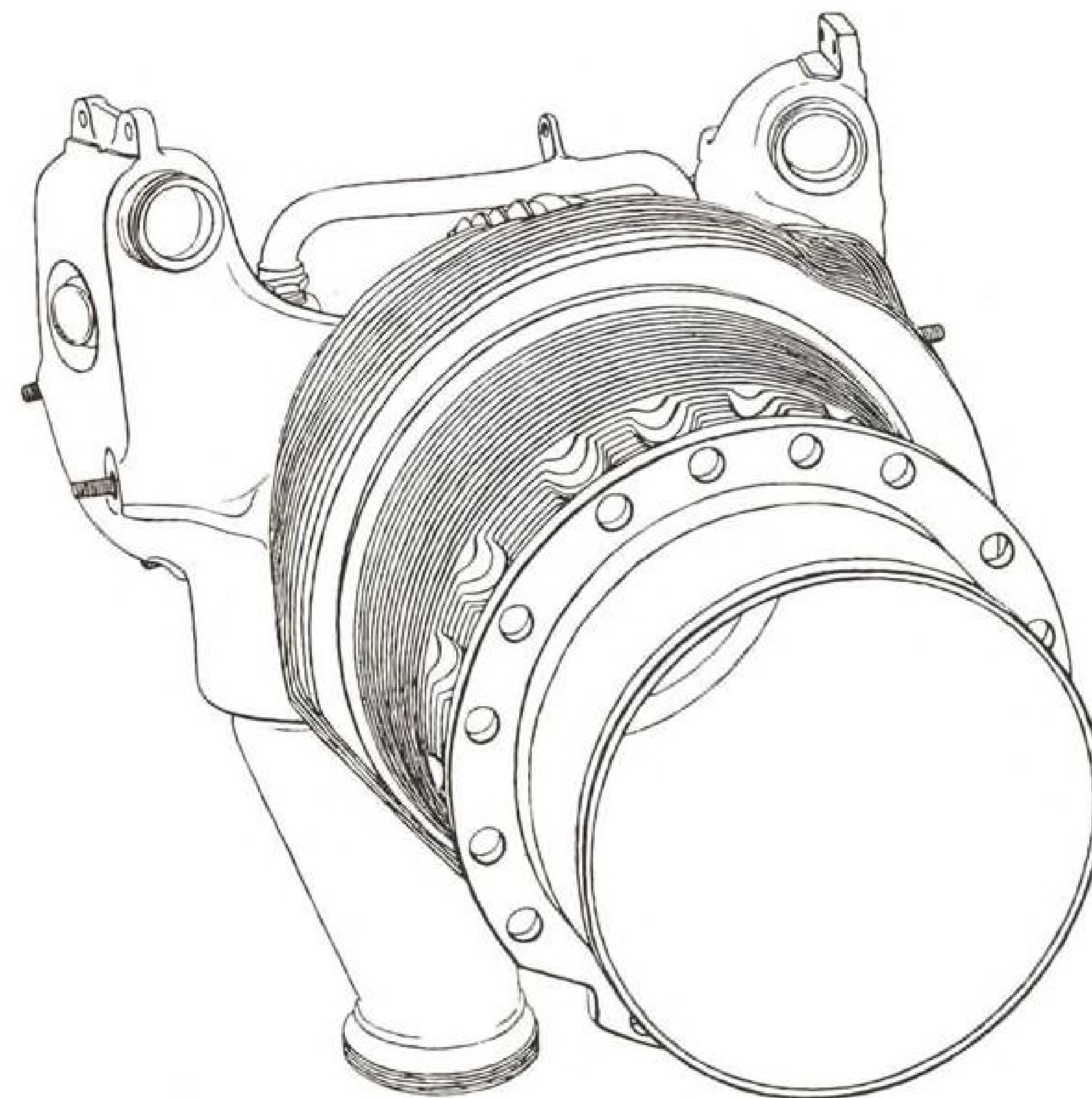
- **Experimental guidance systems (four).** There was no further elaboration on these causes of failure, because of security.

There was also one accident which did not fit into any category above.

Explosives are used to blow off the warhead after the V-2 has started its descent. This is done to make the rocket unstable, which slows it during its drop to the ground, making recovery of instrumentation somewhat easier. In one round, and for no known reason, these explosives blew while the rocket was waiting to take off.

► **Errors**—It is possible to make a further breakdown of these system errors which caused aborted rounds. Electrical trou-

(Continued on p. 35)



**Sound Cylinders ... AFTER 57 OPERATIONS!**

- The cylinders—like every operation of an Airwork overhaul—are done with individual care using special tools and thorough *progressive inspection*. Every detail of the engine's progress through Airwork's modern shop is planned and supervised by men who have infinite pride in their craftsmanship. The dependability of engines overhauled by Airwork is recognized the world over. Scheduled airlines and executive aircraft operators everywhere rely on Airwork's on-time delivery of engines and accessories—convenient exchange plans offered by Airwork save time and money!

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# The NIMONICS

Two high temperature alloys produced by Inco for British-licensed American jet engine manufacturers...

## NIMONIC "75"

Nimonic "75" offers high oxidation and corrosion resistance and is particularly suited for use where a limited creep deformation can be tolerated under steady load and at high operating temperatures.

The principal use of Nimonic "75" has been for nozzle guide vanes, flame tubes and other combustion chamber components in most British aircraft turbines. It is most often used where inlet temperatures exceed 1450° F. Nimonic "75" renders good service under these conditions for the following reasons:

1. High creep and fatigue strength.
2. High oxidation resistance at elevated temperatures.
3. A low coefficient of expansion: similar to mild steel. (Keeps distortion to a relatively low level.)

**MACHINING:** Nimonic "75" has been machined by most common methods, and with standard equipment. Its toughness and capacity for work-hardening, however, necessitate sharp tools, slow cutting speeds and an ample flow of lubricant.

**WELDING:** Nimonic "75" is readily welded by any of the following methods: oxy-acetylene, inert gas arc, metallic arc, carbon-arc, atomic hydrogen, flash, spot, stitch, seam and butt welding.

**FORMS PRODUCED:** Nimonic "75" is produced in sheet, tubing, rods and bars.

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## NIMONIC "80" A

Nimonic "80" A is the standard material used for moving blades in every production aircraft turbine in Great Britain.

While the superior creep resistance of Nimonic "80" A is largely responsible for its suitability in this service, the following factors are no less important:

1. High oxidation resistance at elevated temperatures.
2. High fatigue strength under stress.

Nimonic "80" A is essentially a forging alloy, and as such compares favorably with other alloys designed for prolonged high temperature service under stress.

**MACHINING** and joining: The same methods of machining and joining used for Nimonic "75" can also be used for Nimonic "80" A.

**FORMS PRODUCED:** Rods, bars, forgings.

For help on specific metal problems write directly to Inco's Technical Service Section, at the address given below.

### Approximate Composition

	NIMONIC "75"		NIMONIC "80" A	
Carbon	0.08	— 0.15%*	0.10	max.
Manganese	max.	1.00	1.00	max.
Sulfur	max.	0.015*	0.015	max.
Silicon	0.30	— 0.80	1.00	max.
Chromium	19.00	— 21.00	19.00	22.00
Titanium	0.25	— 0.50	2.00	— 2.75
Iron	max.	2.00	2.00	max.
Copper	max.	0.50	0.50	max.
Aluminum	max.	0.40	0.90	— 1.50
Nickel	Remainder		Remainder	



\*Reproduced by The International Nickel Co., Inc., with the permission of Pratt & Whitney

The turbine blades in the J-42 Turbo-Wasps are made of *Nimonic "80" A*. And in two years of active flying duty these jets have flown more than 150,000 hours *without a single turbine blade failure!*

For more information on high-temperature Nimonics, read the opposite page.





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power packages built by

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of ready-to-install  
power packages  
for airplanes



**ROHR**  
AIRCRAFT CORPORATION

In Chula Vista, California... 9 miles from San Diego

(Continued from page 30)  
bles accounted for 27 poor rounds; the remaining nine were due to mechanical troubles.

If the bad rounds are regrouped under general causes, then the boxscore is like this:

- **Random errors** (one). Detonation of explosives caused this.
- **Design or workmanship**, including wearout (22).
- **Inexperience, lack of test** (eight). An example of this would be the failure caused by the breaking of a jet vane.
- **Personnel error** (one). This refers to the inadequate tanking of peroxide.
- **Special experiments** (four). These were the experimental guidance systems.

Another way of looking at the misfires shows that 26 occurred in flight and ten at takeoff or before.

► **What Was Learned**—After reviewing the causes of accidents, Dr. Porter presented his idea of comparable figures for a V-2 or equivalent program which could be started now. With the experience gathered during the past five years, Porter felt that the 22 design or workmanship accidents would be reduced to a matter of two or three, and that inexperience or lack of proper tests would not be a factor.

He still allowed for one personnel failing and one random occurrence. Thus the total of misfires which could reasonably be expected would be about four or five.—DAA

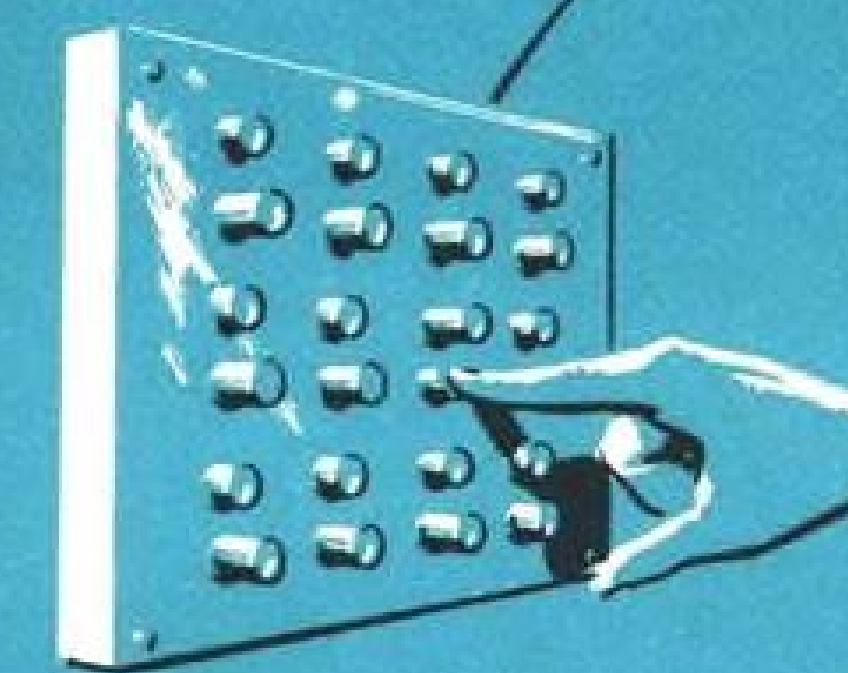
## Research Contracts Increase at NYU

Nearly \$2 million of new and extended research contracts are currently in force at New York University's Engineering Research Division, according to a recent announcement by Dean Thorndike Saville.

This contract dollar volume is about double that of last year. Some of the increase is attributable to military research demands, but much of it is the result of planned expansion.

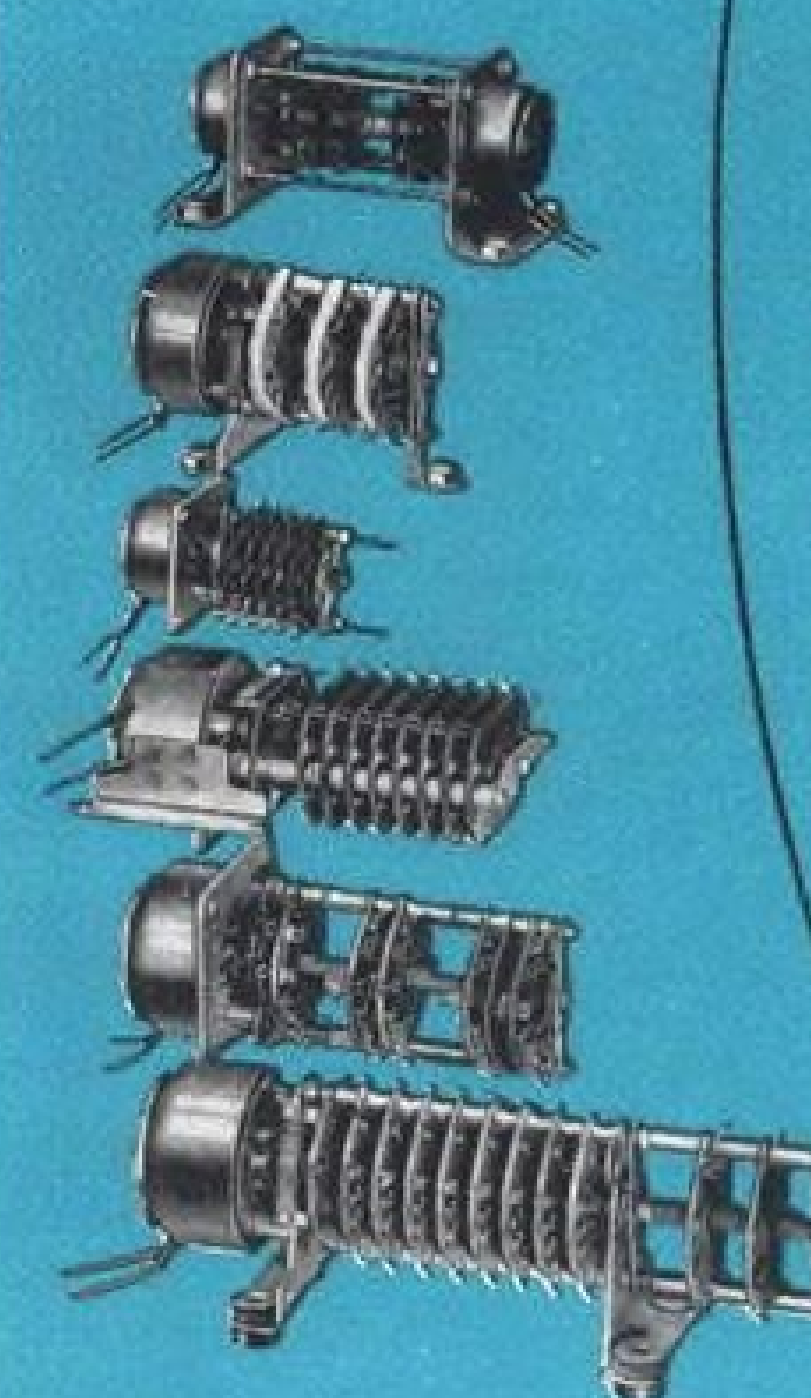
Of particular interest to the aviation field is NYU's research in these subjects:

- **Avionics.** Emphasis here has been on measurement techniques and antenna research, with additional research on servomechanisms, network theory and computers.
- **Rocket fuels.** Navy's Bureau of Aeronautics and Office of Naval Research jointly sponsor an investigation of the potentialities of different acetylenic compounds for use as rocket fuels.
- **Titanium.** Metallurgical research on this new metal is being intensified in fields of high-purity melting and electrolytic polishing. Alloys are being studied, as are machining methods.



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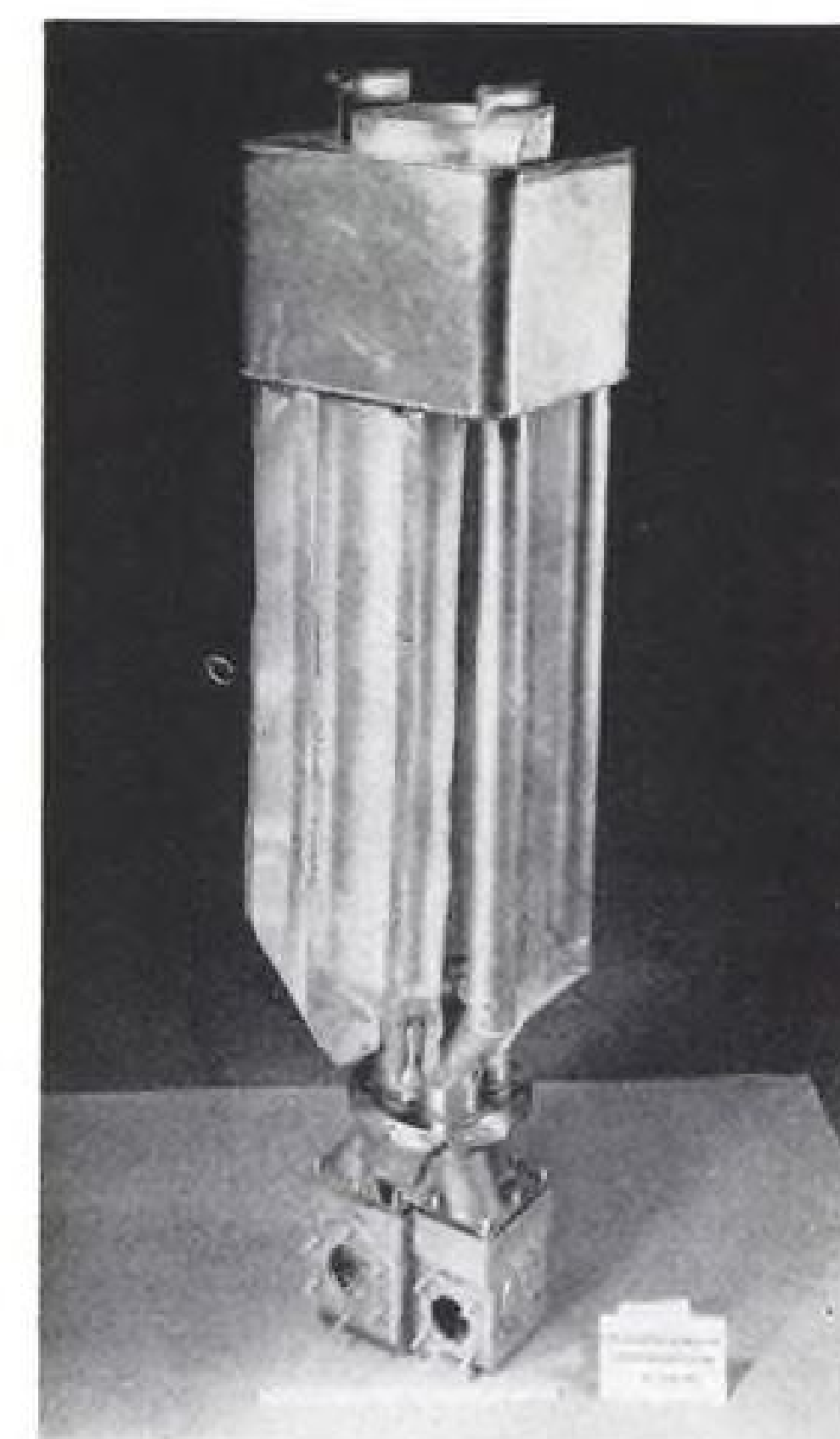
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- ☐ **Designing for Alcoa Forgings.** Covers types of forgings, applications, alloys, design and production details. 171 pages.
- ☐ **Sound Films (16 mm).** (Type of fabrication.)



## New Hot Oil System For Cold Engines

Dayton, Ohio—Blowing hot air on the outside of an engine to warm the oil on the inside seemed like a backward way of doing the job—so United Aircraft Products, Inc. of Dayton, tried a logical approach to the problem of de-congealing oil in sub-zero weather.

The result of the company's development work is a new oil system demonstrated here recently.

UAP's oil system started an engine which had been cold-soaked at minus 65F; 28 min. after the start, full oil flow was developed at the tank inlet. And no external heat was used before the start.

► **Blowing Hot**—Right now external heaters are used to blow hot air on the external surfaces of engine and oil system before trying to start an engine in sub-zero weather.

This process sometimes takes as much as four hours (this figure was quoted for a B-36 at minus 40F outside air temperature).

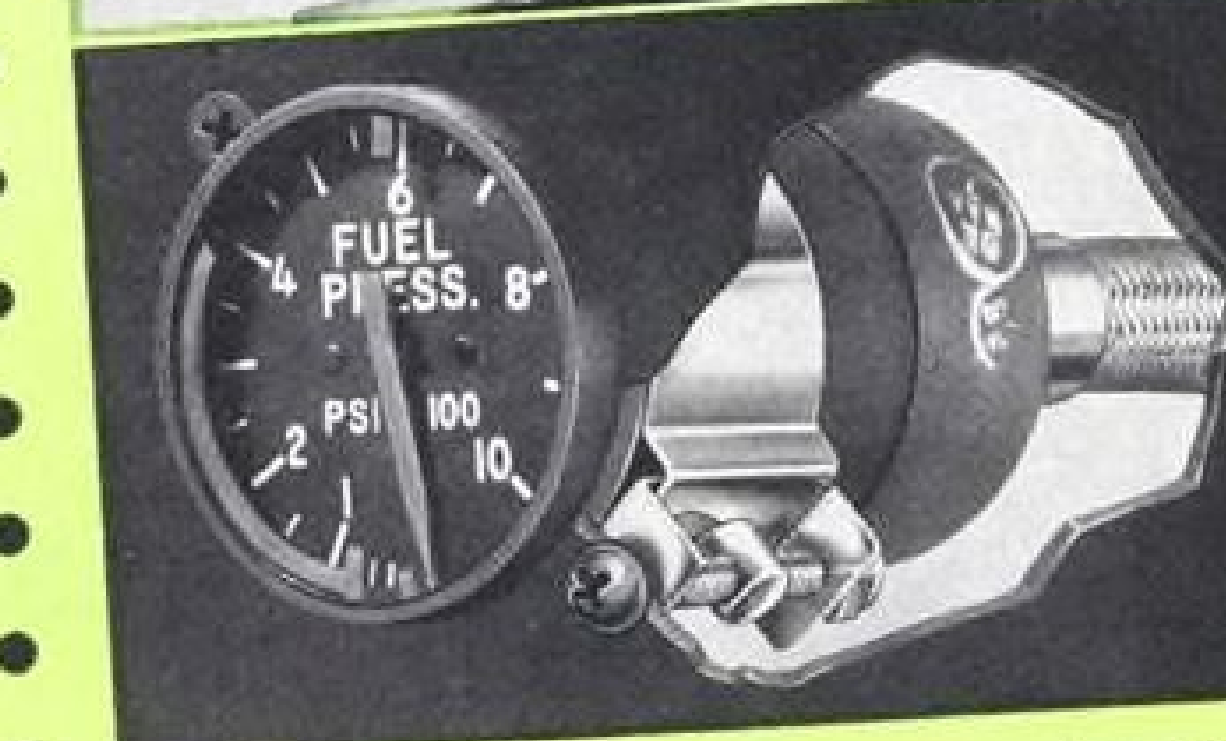
UAP uses a gadget called a diverter-segregator which is simply a finned tank with inlet and outlet valves. The unit which was demonstrated had been built for the B-36; it was about one ft. square in section and a little over four ft. long. Its weight was about 34 lb., and it fits inside the B-36 tank.

For the demonstration UAP built a duplicate of the B-36 tank, installed their segregator and filled the system with oil. Then the whole works was soaked in a cold chamber until the oil was frozen solid. Temperature in the

## ENGINEERS' NOTEBOOK



**New Clamp Allows Attachment of Instruments from Dial Side of Panel**



Significant savings in assembly and servicing time are achieved by Marman Products' new instrument mounting clamp. The clamp is installed on the rear of the panel but mounting or removing is easily accomplished from the dial side of the panel by adjusting only one clamp actuator screw. Marman part No. 23906 clamp conforms to specification MIL-C-6818 and is installed in accordance with Specification MIL-C-6822.

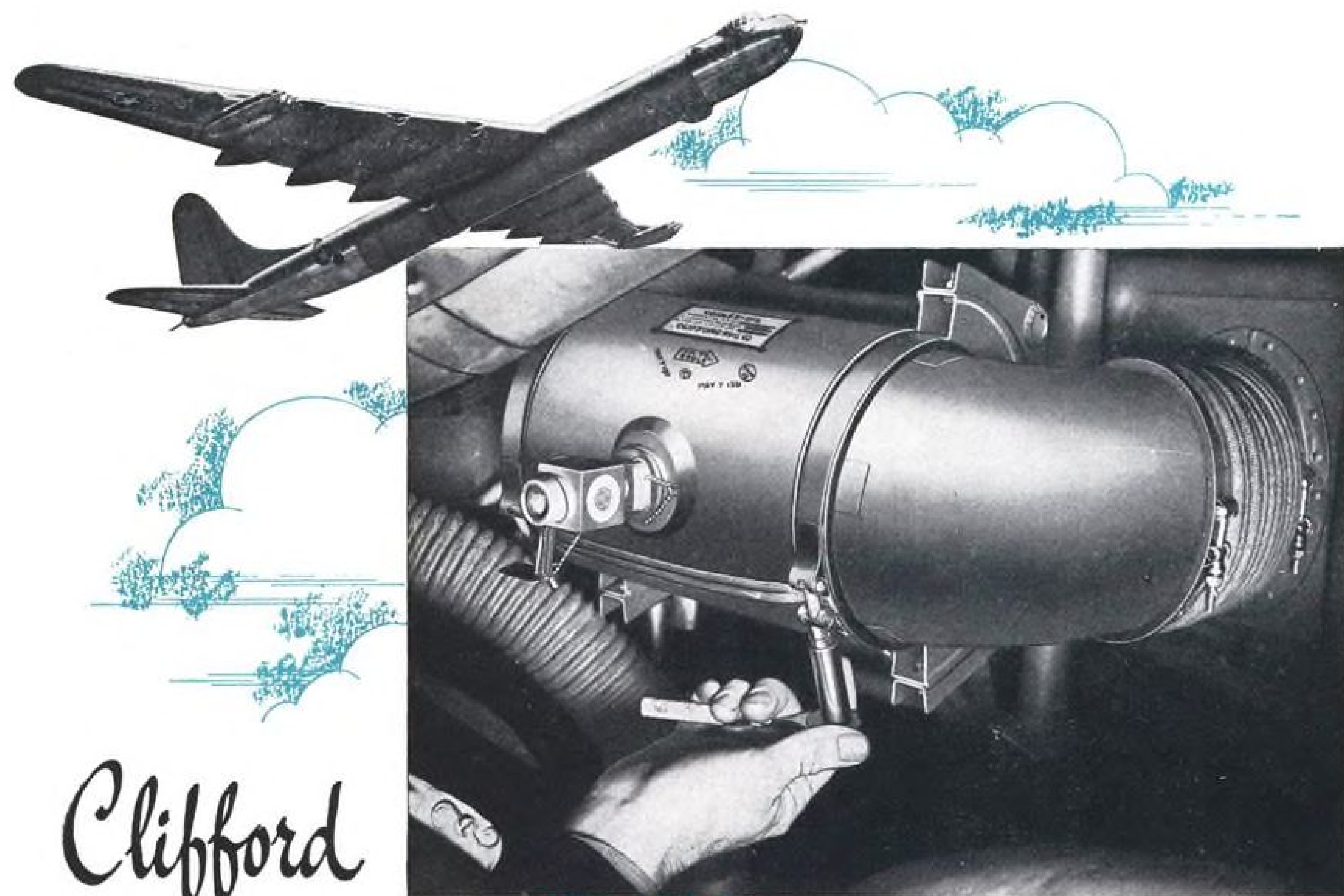
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# Clifford Feather Weights Cool the Oil in

## CONVAIR B-36D BOMBERS

**WORLD'S LARGEST BOMBER**, the Convair B-36D, has a 10,000 mile range and a ceiling of over 45,000 feet.

It uses a Clifford oil cooler to get rid of the heat generated in the constant speed drive which links the engine to the 400 cycle alternator. The oil cooler is essential to the proper operation of the unit under the varying conditions of takeoff and flight, and permits the use of a smaller size and lower weight drive.

