

# AVIATION WEEK

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NOV. 15, 1954

50 CENTS



## **Boeing selects Honeywell Pressure Ratio Indicator for the B-52**

This new Honeywell development features remote indication of engine pressure ratio, using the proved "force rebalance" principle. Measuring the *ratio* of engine inlet pressure to exhaust pressure with an accuracy of  $\pm .02$  units of ratio, this new indicator assures the B-52 pilot of easy, accurate take-off power checks, more economical cruise performance.

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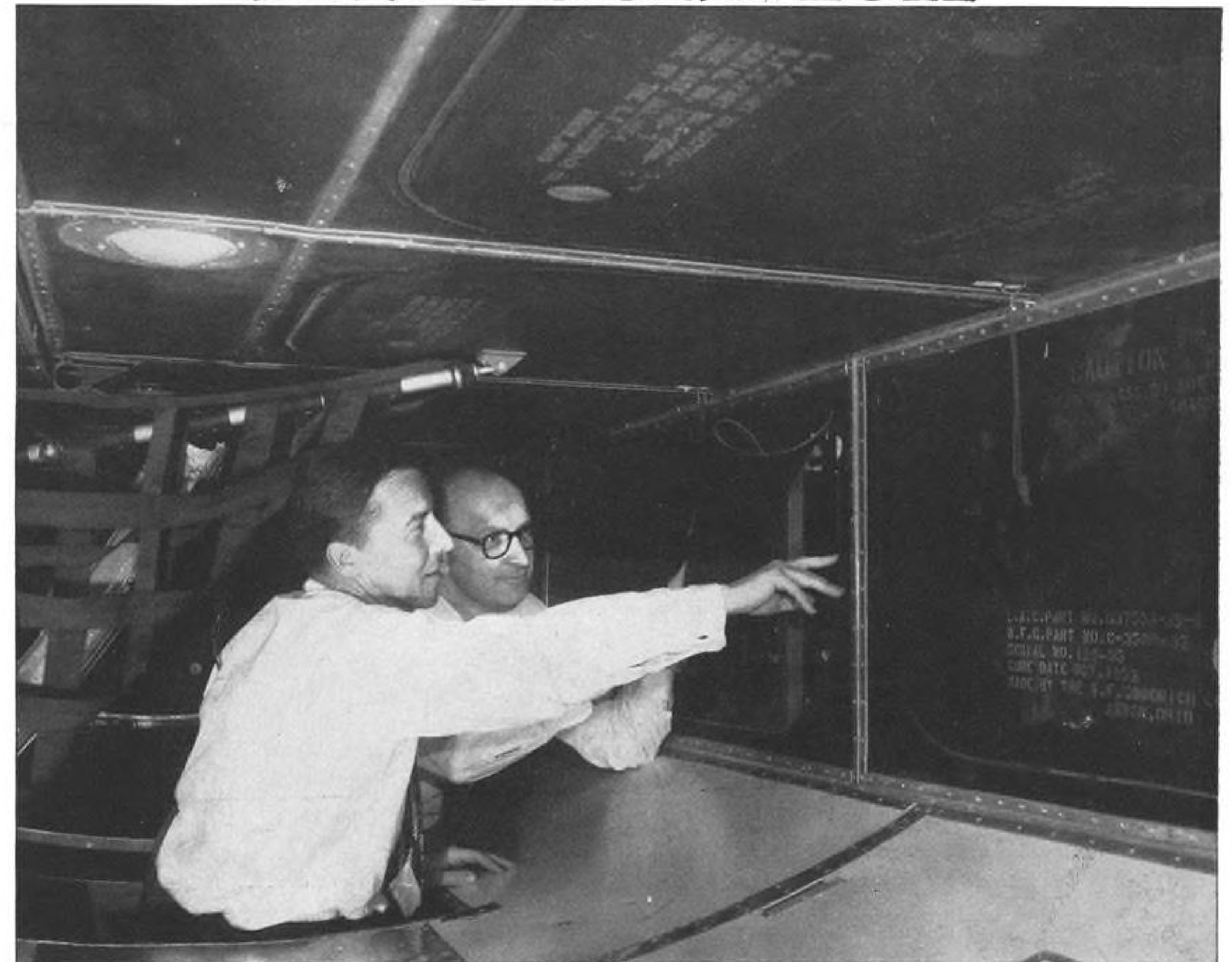
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RESEARCH KEEPS

# B.F. Goodrich

FIRST IN RUBBER



## New baggage panel is air-tight yet easily opened, strong yet flexible

PLANS for Lockheed's Super Constellation called for two big baggage compartments in the lower section of the fuselage. But the panels lining the compartments presented some tough engineering problems.

These panels had to seal out air to meet CAA safety regulations. Yet made to open fast for servicing equipment in 33 places. Flexible enough to fit around tricky contours. Yet strong and abrasion resistant enough to take the impact and scuffing of shifting baggage, and resistant to oil, flame and aging.

It seemed like an almost impossible job—even for rubber. Called in by Lockheed, B. F. Goodrich engineers went after the answers. First, they made the

panels out of a glass fabric combined with a special rubber compound. Not only did the panels prove age-resistant, oil-resistant and flame-resistant, they had the necessary flexibility, wear-resistance and strength. They even passed a severe "guillotine test" that simulated the impact of heavy, sharp-cornered baggage.

Then B. F. Goodrich Pressure Sealing Zippers were added to the panels. The zippers' overlapping rubber lips provided a pressure-tight seal against air. Yet they are zipped open quickly and easily to let maintenance men get at equipment on either side and over the compartments.

The new panels completely filled the bill. The picture above, taken from

inside a Super Constellation's baggage compartment, shows panels lining one side and top.

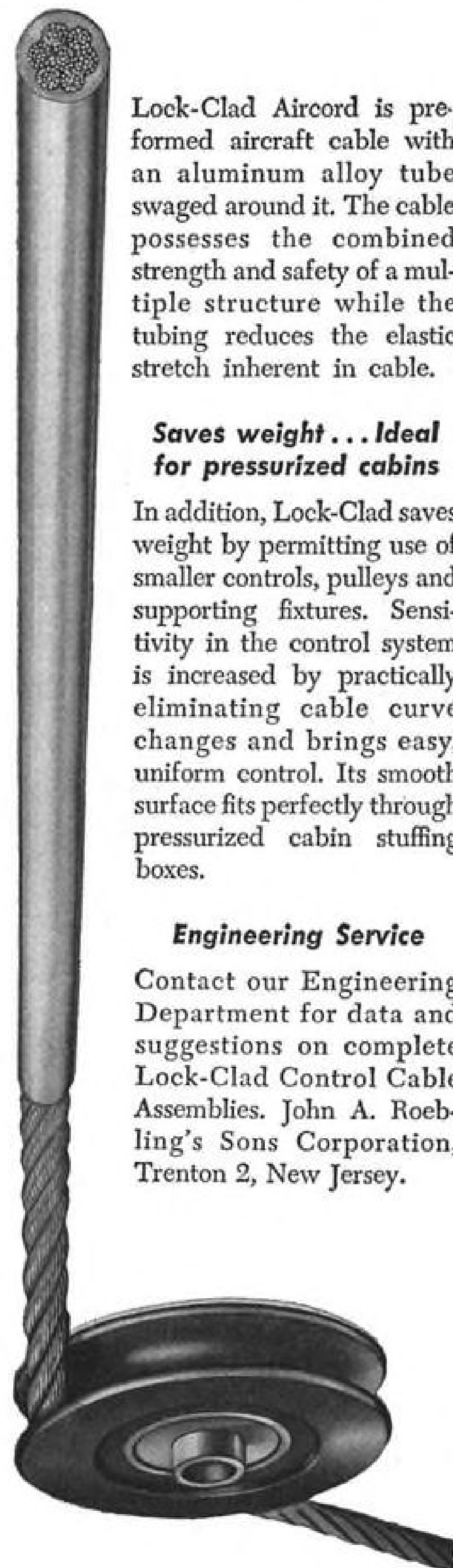
This is one more example of how B. F. Goodrich rubber research and engineering can solve the most difficult aviation problems. B. F. Goodrich products for aviation: tires, wheels and brakes; heated rubber; De-Icers; Avtrim; Pressure Sealing Zippers, inflatable seals; fuel and oil cells; Rivnuts; hose and other accessories. *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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# Aviation Week

NOVEMBER 15, 1954

VOL. 61, NO. 20

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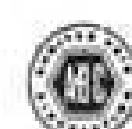
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## NEW AiRESEARCH GAS TURBINE COMPRESSOR

# Starts Jet Engines in Seconds



This new AiResearch gas turbine compressor (GTC85) will start the latest 10,000 lb. thrust jet engines within seconds.

Mounted on a Jeep for easy transport, it is shown starting one of the latest U. S. interceptors, the Convair F-102.

The AiResearch GTC85 has fully automatic controls. Its two stage compressor is surge free—even from full

bleed to no bleed. It can be restarted instantly after switch-off in case of afterfire in the main engine. It has proven itself at high altitude, in desert heat of 130° F., and in Arctic temperature of —65° F.

In addition to the starting power, the AiResearch GTC85 can supply power and heat for ground refrigeration, ice removal, cabin preheat and for ground testing of ram air turbines.

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Hundreds of AiResearch gas turbine compressors are now operating in the field. In the last ten years, AiResearch has accumulated more operational, engineering, production and testing experience in small gas turbine compressors than any other manufacturer. Model GTC85 reflects the improvements and increased reliability of this long production and service period.



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AVIATION WEEK, November 15, 1954



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## NEWS DIGEST

### Domestic

Mach 10 speeds could be reached by experimental sleds if the supersonic research track at the Naval Ordnance Test Station, Inyokern, Calif., were extended to its full proposed length of 11 mi., say personnel at the facility. Present length of 4.1 mi. is designed for speeds up to Mach 3.5.

First ramjet engine to win Civil Aeronautics Administration certification is Hiller Helicopters' 8RJ2B, designed by the Palo Alto, Calif., company for rotary-wing aircraft. The 45-hp. powerplant also is the first engine approved for tip mounting on copter rotor blades.

F-86D flight simulator has been developed by Rheem Manufacturing Co., Philadelphia, and Air Research and Development Command as a fixed-gunnery trainer for USAF.

"Substantial interest" in Marquardt Aircraft Co., Van Nuys, Calif., has been acquired by Olin Mathieson Chemical Corp. through an arrangement with Laurance S. Rockefeller & Associates, a principal Marquardt stockholder.

North American F-86s were grounded last week at the USAF gunnery school at Nellis AFB, Las Vegas, Nev., after two of the jet fighters crashed on the same day. One of the crashes involved an F-86H, the other an F-86F.

Air Commodore G. D. Stephenson, 44, commandant of Britain's Royal Air Force Central Fighter Establishment, was killed last week in an F-100 crash at Eglin AFB, Fla.

Lightplane builders shipped 232 utility and executive planes valued at \$4,935,000 during September, bringing the total for the first nine months of 1954 to 2,383 at \$32,157,000 Aircraft Industries Assn. reports.

Fiberglass business planes are being built by Taylorcraft at its Conway, Pa., plant, may be certificated and on the market in three to four weeks. The Ranch Wagon, powered by a 225-hp. Continental, will carry a price tag of about \$9,000. The Skyliner, with a 145-hp. Continental, is estimated at \$6,000.

### Financial

Boeing Airplane Co., Seattle, reports net earnings of \$27,199,384 from sales totaling \$771,511,226 for the first nine months of 1954, compared with a net



### Smokeless Rato 'Kicks' Neptune Bomber Aloft

Stubby flames flash from the four Rato bottles on the starboard side of this Navy Lockheed P2V-6B Neptune patrol bomber as it makes a rocket assisted takeoff minus the usual clouds of smoke common to earlier types of Rato gear. This performance was given at Patuxent River NAS, Md., where a training movie was made of the new procedure.

of \$13,576,164 and \$656,163,328 in sales for the same period of last year. The company has declared a regular quarterly dividend of 50 cents plus a 624-cent special, payable Dec. 10 to stockholders of record Nov. 19.

Lockheed Aircraft Corp., Burbank, Calif., had record earnings of \$17,143,000 for the first three quarters of 1954, up 37% from the same period a year ago and \$1,681,000 higher than 1953's total. Sales climbed to a new high of \$581,628,000, compared with \$579,251,000 for last year's first nine months. Backlog Oct. 3: \$1,031,062,000, dropping \$140 million from mid-year.

United Aircraft Corp., East Hartford, Conn., reports a net income of \$18,804,884 for the first nine months of this year from shipments of \$487,494,486. This compares with a net of \$15,873,870 and \$579,605,870 in sales for the same period of 1953. Backlog Sept. 30: \$1,225 million, an increase of \$100 million since June 30.

Republic Aviation Corp., Farmingdale, N. Y., increased its backlog from \$918 million to approximately \$1 billion during the third quarter of this year. Net earnings for the first nine months totaled \$6,167,055 from sales of \$225,834,526, compared with a \$6,105,199 net and \$308,159,201 in sales for the same period of 1953. The company has declared a semi-annual dividend of \$1 plus 10% in stock, payable Dec. 17 to holders of record Nov. 24.

Chance Vought Aircraft, Inc., Dallas, had a net income of \$5,154,737 for the first nine months of 1954 from sales

totaling \$111,671,502. Backlog Sept. 30: approximately \$248 million, a drop of about \$35 million from mid-year.

Fairchild Engine & Airplane Corp., Hagerstown, Md., reports earnings of \$3,155,000 for the nine months ended Sept. 30, compared with \$3,486,000 for the first three quarters of 1953. Sales dropped to \$102,550,000 from \$128,874,000. Fairchild will pay a 20-cent dividend on common stock Dec. 1 to holders of record Nov. 15.

Bell Aircraft Corp., Buffalo, N. Y., has split its stock two-for-one, will pay a dividend of 75 cents on each share Dec. 20 to holders of record Nov. 30.

### International

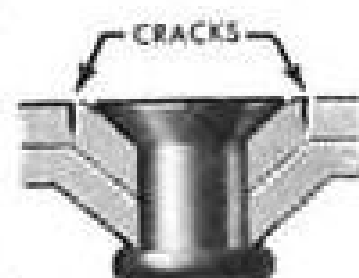
Canadian aircraft builders are assured a production program of at least eight years, with the government as their principal customer, the Air Industries & Transport Assn. of Canada reported last week at its annual meeting at Quebec City.

Canadair Sabre 6 now is coming off production lines at the company's Montreal plant. The latest jet fighter, built under license from North American Aviation, is powered by a newer, more powerful Orenda engine than in previous models.

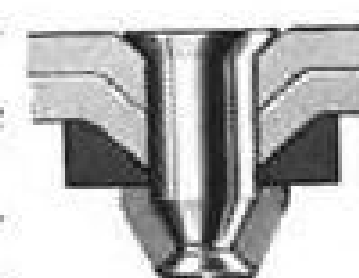
Longrange version of a Canberra bomber has made the first Royal Air Force jet exploration of the North Pole—flying 3,025 mi. nonstop from a Norwegian base, reaching an altitude of more than 52,000 ft. and encountering a minimum temperature of minus 76F.



Uneven driving forces  
during rivet installation  
can crack skin panels.  
Rework is costly.



Using regular HI-SHEAR  
pins and collars, a  
countersunk strip can be  
added to seat the collar.  
This adds another  
part and weight.



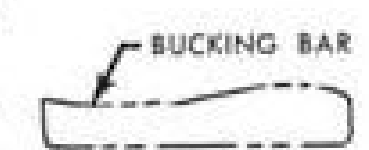
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Now, your structure design can be more  
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to match the sub-dimple  
and obtain HI-SHEAR  
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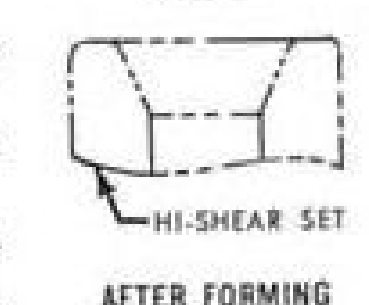
The HS53 24ST collar is  
used with alloy steel  
HI-SHEAR pins, i.e.  
HS51P; the HS54



A17ST collar accommo-  
dates the HS25 75ST pin.



Standard HI-SHEAR Sets  
form the collar to the pin  
with less force than  
required to upset DD



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## Washington Roundup

### New Amortization Plan

Curtiss-Wright Corp. president and board chairman Roy Hurley has presented a new plan to the Pentagon for rapid amortization of production facilities against cost of defense products. Hurley's study, using as an example one part of a J65 turbojet engine, indicates that the purchase of \$400,000 in modern machine tools would cut its cost from the current \$28 to \$11 and result in saving \$1 million annually on production of this single item.

Hurley proposes that Curtiss-Wright be allowed a five-year amortization on this tooling as a cost allowance and indicated Pentagon reception to this principle was favorable.

Hurley says the aircraft industry, particularly engine builders, is now saddled with large quantities of obsolete machine tools that boost production costs, and badly needs a method of privately financing new and more efficient production tools. He proposes that the Pentagon allow industry to retain part of the saving that could be effected through better production methods by use of a target-incentive type production contract.

### Foreign Overhaul Demand

Because foreign customers lack American dollars, there is a growing demand for engine overhaul services in other countries performed under CAA certificates. The foreign repair station certificate is granted, however, only where it can be shown that U.S.-owned aircraft fly in and out and are in need of service. On this basis, U.S. certificated repair depots in such remote spots as Bangkok and Hong Kong. Overhaul firm in Venice is seeking a certificate. Current popular spot for new overhaul facilities: Mexico.

### German Air Requirements

German air force planners are interested in four top-priority equipment items for the defense of Western Germany, according to sources recently returned from Europe. They are, in order of priority:

1. **Anti-missile guided missile.** German air planners regard the Russian missile as the most important threat. Russians are known to be developing missiles with a range up to 1,500 mi. and have perfected a longer-range, V-2-type ballistic missile.

2. **Modern radar network,** providing 360-deg. coverage. Germans point out range of existing Russian jet bombers would make it simple to fly around a standard radar fence and approach from the flanks and rear. Thus they will need radar coverage of all possible approaches.

3. **Anti-aircraft missile** with a range of about 40 mi. Longer range is not believed necessary because of the limited warning time available from radar networks.

4. **Vertical-takeoff and-landing fighters.** Germans conclude that permanent airfield facilities are the most vulnerable targets in Europe, so they are interested only in fighter aircraft that can operate without runways and fixed ground installations.

Best estimates are that it will take the German aircraft industry about three years to swing into significant production.

### Washington Airport Study

The controversial question of additional airport facilities for the nation's capital has been turned over to the

President's Cabinet Committee on Transport Policy and Organization. Senate Interstate and Foreign Commerce Committee has postponed its investigation of the matter, until the top policy group makes its recommendation by Dec. 1. The Senate investigation was launched at the request of John Butler of Maryland, whose delegation has fought for use of Baltimore's Friendship Airport as an alternate Washington facility and has blocked construction of a new airport in Virginia.

### Small Business Fireworks?

Look for Senate Small Business Committee to open fire soon on Defense Department small business programs. USAF probably is less vulnerable than other services, being able to show that small business procurement in fiscal 1954 maintained a good percentage while total USAF budget dropped precipitously from fiscal 1953 (AVIATION WEEK Sept. 27, p. 19). At the same time, the dollar slash has aroused small firms and resulted in their organizing to present a solid front in Washington.

Senate committee is circulating figures for overall Defense Department procurement in fiscal 1954 with comment that it does not consider the percentages "especially encouraging." It speculates further that the dip "may indicate shortcomings in the operation of the small business programs of the military services and the Small Business Administration."

Senators also have their eyes on "the withdrawal of much subcontracting work from small shops by large prime contractors who processed larger percentages of their contracts in their own plants." USAF has been fighting this trend and is determined that AMC, not the prime contractors, will decide what constitutes a satisfactory production base.

### Machine Tool Outlook

Pentagon plans to buy about \$400 million in machine tools during fiscal 1955, most of them for aircraft production. Of this total, \$300 million will be to finance tools required for new production programs such as the Convair B-58 bomber, second-source production of the Boeing B-52 at Wichita, Lockheed F-104 fighter, etc. Remaining \$100 million will be for machine tool reserve.

### New Seaboard Delay?

Prevalent opinion is that Secretary of Commerce Sinclair Weeks is pressing President Eisenhower to defer decision on the controversial case of Seaboard & Western Airlines' application for an all-cargo certificate, pushing the idea it should be deferred to a special committee for "further study."

It is no secret that Weeks strongly opposes certification for the all-freight carrier, and a committee study would furnish him with further "delaying action."

### Underground Installations

Watch for a trend toward underground plants, repair facilities and storage depots. Some industry leaders recently in Europe are disturbed over U.S. failure to follow the example of Sweden in putting important installations underground. Old limestone mines, they say, would make excellent locations.

—Washington staff



# INDUSTRY OBSERVER

► Two British firms are developing rocket-powered interceptors as private ventures. They are A. V. Roe at Manchester and Saunders-Roe at Cowes. These interceptors will use rocket power for climb and combat and return on turbojets. Royal Air Force and British Ministry of Supply are exhibiting the same disinterest in these projects that they showed for the Folland Gnat lightweight interceptor.

► USAF decision on the future production of the Convair F-102 delta all-weather interceptor will hinge on flight tests scheduled next month at Edwards AFB, when this fighter is scheduled to reach Mach 1.2. Current F-102 speed peak is Mach .98 using afterburner on its Pratt & Whitney Aircraft J57 turbojet.

► Grumman S2F anti-submarine planes are undergoing a modification program involving 40 fixes aimed at reducing tail vibration problems and making the plane suitable for barrier crashes aboard carrier decks. S2Fs in service with the Pacific Fleet have completed their modifications at the Navy's Litchfield Park, Ariz., facility. Atlantic Fleet planes now are going through modification at Navy's Quonset Pt., R. I., shop.

► USAF now is checking out pilots on supersonic flight at Edwards AFB in the Bell Aircraft X-1B research aircraft, a sister ship of the X-1A that has reached Mach 2.5 and an altitude over 90,000 ft. X-1A is back at the Bell plant for installation of a specially designed ejection seat. Meanwhile, Bell X-2 stainless steel research aircraft is undergoing ground running of its Curtiss-Wright 12,000-lb.-thrust throttleable rocket engine preparatory to flight testing.

► Glenn L. Martin Co. has a new Navy missile contract for development of the Bullpup, an air-to-surface missile designated XASM-7.

► Navy's Bureau of Aeronautics is experimenting with both the British flexdeck and the French skid landing methods at its Patuxent River, Md. Test Center. Convair recently was awarded a contract for operational studies of the flexdeck rubber mat landing system.

► Glenn L. Martin Co. has received a new USAF contract for 57 B-61A Matador surface-to-surface missiles. Value: \$5,134,511.

► Douglas DC-7B is now at the company's Tucson, Ariz., facility for vibration tests. Douglas plans to use the former Grand Central Aircraft modification center at Tucson for modification programs for B-66-type aircraft.

► General Electric's J79 turbojet is being considered for installation in the Lockheed F-104 supersonic day superiority fighter. Negotiations are under way for a small quantity of J79s, which feature a variable stator compressor, for the F-104 program.

► Convair is joining the parade of VTO designers using jet power. San Diego division has a jet-powered VTO in the design stage and has studied rocket power applications for VTO fighters.

► Curtiss-Wright Corp. has been studying the application of derated turboprops to current Lockheed Constellation and Douglas DC-7 airframes for airline transport operations. Curtiss concludes that turboprops now available could be operated commercially at lower power ratings at about the same ton-mile cost of piston engines and would provide a much faster climb and cruise speed.

► Army is experimenting with a helicopter towing rollers to clear mine fields in the path of advancing infantry. This is an adaptation of the Navy helicopter minesweeping technique.

► Highspeed dart tow target for high altitude jet-fighter gunnery evaluation has been developed by the Naval Ordnance Test Station, Inyokern, Calif. Hook-equipped jet aircraft picks up the 2,000-ft. nylon towline and dart by the target-snatch method.

# WHO'S WHERE

## In the Front Office

Horace Brock, former manager of Pan American World Airways' Atlantic Division, has been elected a vice president of New York Airways.

Victor H. L. Duboucq will move up in KLM Royal Dutch Airlines Feb. 1 from vice president in charge of the Western Traffic Group to managing director of the West Indies Division, succeeding M. Koster, who will retire.

Ronald D. Gumbert is new president and member of the board of Alloy Precision Castings Co., Cleveland.

James F. Tooley, comptroller for Canadair, Ltd., Montreal, has been elected a vice president. Also promoted: John Urwin, acting secretary and treasurer.

E. Douglas Reddan, onetime western aviation sales manager for Walter Kidde & Co., has been appointed a vice president of Electronics Corporation of America's Fireye Division, Boston, Mass.

R. V. Carleton, vice president-operations of Braniff International Airways, and W. W. Flenniken, independent Denver oil man, are new members of the airline's board.

## Changes

C. Hart Miller, former president of Piasecki Helicopter Corp., has joined Northrop Aircraft, Inc., Hawthorne, Calif., as assistant to vice president John W. Myers.

R. M. Kendall has become general manager, Rolls-Royce of Canada, Ltd., Montreal.

C. D. Manhart has been appointed general manager of the aircraft section of Bendix Aviation Corp.'s Products Division, South Bend, Ind.; W. L. Webb is general manager of the missiles section.

Buell A. Patterson, former public relations director for Pan American Grace Airways, has joined McCann-Erickson, Inc., New York, to handle the agency's new Vickers-Armstrongs, Ltd., account.

John A. Drake has been promoted by Marquardt Aircraft Co., Van Nuys, Calif., to director of longrange planning and research programs. Other promotions: John S. Winter, chief engineer-powerplants; Leigh Dunn, chief engineer-test facilities; John S. Liefeld, manufacturing director.

Thomas P. Lombardo is new engineering and sales manager for Dallas Aero Service, Dallas.

Dr. Bodo M. Wolfram, former electronics research specialist for North American Aviation, has been appointed chief engineer of Magnetic Research Corp., El Segundo, Calif.

## Honors and Elections

N. E. Rowe, technical director of Blackburn & General Aircraft, Ltd., next May will become 1955-56 president of Britain's Royal Aeronautical Society.

Warrant Officer Billy T. Wester has received a commendation ribbon from Gen. Matthew Ridgway, Army chief of staff, for setting a 156,005-mph. helicopter speed record in a Sikorsky XH-39 (AVIATION WEEK Sept. 6, p. 16).



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*The New U.S. Air Force—Roger Lewis Outlines Policy . . .*

## USAF Buying Test: Proved Performance

- Materiel Secretary asks for big technical jumps.
- Aircraft industry faces tougher competition.

By Robert Hotz

Air Force is looking for rapid new technical developments and aircraft industry management with courage to push them hard during the next phase of USAF procurement, Roger Lewis, Assistant USAF Secretary for Materiel, told AVIATION WEEK in an interview.

Tougher competition for USAF business, more emphasis on proved performance of new equipment before large orders are placed, tighter contracting procedures and heavier emphasis on individual aircraft firm's past performance in evaluating their future procurement awards also are among the trends in USAF-industry relations, according to Lewis.

► **Way to Superiority**—"We are now in sight of the end of the USAF inventory-buildup stage," Lewis said. "And we are soon to be faced with a new and perhaps more important problem: the consolidation and maintenance of our airpower superiority in a time of fluid and rapidly advancing aerial technology coincident with a determined and successful effort on the part of the Soviet Union to narrow the margin of our technical superiority."

Lewis said the following policies would be emphasized during the next phase of USAF procurement aimed at the maintenance of both numerical strength and a significant margin of technical superiority:

- **Large and rapid technical advances.** USAF no longer can afford to buy small technical improvements or modifications in new equipment. It must shoot for big and rapid technological improvements and is being forced to find methods of cutting down normal development cycles on new equipment to stay ahead of its foreign competition.
- **Tougher industry competition.** Lewis warned that the days of "buying everything from everybody," as in the Korean crash program, definitely are over. USAF will buy only products whose performance has been proved superior in actual

demonstrations rather than in fancy sales brochures.

- **Tighter contracting procedures.** Lewis said follow-on contracts for equipment already in production had been carefully scheduled throughout fiscal 1955 to be placed at the exact time they are necessary to insure proper lead time. This will give industry and USAF more time to negotiate firm and clearer contracts for these orders with much greater detail on what is required from both buyer and seller.

Trend is toward more fixed-price contracts, with cost-plus-fixed-fee contracts being reserved for research and development items. Letters of intent still will be used when necessary to get new projects under way but now are being used sparingly.

- **Weapons system development.** "We are in the aerial weapons business," Lewis said, "not the airplane business. Development and production of complete aerial weapon systems is an absolute must." He indicated USAF had begun sorting out the problems between prime contractors, sub-system developers and equipment producers and would exercise more control over these relations than originally planned.

• **Industry management performance.** USAF has been screening its existing procurement programs for 18 months,

### USAF Procurement Phases

USAF procurement has been characterized by three distinct phases since organization of a separate Air Force in 1947, according to Roger Lewis, Assistant USAF Secretary for Materiel.

The first, which had its roots in post-war mobilization, lasted until 1950. It was marked by a sickly aircraft industry that had lost much of its technical and production personnel and facilities. Technical development reached almost complete stagnation in 1947-49 when no funds were available for new, experimental prototype aircraft. Lewis believes one of the most serious effects of this period was the industry's belief that defense business was finished.