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# CLIFFORD

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FOR AIRCRAFT ENGINES

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AND BELLOWS ASSEMBLIES



cold chamber was between minus 60F and minus 65F.

For the start, the segregator was filled with diluted oil, commonly used for engine warmup in arctic conditions. When the engine was started, the oil flowed from the segregator to the engine and back to the segregator at an increased temperature.

During this cycle, heat was transferred from the warmed oil to the congealed oil outside the segregator, by means of the fins on the outside of the hopper. When the oil inside reached 130F, valves diverted some of the hot oil into the outer tank and drew some of its de-congealed oil into the segregator. (If the tank oil is not completely fluid, a spring arrangement on the valve cuts off the oil flow. This is to prevent a slug of congealed oil from stopping the flow somewhere in the system.)

When the oil inside the segregator reached 155F, the valves automatically cut the hopper unit out of the system so that engine oil was drawn only from the main tank.

► **UAP Viewpoint**—Edward L. Ladd, vice president and general manager of UAP, said that tests should prove the system capable of saving hours of pre-flight time. He pointed out that UAP's scheme has two secondary advantages:

- Frozen engine oil can't clog the lines to the engine and cause it to stop.
- Used oil is de-aerated.

Present status of the system is the end product of research work which began eight years ago, but which was side-tracked at the end of World War II.

Next step in the project calls for the installation of the system in a B-36 aircraft at Ft. Worth. From there plane and system go to Eglin AFB, Fla., for tests in the climate hangar.

Ladd said that if the Eglin tests resulted in production contracts for the system, the hopper portion will not require much tooling. Valves will take more time, but new aluminum brazing equipment is being installed which should cut down production time.

## New Northrop Unit Corrects Sideslip

Drag and weight savings on high-speed aircraft can be obtained by the use of a sideslip-stability augmentor, says Northrop Aircraft, Inc., where the device was developed.

In making this new approach to the problems of aerodynamic stability and control, Northrop's servomechanism group was seeking a way to avoid the use of large tail surfaces to provide adequate stability.

► **Dutch Roll Cure**—A combined motion about the roll and yaw axes—known as Dutch roll—is one of the major types

of dynamic instability. This kind of a motion makes a military aircraft unsuitable as a gun platform, and makes a civil aircraft uncomfortable.

One partial solution is to use a large vertical tail surface to damp the oscillation. But some oscillatory motion may remain, the airplane weight and drag may increase, and the control forces may be stepped up.

Northrop's engineers feel that their sideslip-stability augmentor is a sounder approach than specifying a larger tail.

The augmentor works by sensing side force on the aircraft with a very sensitive accelerometer. Signal from the ac-

celerometer is routed through a servo system to the rudder, which is deflected to neutralize the side force.

Mechanical connection of the augmentor into the rudder control system eliminates rudder pedal motion during the period of operation. Coordinated sharp or slow turns can be made without rudder pedal operation. And if needed, the pilot still has full rudder available.

The augmentor has been flight-tested on the F-89 Scorpion. Work on the device was under the direction of D. T. McRuer, head of Northrop's servomechanism group.

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HIGHER RESISTANCE to erosion, corrosion and abrasion is the verdict on new Series 600 chrome carbide centrifuge blade (rear) as compared with older tungsten carbide blade. They are shown here after 6-weeks test.

## New Carbides Fight Heat, Oxidation

Two recent carbide developments by Carboly are expected to have important applications in aircraft manufacturing.

- Series 600 chrome carbides are considerably lighter in weight than conventional carbides, and have shown good resistance to high temperature oxidation.

- Tungsten carbide bearings are showing excellent properties in laboratory tests at high speed, high load and high temperature operating conditions.

Carboly cites these test results as proof of the valuable properties of its Series 600 chrome carbides:

- Temperature tests. Samples of the series were exposed for 24 hours at 1850F in air, and retained their metallic lustre, with virtually no dimensional or weight change. Conventional carbides and stainless steels, meanwhile, were reported to have disintegrated completely at those temperature ranges.

- Salt spray tests. At Battelle Memorial institute Series 600 carbides were subjected to a 30% salt-spray for 750 hours and were so mildly affected they retained their metallic luster. With sulphuric acid as a corrosive agent, they showed about 30 times the resistance of 18-8 stainless and triple the resistance of conventional carbides, reported Carboly. With nitric acid, resistance was reported about eight times that of other carbides.

The chrome carbides appear to be non-magnetic. Their expansion coefficient is about the same as steel. They are machineable to about the same extent as tungsten carbides. The Series 600 metals, incidentally, are much less dense than orthodox tungsten carbides; price by weight is about the same for the two classes, but you get nearly twice the volume of the lighter chrome carbide per dollar than you get with tungsten carbide.

The chrome carbide unveiling, car-

ried out by General Electric's Carboly department at the Metals Congress, was only one of a number of other developments told about publicly for the first time. A related area was that of titanium carbide, aimed at ultra-high temperature operating conditions—a development still in laboratory stage.

Of nearer application are Carboly's new "thermistors"—temperature-sensitive resistors. Their electrical resistance sharply decreases with rises in temperature. Applications are indicated as the sensitive elements in flow meters, liquid level indicators and controls, voltage regulators, vacuum gages, switching devices, etc. Temperature control as fine as 1/1000th of a degree is claimed

possible for these small instruments. ▶ Flowable Carbide—Just coming out of the laboratory into the engineering appraisal stage is a "weldable" tungsten carbide—a metal that can be flowed onto metal surfaces with orthodox shielded arc welding equipment.

The Detroit manufacture expects this innovation to make possible the coating of metal parts with a relatively thin skin, or case, of tungsten carbide. When flowed onto steel it fuses and blends with the base metal, resulting in a surface coating with about 70% of tungsten carbide. This surface is figured as having a wear-resistant ability about 80% that of straight tungsten carbide.



## 8,000-lb. Load No Bother to Him

Decelerating at 45Gs didn't particularly bother Major John Paul Stapp—and that's the same as loading 8,000 lb. on him. He didn't black out on any of his rides on the rocket-propelled sled at Edwards AFB, Calif., nor did he lose the ability to move his limbs, or to see or hear.

Major Stapp, who is an aero medical scientist at the Wright Air Development Center of Air Research and Development Command, recently conducted a series of deceleration tests with himself as the subject.

In the interests of pilot safety, Major Stapp rode the rocket sled to check human resistance to extremely high, short-duration decelerations, and to prove the ability of a new restraining harness for pilots.

Last week he was presented the Air Force award of the National Research Council for this work.

The rocket sled runs on a 2,000-ft. track and is propelled by three 1,000-

lb.-thrust rockets. Within 500 ft. the sled reaches a speed of 170 mph. It then coasts to 154 mph., and is braked down to 35 mph. in 31 ft. and about one-fifth of a second.

This is a deceleration rate of 493G per sec., and is comparable to slowing an airplane from 120 mph. to a dead stop in 19 ft.

The new harness tested by Maj. Stapp is a modification of the current AF type.

Two shoulder straps center on the buckle of a lap strap and an inverted V-shaped leg strap. Design of the harness distributes pressure evenly over the solid structures of the shoulders and hips, which are the body parts best adapted to load-carrying.

Northrop Aircraft, Inc. designed and built the decelerator sled equipment to Aero Medical lab specs. Northrop personnel operated and maintained the equipment on service contract with the AF.

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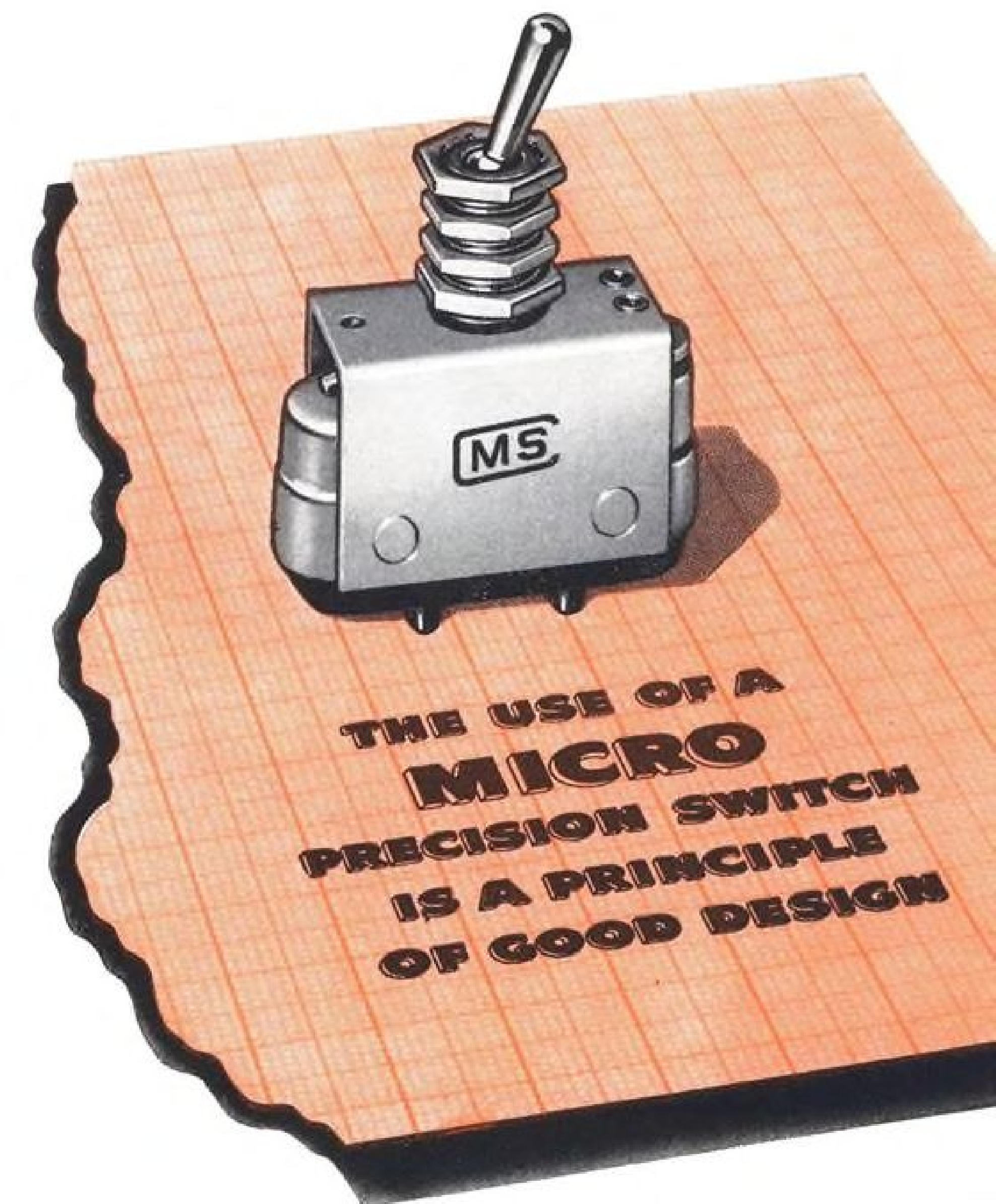
New, special switches to keep pace with aviation needs are always on the drawing boards and in the experimental stage at MICRO SWITCH. If you have a problem of design or redesign involving a precision switch application contact the nearest MICRO SWITCH branch office.

## MICRO SWITCH offers the only hermetically sealed toggle switch for aircraft

This new MICRO precision switch is designed especially for aircraft applications that involve change in atmospheric pressure, change in temperature, corrosive atmosphere, dust, dirt, oil or water. Its hermetically sealed, vapor-proof character prevents formation of condensation on the switch contacts. Electrical capacity is unaffected by change in altitude.

This MICRO sealed toggle switch meets a 100 hour salt spray test under QQ-M-151a and vibration specification similar to that in MIL-S-6743. Mechanical life tests indicate much longer life than usually found in a hand-operated switch. It is mounted in a "U" bracket housing with 15/32-32 panel mount bushing. The positions are maintained "OFF" and "ON."

For complete information on this and the many other MICRO SWITCH aircraft components, we invite you to contact your nearest MICRO SWITCH branch office.



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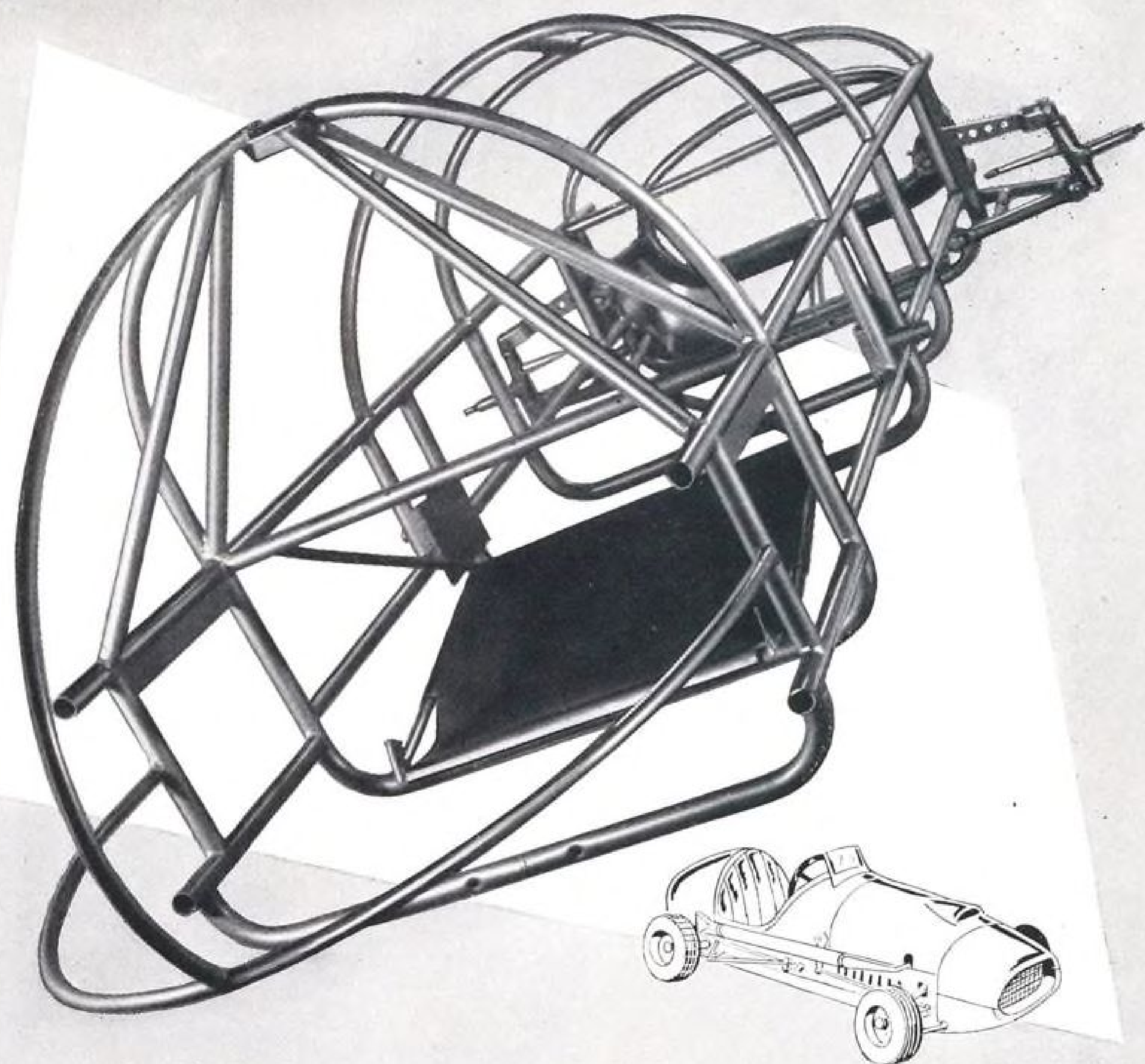
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You're right if you tagged it as a frame for a midge racer. And, chances are, you know metal fabrication and talk the same language as the men of Harter who made this little car as a hobby. Perhaps the most interesting fact about this car is that in a few days it progressed from a mere doodle on a designer's pad to actual production. This is typical of the ability of the Harter organization to translate quickly an idea into a finished product. This quality makes Harter a splendid subcontractor when you need help *fast* to make promised delivery on defense contracts.

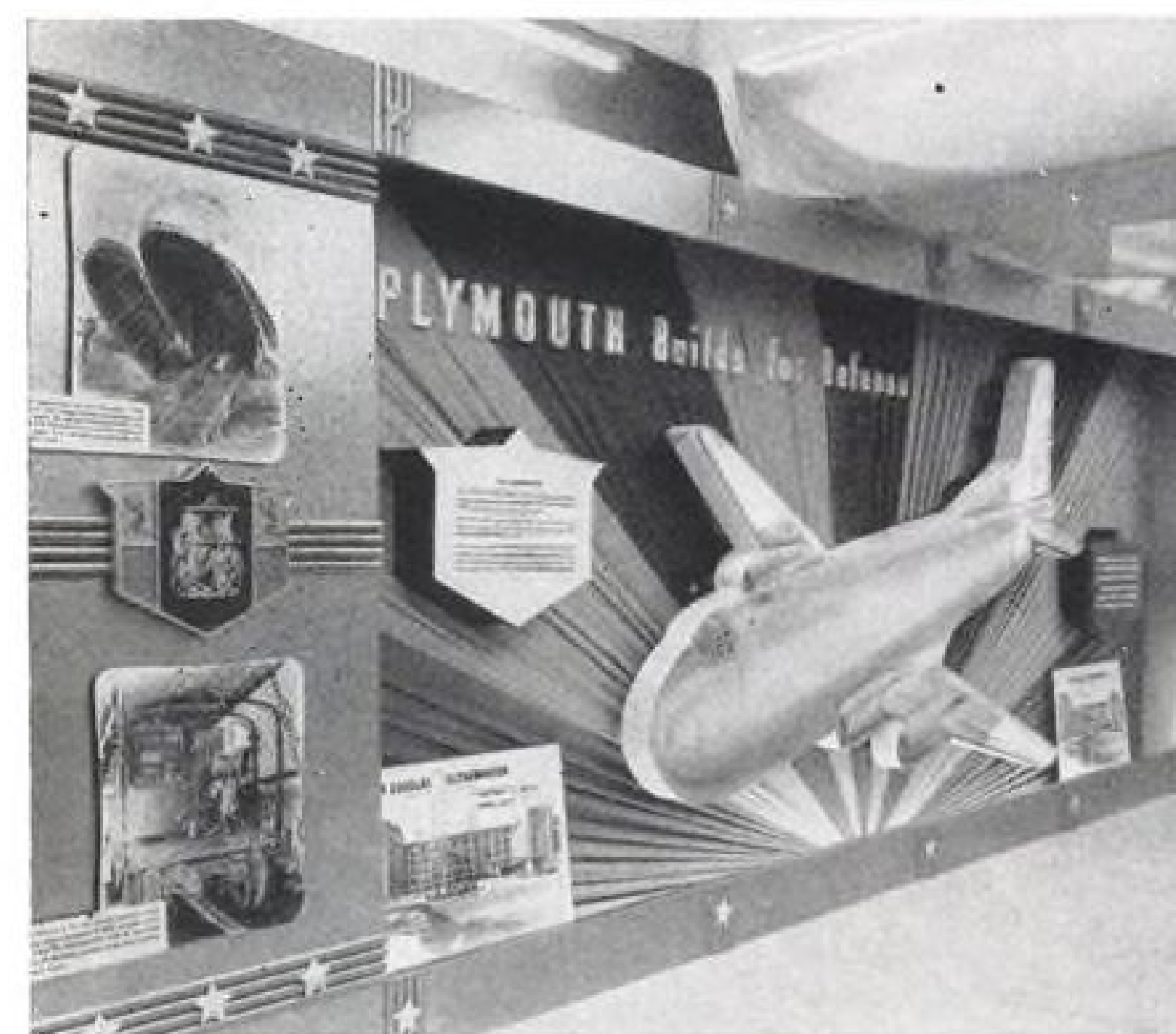
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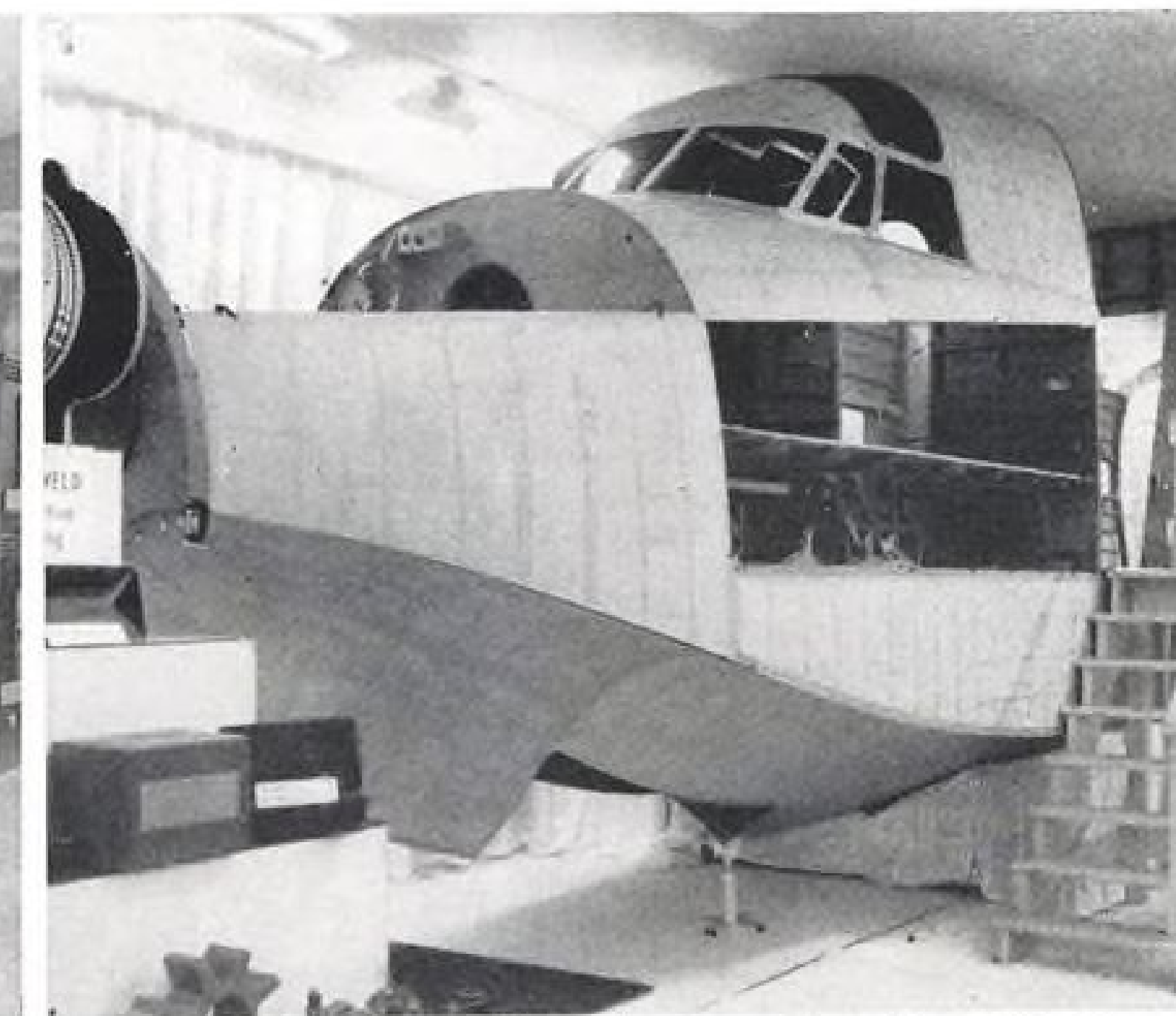
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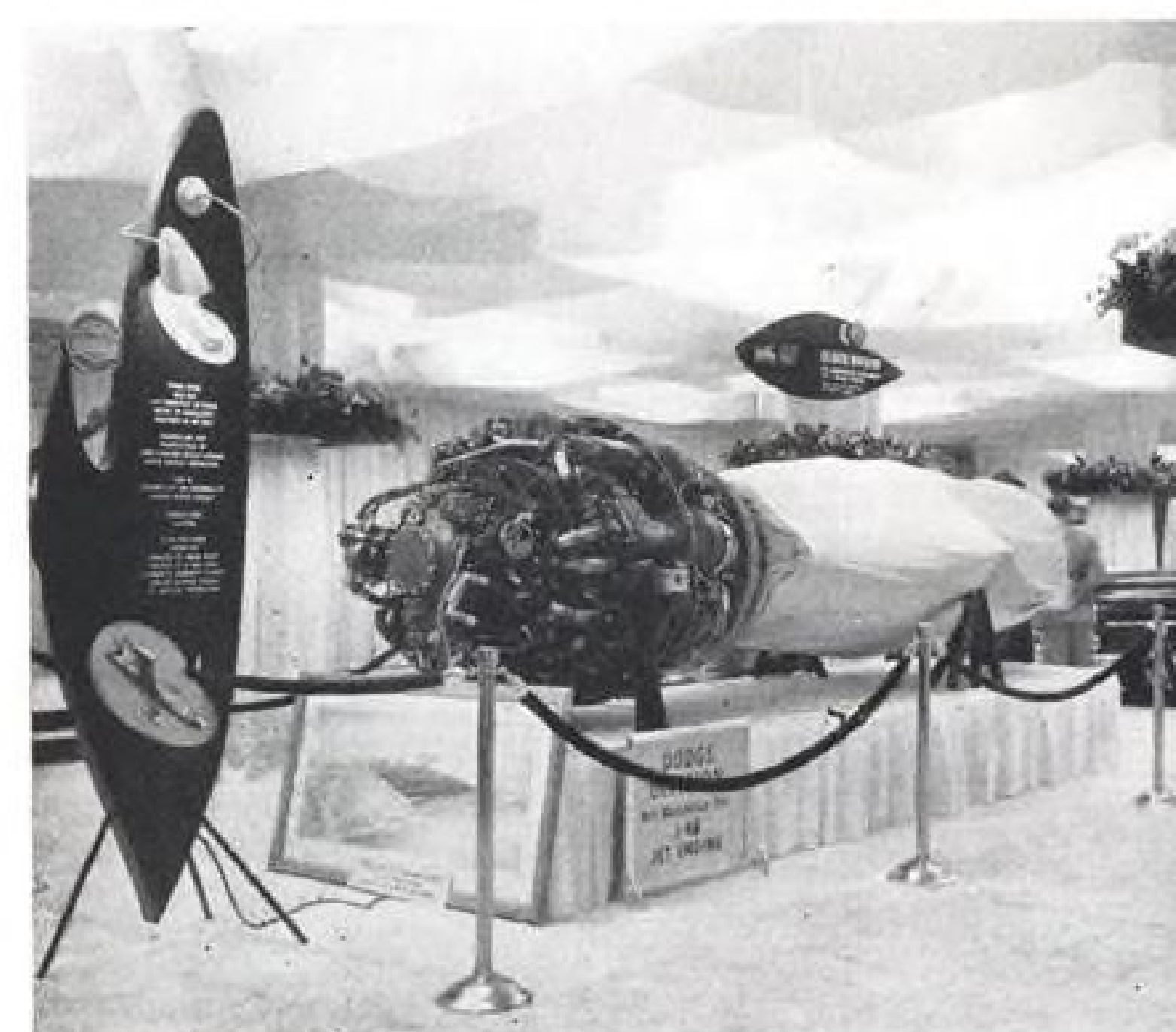
## PRODUCTION