Second phase began with outbreak of war in Korea. It was marked by frantic industrial mobilization and expansion as USAF sought to increase its numerical

strength, modernize its equipment and stimulate technical development all at once. This phase now is ending with a strong and productive aircraft industry supported by an adequate research and development program.

Third phase, to begin shortly, involves maintaining USAF numerical strength plus a significant margin of technical superiority over the Russian air force.

This phase will require the support of an aircraft industry smaller than the post-Korean peak but many times the size of the pre-Korean industry. It must be backed by a continuing strong research and development program and a new type of industrial mobilization base.

Since USAF was organized in 1947, it has spent \$65 billion—the equivalent of a \$1,500 contribution from every family in the United States.

evaluating actual performance of aircraft and equipment manufacturers against their promised performance. A management "character" factor based on this evaluation will guide future USAF procurement awards and evaluation of competitive proposals.

- **Delivery of combat-ready equipment.** USAF no longer can afford to withdraw large quantities of aircraft from combat units for retroactive modifications or to ground them for lack of essential equipment. USAF will be more critical of industry on weapons systems combat-readiness.

• **Dynamic industrial mobilization.** Traditional concepts of industrial mobilization used for World War II and Korea are outmoded by current requirements for a system that will provide equipment for both a short intense atomic war and limited fringe wars of longer duration. USAF barely has tackled this critical problem, but it is convinced that a dynamic type of mobilization planning—subject to constant revision in light of technical change—is necessary to replace present concepts.

Lewis told AVIATION WEEK that USAF faces three principal problems as it begins shifting from the inventory buildup phase of procurement to the maintenance of air superiority for the foreseeable future:

**"killer instinct"**

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**ARMA** ADVANCED ELECTRONICS FOR CONTROL



1. Maintaining USAF combat units in a high degree of combat-readiness for an indefinite period of time into the future.

2. Developing a technically and financially sound equipment replenishment program for a USAF inventory that will avoid future obsolescence.

3. Reorienting industrial mobilization potential to meet the new problems of atomic war.

## Combat-Ready Force

"The Air Force we now have must be maintained in an extremely high and continuous state of combat readiness," Lewis said. "This is quite different from the way we maintained our airpower before World War II and Korea, and it may come as a surprise to some members of industry who wonder why we don't pull aircraft out of service to incorporate modifications or why we aren't more adventurous in depending on a new piece of equipment before it is actually tested and determined ready for combat units."

"The fact is we can no longer pull large numbers of aircraft out of combat units for modification programs because it would leave critical gaps in our combat-ready Air Force in being. We will continue to crank 'state-of-the-art' improvements into combat aircraft types to prolong their useful life as first-line planes, but this will have to be done in an orderly, well-planned program that will coincide with normal maintenance cycles and not disturb the fighting strength of combat units."

"An airplane on the ground because it lacks spare parts or electronic gear that is not operational or the machine that is unflyable because of technical problems is just as much a loss to the Air Force as if it were shot down in combat. We are going to be increasingly critical of weapons readiness in our relations with the industry that supplies us."

"The reliability and degree to which industry supports its products are taking their places alongside the sales brochure and the pious promise and will increasingly dominate the thinking of our procurement specialists."

► **Long-Pull Defense**—Lewis said the job of applying the concept of equipment replenishment into USAF procurement and operational planning now constitutes a major effort of materiel personnel.

"We must have an orderly and rapid equipment replenishment program," he said. "Perhaps one of the most important contributions President Eisenhower has made to date is his firm establishment of the 'age of peril' concept and the policy of building our defense in sufficient strength for a long pull rather than to meet an immediate



LEWIS: Shoot for big and fast gains.

crisis. Without this concept we would have had an obsolete Air Force in a few years.

"Despite the rapid and spreading technological progress already seen for the future, it is possible to predict and plan on the reduction of these developments to usable hardware and their incorporation into the USAF weapons inventory. Some of these development cycles are long and we must plan at any given time for a series of improvements. But the absolute necessity of keeping the quality of our weapon systems at their maximum in performance and availability is such that we have no alternative but to devote the best minds of science, industry and the military to this job."

► **Russian Competition**—Lewis emphasized that the competition from Russia in this technological race had never been stronger.

He said USAF would have to spend its money on major technical improvements in weapon systems and is looking for industry management with the courage to tackle these admittedly tough development problems rather than pursuing what has been a more certain course of prolonging standard

## USAF Strength

USAF now has 119 wings completely equipped and in combat-ready status.

The aircraft industry is scheduled to complete deliveries required to provide equipment for USAF's authorized strength of 137 combat wings plus National Guard and reserve units by the middle of 1956.

Deliveries to USAF after fiscal 1956 will be primarily for maintaining and modernizing authorized combat strength.

production items with minor improvements.

He predicted that major USAF weapon systems procurement will go to the strong technical-management industrial teams combining technical skill with courageous management.

## Mobilization Philosophy

On industrial mobilization Lewis said: "The longrange airplane and thermonuclear weapons have raised the possibility of a short, big war but have not removed the possibility of either long or small wars. As a result of our efforts of the past four years we have a great industrial structure for the production of current types of aircraft engines and equipment. But like the airplanes themselves, these structures have a tendency to get out of hand if they are not looked after."

"We now have the problem of making certain we have an industrial structure which is not only responsive to our needs in the 'age of peril' but one which is of the size and composition to react properly and with the kinds of weapons required at the moment of crisis."

"Not only must we keep that structure at the size and in the degree of health we need but we must also be sure that its composition will change with our developing technology, that new products and industries are welcomed into it and that the old and useless are moved aside."

"This is admittedly a difficult problem and we are just beginning to really come to grips with it."

"One aspect of the mobilization base which we feel needs particular attention is that of dispersal. It is vital to the security of the country that our industrial airpower potential is distributed as much as possible across the country."

## New Competition

Lewis warned the industry that tougher competition for USAF business lies ahead and voiced his belief that this will produce better aerial weapon systems faster and more economically than the crash-type program of "buying everything from everybody."

"The prime assets of the United States, as the spiritual and economic leader of the nations embraced in western civilization, spring from our personal freedom, our free enterprise and competitive system," Lewis said. "It is these things that permit us to make the most of the great scientific and technical assets of our age and give us the swift industrial responsiveness to meet the challenge of aggressors."

"If we are to make the most of these assets, the commitment of public funds for airpower must be based on policies

of competition, opportunity and firmness which make the most of them. Under certain conditions such as the buildup to World War II and the Korean crash program, it is necessary to buy everything from everybody. For even though there may be doubts about our ability to do this or to get that in time or at the price promised, it is more important to get the work than to argue."

"But this should not be our standard operating policy once we have the size and type of weapons inventory we feel we must have. Desirable as such crash programs may be under certain circumstances, carried beyond them they are vicious and destructive to the freedom and competitiveness which is our prime national asset."

► **Faulty Thinking**—He noted three types of industrial thinking that are regrettable:

- "Unfortunately, there is already a tendency in some places to consider that on the basis of pure size there is an obligation on the part of the government to buy whether the product is useful or not."

- "Already there is a tendency in some places toward satisfaction and complacency—a failure to remember that under our system it is often harder to stay on top than to get there."

- "In other places there is a tendency to use blinders—a failure to recognize the great broadening and acceleration of our technological base—a tendency to feel that slight improvements and re-shoeing old horses will keep us superior."

"There is probably no single sure way of making certain that all the great resources of the West can be translated into weapons without delay but those of us responsible for materiel in the Air Force are convinced that until some certain way comes along the application of established American principles is the best system yet devised."

## CAA Orders Changes On Connie Engines

Civil Aeronautics Administration has ordered modification of all Lockheed Constellation engine installations to increase fire resistance.

The action follows a recent engine fire on a Trans World Airlines Constellation during takeoff from Washington National Airport. The airworthiness directive outlines changes to be made on Model 49, 649, 749 and 1049 transports:

- **Flexible hose** in the propeller feathering line between the pump and the governor must be replaced with hose assemblies meeting current fire resistance requirements.

- **Steel plates** must be installed over the lower engine cowling longerons adjacent to the Zone 1 fire seal diaphragm.

## RAE Doubtful on Comet Fuselage

ARB witness says his organization settled for lower proof test requirements than suggested by RAE.

London—Testimony of three technicians last week highlighted the continuing inquiry into the cause of two de Havilland Comet crashes earlier this year:

- **Walter Tye**, chief technical officer for the Air Registration Board, said ARB settled for a less stringent requirement for the design of pressurized cabins than had been suggested by the Royal Aircraft Establishment.

- **Dr. P. B. Walker**, head of aircraft structures at RAE, was quoted in the London Times as saying that—on the basis of a failure after 9,000 hr.—the Comet fuselage was not worth flying at all.

- **Bruno Jablonski**, with long experience in the field of glued-laminated structures, advanced a theory that extreme temperature changes may have weakened the Redux bonding used extensively in the Comet. He also questioned the control of Redux assembling processes to assure the development of maximum bond strength.

- **Proof Tests**—Tye said an ARB meeting was held in 1949 to consider loss of pressurization in high-altitude aircraft and the resulting medical effects. At the time, RAE suggested a fuselage proof test to twice the operating pressure and a design ultimate factor of 2.5. ARB settled on a proof test at 1.33

times the working pressure with a design ultimate factor of 2.0.

Tye added that a proposal first was circulated in June 1953 for tests at 1.25 times working pressure with 15,000 cycles of repeated loads. In that proposal there was a note that designers might have to design to an ultimate factor of three to guarantee the aircraft would stand repeated load tests.

It was ARB's opinion that most fatigue cracks were of the nuisance type and could be detected in time, until the RAE tests were made, Tye said. There was more concern with wing fatigue and the static strength of windows, plastic parts and the metal fuselage shell. But between 1950 and 1952, ARB began to suspect that pressurized cabin life in general was not going to meet operator requirements.

► **Comet Stress**—They were not concerned immediately with the Comet, said Tye, because figures from de Havilland Aircraft Co. showed that no stress on the Comet exceeded 50% of the ultimate. This corresponded to an average life of 10,000 pressurizations, or 30,000 flight hours. Dividing by three would give a minimum safe life of 10,000 hr.

Even after the Elba crash, pressurization was considered as an initial cause at first but later thought unlikely because of the stress calculations. Subsequent inspection of all DH jet transports and a total of 54,000 hr. of repeated load tests on a Comet nose section showed no signs of weakness. Tye pointed out that ARB was surprised at the rate of crack growth demonstrated in the RAE tests.

Tye said he normally would expect less disparity in determination of the complex loading around windows than between the 40% to 50% that DH calculated and the 70% that RAE demonstrated. But he remarked that calculating stress in a plain sheet is easy; the moment structure is attached, the problem is complex and views vary on how to treat the calculations.

► **Test Predictions**—Under cross-examination by a representative of ARB, Walker said no failure occurred in the pressure cabin tests before the equivalent of 9,000 flight hours.

If there had never been an Elba or Naples accident but only the RAE tests, he added, RAE would not have agreed to let the planes fly longer than the approximately 2,700 hr. accumulated on the Naples Comet.

"As a result of those tests we should have regarded the Elba aircraft as defi-

## Big Viscount

A "stretched" Viscount, grossing about 120,000 lb. and powered by new Rolls-Royce R.B. 109 turboprops in the 4,000-shp. class, is on the drawing boards at Vickers-Armstrongs, Gordon R. McGregor, president of Trans-Canada Air Lines, says. The current Viscount grosses about 60,000 lb.

Indications are that the transport's weight will be higher by the time it rolls out, since these projects tend to "grow" during this stage, McGregor says. The R.B. 109, not yet on the test stand, is a "scaled-down" Rolls-Royce Avon turbojet.

McGregor also reports that TCA is not installing autopilots in its Viscounts, although the necessary wiring is fitted in event this decision is reversed later. He prefers pilots to fly the plane "manually" and, since the average TCA Viscount flight will take about two hours, he sees no crew fatigue problems. Trans-Canada is not installing automatic approach equipment or weather radar.



nately in danger and the Naples aircraft as either in danger or getting near to it," the Times quoted Walker as saying.

He was asked what he would estimate as the maximum safe life for a Comet fuselage based on the 9,000-hr. level of failure in the tests.

"I should not have thought it was worth flying at all," Walker replied.

► **Redux Questions**—Although previous testimony had given Redux assemblies a clean bill of health, some pertinent questions were raised by Bruno Jablonski, of Jablo Propellers, based on his long experience with laminated-glued structures.

Jablonski primarily was concerned with the effects of extreme and rapid temperature changes on the strength of Redux bonds. In a rapid climb, he said, there is considerable differential temperature between inside structure and outside air. This could cause skin contraction relative to the fuselage stringers. This would load the joints in shear.

He also noted that under high temperature conditions—as high as 212 F on an aircraft standing on the ground in the tropics—the plastic state of the adhesive and the concentrated loads imposed by landing gear might combine to cause small separations. Subsequent changes in loading and differential temperatures would accentuate these.

► **Increased Strength**—Jablonski was answered by several of the counsels. They pointed out that 47 aircraft use Redux bonding. They said Comets flew more than 30,000 cumulative hours with only one Redux trouble traced to jet efflux vibration.

They also said the peeling strength of Redux increases as temperatures rises, up to 144F. They said the Comet skin-stringer bond was designed for 400 psi. and that the Redux joint in those areas has a shear strength of 3,000 psi.

Bristol Aeroplane Co. fatigue tests with Redux were cited: The tests showed 150 million reversals and finally cracked at a riveted joint. The RAE measured temperature differentials between skin and stringers and found it to be only about 20F.

► **Hanging Fire**—But some of Jablonski's questions remained partially unanswered, in the opinion of a technician observing the inquiry. These points were hanging fire:

- Were the measured temperature differentials the maximums during climb, or steady-state conditions at altitude?
- Did Bristol fatigue tests consider rapid temperature changes?
- How rapidly does Redux strength fall off over 144F?
- Is the use of cumulative hours for all Comets a fallacy?
- Would a margin of eight-to-one strength overload for the skin-stringer connections be meaningless in progressive deterioration of the bond?



SEN. RUSSELL: Conservative critic.



REP. VINSON: "Defense before economy."

## Democrats to Hit GOP Air Policies

Switch in control of Congress may mean effort to restore transport wings, boost missile contracts, fight subsidies.

By Katherine Johnsen

Democratic control of the House and Senate will bring investigations and challenges of the Republican Administration's military and civil aviation programs next year. This is what to expect: Democrats will want to know the reasons for the sharp spurt in contract letting by the Defense Department just before the election. Democratic campaign criticism of the large volume of contracts let to General Motors Corp. seems sure to be revived.

• Democratic opposition to the armed forces goals set by the Administration will focus on the reduction in Army strength and of six Air Force wings to transport land troops. Congress may vote money to increase these forces to meet "rim" aggressions.

Another criticism of the airpower program will be that the Administration has not pushed development and production of planes and guided missiles, has been too slow on contract letting. But Democrats can do no more than bring political pressure for a speedup.

• Spending rate for military aircraft procurement, largely determined by contracts let two or more years ago, is not affected by the election. The Administration has sustained a high spending rate. If it should decide to hold it down by production stretchouts, Democrats can only protest.

• Airline subsidies face even stronger opposition—in the appropriations committees—than they bucked in this year's Republican Congress. The odds are, however, that ultimately Civil Aeronautics Board will obtain what it insists upon.

• Administration's air transport policy recommendations, now being drawn by the Cabinet Committee on Transport Policy and Organization, seem to have little chance of being implemented.

► **The Lineup**—Winners and losers in the election who figure prominently in aviation:

• **Sen. Homer Ferguson**, whose defeat in Michigan by a political unknown, Patrick McNamara, was a surprise. As chairman of the Appropriations Subcommittee on Armed Services, Ferguson was Defense Secretary Charles E. Wilson's staunchest ally on Capitol Hill. He led to support of Wilson's \$5-billion slash in Air Force funds last year.

• **Sen. Leverett Saltonstall**, the Administration's other top congressional spokesman on defense, won in Massachusetts. He is chairman of the Armed Services Committee.

• **Sen. Joseph O'Mahoney's** election in Wyoming returns to the Senate a long-time, vigorous supporter of strategic airpower. He had served 19 years and was chairman of the Appropriations Subcommittee on Armed Services at the time of his defeat in 1952. Since then he has been counsel for North American Airlines.

Democratic control of the House is certain: Democrats, 232; Republicans, 203. Senate control is so close that it is likely to be questionable for several weeks. The lineup now appears to be: Democrats, 49 (including Independent Sen. Wayne Morse); Republicans, 47.

► **Key Men**—These are the men slated to hold key positions on aviation next year:

• **Sen. Richard Russell**, chairman of the Senate Armed Services Committee.



REP. PRIEST: Civil air student.

He is a conservative critic of some of the Administration's defense policies, including last year's cutback in USAF funds and postponement of the buildup.

The more spectacular challenges of Administration defense policies are likely to come from other Democratic committeemen eligible for subcommittee chairmanships, such as Sens. Stuart Symington and Henry Jackson.

• **Rep. Carl Vinson**, chairman of the House Armed Services Committee. Well known for his political effectiveness in promoting strong Naval and air arms, Vinson will insist on a "defense before economy" program.

He spearheaded the opposition to the Truman Administration's cutback in the 70-group USAF program in the late 1940s, working with Symington (then Secretary of the Air Force) and Senate Majority Leader Lyndon Johnson (who was then a member of his committee).

There will be spots for at least two Democratic newcomers on the committee.

• **Sen. Warren Magnuson**, chairman of the Senate Interstate and Foreign Commerce Committee. Magnuson has been firm and outspoken on one commercial aviation matter: opposition to the "single instrument" policy. Magnuson also is on the Appropriations subcommittee that controls the purse strings for CAA and Civil Aeronautics Board. He sponsored Joseph Adams for CAB membership.

There will be two Democratic spots to be filled on the Commerce Committee.

One Republican member, probably Sen. Frederick Payne, is destined to lose his post.

• **Rep. Percy Priest**, chairman of the House Interstate and Foreign Commerce Committee. Formerly an aviation writer for the Nashville Tennessean, Priest has taken an active interest



SEN. MAGNUSON: Chosen instrument foe.

in the development of civil aviation in general.

Democrats will have at least seven vacancies on the committee for new members.

• **Sen. Dennis Chavez**, the prospect for chairmanship of the Appropriations Subcommittee on the Armed Services, has taken a back seat up to now on defense money matters. He wants the post.

Under the seniority system, Sen. Carl Hayden or Sen. Richard Russell could claim it. But Hayden is expected to bypass it in favor of chairmanship of the Subcommittee on Interior Department Funds and Russell in favor of chairmanship of the Subcommittee on Agriculture Funds.

• **Rep. George Mahon** returns as chairman of the House Appropriations Subcommittee on Armed Services, a post he has filled in past Democratic Congresses. He led last year's unsuccessful House move to restore USAF funds clipped by the Republican Administration.

• **Sen. Harley Kilgore**, critic of airline subsidies, will be the key man and probably the chairman of the Senate Appropriations Subcommittee on Commerce, which controls CAA and CAB funds.

This summer he supported \$40 million to finance airline subsidy payments until next February. But at the time he said he wanted more information on subsidized airlines before voting funds for the February-July period. He seeks data on expense accounts, payments to legal, advertising and other outside firms and on subsidiaries such as hotels, which might be financed with subsidy.

• **Rep. John Rooney**, with a long record of voting for slashes in civil aviation funds, will again head the House Appropriations Subcommittee on Commerce.

This year, over Republican protests,

he led two attempts to cut back the \$40-million allowance for airline subsidies to \$23 million—or \$50 million below CAB's request for \$73 million. Rooney's is the first subcommittee CAB will confront in seeking additional subsidy money early in January.

• **Sen. John Sparkman**, the nonskeds' influential spokesman on Capitol Hill, will be back as chairman of the special Senate Small Business Committee.

## Bendix to Produce British Decca Navaid

Pacific Division of Bendix Aviation Corp. has acquired the U. S. manufacturing and sales rights to the British Decca navigation system, frequently mentioned as a likely navaid for helicopter airways.

The low-frequency Decca Navigator provides low-altitude coverage without blind spots encountered in present VHF omniranges, an important consideration for low-flying copters.

Bendix-Pacific will re-engineer Decca to U. S. standards and plans to build the ground station equipment, airborne receivers and the flight log that displays aircraft position on a continuously moving map.

► **Copter Tests**—A helicopter version of the Decca Navigator is expected to weigh around 36 lb., including the plotter and instrument position indicators, a Bendix spokesman says.

One such installation has been flight tested in England by British European Airways in a Bristol Sycamore helicopter and has attracted favorable interest from both American and European transport helicopter operators (AVIATION WEEK Oct. 11, p. 100).

Several helicopter spokesmen, including Frank Piasecki, have called the Decca system "promising" (AVIATION WEEK July 12, p. 46).

► **Large Area Coverage**—A Decca installation, consisting of a chain of four ground stations sited approximately 70 mi. apart, reportedly can provide navigation service for a 125,000-sq.-mi. area for both aircraft and surface ships.

Developed during the war by Decca Navigation Systems Ltd. of London, the British system was a postwar competitor to VOR-DME for an international standard. The Decca system currently is serving the British coastal areas and Western Europe, and there are plans to expand it to the Mediterranean area.

A recent report by the Air Coordinating Committee's Air Traffic Control and Navigation Panel says Decca's low-frequency operation, which gives it the desirable low-altitude coverage, also makes it more susceptible to precipitation static as well as to propagation disturbances.





CONVAIR XFV-1 VTO fighter was the star of Navy's show. It gave newsmen their first view of how it makes transition from vertical takeoff to normal flight (above) to landing.



DOUGLAS XA4D-1 SKYHAWK shows weight savings: seat at left has 240 parts, weighs 98 lb.; A4D's seat has 80 parts weighs 40 lb. Conventional complex avionics gear (center) has been completely repackaged for Skyhawk (right) at saving of 48 lb.

## Navy Shows Off Newest Aircraft

By William J. Coughlin

Los Angeles—Navy has displayed some of its newest aircraft in a three-day press tour highlighted by the first public demonstration of Convair's XFV-1 vertical-takeoff fighter in full flight.

Appearance of new jet, turboprop and VTO aircraft emphasized the modernization of the Navy's air arm now underway.

The exhibition was marred by the dramatic midair breakup of Convair's YF2Y-1 Sea Dart before 100 newsmen, photographers, television and newsreel cameramen (p. 20).

► **Navy Lineup**—Other Navy aircraft shown to the press included Convair's R3Y-1 and R3Y-2 turboprop seaplanes; Lockheed Aircraft Corp.'s P2V-7 Neptune, WV-2 early warning radar aircraft and turboprop R7V-2 Super Constellation; Douglas Aircraft Co.'s A4D midjet A-bomber and F4D Skyray intercepter, and Chance Vought's F7U-3 Cutlass.

Among the more familiar aircraft in the aerial displays were the Douglas AD-6 Skyraider, McDonnell F2H Banshee and Grumman F9F-5 Panther.

A scheduled flight appearance of the Douglas A3D Skywarrior was canceled due to engine difficulties, and newsmen

missed a chance to see Lockheed's XFV-1 vertical-takeoff fighter on static display when part of the demonstration was shifted from Edwards AFB to Inyokern Naval Air Station at the insistence of USAF.

► **Convincing Demonstration**—The ease with which test pilot J. F. (Skeets) Coleman put Convair's new VTO fighter through its full paces at San Diego was a convincing demonstration that the vertical-takeoff aircraft is opening a new chapter in aviation.

The flight was the second Coleman had made through the full cycle from vertical to horizontal and return to vertical. First had been only two days earlier during a 21-min. initial test.

After starting the Allison YT40-14 turboprop engine, Coleman tested his controls and then climbed slowly to a height of approximately 50 ft. He eased the "flying pogo stick" slightly toward the east, then settled slowly to the ramp about 40 yd. from his original takeoff point.

► **Vertical to Horizontal**—With this engine checkout concluded, Coleman moved the throttle forward again and the strange-looking fighter lifted off its four wheels, tilting from vertical to horizontal as it climbed. By the time the VTO reached an altitude of 175 ft., it was in a horizontal flight attitude and speeding away from the field to the west, its odd-looking tail marking a cross against the sky.

Coleman circled swiftly south of the field and came over the runway in a low pass from the east at about 250 mph. and approximately 50 ft. in the air. His canopy was open.

"I was trying to slow it down," the test pilot explained.

He made a second pass over the crowd of newsmen and spectators, followed by a climbing turn.

► **Horizontal to Vertical**—Coleman then made another approach for his transition from horizontal into vertical flight. Flying toward the field in a slow, nose-high attitude, he began climbing at about 45 deg. toward stalled attitude and then up into the vertical attitude at about 500 ft.

As in the takeoff, the transition appeared to be made quite easily. Coleman dropped slowly to about 100 ft., moved over toward the takeoff spot and eased down to a tailfirst landing.

Time for the flight: 22 min.

Coleman said the VTO is simpler to fly than a helicopter because it is a "straightforward airplane." He said there is a brief period during transition from horizontal to vertical flight when the pilot is disoriented for a while.

Coleman reported there is a point during the touchdown "where you either have to execute a landing or take a waveoff." Landing stability is good, he said.

## Policy Attack

Robert Gross, president of Lockheed Aircraft Corp., surprised newsmen on the Navy press tour with an attack on the Administration policy of massive retaliation.

"I am totally out of sympathy with a policy of massive retaliation, which means we have to sit here and take it and then hit back if we have anything left," Gross said.

The Lockheed executive said such a policy is extremely harmful to the morale of the U. S.

But as long as such a policy exists, he said, the heart of it is early warning—"Early warning becomes utterly and absolutely indispensable."

Such a policy requires such tremendous defensive apparatus, tremendous amounts of money that it may well take away money required for offensive forces, Gross warned.

The XFV-1 is equipped with an ejection seat and quick-opening parachute designed to save the pilot in event of low-altitude engine failure.

Allison engine in the pogo, adapted for vertical flight, generates 5,850 hp. and is geared to a six-blade Curtiss-Wright Turboelectric propeller 16 ft. in diameter.

Weight of the aircraft is approximately 16,000 lb.

► **18-Sec. Takeoff**—Next of the Navy's new aircraft to put on a flight demonstration was the huge 80-ton R3Y-1 turboprop seaplane. From the Convair seaplane ramp on the edge of San Diego Bay, the giant seaplane taxied down the ramp on its beaching cradle and into the water. It then slid out of the cradle for takeoff.

Takeoff run of the lightly loaded R3Y, powered by four Allison T40 engines, took only 18 sec. Under fully loaded conditions, takeoff is said to require only 30 sec.

On static display was the R3Y-2, the bow-loader version of the turboprop seaplane. The R3Y-2, unlike the earlier model, can be loaded through a hydraulically operated bow door 8 ft. 4 in. wide and 6 ft. 8 in. high (AVIATION WEEK June 21, p. 17).

The R3Y flight was followed by the ill-fated demonstration of the third member of the Convair-Navy "no-runway" weapons system, the Sea Dart.

► **'Largest Ever'**—At Lockheed's Burbank plant the following day, chief engineer Clarence L. (Kelly) Johnson disclosed that Lockheed had received large new orders from the Navy and Air Force for its WV-2 and RC-121 early-warning radar Super Constellations.

The new orders will extend production of the plane into 1957, he said.



TURBOPROP SUPER CONNIE, R7V-2 with P&WA T34 engines, has made 19 flights since Sept. 1. Second of two turboprop R7Vs has rolled off Lockheed's assembly line.



DOUGLAS XF4D-1 SKYRAY, powered by Westinghouse J40, made two scorching 650-mph. passes low over runway at Inyokern NAS, then climbed steeply for watching newsmen.

Johnson said it is "the largest ever placed for Super Constellation-type equipment."

Largest single commercial order ever placed for Super Connies was for 20 by Trans World Airlines. Some of the earlier military orders have been for more than 20 aircraft and this latest order also tops those.

The order provides for a substantial buildup of early-warning aircraft for both the Navy and Air Force, Johnson said. First order for the radar planes was in 1950. Since then, the Navy has placed four orders and the Air Force three. Twice the services issued joint orders, as in the latest case.

► **Second R7V-2**—On view was the second of the Navy's 440-mph. R7V-2 turboprop Super Constellations, just off the assembly line. The first model already is being flight tested (AVIATION WEEK Sept. 13, p. 18).

R7V-2, powered by four Pratt & Whitney Aircraft T34s, has made 19 flights since it first flew Sept. 1 and now is undergoing preliminary development work prior to its formal demonstration program for the Navy.

► **Navy Flyby**—At Inyokern NAS, pilot

Jay Beasley and co-pilot Carl Setili put the P2V-7, latest in the Neptune anti-submarine series, through its paces.