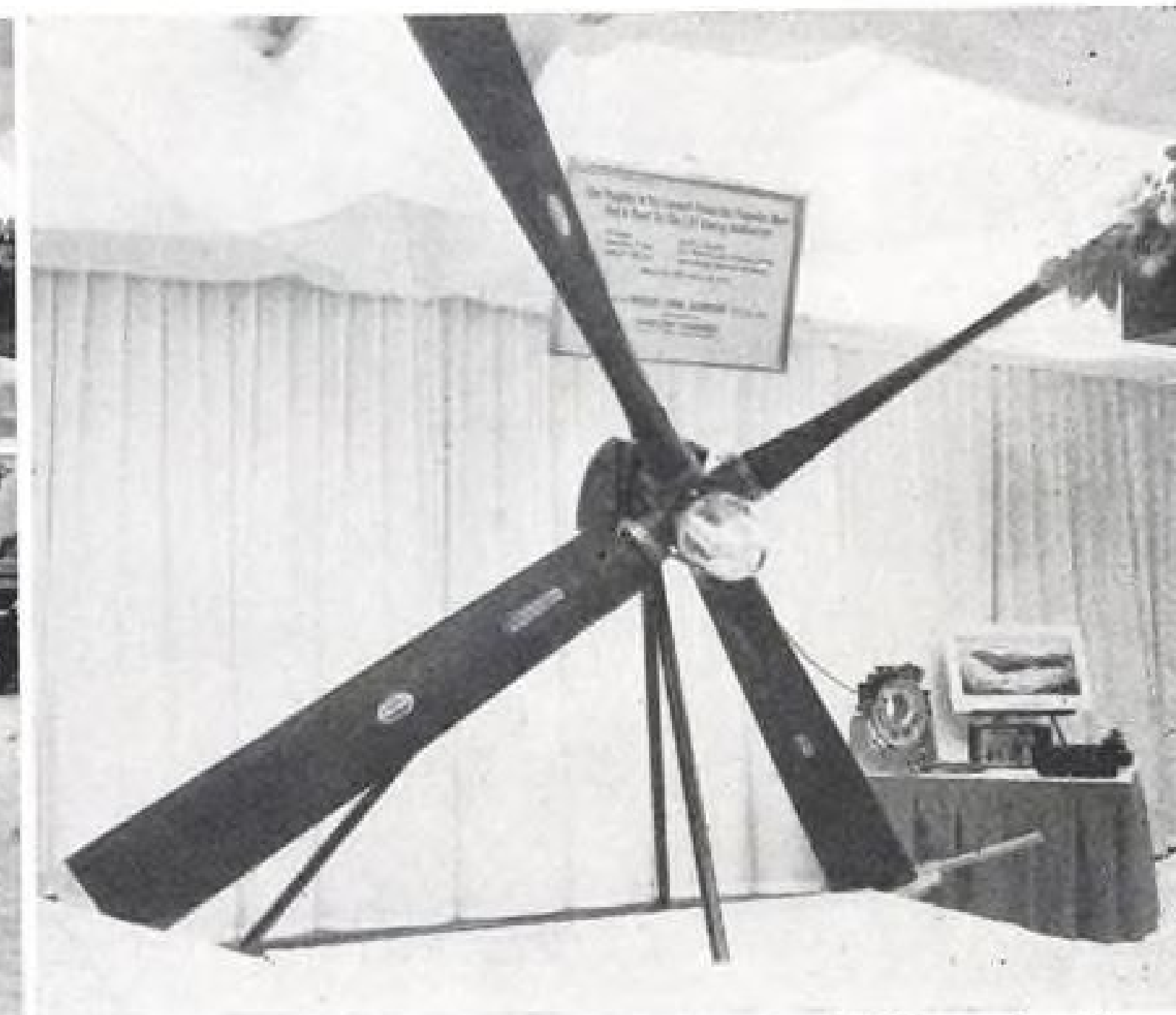
CHRYSLER showed components it is building for C-124A and . . .



GRUMMAN SA-16 amphibian, but Navy clamped security on . . .



AFTERBURNER of J-48s company will make. Also shown was . . .



HAM-STANDARD props which Chrysler builds under license.

## What Chrysler Is Doing for Air Power

Production of jet engines, props, major components of C-124A and SA-16 keep company plants booming.

By Alexander McSurely

Detroit—Chrysler Corp. is about to take on an even bigger share of aviation business than the substantial contracts it already holds, it was disclosed here as the big automobile company unveiled exhibits of its major defense programs, along with an elaborate showing of its sleek new 1952 cars.

Meanwhile L. L. Colbert, Chrysler president, said his company's defense production programs, while still at an early stage, are moving on or ahead of schedules to which the company has committed itself.

Chrysler's four main aircraft projects, so far disclosed are:

- Complete licensed production and testing of the Pratt & Whitney J-48

jet engine of 6,250-lb. thrust (8,700-lb. thrust with afterburner) probably the most powerful U.S. jet engine now in use.

- Sixteen assemblies of the Douglas C-124A Globemaster which together mean virtually all of the Air Force's biggest service transport except the pilot's cabin and nose section, and the center portion of the wing starting from the outboard engine nacelles.

- The complete 60-ft. hull of the Grumman SA-16 rescue amphibian.

- The 16½-ft. diameter four-blade



Hamilton Standard-licensed propeller designed for use with R-4360 engines on the Boeing C-97 Stratofreighter.

Considering the present proportion of the two new Chrysler airframe projects and additional contracts in negotiation, however, it appears the company may end up building both airframes completely in its own plants under license, rolling them out ready for trucking to airports and flyaway.

► **Future Contracts**—The Globemaster Chrysler contracts, already described as multimillion-dollar business, appear potentially the biggest single piece of aircraft defense work for the company.

The C-124, while a very large plane, is not a complicated aircraft from standpoint of curves or fineness of aerodynamic requirements and, like the other USAF cargo planes assigned to Kaiser-Frazer production, the Fairchild C-119 and the Chase C-123, appears well-suited for automotive mass production methods.

USAF placed fiscal year 1951 contracts for approximately 150 of the planes with Douglas and even larger future contracts are anticipated, as the need for airlift of heavy military equipment grows with the expanding U.S. military activities in Europe and Korea.

Plymouth division of Chrysler already has received letters of intent to produce the outer wing panels and wingtip radiators, ailerons, flaps, and complete tail of the airplane.

The division expects to get additional orders to build forward and aft fuselage assemblies, now under negotiation, leaving only the nose section and inboard wings for Douglas.

► **More Space**—The assemblies will be produced in the Los Angeles Plymouth plant where 800,000 sq. ft. of new space is being added to automotive assembly area, which will be converted for the aircraft work.

At the Chrysler show, a huge electric mural panel depicted the C-124, with flashing lights denoting the various assemblies which Plymouth will make. Complete change-over of Plymouth Los Angeles to the C-124 is expected in January, 1953.

The big plane has a 175,000-lb. gross weight, and is designed to carry 50,000 lb. payload for 1,000 miles. It is designed to carry 94% of all military vehicles fully assembled, and has 10,000 cu. ft. of cargo space available. Current powerplants are four Pratt & Whitney R-4360s, but a new experimental XC-124B will be powered with Pratt & Whitney T-34 turboprops, with considerably greater power, and consequent increase in payload.

► **Security?**—Interesting sidelight on meaningless security at the Chrysler show was the opaque plastic cloth cover which shrouded the afterburner of the J-48 engine on display and a large sign in red letters nearby which said "restricted."

This was in spite of the fact that an officially Navy-sanctioned press show on the J-48 at East Hartford, Conn., had released many details on the engine and afterburner and photographs of both early in 1950.

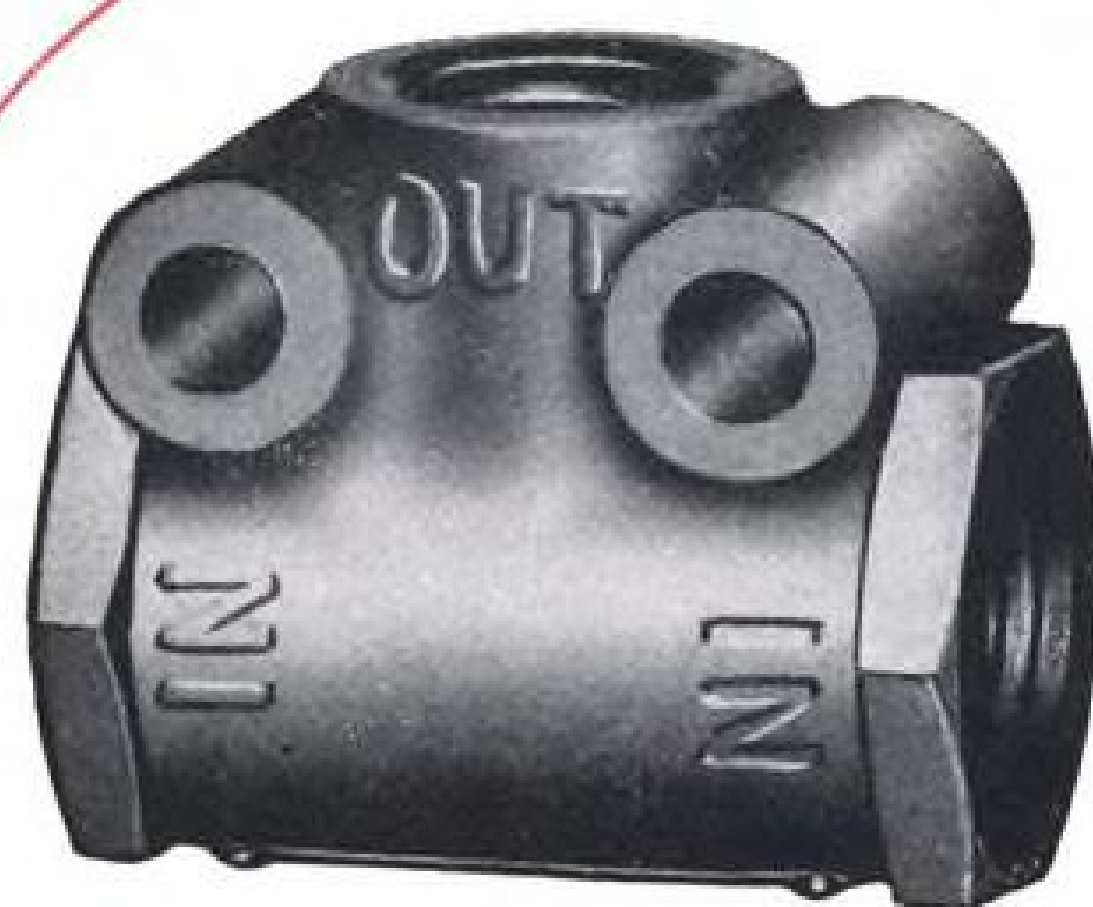
These details and photographs were published in AVIATION WEEK Mar. 6, 1950 p. 15, and in many other magazines, newspaper and aviation yearbooks.

A Chrysler spokesman said Navy had placed a restriction on showing the afterburner.

De Soto division of Chrysler has contracted to build the afterburner, while Dodge division will build the engine, in a large new 1.6-million sq. ft. plant now in early stage of construction at Mt. Clemens, Mich., and scheduled to go into production early in 1953. The initial J-48 contract has been estimated unofficially at around \$140 million with additional contracts to follow.

► **Long Truckhaul**—Nearly everything makes sense about the second Plymouth airframe projects—building the SA-16 amphibian hulls for Grumman at the Plymouth Evansville, Ind., plant—except a long truck-haul from Evans-

it's **LIGHT**  
it's **simple**  
it's **GOOD**



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## "AP" Type Pneumatic Shuttle Valve

Disc-type construction—delivers either of two inlet pressures from outlet port, depending upon which is the higher. Light, simple, and efficient; provides an excellent means for a dual air supply to an operating device.

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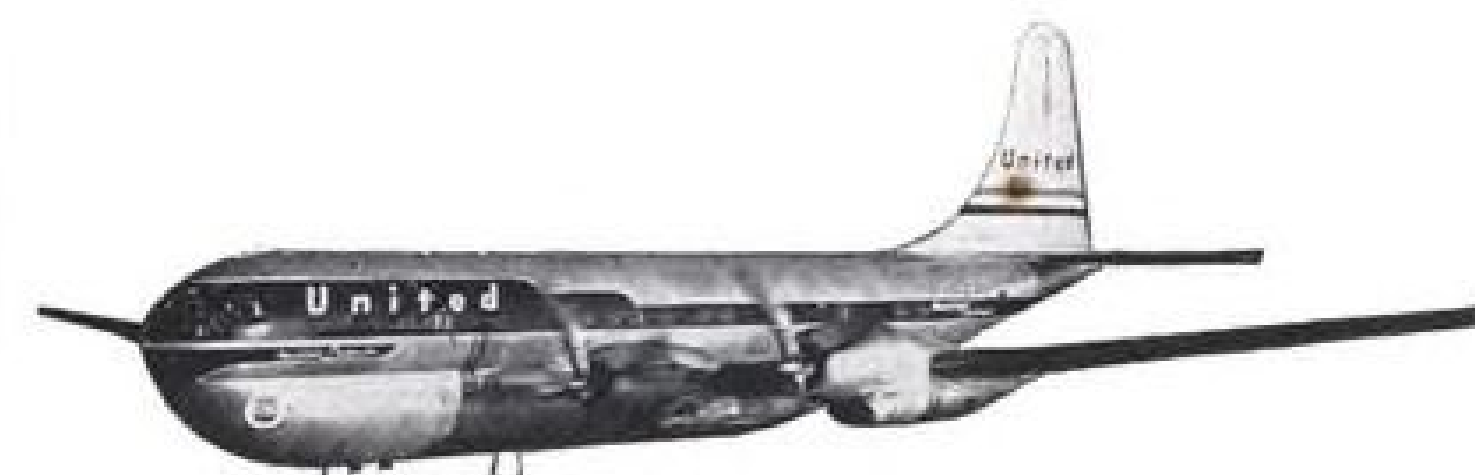


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DC-3**

Photos: Courtesy  
Douglas Aircraft  
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**DC-6**

**UNITED  
377**



...all are equipped with the new Hartman 400-ampere high interrupting capacity cutouts

Modern wide speed range generators of large aircraft—designed to meet heavy load demands of electronic devices and other equipment formerly actuated by non-electrical means—pose unusually difficult control problems.

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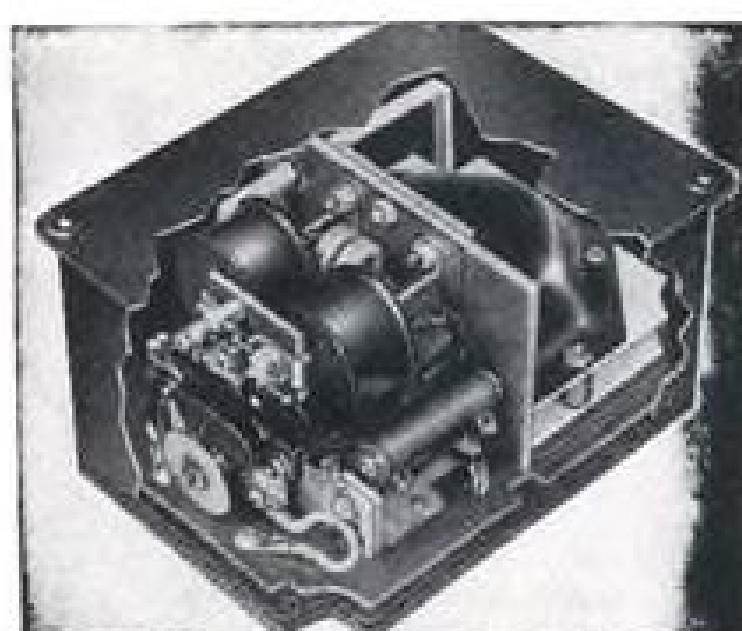
These new Hartman Reverse Current Cutouts have an interrupting capacity greatly in excess of all requirements under all conditions. That's why today manufacturers and operators are turning to these new cutouts for use on new and existing aircraft.

So if your problem involves d-c controls, turn it over to Hartman where it will be analyzed, engineered and produced with an efficiency that comes from nearly half a century of specialization.

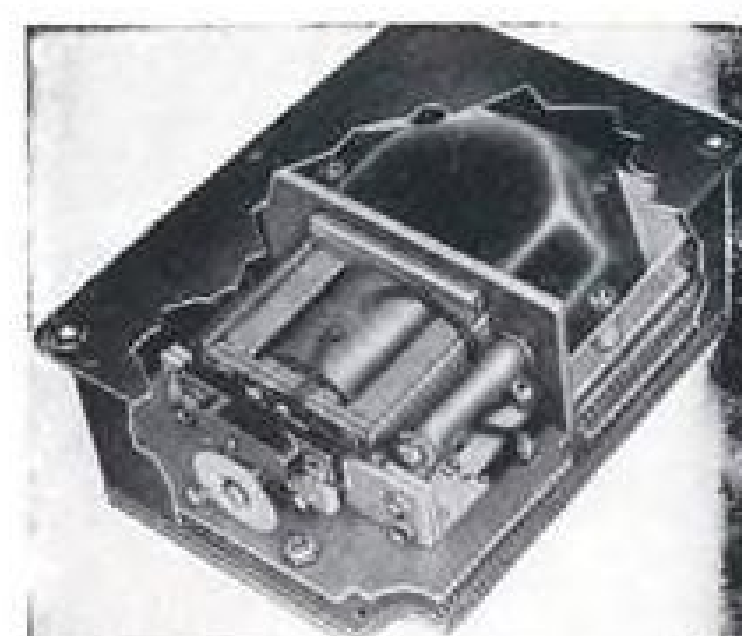
**the Hartman Electrical Mfg. co.**

"D-C CONTROL HEADQUARTERS"

MANSFIELD, OHIO



New Hartman 400-Ampere 28 Volt Reverse Current Cutout (A-750D)



New Hartman 400-Ampere 28 Volt Contactor for aircraft with panelized systems (A-751D)

ville to the Grumman plant at Bethpage, L. I. Here the wing and powerplants are fitted, interior fittings are taken care of, and the plane is flight-tested.

The hull is put on a 70-ft. trailer for the overland journey and has to go approximately 400 miles off the most direct route to Bethpage, a Plymouth representative said, in order to get the necessary highway overhead clearances and to comply with bridge loading requirements.

A reverse procedure of shipping the wing and powerplants to Evansville, or letting Plymouth build the complete airframe and shipping just the powerplants, would be more economical.

The plant where the hulls are built is not at an airport, but the large-size Evansville airport, where Republic P-47s were flight-tested in World War II, is not far away, and the close-by Ohio River would be available to the firm for water hull tests.

Plymouth-Evansville probably will make about 12 of the rescue plane hulls a month when it reaches full capacity.

►Prop Contract—The Hamilton Standard propeller contract calls for the props to be built at Dodge's San Leandro, Calif., plant near San Francisco.

Not strictly an aircraft display but certainly an aviation by-product was a huge Chrysler air raid siren displayed at the show. The siren shrieks out 170 decibels, described as the loudest noise ever attained in modern production and close to the absolute maximum of 190 decibels.

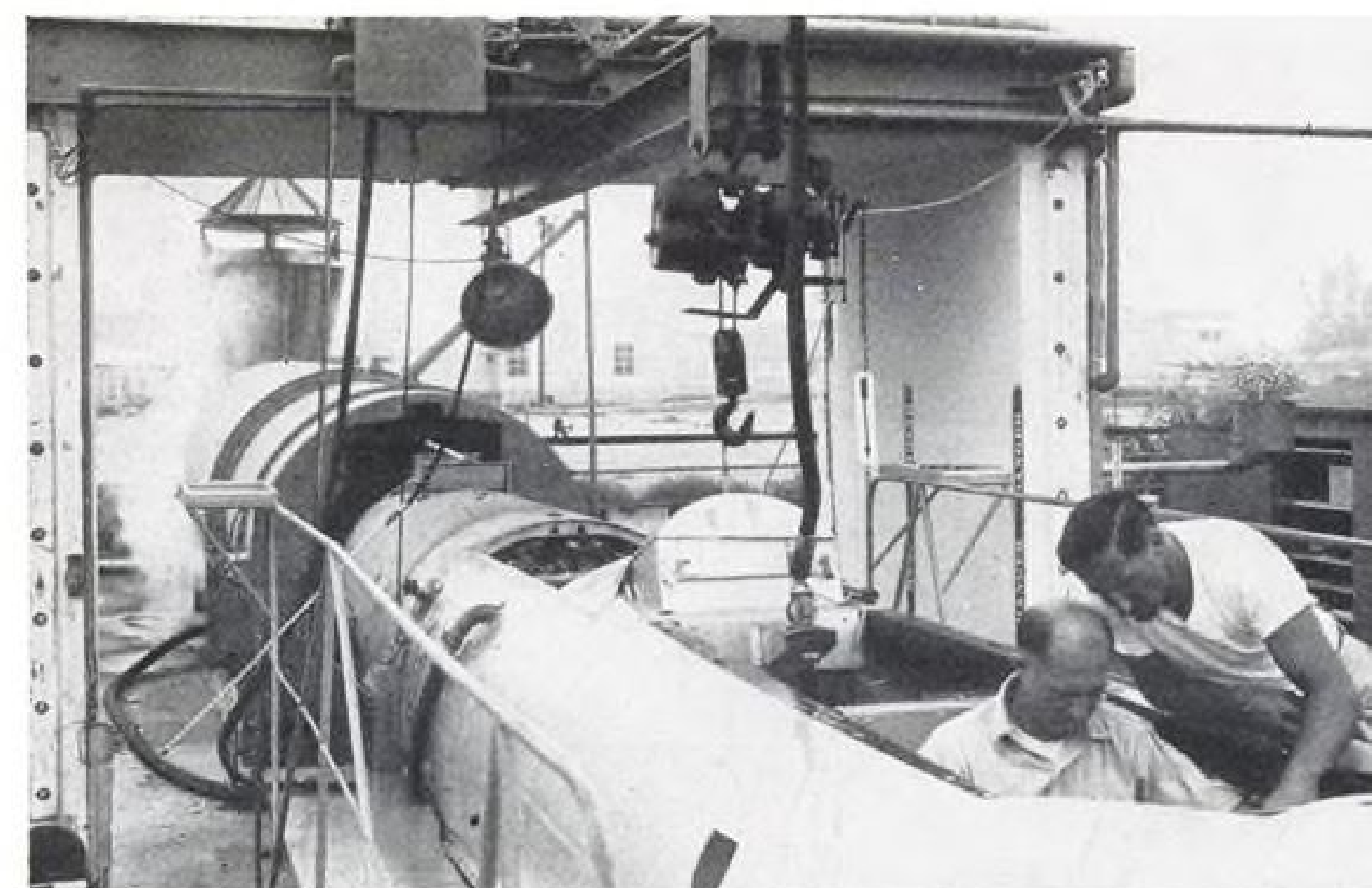
Admittedly, Chrysler is still at a very early stage in its aircraft and engine programs. Of 105,000 total Chrysler employees, about 7,500 are engaged exclusively in war work.

Chrysler officials have estimated the company will need a total of about 7 million sq. ft. of floor space to fulfill its complete program, but that employment on war projects will increase slowly. By April 1, the company expects it will need 14 to 15,000 war workers.