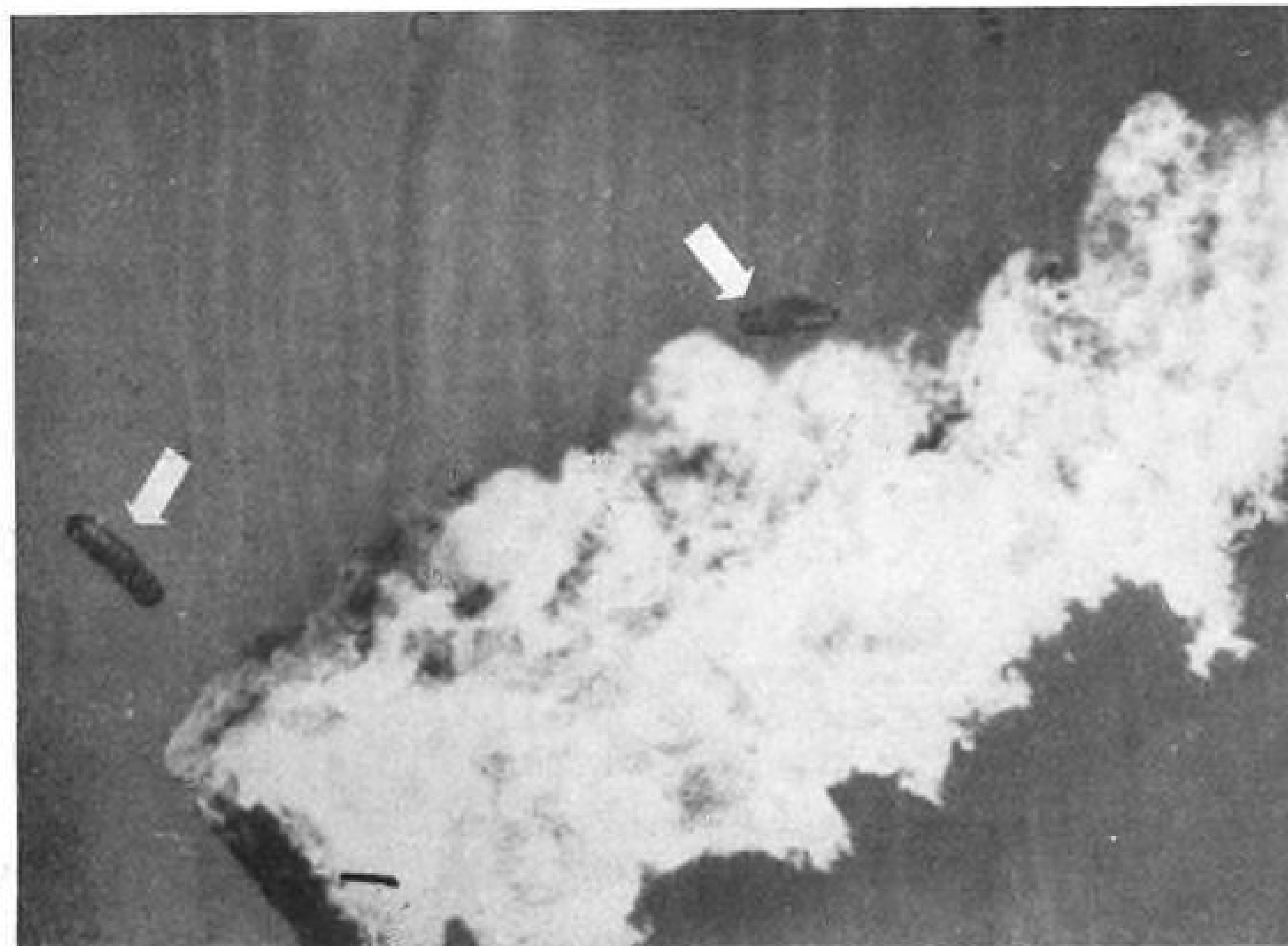
Then came the Douglas A4D "Heinemann Hotrod" on the first public flight made by the little atom-bomber. Test pilot Robert Rahn opened his demonstration with an extremely slow flaps-down flyby and then scorched across the field in a 600-mph. pass with afterburner blazing. He concluded a third low-altitude pass with a series of rolls as he climbed away.

Bill Bridgeman took off next in the XF4D Skyray, powered with the Westinghouse J40. A production model F4D with its P&WA J57 was scheduled for the demonstration but was canceled due to overspeed on the engine during preflight runup.

Bridgeman brought the Skyray across in a low, extremely slow pass and followed with two 650-mph. passes down the runway and a steep climbout.

A demonstration of a Mach 1.5 sled on Inyokern's supersonic track was followed by rocket firing by AD-6, F2H-2 and F9F-5, and an exhibition of the Chance Vought F7U-3 Cutlass with a supersonic dive from 43,000 ft.





SEA DART'S ENGINES (arrows) tear free of flaming aft section of new Navy fighter.



NOSE SECTION, with hydroskis extended and containing pilot, falls away (lower right).

## Navy to Continue XF2Y Program

San Diego—Navy will continue its development program on Convair's water-based supersonic fighters despite the disaster in which the YF2Y-1 broke up in midair and plunged into San Diego Bay in flames.

Navy and Convair divers last week had recovered nearly 90% of the shattered Sea Dart and a joint investigation was under way of the crash that killed test pilot Charles Richbourg.

There was no official hint of the reason for the accident.

►**Fatal Flight**—The YF2Y-1 made its fatal flight as part of a three-day press

tour intended to demonstrate the latest aircraft in the Navy's growing air arm (see p. 18).

As Richbourg eased the Sea Dart down the ramp for the demonstration flight, observers noted that the hydro-skis on the aircraft were shorter and broader than those previously seen on the water-based fighter. Wheels previously used for taxiing were missing and the aircraft entered the water ride on a cradle. Convair frogmen wearing aqua-lungs unhitched the cradle after the plane was in the water.

Richbourg taxied out for a long take-

off run, surging up on the skis and skittering along in a spray of water before what seemed to be a somewhat difficult pulloff.

After reporting several minutes later by radio that "I'm coming over"—the last words from the pilot—Richbourg reappeared in a highspeed shallow dive over the bay from the south.

►**YF2Y-1 Breakup**—Richbourg's speed in the shallow dive appeared to be in the neighborhood of 450 mph. and definitely was supersonic. At an altitude of about 350 ft., the fighter nosed up sharply for a split instant, buffeted, porpoised twice, skidded and then disintegrated in midair as abruptly as though it had hit a wall.

A loud crack accompanied the breakup, but there was no explosion. A flash of flame that followed the breakup probably resulted from rupture of fuel tanks or fuel lines.

Debris hurtled through a wide arc as parts of the aircraft plunged toward the bay. Wing and tail surfaces were ripped to bits. A large fireball trailing smoke streaked downward.

Largest fragment was the needle-nosed forward fuselage that snapped off just aft of the cockpit at the intakes. With Richbourg inside, this tumbled end over end into the water with a terrific impact. Tumbling motion of this section apparently snapped the hydro-skis into the extended position. The skis were in the retracted position when the breakup began.

Convair has asked television, newsreel and still photographers for their negatives to aid in study of the accident.

►**Swift Rescue**—Nearby was a launch with two Convair frogmen aboard. They plunged into the bay, found the cockpit section in 40 ft. of water and brought the Convair test pilot to the surface in a rescue that was remarkable for its swiftness.

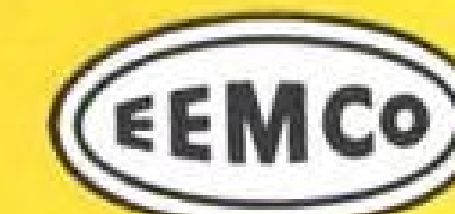
Richbourg died a few minutes later in the launch.

YF2Y-1 was the second Sea Dart to undergo flight tests. It was powered by twin Westinghouse J46 engines equipped with afterburners.

First model of the Sea Dart, the XF2Y-1, has been modified to a single-ski configuration. Work also is under way on at least two other Sea Darts, in the works when the Navy reduced its original contract due to trouble with the hydro-skis. These are not yet ready for flight tests.

### Carrier Nears Launching

Navy's first "big" carrier, the 1,036-ft. USS Forrestal, will be launched Dec. 11. The world's largest ship will carry approximately 90 aircraft and a complement of 466 officers and 3,360 men following its commissioning sometime next fall.



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Duty cycle: 3.0 seconds at 6.5 HP

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Continuous rating: 5 HP at 2300 r.p.m., 15.8 amperes, 200 volts.

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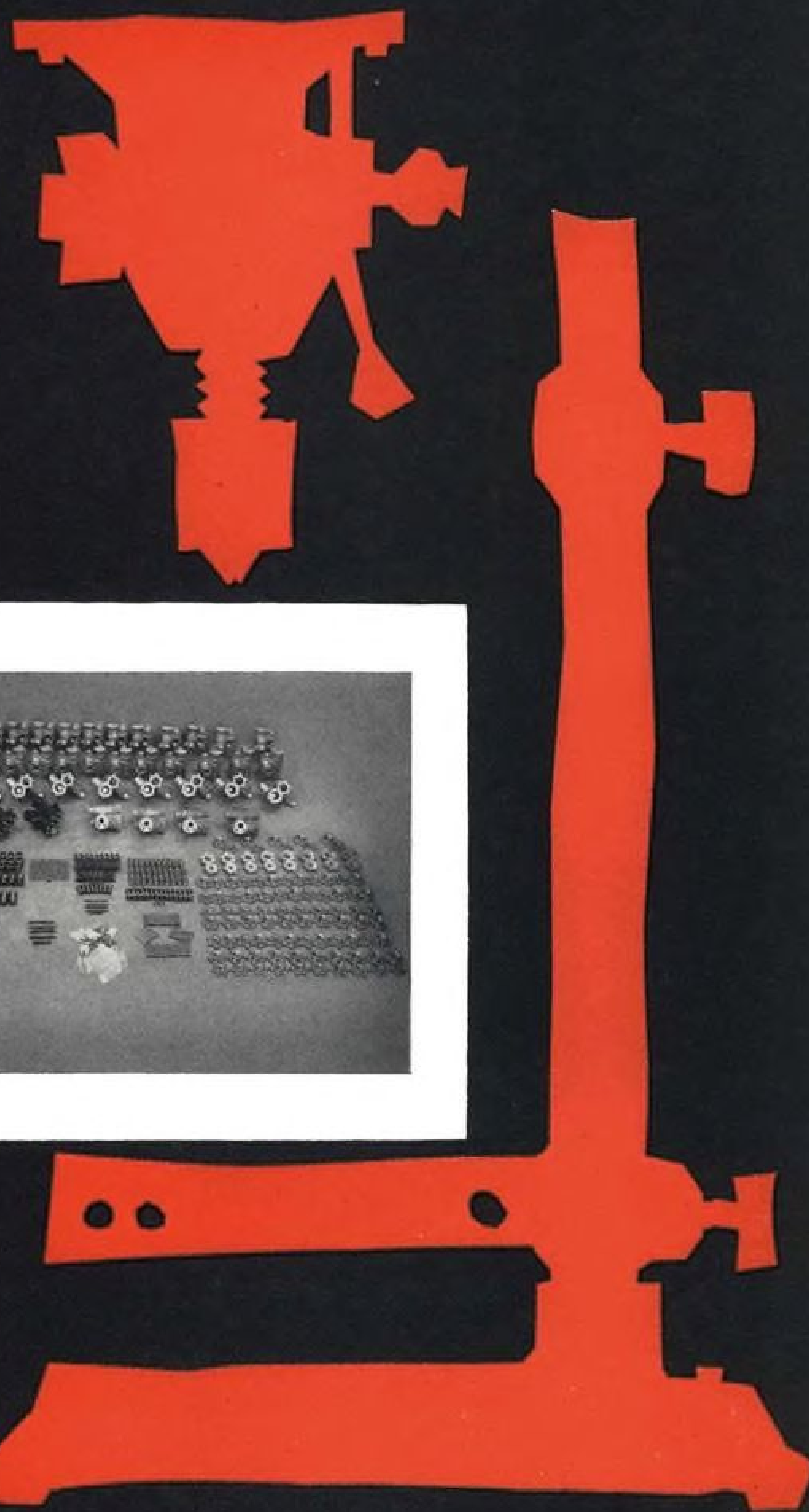
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## Australia's Transport Log

Here is a table of comparative utilization figures taken out by Australia's Department of Civil Aviation this year on a cross-section of that country's airlines:

	Hours					
	TAA	ANA	QEA	BCPA	Ansett	BAT
DC-6		2,940 hr.		2,440 hr.		
Constellation 749A			2,950 hr.			
Convair 240	3,000 hr.					
DC-4	4,000	3,475	3,140			
DC-3	3,750	2,580			3,025 hr.	2,600 hr.
DC-3 (freighter)	2,500	2,280				
Bristol Freighter		2,200				

## Australia Expands Civil Aviation

Big market for air transport is growing in development of country's potentially rich but remote Outback area.

Melbourne—Commercial aviation in Australia has boomed tremendously in the few years since the close of World War II, but the future promises even greater expansion of what has always been a lucrative market for American aircraft and equipment.

The Commonwealth now is at a stage of development comparable in modern terms with America at the turn of the century. Immigrants are flowing in; manufacturing industries are rapidly expanding; wool prices are maintaining a high level, and mineral resources are being highly developed.

► **Planes for Trains**—Back of the buoyant economy and promising future is the need to expand communications in the potentially rich but poorly developed Outback. In this, the airplane offers the communications medium that America found in the iron horse of the railways.

Major plans for this type of expansion include the ambitious but undoubtedly practical air beef scheme, sponsored by Australian National Airlines, for building abattoirs in the present remote northern Australia and flying out carcasses, hides and other products to coastal harbors or the nearest rail heads. This scheme, under consideration for adoption by the federal government on a long-term subsidy basis, will develop a market for large numbers of big transports.

Australia already spends an average of at least \$10 million a year in America on spares and other equipment for air transport system. Her air transport fleets are predominantly U. S.

Recent capital expenditures include 12 Super Constellations for Qantas Empire Airways; two DC-6s and two DC-6Bs for Australian National Airways; one Convair 340 for Ansett Air-

ways, which expects to order another next year, plus a variety of navigation and landing aid equipment for the Department of Civil Aviation and scintillometers and other aerial mineral research equipment for the government's Bureau of Mineral Resources and private companies.

► **Tax Eliminated**—Ever since the DC-2 captured the transport section prize in the 1931 Melbourne Centennial Air Race and an order from ANA, U. S. aircraft largely have dominated Australia's airlines.

Because of this and the war-strengthened commercial ties with America, Australia has had no restrictions on U. S. purchases—other than those imposed by dollar finance difficulties. With the growing competition from the United Kingdom industry, that difficulty still is acute.

Any company wishing to order new equipment from America first must obtain a permit from the Department of Civil Aviation substantiating that the requirement is valid both in terms of the airline's need to serve its system and that the type meets DCA safety standards. It then makes an application to the Central Import Licensing Administration for the necessary dollar allocation and an import license.

Until recently sales tax was imposed, varying from 8½% in 1949 to 12½% in 1953. Recently, however, the airlines have been exempted retroactively, an exemption said to have been worth nearly \$700,000 to ANA.