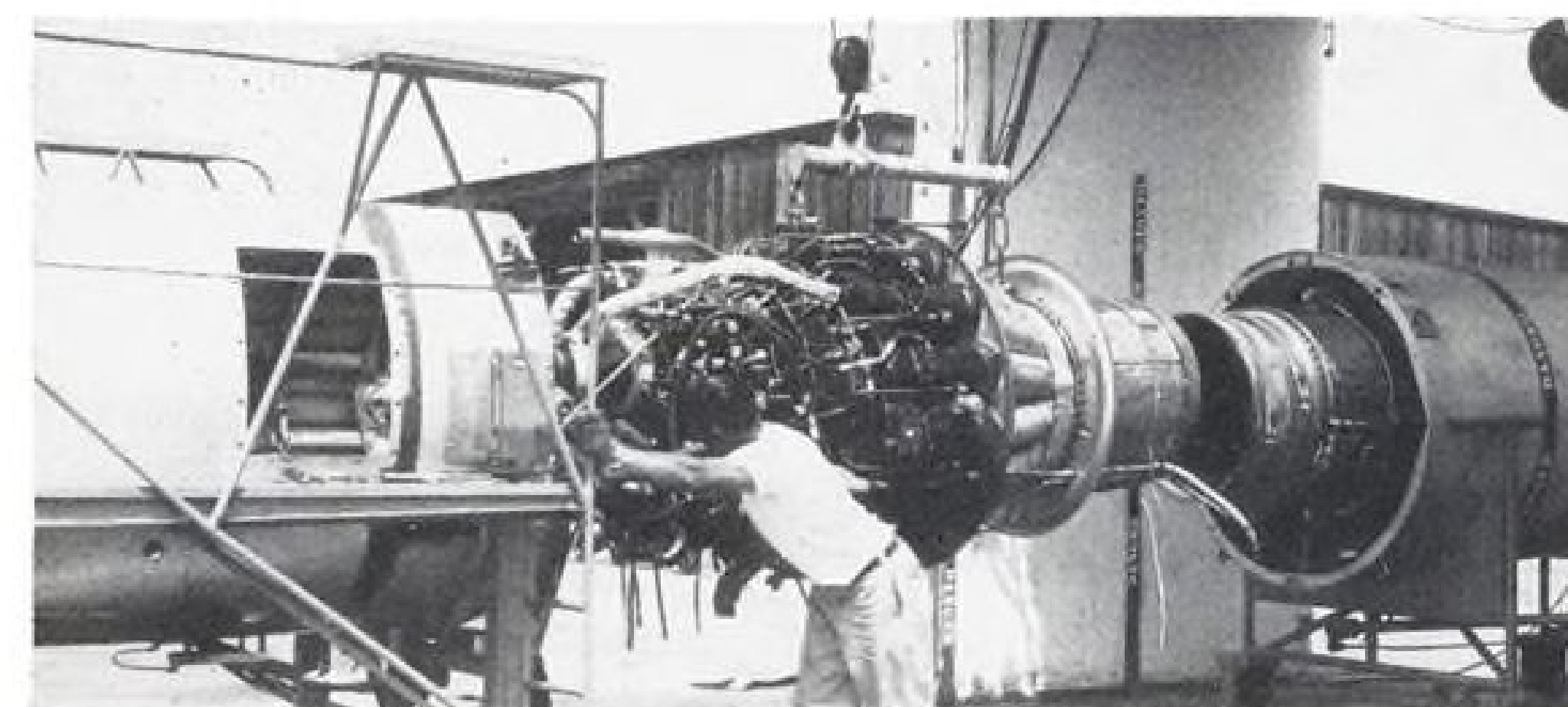
## Solar Licenses Ceramic Coatings

An extensive line of Solaramic ceramic thermal protective coatings soon will be made available to the aviation industry on a production basis as a result of a licensing agreement between Solar Aircraft Co., San Diego, and Ferro Corp. of Cleveland.

Production already has been started by Ferro, a large producer of raw materials and furnaces for the porcelain enameling industry. Ferro will market Solaramic by grades, each engineered for specific temperature range.



TEST rig fits tail of engine into silencer, completely preflight checks jets. And . .



INSTALLATION or removal of engine is done in a matter of minutes instead of hours.

## Jet Rig Cans Noise, Speeds Tests

New unit preflight-checks engines completely before they are installed in actual airframe.

Lockheed Aircraft engineers are cutting three days from production time for F-94 interceptor and T-33 trainer jets with a novel "test cell" fuselage.

This new preflight-check scheme for jet engines replaces the former arrangement in which the Allison powerplants were tested in finished airframes. This required moving the planes from the factory to an outdoor battery of Maxim silencers.

During the test run adjustments would occasionally show up that required engine removal—a comparatively long and expensive job.

Now the engines are pre-checked in the new fuselage test rig before the actual airframe is completed. The fuselage rig is an old jet plane stripped of wings, canopy, landing gear and tail assembly. It carries metal wheels and rolls along a track so aimed that the

fuselage aft end fits into mouth of the silencer.

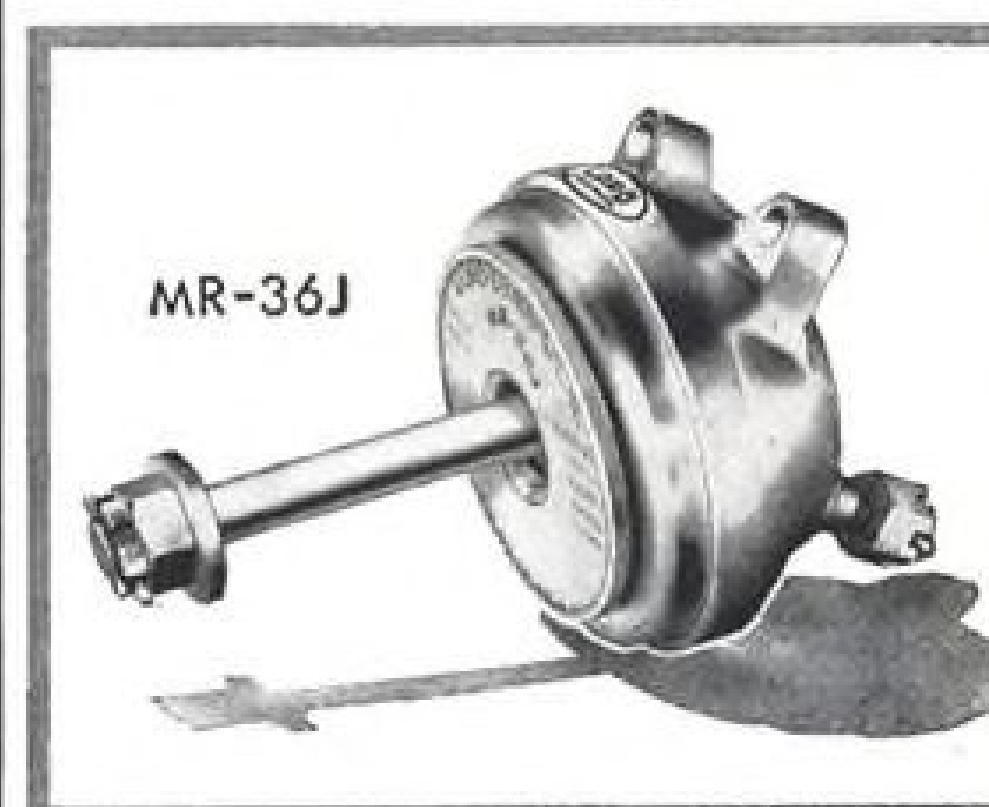
The powerplant can be installed in and removed from the fuselage in a matter of minutes. There are direct fuel and oil hose connections to eliminate need for fuel trucks. In addition to cutting production time, valuable space is saved by using the wingless rig instead of an actual plane.

## New Flight Hangar

McDonnell Aircraft Corp. has broken ground for a \$3.5 million flight test hangar near its plant on the Lambert-St. Louis Municipal Airport. The building is scheduled to be completed late next year. The company also plans to add propulsion test laboratories, helicopter test facilities and \$2 million worth of wind tunnels.

## Increase Payload

20 lbs. for Convair 240  
40 lbs. for Douglas DC-6



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Here is an opportunity for operators of 240's and DC-6's to add extra payload capacity by reducing gross weight.

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Thus—at a fraction of the cost of new mountings—you receive factory rebuilt Dynafocals which incorporate the latest LORD design features. The weight is reduced to 30.5 pounds per assembly without sacrifice of strength or performance. Write to the attention of Product and Sales Engineering Department for specific information.

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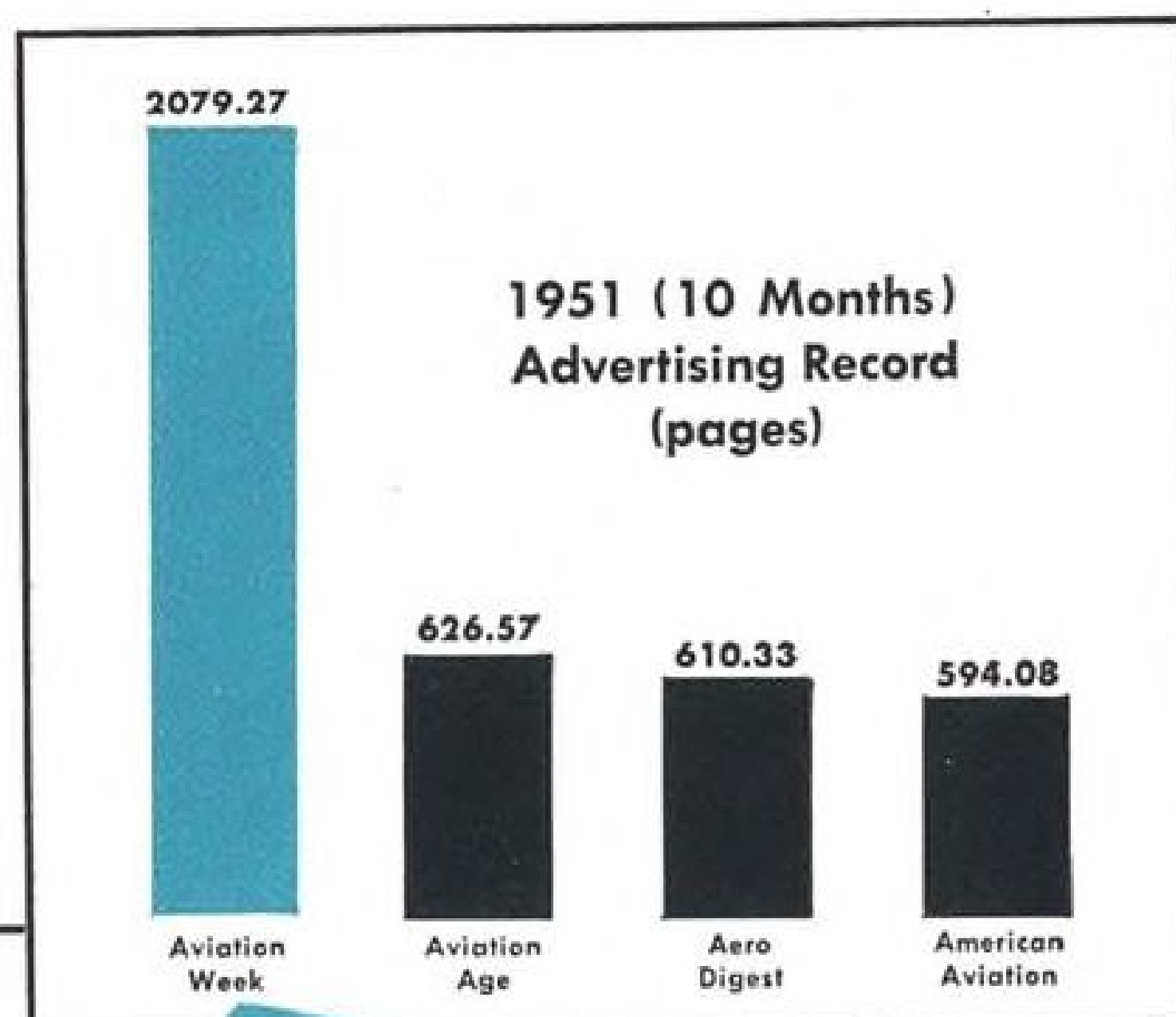
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## LABOR SUPPLY VARIES IN AIRCRAFT CENTERS ...



## Labor Force Must Double in '52

Shortages showing up in unskilled categories as well as skilled; engineer situation critical.

Despite the large increase in aircraft employment that already has taken place since Korea, the industry will have to more than double its labor force by the end of next year if it is to meet planned production goals.

That is the forecast of Director Robert C. Goodwin of the Bureau of Employment Security in a special report on manpower and partial mobilization issued by the U. S. Department of Labor.

During the first year after Korea, the number of aircraft workers zoomed from 256,000 to 447,600. By the end of 1952, Goodwin estimates that an additional 600,000 will be needed. Not all of them will have to be recruited and hired by aircraft companies. Many will simply shift from one kind of work to another, as aircraft contracts are placed in plants now engaged in automobile, electrical or some other kind of production. During the war more than two million workers were in aircraft.

► **What Is Needed**—A September survey by BES showed that most of the aircraft manpower shortages are in highly-skilled technical workers needed in planning and designing. Later surveys disclosed shortages also beginning to show up in ordinary production workers. Other shortages:

• **Engineers.** BES found the "most pervasively unsatisfied demand" in aircraft is for engineers of all types—mechanical, aeronautical, electrical, electronic, industrial and others.

• **Technicians.** Hard to find also are workers with skills needed in getting ready for mass production—draftsmen, tool and die makers, designers, production planners, tool designers, radar and electronic technicians, template makers and stress analysts.

• **Mechanics.** Expansion in the industry is expected to intensify the shortages of aircraft fitters, aircraft and engine mechanics and aircraft assembly mechanics.

Hiring standards are being relaxed in aircraft as a result of the inability to find enough qualified workers, BES learned. Age restrictions are being relaxed; experience and physical requirements are becoming less rigid.

Other steps being taken to alleviate the worker shortage include an increase in training, hiring of women, lengthening of working hours and starting second and third shifts.

► **The Labor Market**—Here is how the labor market shapes up in major centers of aircraft production:

• **Shortage.** Wichita, Hartford, San Diego and Indianapolis are so-called "labor shortage areas."

• **Balanced supply.** Seattle, Dallas, South Bend, Buffalo and Baltimore are areas of "balanced labor supply."

• **Moderate surplus.** Los Angeles, Fort Worth and Patterson, N. J., have a "moderate labor surplus."

• **Substantial surplus.** New York City is the only center in this category.

PRECISION DOESN'T COST—

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Aircraft Equipment Testing Co. has been formed as an independent organization for testing aviation equipment. Initially opened is a hydraulics section, other types of work will be added gradually. Harry P. Kupiec is general manager. Aetco is located at 1806-12 Fleet St., Baltimore, Md. Phone is ORleans 8337. . . .

Computer Research Corp., builder of electronic digital computers and allied electronic products, has moved into a new and larger building, increasing plant space eight times, at 3348 W. El Segundo Blvd., Hawthorne, Calif. . . .

Douglas Aircraft Co., Tulsa, has started construction of a \$965,806 electronics laboratory to assemble and test equipment for the B-47 Stratojet which Douglas will build there under license. Building is expected to be completed by April. . . .

General Electric Co. has opened a service shop at Strother Field, Arkansas City, Kans., to handle J-47 overhaul and modification. GE has a similar facility in operation in Los Angeles. . . .

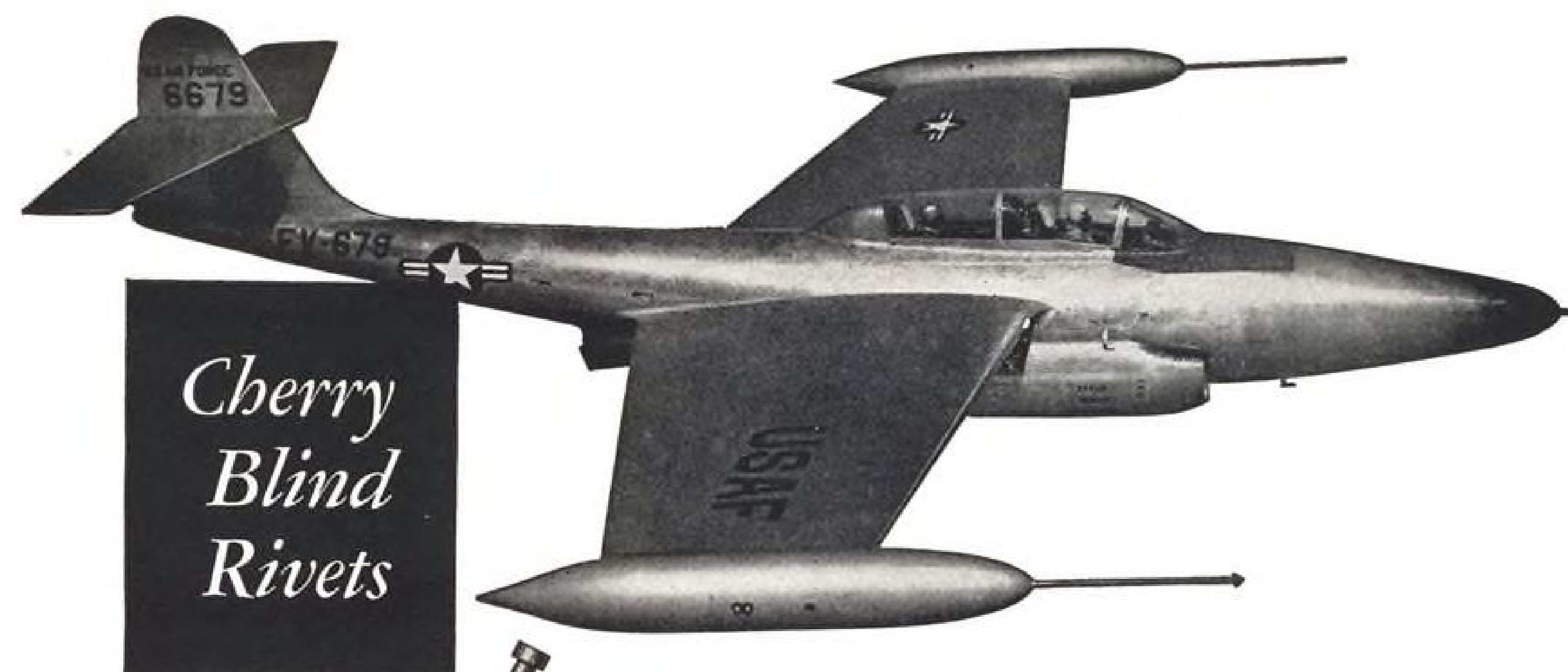
Gibson Refrigerator Co., Greenville, Mich., has delivered its first set of outer wing panels to Chance Vought, with which it has a subcontract. . . .

Holmes & Narver, Inc., Los Angeles, is offering the services of its reports division on a subcontracting basis for preparation of technical manuals, parts and maintenance catalogs and aircraft and electronics handbooks. . . .

Lenkurt Electric Co., San Carlos, Calif., recently installed a Tenney 18STR-100 stratosphere test chamber to test electronic apparatus made by the company. . . .

Glenn L. Martin Co., Baltimore, has added 60,000 sq. ft. of floor space to accommodate electronics engineering in a building where rockets, guided missiles and other special weapons are built. . . .

North American Aviation, Inc., Los Angeles, is adding new facilities providing 483,300 sq. ft. of manufacturing area. Two leased buildings at Crenshaw and El Segundo Blvds. will be used for F-86 sub assemblies, two hangars on Sepulveda Blvd. will be used for F-86D modification and electronics installation, and three structures will be put up to handle manufacturing at Douglas St.



*save time... speed production on the Northrop F-89*

Here's the U.S. Air Force's new Scorpion F-89 all-weather fighter now rolling off the production line at Northrop Aircraft, Inc., Hawthorne, California. Combining range, speed and punch with "X-ray eyes," the Scorpion is the jet-propelled successor to the famous World War II Black Widow.

Note the jaw-like control surfaces at the outer end of the wing's trailing edge. These are Northrop's latest development—"Decelerons." Combining the functions of ailerons, fighter brakes and landing flaps, Decelerons pack extra maneuverability and weight-lifting ability into this razor-winged, twin-jet fighter.

Note also that Northrop uses Cherry Rivets in the

fabrication of these Decelerons. Like many other aircraft manufacturers, Northrop Aircraft, Inc. has found Cherry Rivets make their hard jobs easy.

Cherry Rivets are installed by one man from one side of the work. They eliminate the two-man crew used to buck solid rivets. It's a pulling action that does the work—no twisting, no exploding, no hammering.

Cherry Rivets are ideal for double-surface structures, box sections, tubes, ducts and other "hard-to-get-at" spots. They speed assembly... cut man hours... lower unit costs. If you're not familiar with Cherry Rivets and their time-saving potentials, take a moment now to write for full information.



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## EQUIPMENT

# Frontier's Pattern for Low-Cost Overhaul

• Package maintenance calls for specific jobs to be done on specific visits of plane to shop.

• And this 'close-to-the-chest' program will increase utilization of each unit by 48 days per year.

By George L. Christian

Denver—You don't need a large fleet of aircraft to make progressive overhaul pay.

The same sort of system that is cutting costs and promoting maintenance efficiency for Pan American World Airways at its mammoth Miami Overhaul Base (AVIATION WEEK Mar. 12), is also proving its value to Frontier Airlines.

Frontier maintains a fleet of 12 DC-3s at its Stapleton Field base here, while PanAm services 111 Stratocruisers, Conquies, DC-6s, DC-4s, Conquies, C-46s and DC-3s at Miami for itself and Panagra.

► **Frontier Figures**—Frontier established its version of progressive maintenance in March, with a program geared to its own particular requirements.

Anticipated gains, aside from the leveling of work load and stabilization of parts procurement, include a reduction of 600 hours per airplane in maintenance time. Also, Frontier finds that by scheduling all its work to begin on Mondays and be finished before the end of the week, no aircraft will be laid over in the hangar on week-ends, which are usually non-working days at the base.

The carrier estimates that this gives it an increased availability per plane of 48 days a year.

► **Package Deal**—Jack Burnell, Frontier's director of engineering and maintenance, wrapped up his progressive overhaul plan in a neat six-pattern package. Each pattern represents one-sixth of the major maintenance work required to keep the planes in top shape, and should take three days.

Here is how Frontier works out its package deal:

First step is to reshuffle aircraft inspections until each plane comes into the hangar at the exact date desired. Level-off date, when the pattern of aircraft visits becomes constant, is Mar. 3, 1952.

After that date, DC-3 No. 985 will come into the hangar on Monday, Mar. 17 for three days, during which time approximately 600 man-hours of work

will be accomplished performing a Number 6 pattern.

Frontier's recently completed overhaul manual tells precisely the work to be done at each pattern. And a three-view layout of the plant, a "zoning chart," shows in color code just where the work will be accomplished on the ship's fuselage, empennage, wings, etc. Colors indicate whether the work to be done is radio, aircraft overhaul, hydraulic, electrical, cabin or engine.

After this zoning chart, is a listing of jobs to be performed, each one being assigned a work order number. This is followed by a series of work sheets for each mechanic to sign off his work on. Three days later, No. 985 pulls out of the dock and goes back to work.

But, if unforeseen contingencies arise, two more working days remain to clear them up.

► **Next, Please**—On Mar. 31, ship No. 028 comes in for a three-day stint—its No. 1 pattern. Two weeks later, No. 376 is hangered for a No. 2 pattern. So, if Frontier's pretty pattern stays on schedule, the entire fleet of DC-3s will parade through the hangar at two-week intervals. A complete 8,000-hr. cycle will take 144 weeks, or 24 years, at the airline's estimated utilization figure. The plan as now laid out extends through 1954.

Samples of jobs at various patterns:

- **No. One Pattern:** Accessory shop functions: Power brake valve; nacelle plumbing, and hydraulic oil emergency valve change.

Electrical shop functions: Companionway and pilot's compartment; flare change.

Radio shop functions: None.

- **No. Three Pattern:** Accessory shop functions: Landing gear upper trusses; retract struts and aeroquip lines; bungees or compensator cylinders, and landing gear latches.

Electrical shop functions: Work on instrument panel to nose terminal strip and pitot system; instrument panel shock mounts and plumbing.

Radio shop functions: Overhaul all radio antennas.

- **No. Six Pattern:** Accessory shop functions: Main gear shock . . . and retract struts; tail wheel shock strut.

Electrical shop functions: Junction box to nose.

Radio shop functions: All in cockpit forward compartment and belly of airplane.

The six patterns are scheduled so that each item on the aircraft is overhauled within its specified period. The cabin interior is considered "on condition" and is worked on during each pattern as required.

Kits are prepared for each operation before an airplane arrives in the dock, so parts and components can be on hand for the work to be done.

► **24-Week Interval**—Under the schedule, any one plane arrives in the hangar for one of the six progressive overhaul patterns every 24 weeks.

Interim inspections are performed. They are: No. 1—daily; No. 2—100 hr.; No. 3—200 hr. During a regular, scheduled overhaul, a general inspection equal to and more inclusive than the present No. 3 inspection is made, so that any necessary nonscheduled work may be accomplished.

Manpower required to perform the patterns is drawn from the airlines various shops—sheet metal, radio, electrical, etc. When the docks are empty, the men perform routine shop work and busy themselves repairing and reworking items removed from the plane that has just been returned to service.

Burnell told AVIATION WEEK that one of the greatest advantages to be expected from the establishment of such a program was a stable, well-trained and co-ordinated work force whose increased efficiency should reduce maintenance costs.

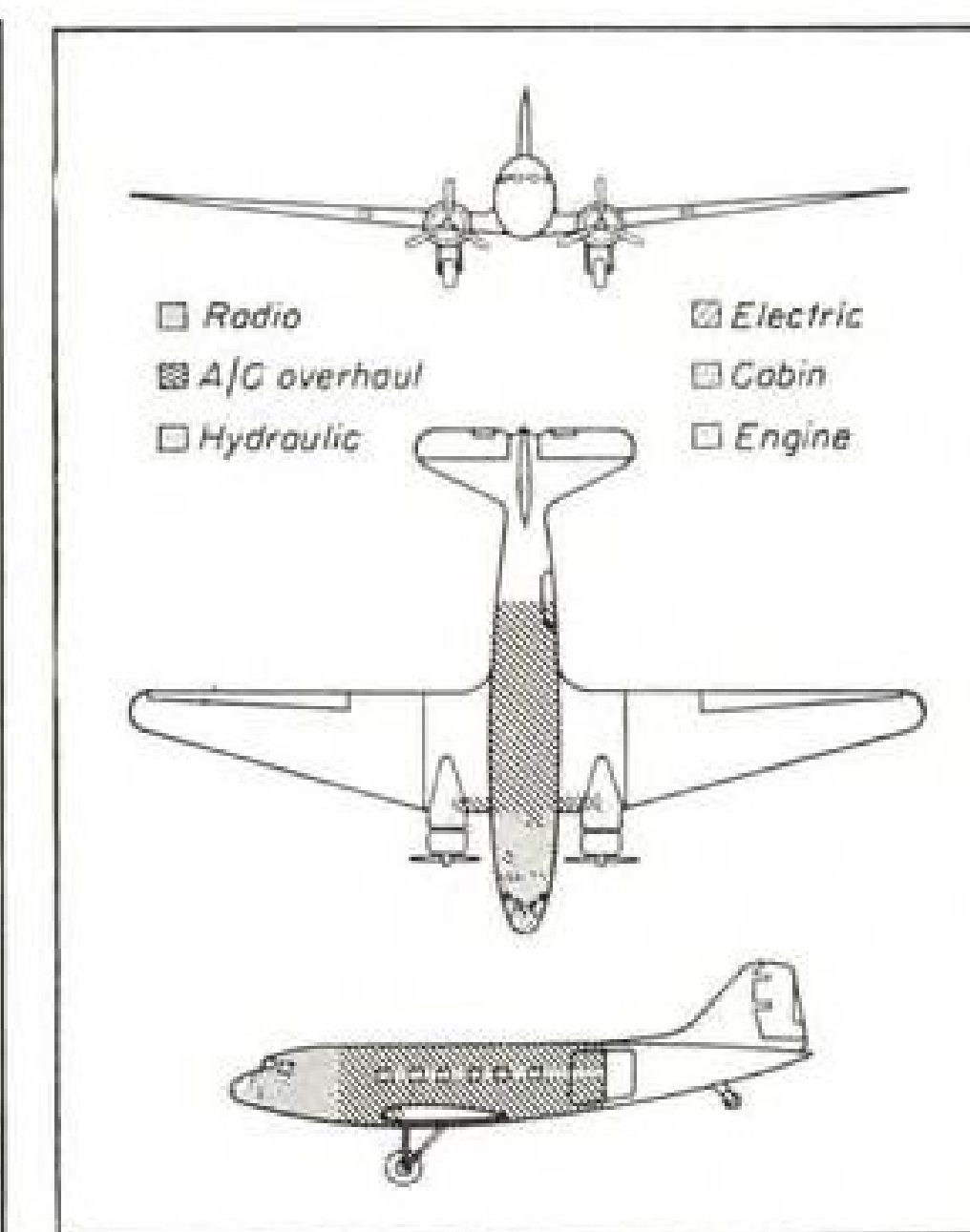
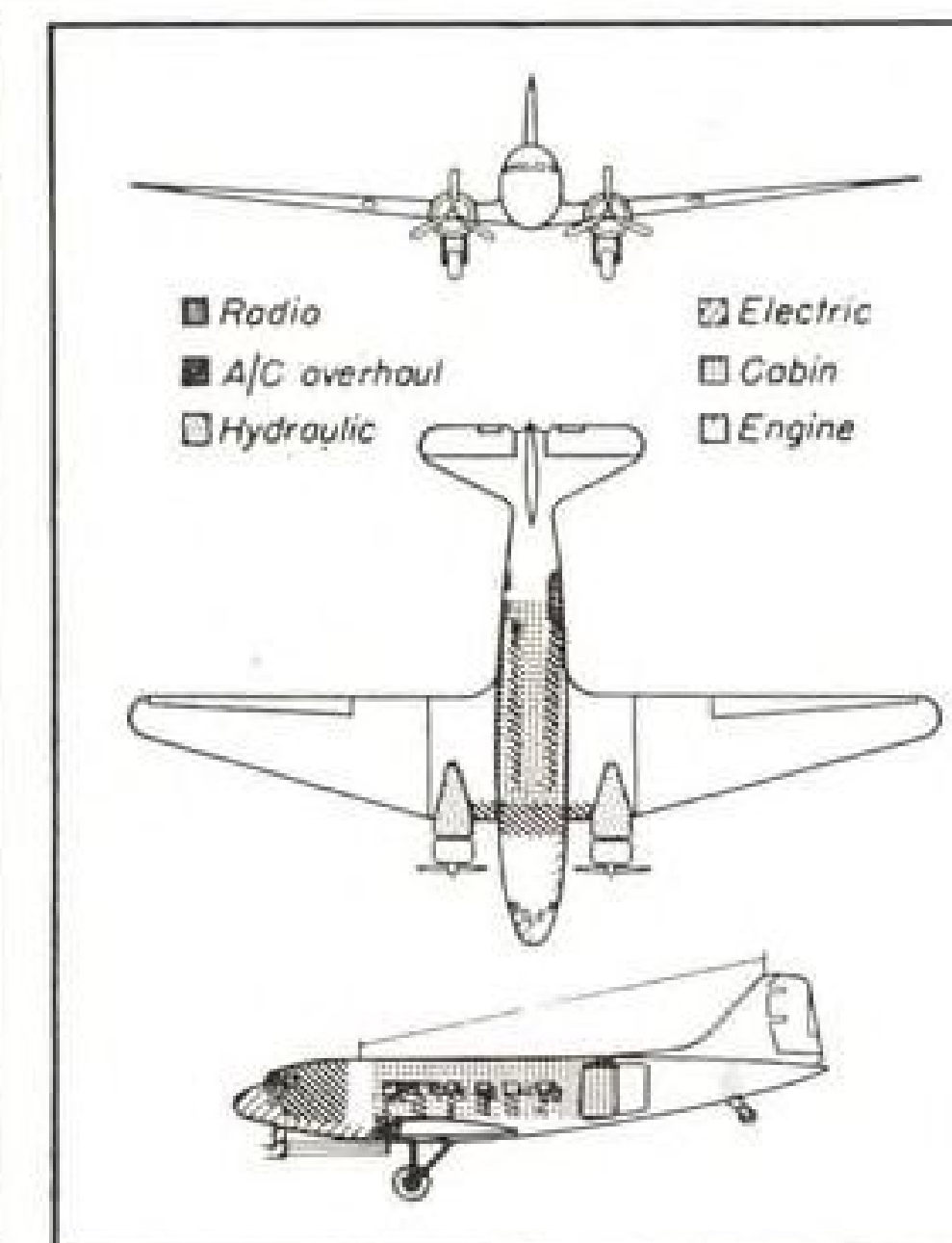
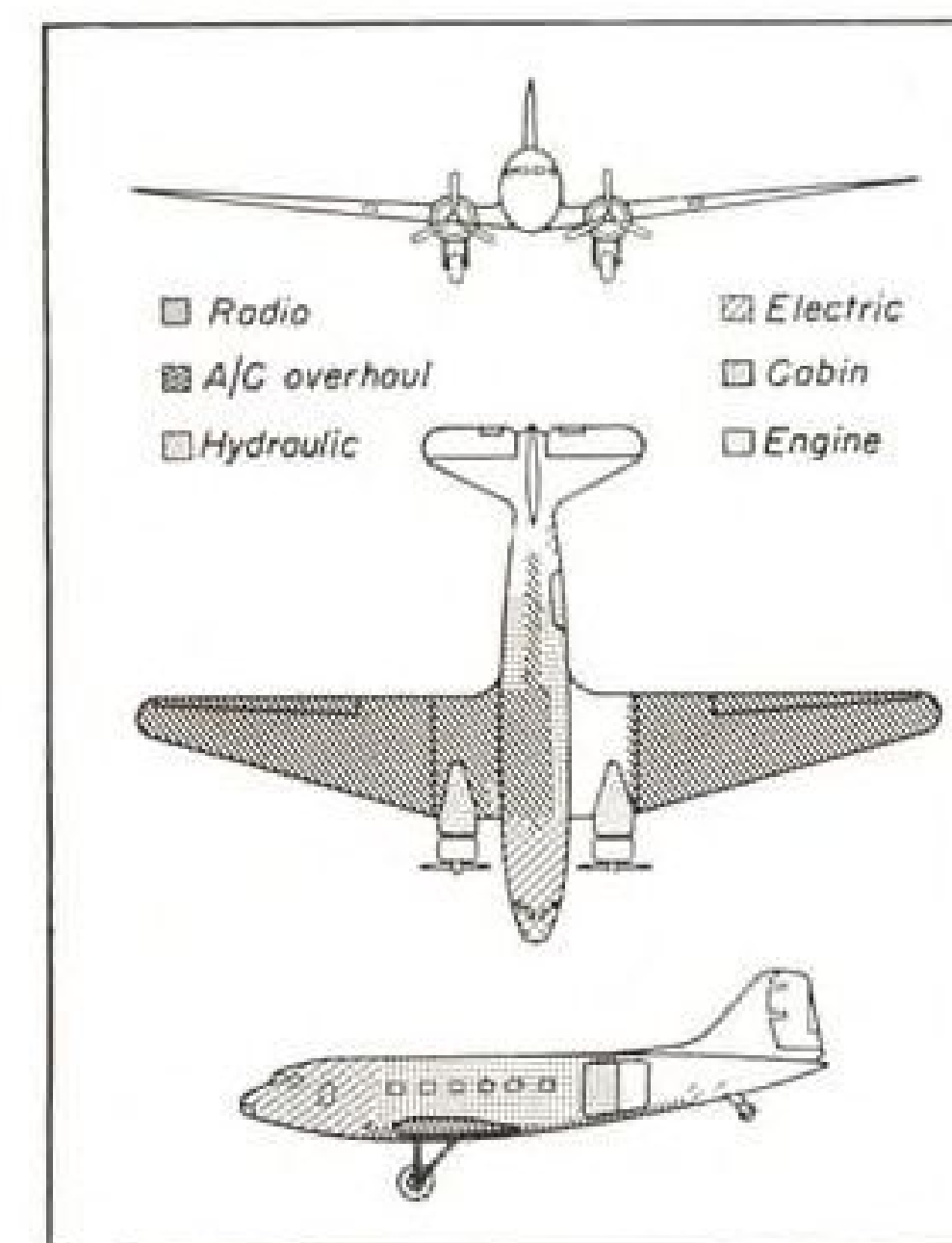
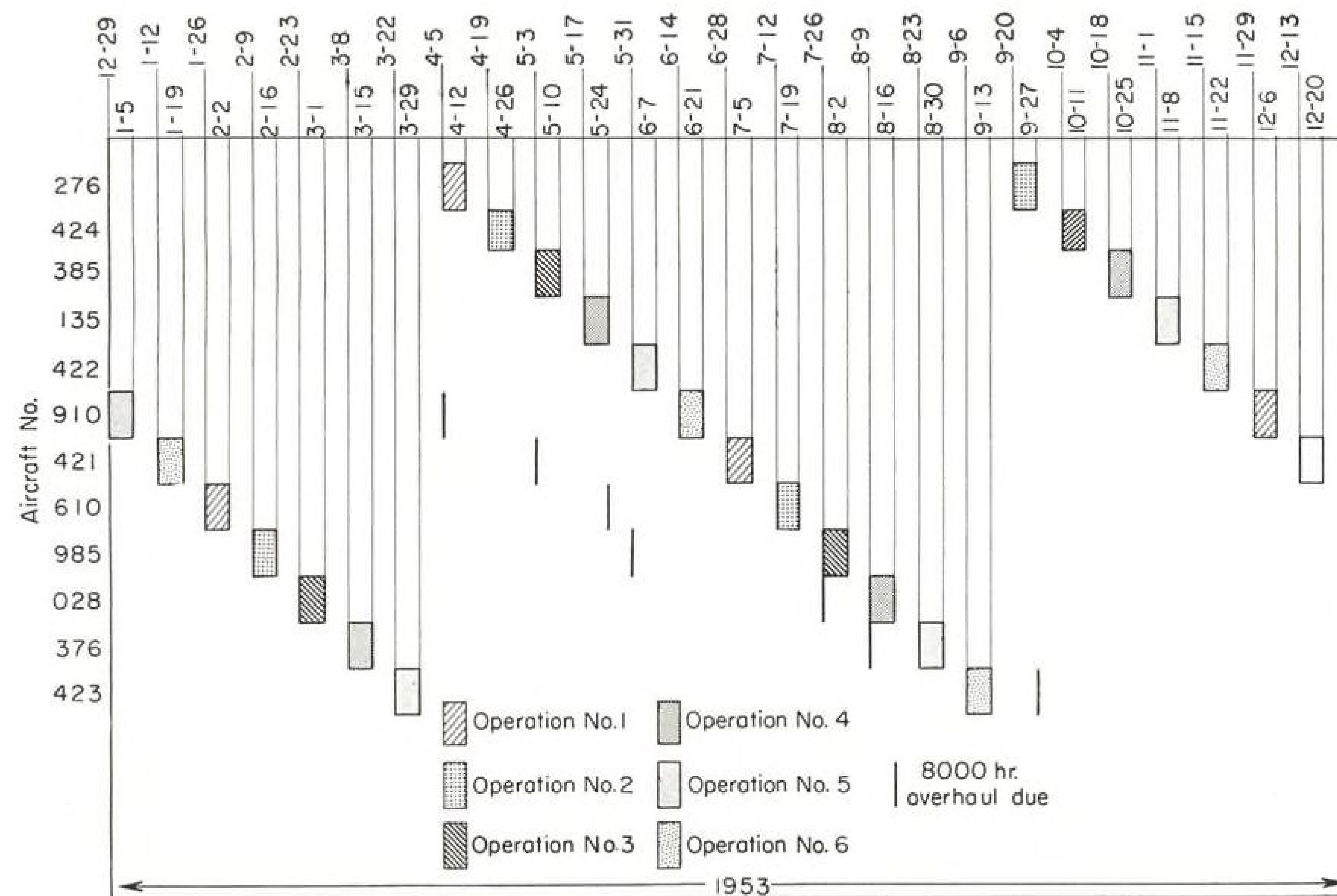
He quoted Frontier's DC-3 maintenance costs:

- **Direct maintenance**, per revenue mile, \$.0903.

- **Indirect maintenance**, per revenue mile, \$.0892.

- **Total cost**, \$.1795.

► **Quick Change**—Frontier finds that the old military scheme of "remove and replace" works well for them. When components such as wings, stabilizers, control surfaces, landing gear, cowling, etc., become damaged or need re-skinning or repair, the entire assembly is removed and replaced with a serviceable unit. This can usually be done much more rapidly than a repair job. The



FRONTIER'S OVERHAUL PATTERN calls for complete servicing of each DC-3 in 144 weeks. Ship 276 comes in for Pattern 1 on Apr. 5; Pattern 2 on Sept. 27; and so on through Pattern 6. Lower strip shows "zoning charts" for Pattern 1, 3 and 6 respectively.

removed component is repaired at leisure, when time and manpower permits.

To make this idea practical, Frontier has built up a relatively large supply of spares—for a fleet of 12 aircraft, the carrier has four entire spare wing assemblies, for instance.

This practice has paid off in many ways. Take the charter flight Frontier recently flew from Denver to Cheyenne for the rodeo show "Frontier Days."

The stage coach driver meeting the plane at Cheyenne clipped a wing. The crew ferried the plane back to Denver, a spare wing was installed, and the flight returned to Cheyenne in time to pick up the charter.

► **Heavy on Cargo**—Frontier's DC-3s are modified to carry an unusually large amount of cargo plus 24 passengers. The rear hold has the unusually large

area of 41 sq. ft.

Ray Wilson, vice president-operations, told AVIATION WEEK that this was dictated by the nature of the carrier's route, where a lot of cargo, some of it extremely bulky, is available for air transportation.

A help in this respect is elimination of a galley. Frontier serves only coffee, juices, cookies and crackers. "Sky snacks" are available at certain stations



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upon request. The passenger pays for this service; average charge is 80 cents. Wilson said that one advantage of the Frontier configuration was that it had a minimum of weight and balance problems.

► **In the Shop**—A tour of Frontier's shops at Stapleton Field here showed several ingenious pieces of homemade equipment.

• **Engine accessory checker.** This device is used to check engine accessories after they are mounted on a built-up engine, but prior to swinging the engine on the aircraft. Thus, if a component is defective, it can be removed while still readily accessible, instead of after engine installation when the accessory section is crowded.

Accessories checked by the tester are: fire warning thermocouples for polarity, continuity and output; cylinder head thermocouple and wiring; generator field resistance and continuity; oil and carburetor temperature bulbs and wiring; starter vibrator and magneto continuity; starter meshing circuit; tachometer generator for polarity and continuity.

• **Harness overhaul machine.** This device, which holds ignition harnesses in position during overhaul, saves a mechanic from wishing he had four hands. Frontier says it saves many manhours.

• **Oil cooler shaker.** This is simply an adaptation of a paint conditioner, such as used in any hardware store. Cooler is clamped into place, protected by felt strips. It is then washed out with non-caustic soap, steam, and finally with Turco Products Surgex. Frontier claims excellent results with this set-up.

► **Rugged Route**—Wilson, a pioneer Colorado flyer, and pilot of World War I crates for the movies, pointed with pride to rugged territory over which his planes fly daily.

Actually you can say the ships fly through part of the route, since they navigate through passes, such as 9,300-ft. La Veta in southern Colorado, with 14,000-ft. peaks towering on either side. Frontier's pilots do it with the greatest regularity, and in instrument weather too.

And, like Pioneer, its local service airline neighbor to the south, Frontier's operation is rough on its equipment because of the short distances between stations. This is where its "close-to-the-chest" type of maintenance pays off.

## AA Scours World For Spare Parts

Tulsa, Okla.—The spare parts shortage is plaguing American Airlines. Marvin Whitlock, assistant vice president-maintenance & supply, told AVIATION WEEK that AA will run out of Pratt & Whitney R-2800 crank



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The planes shown above are typical designs that incorporate Aerotec Automatic Controls. The Republic F-84F Thunderjet, a combat-proven craft, uses Aerotec pressure switches and a new dual float switch suitable for tip or pylon mounted auxiliary fuel tanks. Boeing has long used Aerotec valves, float switches, and pressure switches on their famous planes.

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**DAYTON 3, OHIO** Jay Engineering Co. 1517 East 3rd Street  
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shafts this month and will not get any more until March of next year.

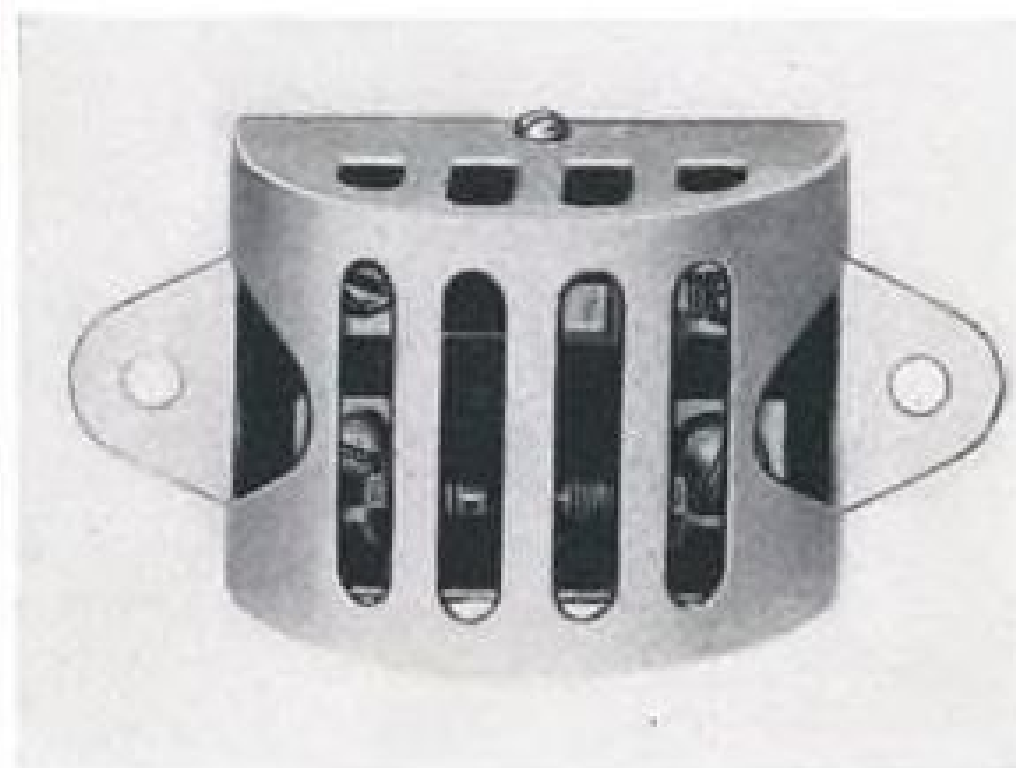
In an effort to find crank shafts, the airline has sent representatives as far afield as Paris and Bombay searching for spares.

The part costs \$2,700, and since it can only be used for two engine runs, the operating cost figures out to about \$1.00 an hour.

### Connie Conversions

Kansas City—All 24 of Trans World Airlines Constellation Model 749As and ten 1094s now on order will feature forward compartments that can be quickly converted from navigator compartment to passenger accommodations or vice-versa. Conservative estimate is conversion will take 20 man-hours and eight hours elapsed time, say TWA officials. They add that Lockheed has performed the conversion in three hours.

Purpose is to make ships interchangeable for overseas (with navigator) or domestic (with passengers) use.



### Better Plane Switch

Thermal switches for aircraft, reportedly more accurate and sensitive and providing surer operation when subjected to shock or vibration than previous designs, have been developed by the Wilcolator Co.

Higher performance is accredited to use of a new snap-acting, bimetal element, representing a "... basic advancement in thermal blade design," says Wilcolator. The switches have various aviation applications, finding use in fire warning systems (Douglas Aircraft Co.), de-icer heater systems (Consolidated-Vultee), and with other equipment.

They are supplied both with normally closed or normally open contacts, weigh less than two oz.

More positive operation under shock conditions is achieved by designing switches so contact pressure actually increases up to instant the bimetal blade snaps and opens the circuit, the firm explains. With normally open switches, the element deflects from the contact

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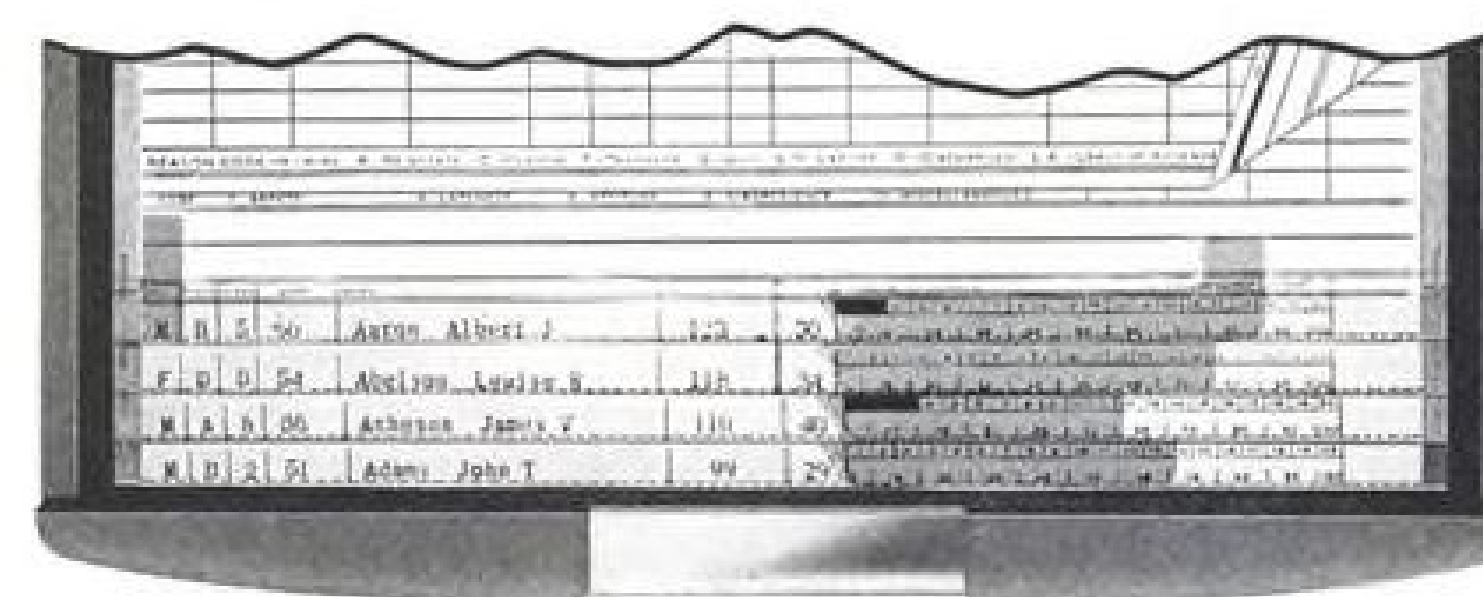
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until it snaps to close. Higher sensitivity is attained, the firm adds, because the bimetal element is in direct contact with ambient temperature (note open construction of switch). The unit is rated at one amp., 28v. d.c.

The Wilcolator Co., 1001 Newark Ave., Elizabeth, N. J.

## Modification Boosts Convair 240 Payload

Tulsa, Okla.—American Airlines is well along on its Convair 240 modification program. Of a total of 79 planes, 65 have been modified.

The modified aircraft maximum gross takeoff weight increases from 40,500 to 41,200 lb. while the landing weight is boosted from 38,600 to 39,800 lb. Some 200 lb. are absorbed in the modification.