► **QEA Holds Back**—Some airlines favor an immediate introduction of British turboprop equipment, while others—unconvinced yet of their operating economy—are retaining their faith in American piston-engine types.

Among the cautious ones is Qantas.

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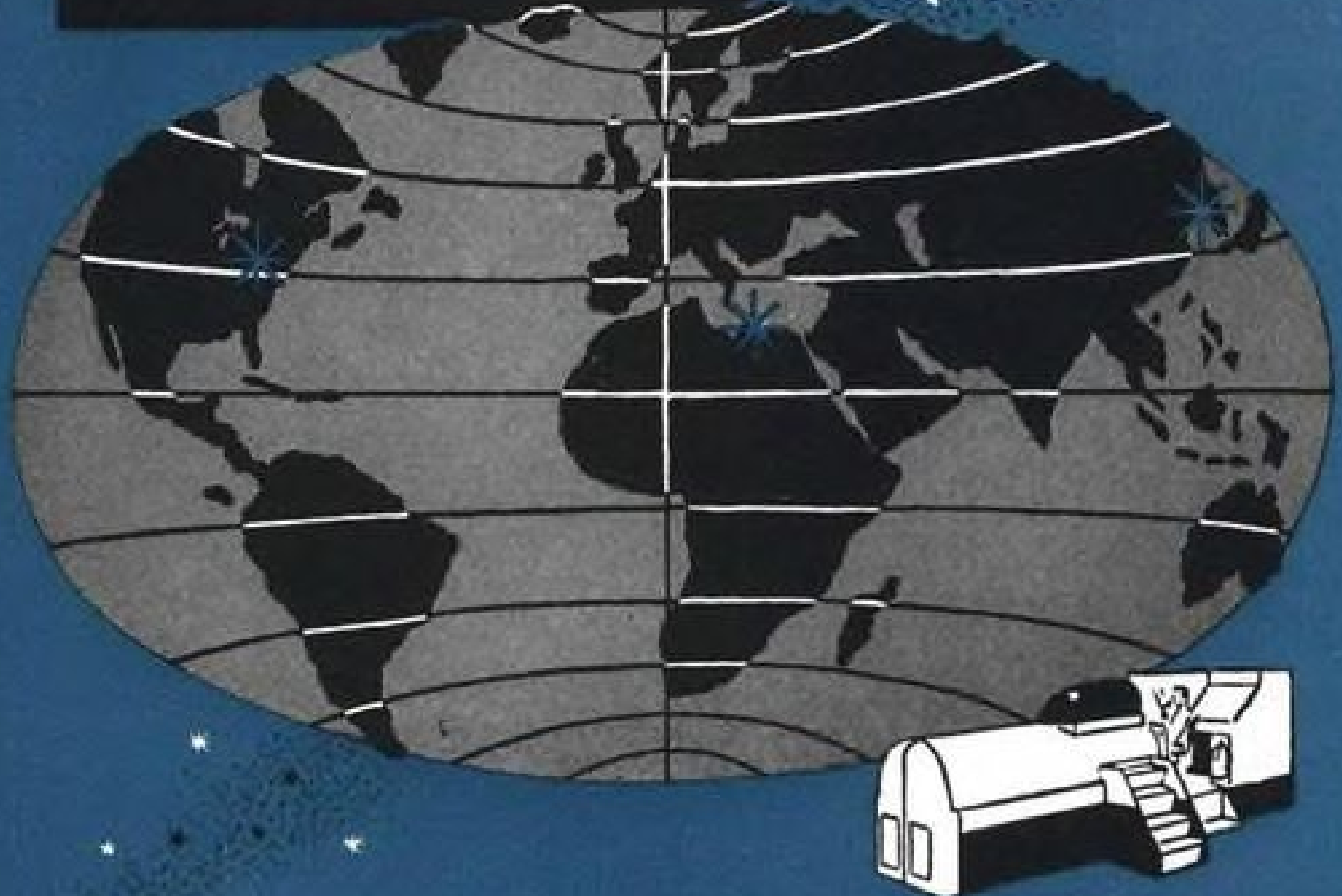
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which now operates to the United Kingdom via the Middle East, to South Africa via the Indian Ocean and to North America over the South Pacific route.

Under the terms of its recent merger with British Commonwealth Pacific Airways, QEA accepted BCPA's option on two Comet 2s. BCPA also had options to buy four turboprop Bristol Britannias. It is doubtful if either will be bought, although strong pressures are being brought to bear upon QEA.

Qantas chairman Sir Hudson Fysh hints that the airline is interested in economical longrange jet and turboprop equipment but does not regard itself as committed to buy existing British types. The airline will investigate the world market, with 1960 as the likely earliest date to take delivery on turbine-powered airlines.

► **First-Class Competition** — Trans-Australia Airlines, set up in 1946 by a Labor government that had been defeated in the high court on a legislative move to nationalize domestic air transport, has based its re-equipment policy on passenger attraction in competition with its main privately owned rival, ANA.

TAA bought six Convair 240s and "sold" pressurization so successfully that ANA, with its DC-4s and DC-3s, dropped into second place in passenger carriage. Now TAA has taken a further adventurous step by ordering six Vickers Viscounts.

Because of Convair competition, ANA was interested in the Viscount but at the last moment had second thoughts, canceled its option with Vickers and turned again to Douglas Aircraft Co. To get in first with new equipment, it bought two DC-6s from National Airlines, put them into operation last December and ordered two DC-6Bs from Douglas for delivery in February/March 1955.

In the six months, March through August, the influence of the DC-6 purchase has been striking. They carried 316,403 passengers, compared with 273,487 in March-August 1953. At the moment they probably are topping TAA's figures.

► **Big Freight Load** — Whether this passenger growth will continue in the face of Viscount competition is doubtful, but ANA believes better overall economics will be possible with the DC-6s and -6Bs than with the Viscount. In this reckoning they include freight carrying capacity and long distance flights over the most lucrative Melbourne/Adelaide/Perth route.

ANA carries more freight than all the other Australian airlines put together and earns more than 30% of its revenue from this side of its business. In the year ending June 1954, it lifted a total of 80,785,011 lb. Two-thirds of this

## AN IMPORTANT MILESTONE



### in the Development of Greater Aircraft Safety

Official recognition of more than five years of pioneer work in the development and perfection of Explosion Suppression and Fire Suppression Systems occurred on November 2, 1954, with the issuance of U. S. Patent #2693240 covering the basic work done in this field.

Explosion Suppression is the new protective technique which has been called "a wet blanket for aerial blow-ups." It provides protection against the largest single cause of loss of combat aircraft—explosions resulting from the ignition of fuel/air mixtures.

This story goes back prior to 1949 with the original research into the characteristics of explosions conducted at England's Royal Aircraft Establishment by W. G. Glendinning and A. M. MacLennan. In 1951 they visited the U. S. under the sponsorship of the British Government to make their invention available to the U. S. aircraft industry, the U. S. Air Force, and CAA officials.

In accordance with a well established custom, the British Government granted the inventors rights to the development of this device in both aircraft and industrial fields. They, in turn, contracted the development and manufacturing rights of Explosion Suppression to Gravinier Manufacturing Company, Ltd., of England, of which Simmonds Aerocessories, Inc., is the sole U. S. licensee.

And now—1954—Simmonds, working with U. S. aircraft companies, has successfully installed Ex-

plosion Suppression Systems on three advanced type U. S. aircraft, the first to be completed.

In operation, Explosion Suppression Systems utilize data originally determined by Glendinning and MacLennan — namely, that in any fuel/air explosion there is, in the initial stages, a minute but measurable time lag, during which the incipient combustion can be snuffed out and/or made relatively harmless.

Basic elements of an Explosion Suppression System include a device designed to detect the incipient combustion, which is connected by means of an electrical circuit to one or more capsules containing suppressant fluid. When the detector senses an incipient explosion, the circuit closes and the capsules detonate, thereby scattering fluid and suppressing the combustion. Each system is designed to meet the requirements of a particular installation and may serve to protect against single explosions or multiple explosions. Simmonds offers two types of detectors — a unique visual type detector, and a pressure-rate-of-rise detector, depending on the requirements of the installations.

Simmonds is currently working with the U. S. Air Force, with a group of leading aircraft manufacturers, and with a number of industrial (non-aircraft) firms in the installation and in the further development and perfection of this important invention.

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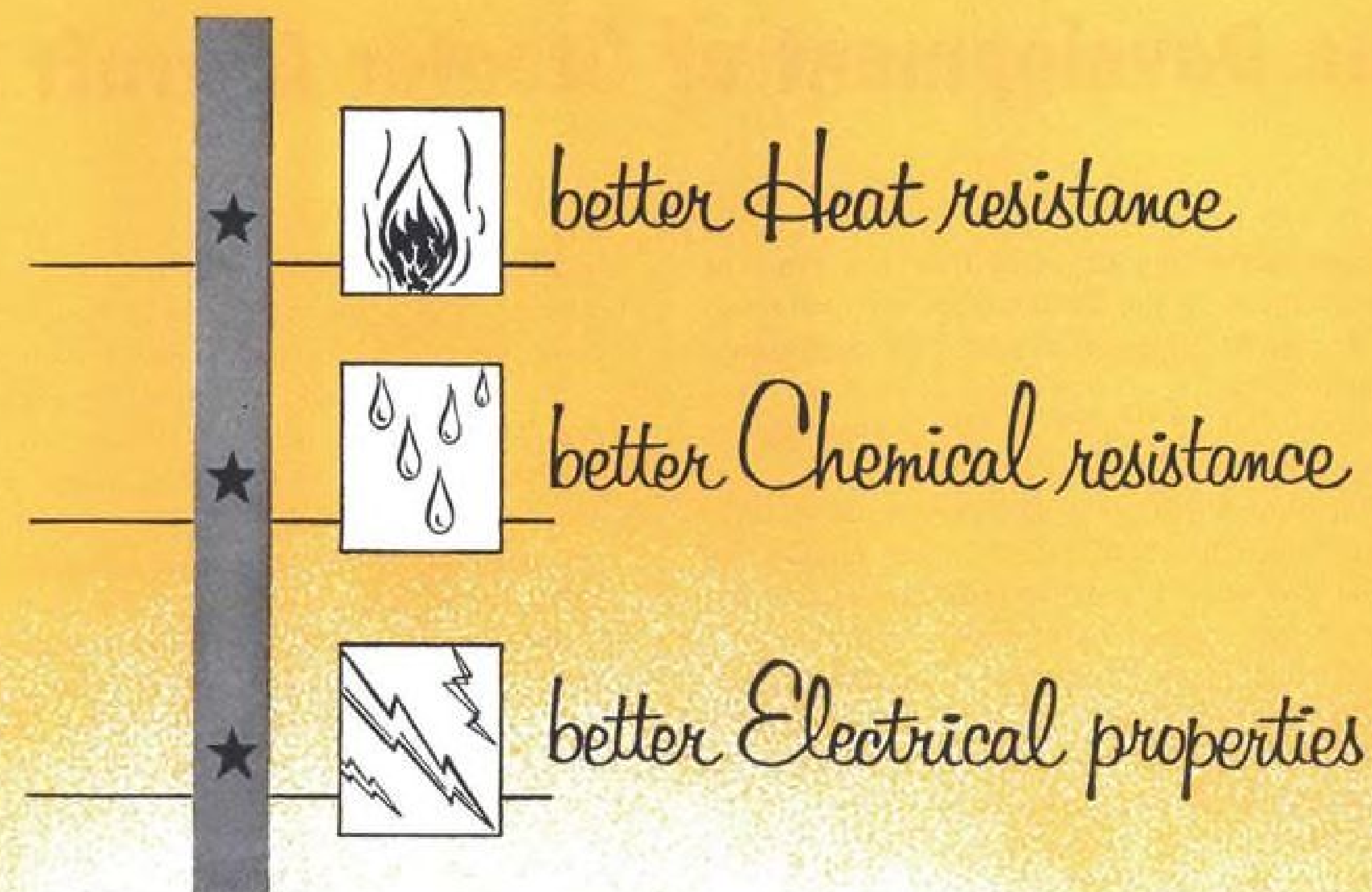
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freight is flown in passenger aircraft.

Australia always has been noted for high aircraft utilization, but the introduction of bigger and higher performance aircraft is already having its effect. ANA, for instance, is getting more than 4,000 hr. per year regularly from its DC-4s and nearly the same figure for their DC-3s. The introduction of the DC-6s caused a substantial drop. The expectation is that TAA's utilization will similarly be affected by the introduction of the Viscount.

► **Interstate Competitors**—Competition in new types is not restricted to the major interstate operators.

Ansett Airways, which has built a thriving interstate semi-coach/freighter service with slightly lower fares than TAA and ANA, until now has stayed steadfastly in the DC-3 field and has not worried the major operators. Its introduction of the Convair 340, however, has brought a new development to the Australian air transport picture.

Butler Air Transport, with which it competes on intra-state routes in New South Wales, has ordered two Viscounts, one of which will be delivered in mid-1955.

Both ANA and TAA have responded by going into active competition in the interstate coach service field, formerly exploited exclusively by Ansett. The effect of this still is to be realized.

► **Available Markets**—A major equipment problem facing all Australian airlines is the search for a DC-3 replacement. At the moment their interest is centered on the Fokker Friendship and the Handley Page HPR3 Herald. If American manufacturers can produce a feeder airliner of exceptional economic rating, there is no doubt of the market available to them in this rapidly expanding country.

Another field in which Australia promises good market openings is aerial agriculture. As yet there are few aerial topdressing and spraying firms in operation and most are small and equipped with nothing better than Tiger Moths, although some Cessnas have been ordered recently.

Agricultural economists point out that Australia offers the enormous area of 342 million acres capable of improvement by topdressing and the correction of soil mineral deficiencies. In addition, crop diseases and agricultural pests take heavy toll of the commonwealth's primary production.

Australia's sister dominion, New Zealand, already has made tremendous strides in this direction and the recent order for 100 kits of Fletcher FU-24 dusters for assembly and sale in New Zealand has aroused interest in Australia. There is no doubt that in the future even bigger markets will be available in Australia for the sale of the right type of equipment for this work.