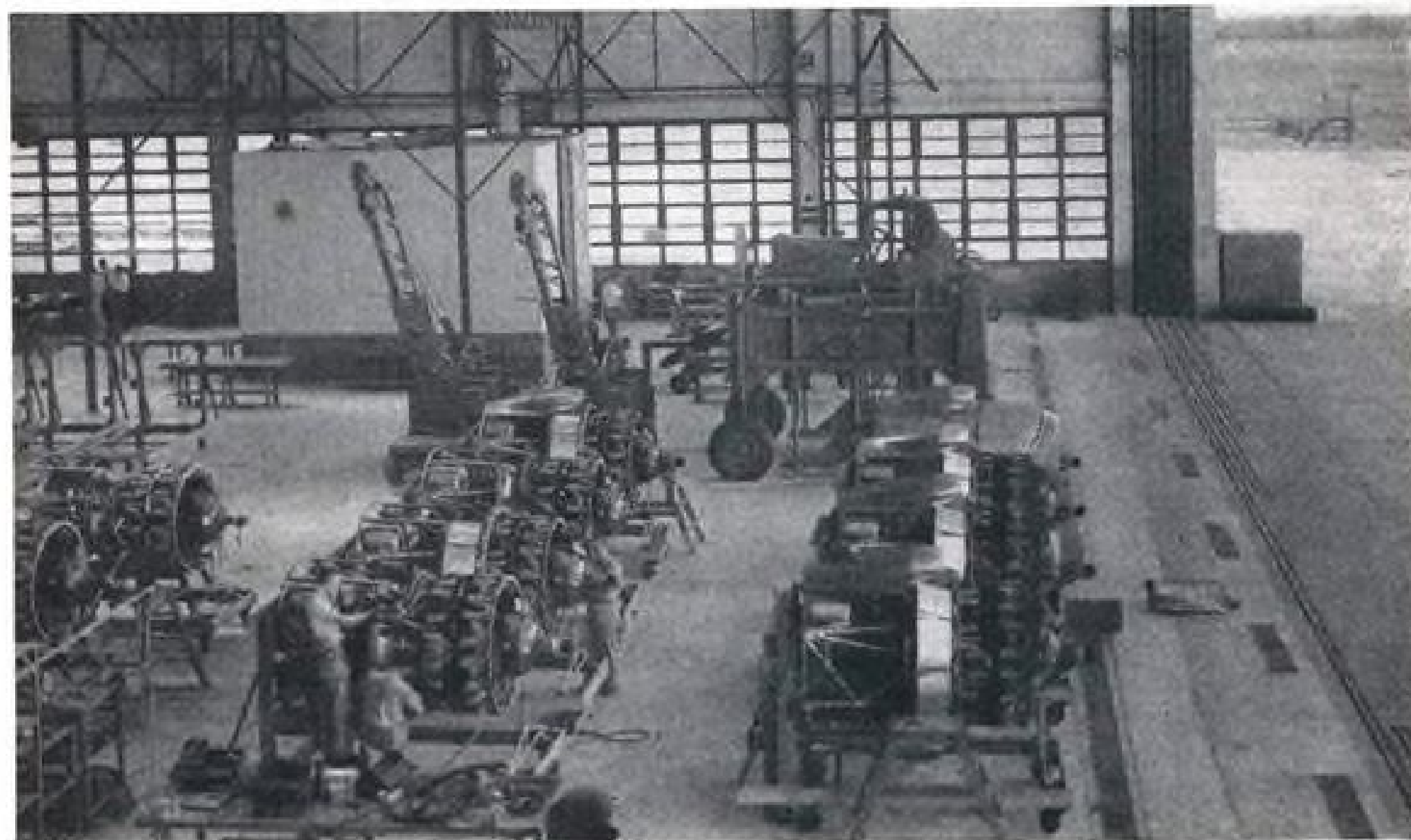
Principal elements of the change are: replacing nose gear strut with a new Bendix unit (the Convair kit included a Menasco nose strut, but AA elected to use the new Bendix component instead) and drag link. Extensive wing beef-up inboard of the nacelle, plus stiffener and stringer reinforcement to the center fuselage.

Among benefits derived from this modification is the plane's ability to

carry greater loads on short hauls where the small amount of fuel consumed does not bring the ship's weight down to the old 38,600 lb.

Other major Convair projects in progress or contemplated are: con-

version from high to low tension ignition; conversion to Hamilton Standard propellers and changing the triamese exhaust stack configuration to siamese, for better engine cooling characteristics.



AMERICAN'S ENGINE HAULER

American Airlines has found this Lumber Loader is also a good engine loader. Seen here at the airline's Tulsa overhaul base, the

unit is used to haul engines, mounted on stands, from engine shop to test cells and back; can do other jobs at the base.

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## NEW AVIATION PRODUCTS



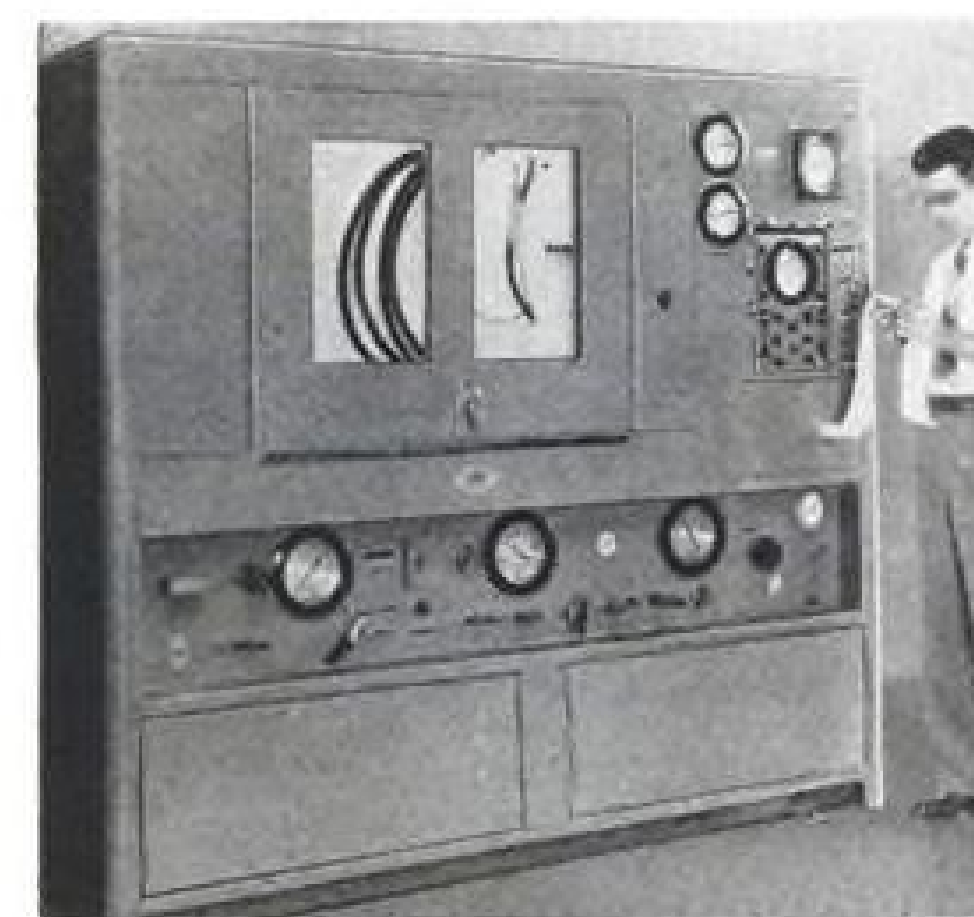
### Pressure Fuel Cap

A new filler cap for pressurized fuel and oil tanks in aircraft has been announced by Ross & Amann, Inc., designers and distributors of the device.

The cap, manufactured for the engineering firm by Lightolier, Jersey City, N. J., is built to hold pressures from zero to 250 psi. No tools are required to remove or replace it. A warning flag on the unit can be seen for some distance when it is not locked in place.

The cap is designed to meet Air Force Specification No. 285654, Types I and II, Size 3. The mounting flange is interchangeable with flange AN4123. A flush version also is available.

Ross & Amann, Inc., 420 Lexington Ave., New York 17, N. Y.



### Aircraft Hose Tester

A test stand, that can be used for laboratory testing of complete aircraft hydraulic hose assemblies and provides a permanent record of tests, has been announced by Sprague Engineering & Sales Corp.

The stand is designed for cycle and impulse tests in accordance with Specifications MIL-H-5511 and MIL-H-5512. Also, it makes burst tests up to 25,000 psi.

The test chamber is accessible through two safety doors. The unit also includes two other compartments, one containing electronic equipment, the

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other housing the oil reservoir, pumps, motors and controls. To supply accurate data on impulse and surge patterns, the stand is designed for use with the Aeroquip Model No. 1000-A Hydraulic scope or similar equipment. Price ranges around \$10,000, depending on electronic sets specified.

The maker points out this laboratory test stand, Model 221B, is not designed for production-line testing. For this purpose, the company produces a Model S-273 stand which makes static tests on hose assemblies up to pressures of 30,000 psi.

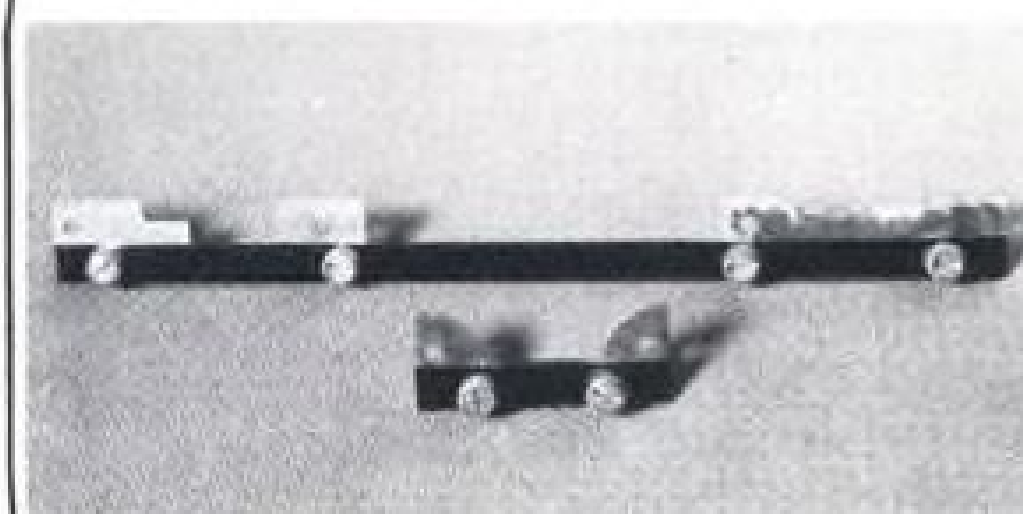
Sprague Engineering & Sales Corp., 1144 W. 135th St., Gardena, Calif.



### High Temp Valves

A series of motor-actuated air valves, designed for service in aircraft at temperatures up to 800 F., is announced by Pacific Airmotive Corp., 2940 N. Hollywood Way, Burbank, Calif.

The valves are built to shutoff or modulate pressures up to 200 psi., according to the firm. They may be equipped with single- or three-phase 400 cycle, a.c. actuators and are available in sizes from 2½ to 6 in. diameter.



### Radio Panel Adaptors

Special radio control panel adaptor plates, of particular interest to airframe manufacturers installing five in. transition type radio control panels, are available from Technical Development Co., 22 Meredith Rd., Philadelphia 31.

The plates, made of 24ST aluminum alloy to Air Force drawings, adapt control panels of avionic gear like the AN/ARC-3, SCR-274N, AN/ARN-6, etc., to the standard 5.75-in. console. They incorporate Dzus fasteners to mount them to the type fastening rail detailed in USAF Specifications No. 7225, 49C12550 and 49C12551 and include hardware necessary to hold the control panels.



### Aircraft Generators

Three-phase a.c. generators, engineered expressly for aircraft use, are slated to go into production soon at the General Electric Co.

The firm predicts wide application for the new units in furnishing power for de-icing equipment, radar, radio, internal heating and many other airborne uses. It says savings in weight up to 30% can be realized by using these generators instead of d.c. types.

They produce a nearly perfect sine wave output, allowing proper operation of electronic equipment demanding a low percentage of harmonics in the voltage wave form, says GE. The units also are designed to give positive short circuit protection. They are available in a variety of ratings from 15 to 90kva. at 120/208v. and have normal operating speeds ranging from 3,800 to 8,000 rpm. They are wye or delta connected.

General Electric Co., Schenectady 5, N. Y.

### ALSO ON THE MARKET

Heavy-duty hydraulic power package, essentially a triplex pump and motor assembly, is available in 15-, 30-, and 50-hp. sizes with pressure ratings up to 5,000 psi. and displacement ratings up to 60 gpm. Special 10,000 and 20,000-psi. heads also are supplied. Kobe Inc., division of Dresser Equipment Co., Huntington Park, Calif.

Midget telephone-type relays, having multiple contacts (rated 3 amp. non-inductive) and endowed with vibration and shock-proof characteristics, meet operating requirements of various military applications. Coil windings for d.c. voltages up to 115 v. are available. Signal Engineering & Mfg. Co., 154 W. 14 St., New York.

No filaments burn out in the new Haledy lightweight electronic signal flasher. This unit gets around that by using a cold cathode tube, aimed at increasing battery life and visibility. Sharp, brilliant flashes can be seen a mile away, says Haledy Electronics Co., 57 William St., New York 5.

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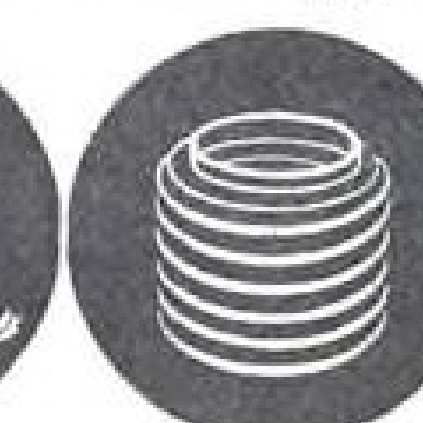
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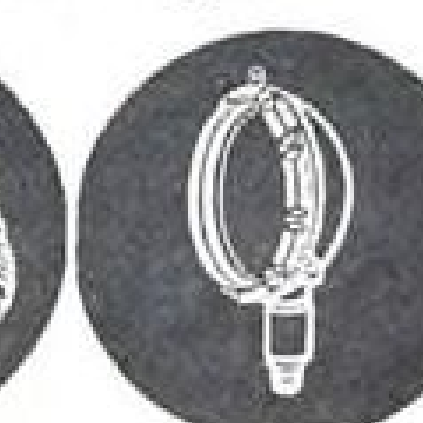
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J-54003-B



## FINANCIAL

### Projected Sales and Earnings

1951 and 1952

	Estimated Sales		Estimated Earnings	
	1951	1952	1951	1952
	(millions)		(per common share)	
AIRCRAFT				
Boeing .....	\$350	\$450	\$6.00	\$8.50
Curtiss-Wright .....	185	325	.50	1.10
Douglas .....	190	350	5.25	9.00
Grumman .....	180	275	3.25	5.00
Lockheed .....	225	350	3.15	4.60
Martin .....	60	135	d2.00	4.00
North American ....	190	300	2.15	2.75
Republic .....	110	150	2.75	4.00
United Aircraft ....	375	425	3.25	3.75
AIRLINES				
American .....	142.5	165	1.75	2.00
Eastern .....	105	125	3.00	3.55
Northwest .....	53	63	1.00	1.45
Pan American .....	200	250	.90	1.40
TWA .....	135	145	1.75	2.25
United .....	125	140	3.75	4.25

## Tomorrow Will Be Still Better

'Substantial increase in profits,' is conclusion of Value Line survey of aviation prospects through 1952.

An ambitious look into the future, projecting 1951 and 1952 sales and earnings for fifteen leading aviation companies, is attempted in a current report being released by the Value Line, an investment advisory service.

► **Gains Ahead**—The position and outlook of the aircraft and airline groups are reviewed as a prelude to the individual forecasts.

• **Manufacturers.** In discussing the aircraft builders, Value Line declares: "As aircraft production increases in tempo next year, substantial revenue gains are to be reported by most companies. However, advances at the net income level will be limited by heavier research expenditures, government renegotiation processes, extensive subcontracting networks and accrual of profits taxes at the maximum rate of 70%. Even so, all companies are expected to show substantial increases in profits."

• **Carriers.** In looking at the air transport group, Value Line also takes an optimistic view: "Many air transport companies will be reporting record profits this year. Furthermore, still larger earnings are in prospect for 1952. The statistical background is therefore distinctly favorable. In a broad sense, the current earning power of the industry is limited by present fleet capacity."

In taking a look at 1952 airline pros-

pects, the investment service asserts that: "Substantial gains in operating revenues and well-maintained profit margins should fashion a further increase in pre-tax income for the industry next year . . . ."

"The resulting expansion in revenues promises to offset increased wage and supply costs which have developed during 1951. Thus, profit margins should continue favorable."

The accompanying table summarizes 1951 and 1952 projections as to both sales and earnings for the nine aircraft and six airline companies reviewed by Value Line. It can be seen that in all cases, sales and earnings for 1952 are expected to surpass corresponding results for 1951.

The separate observations of the advisory service on each of these companies are significant and are excerpted as follows:

• **Boeing.** Earnings are running well below the record 1950 rate. Boeing, like most airplane manufacturing companies, has been affected by slow-downs and cut-backs in its operations. Work on the B-52A assures volume production for several years ahead at least.

• **Curtiss-Wright.** Engine production

of the Wright Aero division represents the chief source of earnings for Curtiss-Wright. Also affecting operations this year has been a protracted period of plant rearrangement and tooling-up in preparation for mass production of the J-65 Sapphire jet engine.

It is expected that full production on this new product will be attained in 1952. There should be a corresponding improvement in earnings of the company.

• **Douglas Aircraft.** A shortage of component materials (which has plagued most aircraft manufacturers) caused Douglas' operations in the third fiscal quarter (3 months ended Aug. 31) to decline somewhat. After accrual of profits taxes at a 63% rate, net income was at the lowest level in 18 months. Longer-term prospects for sales and profits are quite favorable.

• **Grumman.** Primarily a Naval contractor, Grumman has not been caught in the cross-currents of unrealistic scheduling and, therefore, has not been affected to the same measure as the rest of the industry by materials shortages and last minute production postponements.

• **Lockheed.** In line with an industry-wide trend, Lockheed's production in recent months has been handicapped by a shortage of engines. Production of airframes has been temporarily curtailed until powerplant manufacturers can supply the necessary engines to raise plant output.

• **Glenn L. Martin.** A return to profitable operations is in prospect in 1952. However, resumption of dividend payments appears remote, due to the poor earnings record of recent years and the dividend restrictions written into the company's loan arrangements. Martin is the only major aircraft manufacturing company which will have substantial carry-forward losses to shield it from income tax liability in 1952.

• **North American Aviation.** North American Aviation has been handicapped in its recent operations by failure of subcontractors to deliver on schedule various types of electronic equipment for installation in its planes. As a consequence, output of airframes has had to be cut back temporarily to the level of suppliers' component production.

• **Republic Aviation.** Supply difficulties are believed to have intensified in the current quarter. As previously emphasized, Republic's present contracts are concentrated on a single plane type, the F-84 series. For this reason, the long-term position of the company does not appear to be so fundamental or so well assured as in the case of other aircraft manufacturers which are currently manufacturing several series of planes for the military.

• **United Aircraft.** Operations in the





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current half are being adversely af-  
fected by (1) a shortage of aluminum  
forging caused by the long strike at  
Alcoa's Cleveland plant in June and  
July, and (2) labor disturbances in the  
company's own plants.

A moderate further increase in sales  
and earnings is in prospect for 1952 but  
it appears unlikely that United Aircraft  
will show such a wide sales gain as is  
projected for many of the airframe  
companies. Reason: United Aircraft's  
Pratt & Whitney operation has been  
much closer to its effective capacity  
through the postwar years than was true  
of the airframe industry.

• **American Airlines.** The second-half  
earnings comparison is likely to be un-  
favorable. American is the only major  
airline in the excess profits tax bracket.  
Furthermore, wage costs are expected  
to be greater, in line with the industry  
trend toward higher compensation for  
pilots. Salary increases have also been  
granted to other classes of employees in  
view of the intense competition for  
manpower now taking place in the de-  
fense economy.

In view of the sizable number of new  
planes to be in operation next year,  
gross revenues are expected to rise to  
\$165 million. The increase in net in-  
come may be more moderate, however,  
due to increased depreciation charges  
and a slightly higher tax rate.



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• **Eastern Air Lines.** Prospects are  
highly favorable for 1952. In a broad  
sense, Eastern's earning power is cur-  
rently limited only by capacity. New  
planes to be installed in the months  
ahead will greatly expand the fleet. Not  
only will the company have a greater  
carrying capacity as its present re-equi-  
pment program approaches final stages,  
but more economical operation will be  
attained.

• **Northwest Airlines.** Nine-month  
earnings were equal to \$1.38 a common  
share, well above the deficit of \$1.35  
a share shown for the corresponding  
period of 1950. However, Northwest  
is now entering the time of year when  
pronounced seasonal factors of an ad-  
verse nature come to bear. The com-  
pany has made a \$1-million payment  
on its outstanding bank loan, reducing  
long term debt to \$12.1 million as of  
Oct. 1. We tentatively estimate an  
increase in gross revenues and in earn-  
ings in 1952.

• **Pan American.** Pan American is hav-  
ing a good trans-Atlantic year. PanAm  
is a public advocate of tourist fares on  
trans-Atlantic routes. These promo-  
tional fares will probably go into effect  
next year and can be counted on to  
increase the company's traffic consid-  
erably. The company has a good tax  
shelter, so that the increase in gross  
should be reflected in a satisfactory  
advance in net income.

• **Trans World Airlines.** TWA, under  
the terms of its loan from the Equitable  
Life Assurance Society, has agreed to  
sell sufficient shares of its unissued  
stock to realize aggregate net proceeds  
of \$10 million, of which \$5 million is  
to be sold on or before Dec. 31, 1951,  
and \$5 million on or before Dec. 31,  
1952.

While a further satisfactory gain  
in gross revenues is estimated for 1952,  
the improvement at the net income  
level may be only moderate as further  
deductions are made to satisfy mail pay  
refund requirements.

• **United Air Lines.** Payment for new  
equipment will be made through sale  
of \$10 million more debentures, a \$16-  
million bank credit and from treasury  
resources. It is expected that a further  
wide increase in gross revenues will  
more than offset increased costs and  
moderately higher taxes so that net in-  
come can show a further gain. It is  
understood that two recent crashes  
have exhausted United's self-insurance  
reserve on hulls. This account will  
have to be recouped by charges in  
future accounting periods.

The opinions reviewed are those of  
the advisory service and not neces-  
sarily those of this writer. Neither the  
writer nor AVIATION WEEK stands  
sponsor to or endorses the advisory  
service indicated above.

—Selig Altschul

## AIR TRANSPORT

### '51 Trunkline Outlook: \$50 Million Net

• **Figures unavailable for  
local international lines.**

• **But all carriers seen to be  
on prosperity boom.**

By F. Lee Moore

U. S. trunk airlines are expected to  
earn about \$50 million net income on  
domestic operations after taxes this  
year, according to qualified Washington  
observers. This compares with last  
year's \$33 million and an \$11-million  
six-year postwar average, including esti-  
mated 1951.

No official estimates are available for  
international and local service earnings.  
• **International operators,** who earned  
\$2.7 million the first half, report their  
finances late, and their international  
accounts are unpredictable.

• **Local service operators,** who lost a  
half million dollars January-June this  
year, have quick-changing mail (sub-  
sidy) rates right now. But observers  
note that they're holding their gains  
over a year ago into the fall season.

Chief worry of locals is possibility of  
severe winter weather. Weather is  
especially hard on the locals because  
they serve mostly the small fair-weather  
airports. For instance, on a bad-  
weather day, the up-state New York  
local, Robinson Airlines, loses about  
\$4,000 a day to delays, cancellations,  
and circuitous routings.

► **Trunkline Boom**—The big-earning  
domestic trunk airlines still aren't wal-  
lowing in dollars, despite the fact they  
earned 3½ times as much the first half  
of this year as in the preceding year.  
They're making up past losses, riding  
a prosperity boom and stashing away  
cash for much-needed new equipment.

Right now, U. S. scheduled airlines  
have over 400 new-type transports on  
order, worth an average of about \$1  
million apiece. These include more  
than 100 four-engined Douglas DC-6Bs  
and As, about 70 four-engined Lock-  
heed Super Constellations, about 115  
twin-engined Consolidated Vultee Con-  
vair-Liner 340s and 101 twin-engined  
Martin 4-0-4s, plus two Sikorsky 10-  
passenger helicopters for Los Angeles  
Airways.

A few experts viewing this half-bil-  
lion-dollar airline equipment program  
fear a postwar slump like that of  
1946-48 may catch the airlines. They  
point to the surprise airline depression

### Net Operating Income and Net Income After Taxes

January-June, 1951 & 1950

CARRIER	NET OPERATING INCOME		NET INCOME AFTER TAXES	
	1951	1950	1951	1950
American.....	\$17,102,436	\$5,179,569	\$6,257,998	\$2,495,091
Eastern.....	11,027,517	5,406,202	5,007,586	2,940,298
TWA.....	3,288,296	1,657,235	2,620,656	702,736
United.....	6,748,655	1,483,477	2,930,571	939,457
Braniff.....	1,378,226	592,727	907,577	563,635
Capital.....	1,548,850	614,560	719,101	375,793
C&S.....	314,724	254,763	334,220	142,433
Colonial.....	(92,176)	(355,431)	(94,869)	(358,625)
Continental.....	464,084	17,366	210,240	1,805
Delta.....	2,401,752	1,221,788	1,162,544	677,295
Inland.....	221,631	188,271	95,249	114,169
Mid-Continent.....	198,482	270,928	85,176	154,282
National.....	3,840,830	1,505,161	2,178,632	1,486,447
Northeast.....	88,367	(268,637)	52,265	(288,801)
Northwest.....	(477,622)	(4,478,245)	(857,798)	(4,714,629)
Western.....	1,103,153	289,749	514,659	73,940
TOTAL.....	\$49,157,205	\$13,579,483	\$22,123,807	\$5,305,326

Figures in parenthesis represent losses. Source of all tables: ATA.

### Revenues, Earnings & Rate of Return

1946-1951\*

	Total Operating Revenues (millions)	Net Income After Taxes (millions)	Cents Earned per Dollar of Sales**
1951.....	\$650‡	\$50‡	\$.08‡
1950.....	524	33	.06
1949.....	460	13	.03
1948.....	413	5	.01
1947.....	353	20	.06
1946.....	312	6	.02
6-year total.....	\$2,712	\$66	
6-year average.....	\$452	\$11	\$.02

\* Domestic operations only.

\*\* Cents earned per dollar of sales is same as percent return earned on total oper-  
ating revenues.

‡ Unofficial estimate. Italic figures represent losses.

of the postwar era in the midst of in-  
dustrial and consumer prosperity.

But the airlines themselves and most  
government and private observers be-  
lieve the air transport business is now  
approaching the mass 10-cent-store-type  
appeal—a big volume commodity now  
publicly accepted as essential to busi-  
ness and long-range vacation travel.

► **More, But Not Enough**—Applying for  
approval of their big, new plane-buying

programs by mobilization authorities,  
many of the airlines say that even the  
new orders will not be enough to meet  
expected air traffic demands.

For instance, Eastern Air Lines  
President E. V. Rickenbacker, justifying  
his order of 16 more Super Con-  
stellations at \$1,475,000 each, to  
round out a \$100-million aircraft pur-  
chase program, writes CAB: "It was  
thought that the 60 Martin 4-0-4s and



## Traffic, Revenue and Income

January-June, 1951

### International operations

	1950	1951	% Increase
Passenger miles (1,000 miles)...	1,003,431	1,187,649	18
Total revenue ton miles .....	146,959,226	169,966,402	16
Passenger revenues .....	\$72,775,361	\$83,999,542	15
Total operating revenues .....	127,919,654	135,008,589	5
Net operating income .....	5,094,798	5,160,971	1
Net income after taxes .....	2,471,000	2,700,000E	9

### Domestic trunk operations

	1950	1951	% Increase
Passenger miles (1,000 miles) ...	3,533,086	4,848,090	37
Total revenue ton miles .....	432,786,817	575,359,037	33
Passenger revenues .....	\$197,345,497	\$269,961,177	37
Total operating revenues .....	239,700,344	311,862,326	30
Net operating income .....	13,597,483	49,157,205	257
Net income after taxes .....	5,305,326	22,123,807	317

### Local service operations

	1950	1951	% Increase
Passenger miles (1,000 miles) ...	78,861	136,328	73
Total revenue ton miles .....	8,480,499	15,176,010	79
Passenger revenues .....	\$4,317,319	\$6,925,540	60
Total operating revenues .....	12,954,658	16,552,482	28
Net operating income .....	(24,117)*	(508,304)*	..
Net income after taxes .....	(482,000)*	N.A.	..

\* Deficit. N.A.—Not available. E—Estimate.

## Revenue Passenger Miles

January-June, 1951 & 1950

CARRIER	REVENUE PASSENGER MILES (000 omitted)		% Change
	1951	1950	
American .....	1,131,607	760,410	48.8
Eastern .....	840,439	624,380	34.6
TWA .....	712,418	480,000	48.4
United .....	761,178	617,445	23.3
Braniff .....	128,023	100,941	26.8
Capital .....	277,307	179,052	54.9
C & S .....	77,004	53,948	42.7
Colonial .....	28,184	21,148	33.3
Continental .....	45,095	32,488	38.8
Delta .....	204,623	139,471	46.7
Inland .....	19,562	15,949	22.7
Mid-Continent .....	58,291	48,463	20.3
National .....	219,978	129,923	57.2
Northeast .....	37,581	27,828	35.0
Northwest .....	195,314	235,172	-16.9
Western .....	111,486	66,468	67.7
TOTAL .....	4,848,090	3,533,068	37.2

14 Lockheed 1049s would serve to replace the 49 DC-3-type airplanes and the 20 DC-4 airplanes . . . and to accommodate the greatly increased traffic, but it is now clear that additional aircraft will be needed. . . . Indications are that the trend of traffic increase is continuing. . . ."

► **Impetus of Air Coach**—One big ex-

pected impetus to further growth for scheduled airline business is the air coach business—just started three years ago. The airlines have at length discovered that if you put one-third more seats in a plane you can charge one-quarter less fare per head. The fare cuts (down from standard six cents a passenger mile to 4¢ for coach) are making

air travel a mass transportation market.

Only conceivable threats to it are CAB rate-making and non-scheduled airline competition. But in fact, both CAB and the nonskeds appear to be helping scheduled airline coach development.

CAB Rates Division Director Irving Roth says his entire staff favors further air coach development. As for nonsked airline competition, statistics show that on the busiest nonsked routes, the scheduled airlines' total business prospers most also. While some people still say nonskeds divert traffic, statistics appear to show they are giving a boost to scheduled airline business.

Furthermore observers point out that scheduled operators have more capital, more efficient equipment and better management facilities than the nonskeds, and hence should be able to beat them at their own game of promotion and low-fare service.

► **Long-Distance Coach**—Long-distance air coach expansion is a big factor in today's airline purchase programs of four-engined long-range DC-6Bs and Super Constellations at the expense of twin-engined equipment. After they meet the present equipment shortages, airlines plan to convert many of their DC-6s and Constellations to air coaches.

After this long-distance phase, the next huge market potential that transport economists expect the airlines to go after is short-haul, intercity business, competing with trains, buses and cars.

► **Short Hauls**—For instance, already 70% of airline passengers buy tickets to travel less than 400 miles. As airlines' on-time performance improves slowly with avionics development, they'll have far more to offer millions of short-trip travelers. Cheaper operating costs and coach-density twin-engine planes may also enable the airlines to price the short trips competitively with surface transportation.

Sales potential of the airlines, then, is definitely expanding. But how about net income? And another big question mark in airline income growth potential is: Will those airlines needing and deserving subsidy to continue expansion continue to get that subsidy?

CAB Chairman Donald Nyrop, in a carefully prepared statement says:

"It took subsidy money from 1926 to 1938 to launch American air transportation; it took subsidy money to continue its efficient development in the public interest and in the national defense from 1938 to 1951.

"It may take continued subsidy for some of our carriers in the years ahead if we are to continue to expand and serve our nation in air transportation nationally and internationally, and if that subsidy amount is required under honest and efficient management, it will be paid."

## AA Coach Plans

• Large part of DC-6 fleet may go into network

• Only final approval of board needed for action.

Spurred by at least four incentives, American Airlines is reported planning a large expansion of air coach services next year. Here is why:

• **Demand exceeds capacity** on American's present transcontinental coach flights (averaging load factor of 90%).

• **American's excess profit tax bracket** makes equipment buying and low-fare service expansion attractive.

• **CAB has blessed coach expansion** by the scheduled airlines in its recent decision denying applications of new airlines for transcontinental coach certificates.

• **The nonskeds make money** with coach service on American's routes and American doesn't want to stand by while others develop, then reap, the new mass market.

American's program is already well ahead in the plan stage. But start on conversion of DC-6s awaits final approval of the American board of directors.

American is preparing a large-scale promotion campaign to introduce the new air coach network.

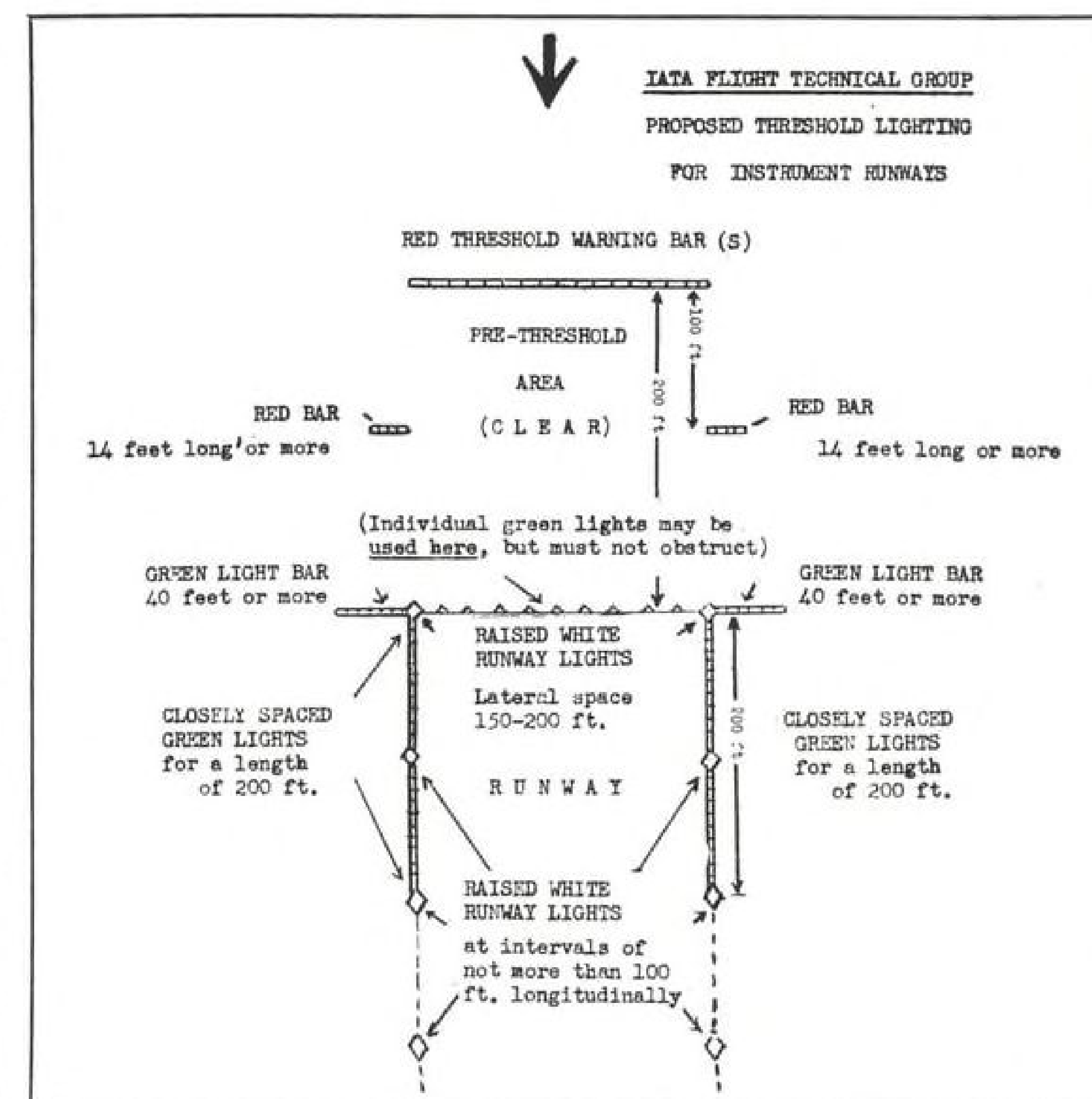
Number of DC-6s to be converted, and the routes they'll fly are still undisclosed.

But it is reported the airline will convert a "substantial part" of its fleet of 45 standard DC-6s. American's complete stable right now boasts: 79 Convair-Liner 240s; 45 standard DC-6s; four 70-passenger DC-6 air coaches; 13 DC-4 airfreighters; and about 15 DC-6Bs. Additional transports on order include 26 more DC-6Bs and six more DC-6As.

► **Other Plans**—Trans World Airlines was reported last summer planning conversion of at least five more of its Constellations to 81-passenger air coaches in its modification programs for fall and winter.

United Air Lines spokesman says United has no plans for expansion of its present one-a-day transcontinental DC-4 coach service. He says United doesn't find a demand for it.

Capital Airlines and Northwest Airlines, who also operate east-west air coach services, are short of aircraft and aren't expected to expand coach service much in the near future. And Capital, founder of scheduled domestic air coach, says daylight coach wouldn't pay for Capital, but that night coach does pay.



## Group Urges Standard Visual Aid

A standard system of visual aids, to aid the airline pilot in the critical period between approach and touchdown, is proposed to the International Civil Aviation Organization by the International Air Transport Assn.'s flight technical group.

Both the Calvert and the Air Line Pilots Assn. approach lighting systems were declared satisfactory by the IATA group during its ten-day meeting in New York last month. Taking part as observers at the meeting were experts from the International Civil Aviation Organization, individual governments, and lighting designers and firms.

► **Ground Markers**—Liberal use of the paint-brush is also urged by the group to aid the incoming pilot. The IATA group recommends paint markers in this pattern:

• **A threshold block** at the start of the runway, made up of painted stripes at least 125 ft. long and 9 ft. wide, going in the direction of the runway.

• **A broken line of markers** and blank spaces, each 100 ft. long and at least 3 ft. wide, down the center of the runway, its entire length.

• **Continuous lines** (not necessarily solid) about 5 ft. wide about 75 ft. on either side of the center line.

► **Approach, Threshold and Runway**

**Lights**—The IATA technical group favored the center line lighting systems as generally meeting the operational requirements for this form of visual aid and as having been tested operationally and found satisfactory. However, they do not fully meet USAF's rigid requirement for a 1,000-ft. clear zone at each end of the runway.

• **For approach lighting**, IATA's technicians favored a single row of high-intensity lights 100 ft. apart along a 3,000-ft. extension of the runway center line.

• **Threshold lighting** would comprise three systems: (1) a bar of red warning lights 200 ft. from the threshold, supplemented with two sidebars of red lights at least 14 ft. long, 100 ft. from the start of the runway, extending at right angles from the side of the pre-threshold area; (2) threshold bars of green lights, each at least 40 ft. long, extending at right angles from the ends of the runway; (3) closely spaced line of green lights down the side of the runway from the threshold for 200 ft.

• **Runway lighting** would be by wide angle high intensity lights spaced 100 ft. apart along the 2,000 ft. touchdown area and then at intervals of not more than 200 ft.—preferably 100 ft.—for the rest of the strip.





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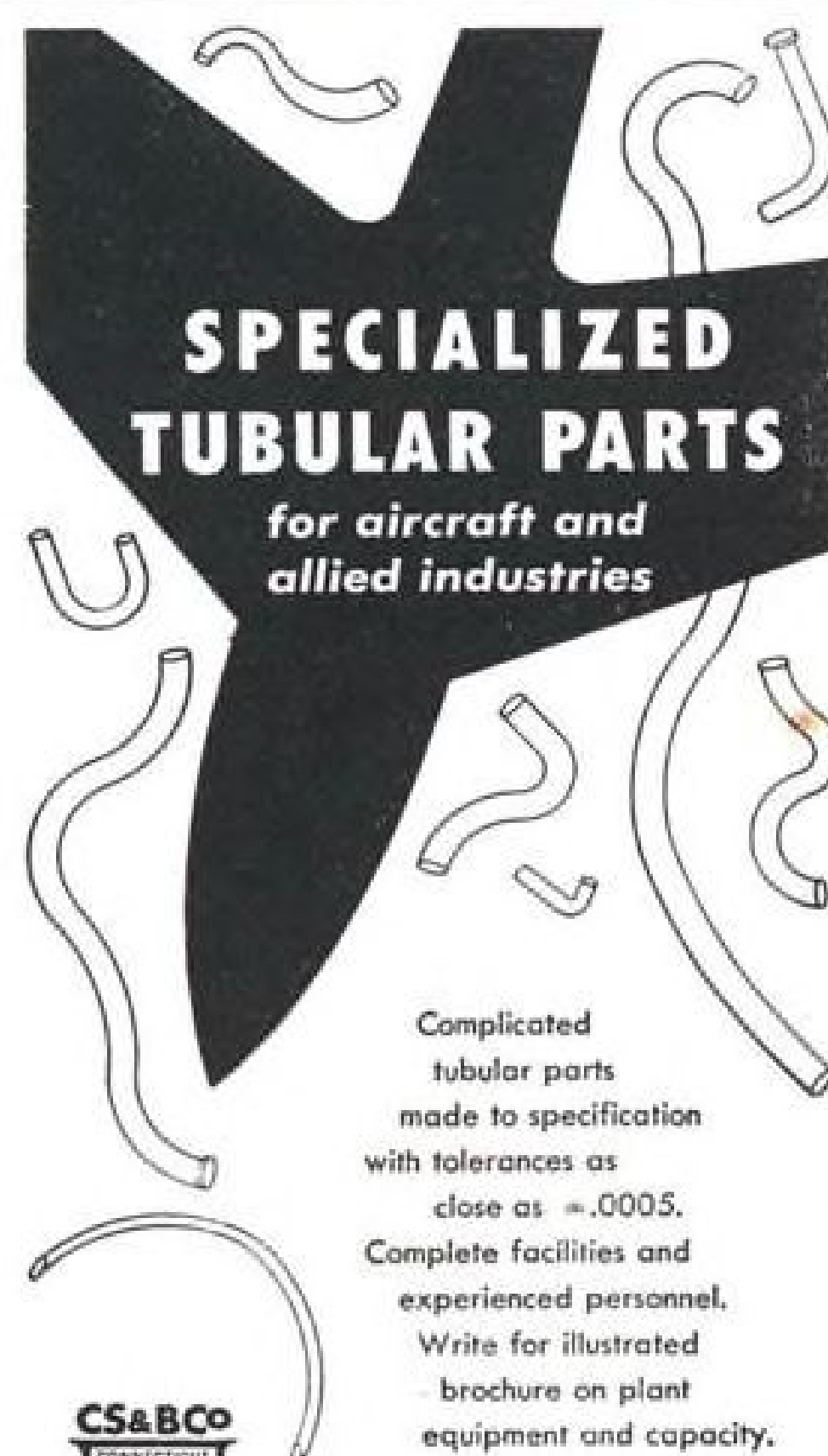
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*They're coming through the windows. . . .*



*. . . They're coming out the door.*

## How Many Exits for Air Coaches?

CAB sets pattern for new transport designs, but present planes must await findings of study group.

A Nov. 29 deadline has been set for a joint CAA-CAB study group to submit recommendations on how many additional exits should be required in airline transports if presently approved air coach seating density is increased.

Meanwhile, CAB has adopted a new regulation setting emergency-exit specifications for any new transport design introduced in the future. It does not affect any of the present on-order designs—Convair 340, Douglas DC-6B, Lockheed 1049 or Martin 4-0-4. It will affect design of future aircraft

models and modifications not yet on order.

►Exit Formula—Pending CAA-CAB decision on air coach exits will affect any airline that plans to increase the number of seats in a transport above the density already CAA-approved. For instance, American Airlines flies a 70-passenger version of the DC-6 as its transcontinental air coach.

If American wanted to increase seating to say 80 or more passengers for short-haul coach, the airline would have to use the exit formula now in the

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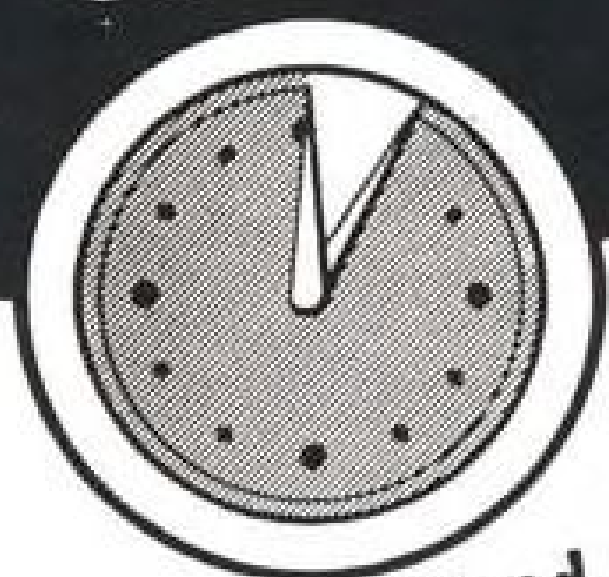
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Searchlight Section Continued on Page 76



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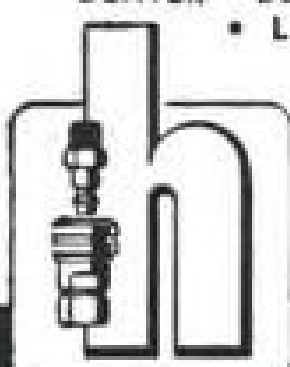
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works at CAA and CAB. Same requirement applies to the present 82-passenger TWA Constellation coaches and the 60-70-passenger DC-4s operated by scheduled airlines.

TWA added two more window exits to its coach Connies when it changed them to coaches two years ago; this was done after conference with safety officials of CAA Region Five.

Official decision on air coach exits is being rushed because other scheduled airlines are expected to follow American Airlines' lead in planning air coach expansion. And CAB recently made a policy proposal that the airlines try short-haul air coach. On short-haul operations, a plane could carry more passengers because less fuel would be needed.

Only limits on seating density then become:

• Maximum payload on longest segment of the route.

• Floor area of the cabin available for seats.

• Compliance with emergency exit safety requirements.

► **Exits Regulation for New Design**—The newly adopted CAB regulation for emergency exit configuration of any new design transport requires basically the following formula:

• 1-19 passengers, 2 doors in rear, but no window exits required.

• 20-39 passengers, 2 doors in rear and 2 window exits over wing.

• 40-69 passengers, 2 doors in rear, 2 window exits over wing.

• 70-99 passengers, 2 big doors in rear, 4 window exits over wing.

• 100-139 passengers, 4 big doors in rear, 4 window exits over wing.

(Required size of the exits increases with passenger load.)

Governing theme of these specifications is to provide adequate escape facilities, even assuming one entire side of the plane is blocked off by fire or plane position on ground or in water. For instance, the 139-passenger plane must have on each side: two big doors in the rear and two big window exits over the wing.

Doors are more important on ground

emergency exit; window exits over wing are more useful on water. Also, experience shows the rear part of a plane is most likely to remain in fair shape in an accident.

CAA and CAB studies also have revealed the following additional factors of emergency exit speed:

• Doors are better than window exits, generally.

• Door chute or slide is much faster than rope or ladder. (But many airlines still have not switched to chute equipment.)

• Window exits of 19 x 26 in., the standard size on today's transports, are adequate when located over the wing with an easy step-up and step-down.

• Window height from cabin floor and step-down outside are the main governors of speed of passenger exit through window exits. It's the climbing up to the window sill and then down from it that takes time under pressure of emergency evacuation. That is why floor-level doors are faster than window exits—on land. Position of seats near exit also is important.

These facts and the new CAB regulation are based on CAA tests made over the past year with airline help.

Airlines still are cooperating with the CAA on continuing tests and demonstrations on air coach planes to improve passenger handling techniques in emergency exit. Overseeing these studies, tests and demonstrations is Dr. B. G. King, chief of CAA Medical division's Aeromedical Design branch.

## Mexico Sees 10% Air Travel Rise

(McGraw-Hill World News)

Mexico City—Airlines in Mexico carried 1,032,413 passengers in 1950, according to official figures just released by the government. This is an increase of 99,712 passengers over 1949 or roughly a 10% increase in one year.

Altogether air travel has increased more than ten-fold in Mexico during the past ten years, as figures for 1940 show that only 86,788 passengers were carried by air in that year.

Figures for the first three months of 1951 show that the trend in Mexico is toward still greater passenger totals for the air industry in general.

There were 309,067 passengers carried in the first three months of the year, which would indicate that the total for 1951 will run in excess of 1,200,000 passengers. This would be another 10% gain.

► **Express—Express** for the first three months of 1951 amounted to 7,467 tons which would indicate an air express total of close to 30,000 tons can be expected by '51 Mexican carriers.

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transported 27,360 tons of express compared to 22,388 tons in 1949.

This was a jump of 5,000 tons during the year, and reflects the intensive promotion currently being made by the airlines to secure more air express business.

Airmail carried also increased, from 1,975 tons in 1949 to 2,427 tons in 1950.

Volume during the second half of the year is likely to exceed the first six months' record through further development of night flying, completion of the Lodair cargo dock at Barranquilla, which will go into operation in October, and purchase by Avianca of Colombia's second largest airline, Lansa.

### Short-Haul Copter Service Need Cited

Within 20 years, some 30% of the 2.5 million annual airline passengers traveling to and from airports in the New York metropolitan area would use helicopter transportation, if it were available—materially more if some form of subsidy would advance development of large rotary-wing aircraft before that time.

That was the firmly expressed opinion of Port of New York Authority Director Fred M. Glass before the Radio Technical Commission for Aeronautics recently.

As if in answer to those who wonder why passenger-carrying helicopter airlines have not sprung up overnight in recent years, Glass said that the present type helicopter, without subsidy, is capable of making only small penetration of dense and direct travel routes with excellent rail service, such as New York-Philadelphia and Chicago-Milwaukee.

But, according to Glass the caliber of these particular services is better than average; there are other runs more typical of the average that offer good potentialities for use of copter transportation.

He cited, for example, the Washington-Norfolk run, where it takes a rail passenger 5 hr. 20 min. elapsed time to go only 143 mi.; between New York and Pittsfield, Mass., where the trains take 4 hr. 13 min. elapsed time to cover only 118 mi. "There are many Washington-Norfolk and New York-Pittsfield segments in this country," Glass declared.

Conventional aircraft services also have their drawbacks, especially on the short-haul trips—ground times at each end of such major short-haul routes as New York-Boston almost always equal and many times exceed air times, for travellers who go by plane instead of train or bus, he said.

### Alaskan Airline Gets \$700,000 RFC Loan

Northern Consolidated Airlines of Anchorage, Alaska, has obtained a seven-year loan totaling \$705,550 from the RFC for purchase of equipment and terminal improvement. It has earmarked \$300,550 for the purchase of equipment; \$215,000 for a hangar, operations and general office buildings at Anchorage; \$50,000 for operational quarters and waiting rooms at King Salmon and Dillingham; \$100,000 for working capital, and \$40,000 for temporary quarters at Fairbanks.

Organized four years ago by a group of Alaskan bush pilots, the line serves scores of communities in western Alaska. It has 18 planes, including three DC-3s, two C46s and a PBV.

Seattle, Wash., RFC office says loan was granted because defense contractors in remote parts of Alaska are dependent 100% upon the airline during nine months of the year.

### New Italian Airline Establishes Routes

(McGraw-Hill World News)

Rome-Trieste Airways Co. has been incorporated at Trieste for international airline operation serving Athens-Cyprus-Beyrut, Vienna-Geneva and Agram-Belgrade.

Later service to New York, with intermediate stops, is planned. First flights will start from Ronchi Airfield in the Italian republic of Trieste, but operations later will be moved to a new international airport at Prosecco, located in the Anglo-American zone of the Free Territory of Trieste.

Managing director and general manager of the new company is Capt. Ignatius Zgardelj, former staff member of a British airline. Final operations approval will be up to the Allied Military Government.

(Shortlines appears on page 80)

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**AERODYNAMICISTS—AIRPLANE.** Two years of aerodynamics experience required in either stress analysis, air loads, or physical testing for work on high performance military airplanes.

**STRUCTURES ENGINEERS—AIRPLANE.** Two years or more of experience required in either stress analysis, air loads, or physical testing for work on high performance military airplanes.

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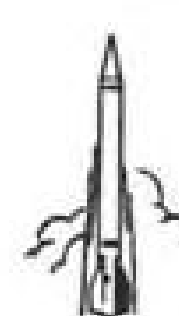
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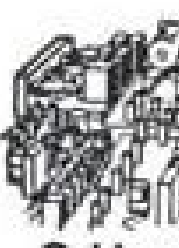
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## SHORTLINES

► **Capital Airlines** has CAB show-cause order setting final mail rate of 53 cents a mail ton-mile "without subsidy," retroactive to Oct. 1 this year. CAB forecasts Capital earnings before mail pay but after taxes at \$1.1 million for the 12 months ending next Aug. 31, and estimates mail revenue in that period will be about \$1,060,000. . . . Night air coach load factor dropped seasonally from 71% in September to 62% in October. Still has no plans to buy new aircraft, an official says.