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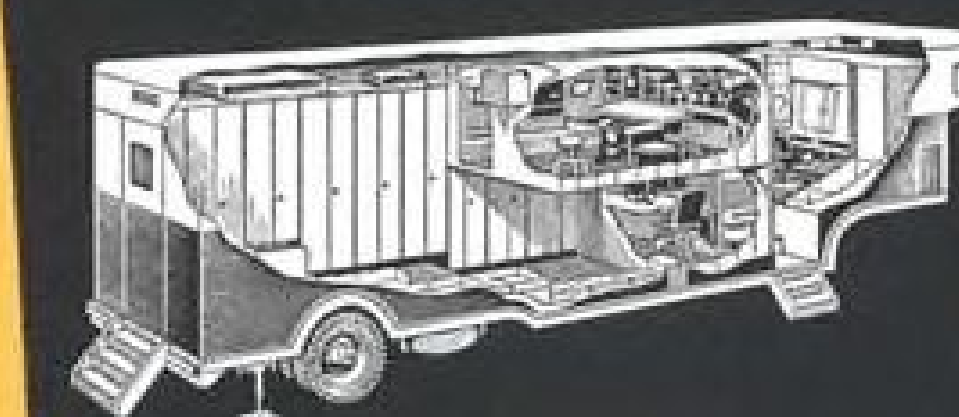
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- Douglas XA2D-1 "Skyshark" Navy Attack Bomber
- Grumman F9F "Panther" Navy Fighter Plane
- Lockheed F-80C "Shooting Star" Fighter Plane
- Lockheed F-94A & B Air Force Fighter Plane
- Martin P4M-1 Long Range Navy Patrol Bomber
- Martin B-57A U.S. Air Force Version of the English Electric Canberra Medium Bomber
- North American AJ-1 "Savage" Navy Carrier Attack and Search Airplane
- Northrop F-89A All Weather Fighter Plane
- Northrop YRB-49A "Flying Wing" Heavy Bomber
- Republic F84F "Thunderjet" Fighter Plane

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## Airport Rivals

- Dallas-Ft. Worth vie for top ranking terminal.
- Cities pressure airlines to capture schedules.

While other areas go begging for adequate airport facilities, Texans in the Dallas-Ft. Worth area soon will have two of the most modern airfields in the world—within 20 mi. of each other.

One, the \$12-million Greater Ft. Worth International Airport, already is in existence. The other, antiquated Love Field outside Dallas, is about to get its face lifted in one of the most extensive and expensive modernization programs ever undertaken.

The reason for two big airports so close together: Civic pride among citizens of the two cities.

► **Bitter Fight**—The two cities need but one airport, centrally located. Originally, both had agreed to support the Ft. Worth airport (by any other name), since it was felt that its proposed location would serve their mutual interests.

But prior to construction, after much

haggling over administration and control, Dallas pulled out of the deal.

Thus began a bitter fight between the rival chambers of commerce, highlighted by Ft. Worth's decision to "go it alone." Prime motivator was Amon Carter, the city's leading citizen, publisher of the Ft. Worth Star-Telegram and a member of American Airlines' board—so much so that the installation originally was to be known as "Amon Carter Field."

Under Carter's leadership, Ft. Worth built what is generally considered the "last word" in airport facilities, expecting to attract the greater portion of the area's airline traffic from outmoded Love Field.

► **Undermine, Outdo**—Incensed Dallas immediately started a fund-raising campaign for Love Field modernization. Greater Ft. Worth International Airport hardly had opened its doors when it was announced that Love Field would undergo extensive face lifting.

The struggle intensified, with each city trying to undermine and outdo the other. Pressure was put on the airlines—by Dallas to maintain Love Field schedules and by Ft. Worth to divert schedules to their airport. With Amon Carter on its board, American shifted its base of operations to Ft. Worth airport and split its schedules between the two terminals.

When it looked like Dallas' son, the late Tom Braniff, might do the same with his Braniff International Airways operations, citizens of Dallas quickly proclaimed him the city's "outstanding man of the year."

It even came to the point where some airlines were, and still are, forced to land Dallas passengers at Love Field, then take off for the flight of a few minutes to debark passengers at Ft. Worth airport.


► **High-Priced Pride**—So far, even without modernization, Love Field has been able to maintain the greater portion of its schedules, while Ft. Worth's terminal is operating at less than half its capacity.

Located 17 mi. from both Ft. Worth and Dallas and covering 1,780 acres, Greater Ft. Worth International Airport is one of the outstanding facilities in the country.

It has three good runways. The northwest-southeast main instrument runway is 6,400 ft. long and 200 ft. wide, with provisions to extend to 12,000 ft. The north-south runway also is 6,400 ft. long, but 150 ft. wide, while the northeast-southwest is 4,100 ft. long and 150 ft. wide.

Two passenger loading fingers can handle 17 four-engine aircraft simultaneously or 20 to 21 mixed-type aircraft.

There is a heliport on the west side



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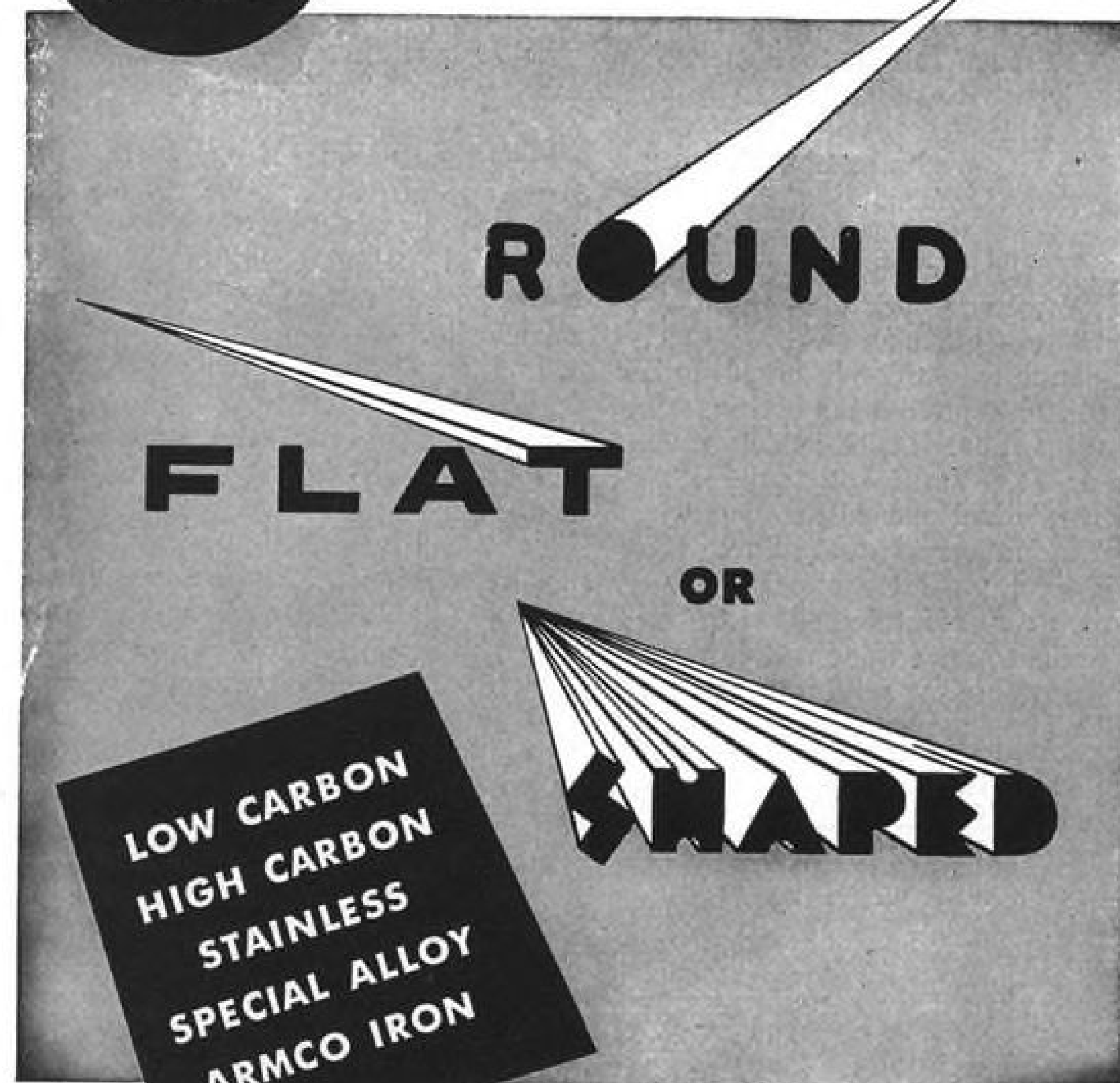
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of the terminal building, which can accommodate 12 copters simultaneously. **►Planned Safety**—Stressing safety, the airport was designed with all utility, water and gasoline systems underground. There is a zone radius of 5 mi. to maintain clear approaches to all runways.

It has all of the latest navigational aids—including radar, radar search, instrument landing system, ground control approach, high-intensity runway lights and high-intensity leadin lights on the instrument landing strip.

Driving time to both Dallas and Ft. Worth is approximately the same, 30 min. Taxi and limousine fares are the same to both cities.

**►Room for Growth**—Containing a present total of approximately 242,000 sq. ft., the terminal building is expandable to a total of more than 500,000 sq. ft. when and if conditions should dictate the need.

For example, ticket counters now occupy 208 linear ft. By removing the south end of the wing and extending southward, 200 additional linear ft can be made available.

Future expansion of north and south loading aprons is provided by the 1,200 ft. reserved for this purpose. By removing the end of the north-south passenger concourse and continuing it another 450 ft., two more fingers can be added.

**►Soft Voices, Sweet Music**—In one corner of the building, a public address booth is visible through a large picture window.

Women announcers are seated behind a control console with a maze of switches that rivals the cockpit of a B-36. All airline and other announcements are made by this one person, eliminating the harsh, rasping voices of many ramp, ticket and cargo agents.

Between announcements, soft music is heard throughout the terminal building.

**►Baggage Speeded**—Baggage handling, long the bugaboo of air travel, is outstanding at the Ft. Worth passenger terminal.

Average time for baggage to be delivered from the most distant gate section to the delivery station upstairs is 2 min. 40 sec.

This is accomplished through the use of electric trucks, selected because of their low maintenance costs and quiet operation, that run directly via ramp from inbound plane to the claim counter.

**►Expensive Program**—The Love Field modernization is expected to cost considerably more than the construction of Greater Ft. Worth International Airport. Here are plans for Love Field improvements:

- Lengthening of runways, forcing destruction of numerous buildings and

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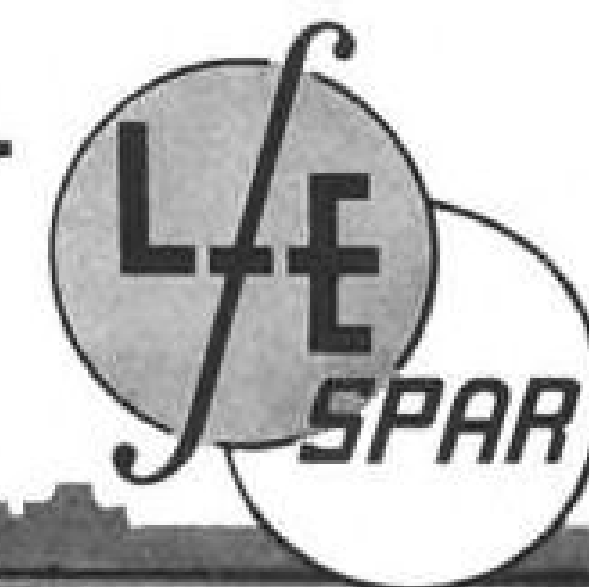
*More exciting products will be forthcoming—soon.*



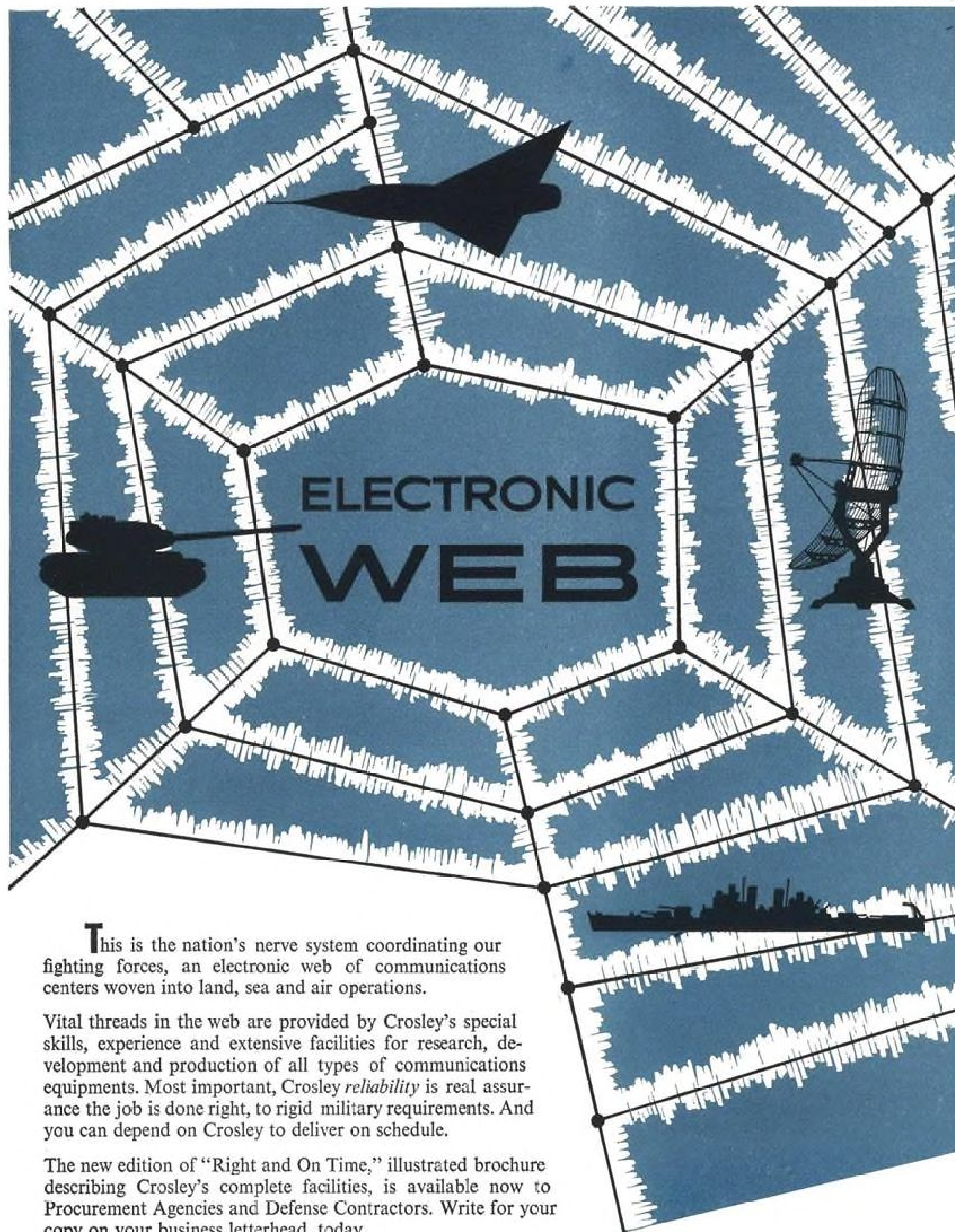
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installations within and outside the airport perimeter.