► **Consolidated Vultee Aircraft Corp.** is reported winding up negotiations for sale of 35 more Convair-Liner 340s to several airlines. This would bring Convair's commercial sales of 340s to 148, plus 100-odd T-29 modifications of the 340 to Air Force.

► **Eastern Air Lines'** first Super Constellation is scheduled for delivery by Lockheed this month. Two others for EAL are being tested.

► **International Civil Aviation Org.** has adopted resolutions exempting from customs and other duties fuel and oil of airlines going between two or more points of the foreign country. And each country is to tax its own operators and exempt foreign airlines from taxation; this is to end multiple taxation on income and flight equipment.

► **Japan Air Lines** has started Tokyo-Osaka service with one DC-4 and two Martin 2-0-2s. Northwest Airlines is flying and maintaining the planes for the line.

► **Local service airline** break-even load requirement without subsidy is reported still running 70-80% of capacity, while actual average load has been around 40% this fall. But Piedmont's break-even is about 60% and ran 59% in August. Since it is difficult even for a trunk airline to run an 80% load factor, outlook is for subsidy for most locals until they get more efficient aircraft or helicopters that might ultimately bring costs down to where a 50% load would pay, observers say.

► **National Airlines** "experimental" daylight 68-passenger DC-6 air coach recently approved by CAB ran a 70% load factor in September and 76% in October. Night 58-passenger air coach ran only 50% load in September 54% in October.

► **Northeast Airlines** has asked CAB for a route extension to Miami from New

York, via Philadelphia, Washington, Charleston, Jacksonville, Orlando and St. Petersburg.

► **Northwest Airlines** Martin 2-0-2s, on lease to nonsked Transocean Airlines for military charter operation, are booked by Air Transport Assn.'s Military Traffic Bureau. They are flown and maintained by Transocean personnel. Transocean bought three of NWA's other Martins last August. . . . A leading scheduled airline is considering purchase of five of Northwest's Martins.

► **Swissair** has started DC-6B sleeperette service exclusively on all trans-Atlantic flights. Illustrating the luxury competition plaguing that route, Swissair has reduced DC-6B capacity to 32 passengers with an 11-man crew. (Pan American proposes to seat 82 passengers on trans-Atlantic air coach service with the same plane.)

► **Transocean Air Lines** has finished modifying an Argentine air force C-47 for antarctic operation. Fuel capacity is doubled to give 18 hours or 2,800 miles flight endurance; jet-assist takeoff equipment (jato) and skis are also fitted. First operation is planned as a mercy flight to pick up a group of scientists marooned at the Argentine research base at Marguerite Bay in the Shetland Islands.

► **Trans Pacific Airlines** reports record traffic gain of 68% (to 11,493 passengers carried) in the Hawaiian Islands in October over a year ago . . . always uses its new trade name—TPA Aloha Airline—now . . . has carried its 250,000th passenger.

► **Trans World Airlines** reports net earnings of \$6,192,170 nine months to September compared with \$6,938,465 a year ago . . . has received its first of 40 Martin 4-0-4s on order . . . reports 32% traffic gain on international routes and 40% gain on domestic first nine months this year over last: international, 283,319,000 revenue passenger miles; domestic, 1,139,869,000. Cargo ton-miles same period systemwide are 33,601,000, of which 24,588,000 is domestic and 8,746,000 international. . . . October international traffic gained 16½% over a year ago to 36,700,000 revenue passenger miles.

► **United Air Lines** flew 179,620,000 revenue passenger miles in October, 22% over a year ago . . . has promoted Charles E. Haneline to assistant for vice president-transportation services D. F. Magarrell. Duties include long-range planning of ground activities and proper coordination with other departments.

## WHAT'S NEW

### New Books

**Sheet Metal Tables of Bend Allowance and Setback**, Carl Jants and John L. Shipman. Published by Jants, Johnson & Shipman, 9044 Ione Lane, St. Louis 23. Price \$1.

This little pocket-sized (4x5½-in.) manual contains tables of bend allowance and setback for a range of metal gauges from 0.010 to 0.125, which covers most of the metal thicknesses used today.

Bend radii start at ¼ in. and go to ¾ in.; bend-up angles start at 30 deg. and go to 150 deg. for direct reading. Interpolation and use of 1 deg. values make possible the calculation of bend angles not given directly in the table.

Seems like a handy little folder, and it fits in the pocket. But the pages aren't numbered, although a note in front says to look at pages 16 and 17 for instructions. For design engineers and draftsmen it seems to be worth the dollar cost. —DAA

### Telling the Market

**Some Good Things to Know About Metal Cleaning** is a handy 44-page booklet reviewing many phases of cleaning metals. It can be had by writing Oakite Products, Inc., 22 Thames St., New York 6. . . . Recently revised list of commercial aircraft operators in the U.S. engaged in agricultural and industrial activities is available by writing General Flight Branch, Flight Operations division, Civil Aeronautics Administration, Washington 25, D. C.

A 36-page, two-color pocket-size booklet, put out by Mehl Mfg. Co., presents comprehensive data on current Army, Navy, and Air Force packaging specifications and gives illustrations of types and procedures of packaging. Write the company at 2057 Reading Rd., Cincinnati 2.

An interesting study of accidents involving surface vehicles at airports is available in data sheet form from the National Safety Council, 425 No. Michigan Ave., Chicago. It's entitled, **Air Terminal Vehicular Safety Guide**.

Reference list of rust-proofing, paint bonding and metal protective chemicals applicable to fabricators of steel, zinc and aluminum products can be obtained from American Chemical Paint Co., Ambler, Pa. . . . **Basic Facts About Materials Handling** is a new booklet showing how to make the best use of existing machines through utilization of attachments and multiple usage. Write Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.

## ADVERTISERS IN THIS ISSUE

AVIATION WEEK—NOVEMBER 26, 1951

AEROTEC CORPORATION, THE.....	58	NORTH AMERICAN AVIATION, INC.....	75
Agency—Hening & Co., Inc.		Agency—Batten, Barton, Durstine & Osborn, Inc.	
AIR ASSOCIATES, INC.....	61	PASTUSHIN AVIATION CORP.....	61
AIRCRAFT-MARINE PRODUCTS, INC.....	56	Agency—Lynn-Western, Inc.	
Agency—Kemper Advertisers		PHILLIPS PETROLEUM CO.....	5
AIRWORK CORPORATION.....	31	Agency—Lambert & Peasley, Inc.	
Agency—Charles Blum Adv. Corp.		PIASECKI HELICOPTER CORP.....	66
ALUMINUM CO. OF AMERICA.....	36	Agency—B. K. Davis & Bro.	
Agency—Fuller & Smith & Ross, Inc.		REMINGTON RAND, INCORPORATED.....	59
B. G. CORPORATION, THE.....	Front Cover	Agency—Leeferd Adv. Agency, Inc.	
Agency—Buchanan & Co., Inc.		ROHR AIRCRAFT CORP.....	34
BREEZE CORPORATIONS, INC.....	25	Agency—Barnes Chase Co.	
Agency—Burke Dowling Adams, Inc.		SCINTILLA MAGNETO DIV. OF BENDIX	
CHAMBERLAIN AVIATION, INC.....	72, 75	AVIATION CORP.....	60
Agency—Ralph Gross Adv., Inc.		Agency—MacManus, John & Adams, Inc.	
CHERRY RIVET COMPANY.....	53	SCOTT AVIATION CORPORATION.....	27
Agency—Hixson & Jorgensen, Inc.		Agency—Melvin F. Hall Adv. Agency	
CHICAGO METAL HOSE CORP.....	12	SEARCHLIGHT SECTION.....	71, 76, 77, 78, 79
Agency—Russell T. Gray, Inc.		SMITH-MORRIS COMPANY.....	40
CHICAGO PNEUMATIC TOOL CO.....	7	SPERRY GYROSCOPE COMPANY.....	Third Cover
Agency—G. M. Basford Co.		Agency—Charles Dallas Reach Co., Inc.	
CLIFFORD MANUFACTURING COMPANY.....	38	STANDARD PRODUCTS, INC.....	62
Agency—James Thomas Chirurg Co.		Agency—The McCormick-Armstrong Co.	
CONTROL PRODUCTS, INC.....	90	STANDARD-THOMSON CORP.....	63
Agency—George Homer Martin Associates		Agency—Childwell, Larkin & Co., Inc.	
DUMONT AVIATION ASSOCIATES.....	Second Cover	STEWART WARNER CORP.....	71
Agency—Edward S. Kellogg Co.		Agency—MacFarland, Aveyard & Co.	
ELASTIC STOP NUT CORP. OF		SUPREME PRODUCTS, INC.....	57
AMERICA.....	Fourth Cover	Agency—Hamilton Adv. Agency, Inc.	
Agency—G. M. Basford Co.		SURFACE COMBUSTION CORP.....	28
ELECTROFILM CORPORATION.....	24	Agency—Odiorne Industrial Adv.	
Agency—The Jordan Co.		SWEDLOW PLASTICS CO.....	21
GADGETS, INCORPORATED.....	62	Agency—Francis D. Gonda Adv.	
Agency—Kircher, Helton & Collett, Inc.		TELEFLEX, INCORPORATED.....	81
GENERAL CONTROLS CO.....	39	THOMPSON PRODUCTS, INC.....	22
Agency—Hixson & Jorgensen, Inc.		Agency—Meldrum & Fawcett, Inc.	
GENERAL ELECTRIC COMPANY.....	6	TINNERMAN PRODUCTS, INC.....	30
Agency—G. M. Basford Co.		Agency—Meldrum & Fawcett, Inc.	
HANSEN MFG. CO., THE.....	72	TITEFLEX, INCORPORATED.....	4
Agency—Richard T. Brandt, Inc.		Agency—Robert L. Marloff, Inc.	
HARTER CORPORATION.....	44	TUBE BENDS, INCORPORATED.....	70
Agency—Lampert, Fox, Prell & Dolk, Inc.		Agency—Charles Palm & Co.	
HARTMAN ELECTRICAL MFG. CO.....	40	UNITED AIRCRAFT CORP.....	11
Agency—Palm & Patterson, Inc.		Agency—Geyer, Newell & Ganger, Inc.	
INDIANA GEAR WORKS.....	51	UNITED STATES STEEL CORP.....	74
Agency—A. L. Perkins & Co.		Agency—Batten, Barton, Durstine & Osborn, Inc.	
INTERNATIONAL NICKEL CO., INC., THE.....	32, 33	VAN DUSEN AIRCRAFT SUPPLIES.....	62
Agency—Marschalk & Pratt Co.		Agency—Davis-Parsons, Inc.	
KIDDE & CO., INC., WALTER.....	3	WESTINGHOUSE AIR BRAKE CO.....	46
Agency—Cunningham & Walsh, Inc.		Agency—Ketchum, MacLeod & Grove, Inc.	
KOLLSMAN INSTRUMENT CORP.....	29	WESTINGHOUSE ELECTRIC CORP.....	64
Agency—Erwin, Wasey & Co., Inc.		Agency—Fuller & Smith & Ross, Inc.	
LEBANON STEEL FOUNDRY.....	52	WIGGINS OIL TOOL CO., INC., E. B.....	61
Agency—Foltz-Wessinger, Inc.		Agency—Welsh-Hollander Adv.	
LELAND, INCORPORATED, G. H.....	35	YOUNG RADIATOR COMPANY.....	41
Agency—Weber, Geiger & Kalat, Inc.		Agency—Western Advertising Agency	
LORD MANUFACTURING COMPANY.....	49		
Agency—W. S. Hill Company		SEARCHLIGHT SECTION	
MARMAN PRODUCTS CO., INC.....	37	(Classified Advertising)	
Agency—West-Marquis, Inc.		EMPLOYMENT	
MARTIN CO., THE GLENN L.....	26	Positions Vacant.....	71, 76, 77, 78
Agency—Vansant, Dugdale & Co., Inc.		Positions Wanted.....	76
McGRAW-HILL BOOK CO., INC.....	81	PLANES—EQUIPMENT	
MICRO SWITCH CORP.....	42, 43	(Used or Surplus New)	
Agency—Hamilton Adv. Agency, Inc.		For Sale.....	78, 7
MONOGRAM MANUFACTURING CO.....	8	WANTED	
Agency—Taggart & Young Adv.		Equipment.....	78

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## LETTERS

### The Raymond Paper

Every now and then we find an article in AVIATION WEEK which we feel is particularly worth preserving for future reference. The series of digests concerned with Mr. Arthur E. Raymond's paper entitled, "The Well-Tempered Aircraft," is such an article. We would be grateful to you if you would forward a reprint of the complete series of articles.

ANDREW J. HAYES, Administrative Assistant  
General Instrument Inc.  
6000 Lemmon Ave.  
Dallas 9, Tex.

I note with interest the series of articles under the general heading "The Well-Tempered Aircraft" which appear in AVIATION WEEK for Oct. 15, 22 and Nov. 5. If tear sheet or a reprint of this series is available, I would appreciate receiving a copy.

W. H. FENN, Sales Manager  
Polytechnic Research & Development Co., Inc.  
202 Tillary St.  
Brooklyn 1, N. Y.

### Airplane Noise

I wish to congratulate you on the excellent article (Cockpit Viewpoint) in the Oct. 15 issue by R. C. Robson.

The noise problem is much greater than most people in the aviation industry realize, especially the aircraft and engine manufacturers. They have made NO attempt to do anything about it. In small civilian, personal and training planes, we had quieter planes in 1940 and 1941 than since the war.

The only solution is to quiet the plane and this can be done if we want to, or have to. Unless it is done, and done soon, all planes are going to be banished to the sticks where they will be of no practical use to anyone and it will be impossible to run an airport at any reasonable distance from a populated area.

I hope to see reprints of this article in every aviation magazine and paper in the United States.

EDWARD C. WATSON, JR., Manager  
San Mateo Airport  
19th Ave. and Bayshore Hwy.  
San Mateo, Calif.

We were interested to read your editorial, "Taming the Giant's Roar," in the Oct. 1 issue, but I feel obliged to find a flaw in the paragraph in which you say that you are not concerned at this point about the noise the customers get. "They know they are going to get it; they buy their tickets with their ears wide open."

Recently I flew to Brazil and Peru and back in a Constellation, and shortly afterwards I flew to Johannesburg and back in the Comet. You can deduct a little for prejudice if you like, since I am a de Havilland man, but I do promise you that the Comet was the quieter of the two aircraft,

from the point of view of the traveling passenger.

Furthermore, the absence of vibration in the Comet, which is quite a curious and subtle thing, reduces fatigue on a long journey in a manner that is going to be a revelation to Comet travelers. The absence of bumps, through flying so high above the weather, contributes to one's freshness on arrival.

But I am only really arguing against your reference to noise within the cabin.

I agree that the high-pitched whine of jet engines is unpleasant to people on the ground. I suppose it can be even more unpleasant than the roar of big radial engines, but airport designers would have to do something about this aspect of terminal layout, regardless of the advent of jet airliners, don't you agree?

MARTIN SHARP, Public Relations Manager  
De Havilland Aircraft Co., Ltd.  
Hatfield, Hertfordshire, England

(The editorial was concerned solely with the non-passenger aspect of the noise problem. This is proving to be the toughest public relations phase for the operators.—ED.)

### PAA & Stalls

The article "How Much Stall Warning?" Oct. 15 in AVIATION WEEK contains a number of misstatements of facts which give a most misleading impression of Pan American World Airways' attitude concerning the use of special stall warning devices on PAA aircraft.

The demonstration and discussion on Sept. 28 which were attended by Captains Flower and Moss and myself was part of the normal process by which our organization keeps abreast of latest developments in aircraft equipment. In view of current consideration by the CAB of possible changes in the stall demonstration section of CAR 04 (B), which might require use of a special warning device on some future aircraft, we have naturally been interested in learning the latest information concerning this type of device.

However, there has been no "demand" for installation of such a device at Pan American Airways, either before or after the demonstration of Sept. 28. Furthermore, there is no plan for any test installation on a Stratocruiser either by us or, to our knowledge, by Boeing.

While we have been interested for some time in a project to remove the inboard wing spoilers from the Stratocruiser, this has been purely for reasons of improving the handling characteristics of this aircraft during takeoff and landing and at no time has there been considered any change in the operating limitations of the aircraft. The only gain in payload contemplated has been that due to elimination of the weight of the spoiler, which is something of the order of 40 lb. and is an entirely secondary consideration.

With regard to the amount of pre-stall

warning of the Stratocruiser, it should be noted that this aircraft was certificated under current CAR requirements, the applicable paragraph of which is 04B.162 which states:

"Clear and distinctive stall warning shall be apparent to the pilot of a speed at least 5% above the stalling speed, with flaps and landing gear in all possible positions, both in straight and in turning flight. It shall be acceptable for the warning to be furnished either through the inherent aerodynamic qualities of the airplane, by a suitable instrument, or by other means which will give clearly distinguishable indications under all expected conditions of flight."

R. W. BLAKE, Staff Engineer  
Pan American World Airways, Inc.  
135 E. 42nd St.  
New York 17, N. Y.

### A Quotation's Origin

We have noted that the advertisement of the Voi-Shan Mfg. Co., Inc., Culver City, Calif., in the Oct. 1 AVIATION WEEK, credits C. R. Smith, president of American Airlines, Inc., with the quote, "Aviation in itself is not inherently dangerous—but like the sea, it is terribly unforgiving of any carelessness, incapacity or neglect..."

Appreciating your intention to give credit where credit is due, we wish to correct an error which has been gaining circulation over the years. While Mr. Smith has used it frequently and while it did at one time stand as a slogan in the masthead of our house organ, Mr. Smith did not originate the quotation.

The credit belongs to Capt. A. G. Lamplugh of the British Aviation Insurance Co., Ltd., in London, and we are indebted to Jerome Lederer, now Director of the Flight Safety Foundation, Inc., in New York, for the full story of the quotation's origin.

On our request for clarification of the question, Mr. Lederer recently wrote: "I believe the original quotation read 'Aviation is inherently safe but to an even greater extent than the sea is terribly unforgiving of any incapacity, carelessness or neglect'."

"This was contained," Mr. Lederer wrote, "in a speech delivered in 1928 before the Royal Aeronautical Society by Capt. A. G. Lamplugh of the British Aviation Insurance Group. When I read it in 1929 I changed it to read, 'Aviation to an even greater extent than the sea is terribly unforgiving of any incapacity, carelessness or neglect' and used it on literature of my company, Aero Insurance Underwriters, for about 15 years thereafter."

Somewhere along the line it was given the construction now most widely quoted. We call this to your attention merely to set the record straight as Mr. Smith is keenly anxious to see that credit is given to whom credit is due.

HOMER E. STRICKLER, Manager  
of News Services  
American Airlines  
100 Park Ave.  
New York 17, N. Y.



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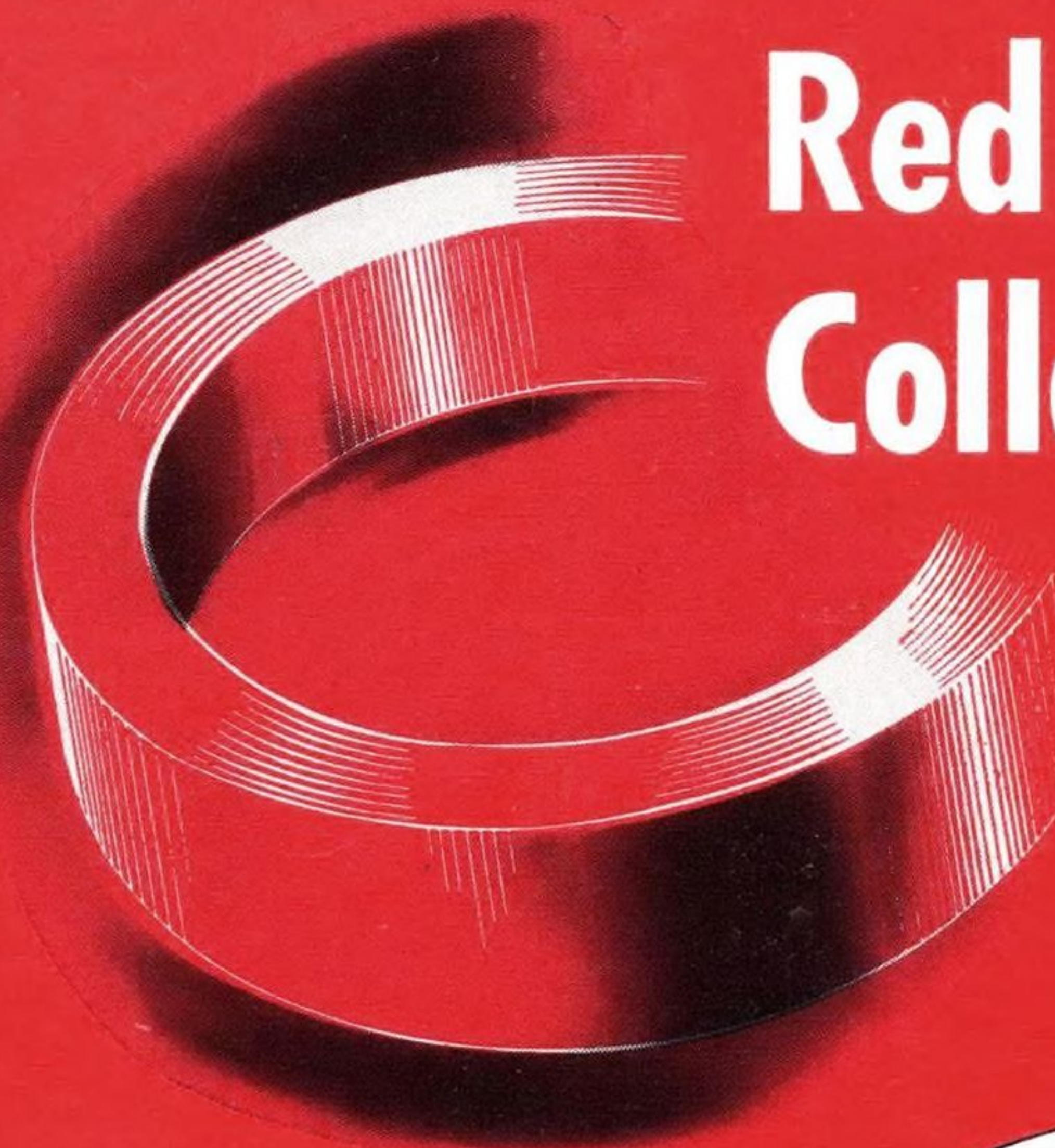
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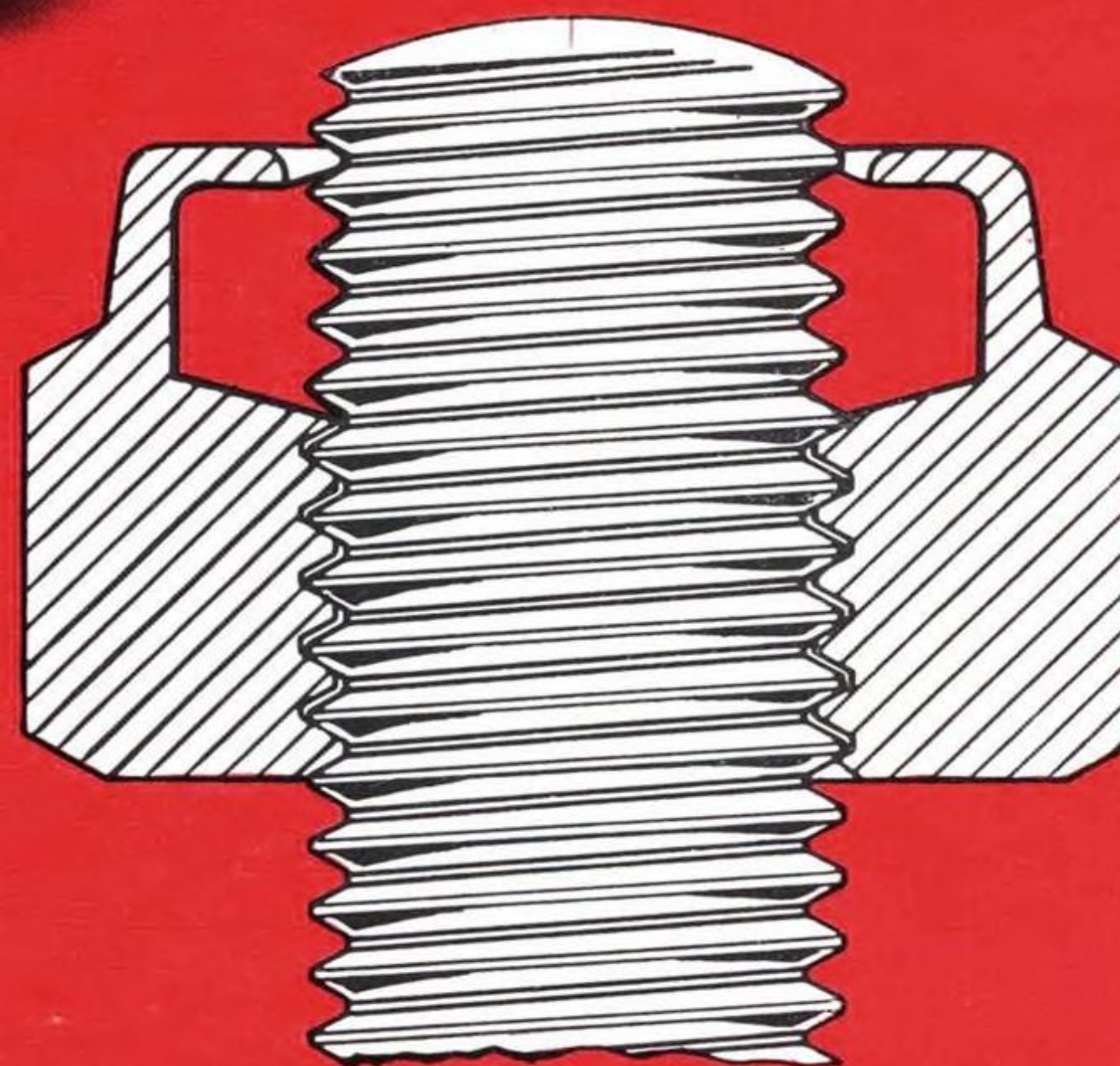
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