- Overall runway improvements, including reconstruction to a large extent.

- New terminal building, slated to be "even more plush" than that at Ft. Worth.

Construction is scheduled to begin early next year, and plans call for completion of all work and occupancy by the latter part of 1956.

The basic plans call for construction of a single-level terminal with aircraft loading positions along the three piers, extending in three directions from the main lobby. Initially, the terminal will provide 21 aircraft loading positions.

► **Endless Sidewalk**—The present Love Field terminal has 12 loading gates, with four more under construction.

Approximately 300 ft. of moving sidewalk will be installed in each of the three piers, enabling passengers to ride most of the way to their departure gates. All loading piers will be fully air-conditioned.

Plans call for a system of "passenger flow" to eliminate congestion and separate inbound and outbound passenger traffic. Embarkation and debarkation points will be at opposite sides of the terminal, with all related activities channeled accordingly.

Love Field is considerably closer to the Dallas downtown area than Ft. Worth's airport, being approximately 6 mi. away compared with 17. But it is too far away for residents of Ft. Worth. General thinking in Ft. Worth is that the 10 extra miles should not make much difference when compared with the millions of dollars that will be expended to save both "those miles" and civic pride.

Texans are fond of boasting that the state has more civilian airports than any other state in the nation. They say this is no accident, because "Texas has more air." Many observers wonder, however, if such reasoning applies in this case.—FS

## 10 Pacific Accidents Blamed on Albatross

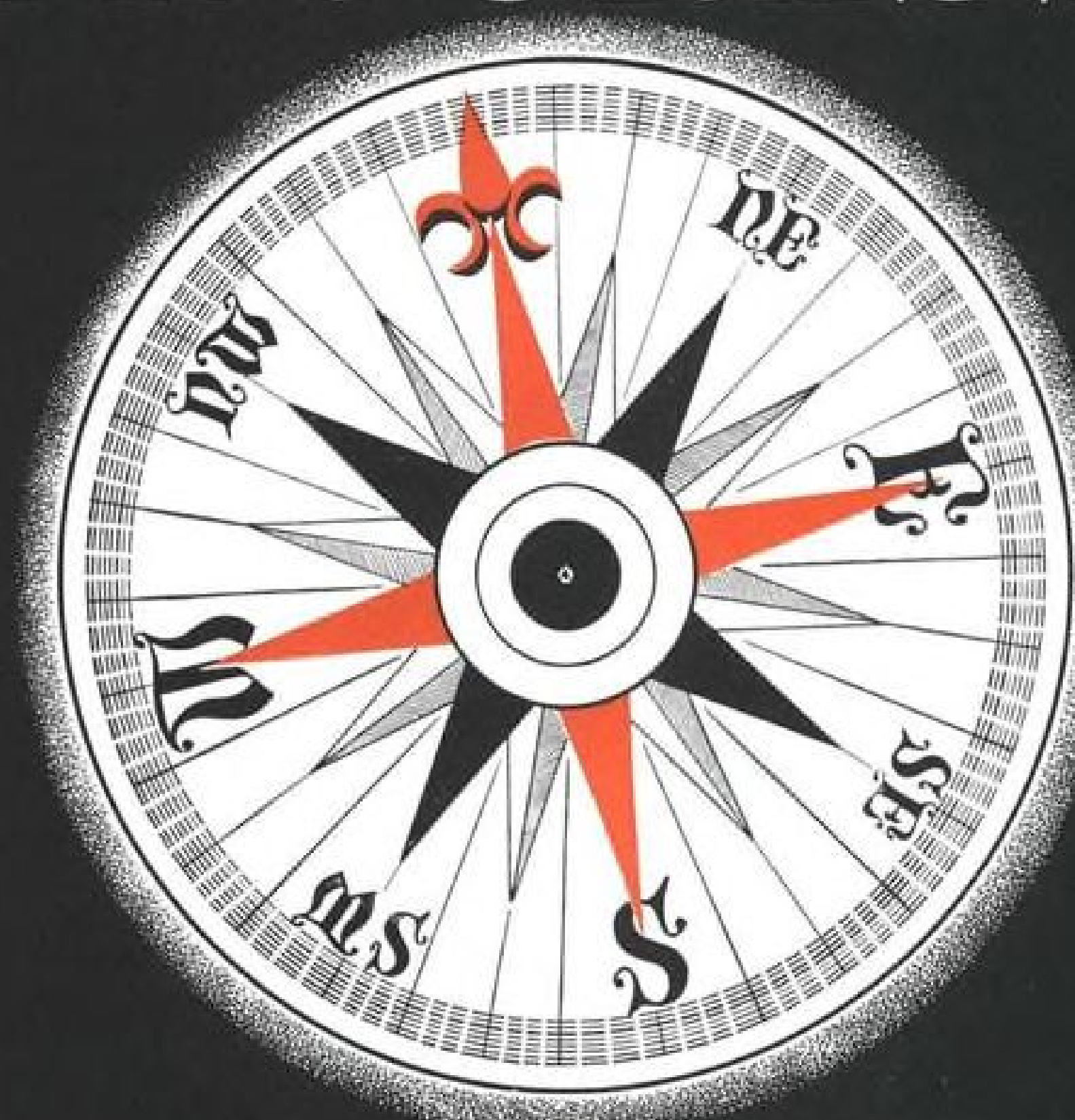
Albatrosses with wingspread of 7 ft. have become a new flying threat in the area of Midway Island in the mid-Pacific, taking the blame for 10 accidents so far this year.

At the request of the Air Force and Navy, Interior Secretary Douglas McKay has assigned two biologists of the Fish and Wildlife Service to develop ways and means of diverting the large sea birds from landing areas.

Defense officials fear the birds may be sucked down the forward induction vents of jets, causing the planes to explode.

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# PROGRESS



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JOHN TYNDALL

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# PRODUCTION ENGINEERING



MOLDING MACHINE in general foundry area feeds molds to pouring line conveyor. Worker (right) gages precision metal core box.



## Sperry Sand-Casts to Precision Finish

By Irving Stone

Great Neck, N. Y.—The old-time skills of the foundry are being adapted to create non-ferrous precision avionic components in the shops of the Sperry Gyroscope Co.

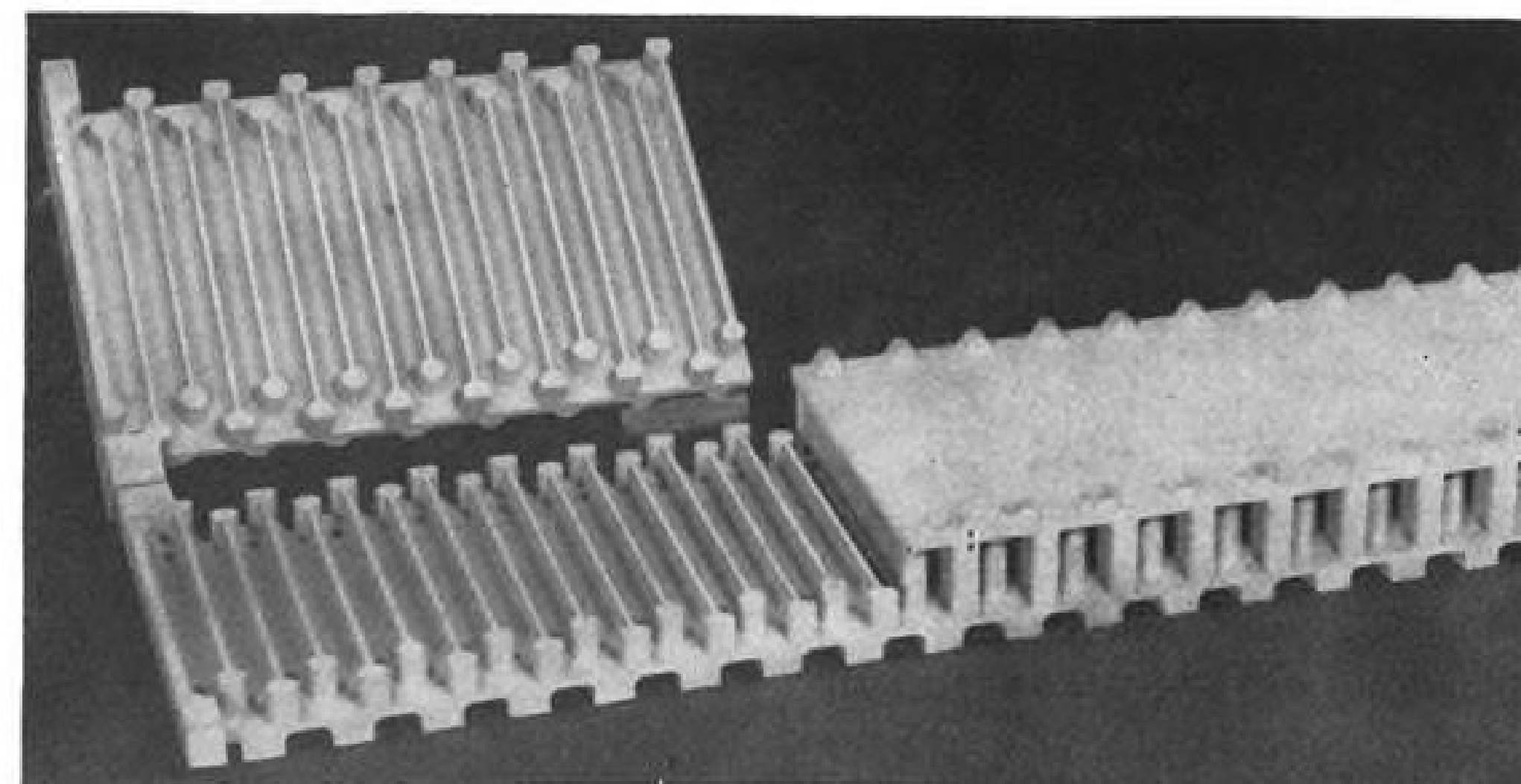
Using a sand-casting technique refined to meet the exacting demands of modern avionic equipment, Sperry is precision-casting microwave waveguides in a large range of configurations and sizes for itself and for other avionics manufacturers.

Not only does the process give high finishes and close tolerances; it also gives a considerable saving in cost. Furthermore, in some instances these castings are so complex as to rule out their manufacture by fabrication methods.

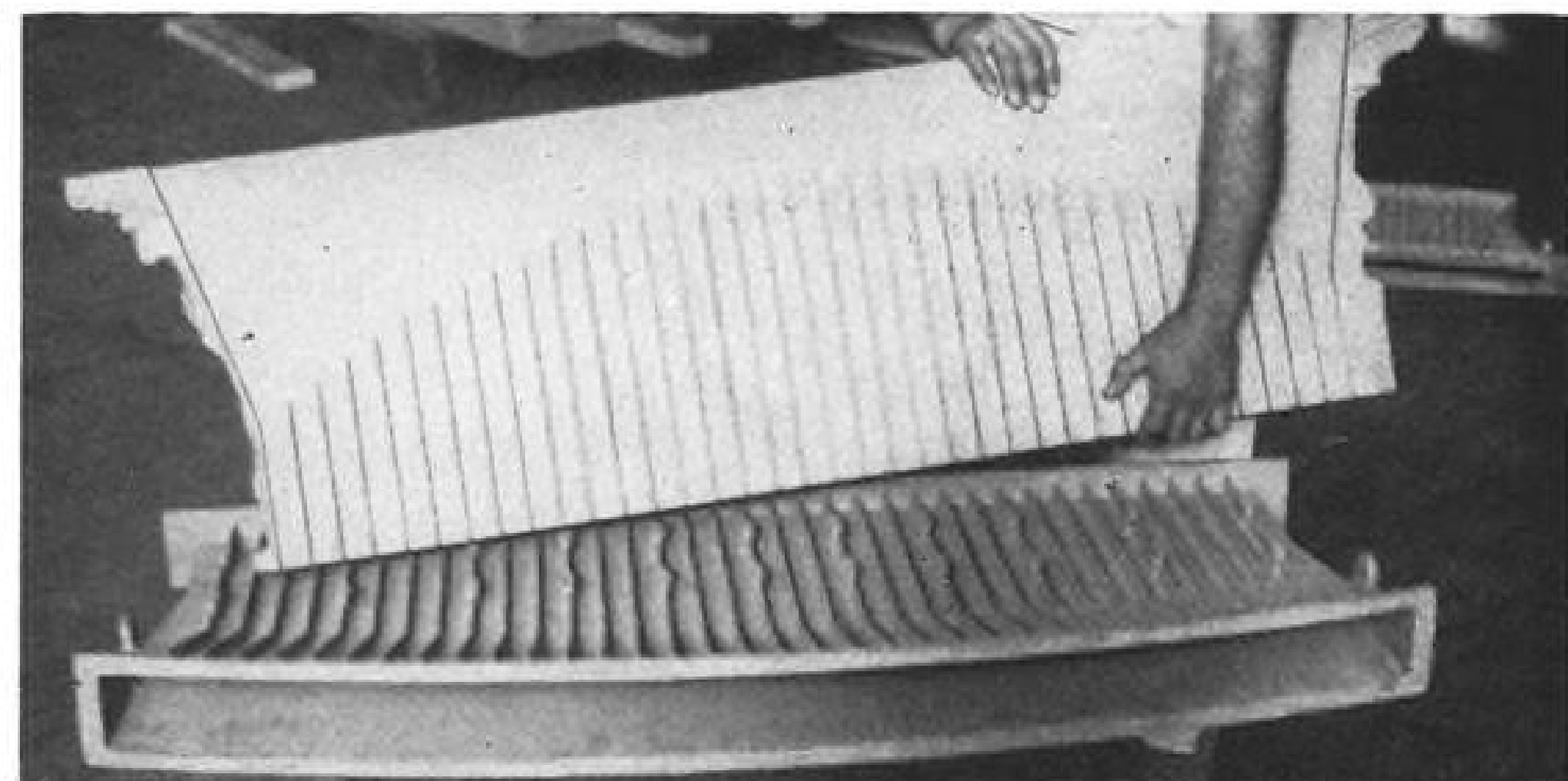
► **Work Range Extended**—Sperry is now extending its casting setup to include work for close tolerance fittings and other units used in conjunction with airframes and missiles. More and more of these parts are being designed for precision castings, Sperry says. Formerly they were fabricated—sheet metal jobs involving brazing and machined components requiring assembly. This is much the same way that wave guides formerly were fabricated.

► **Old Foundry, New Skill**—Foundry operation, not usually a complementary activity to the manufacture of avionic equipment, has been a part of Sperry's organization since 1914—four years after the company was founded.

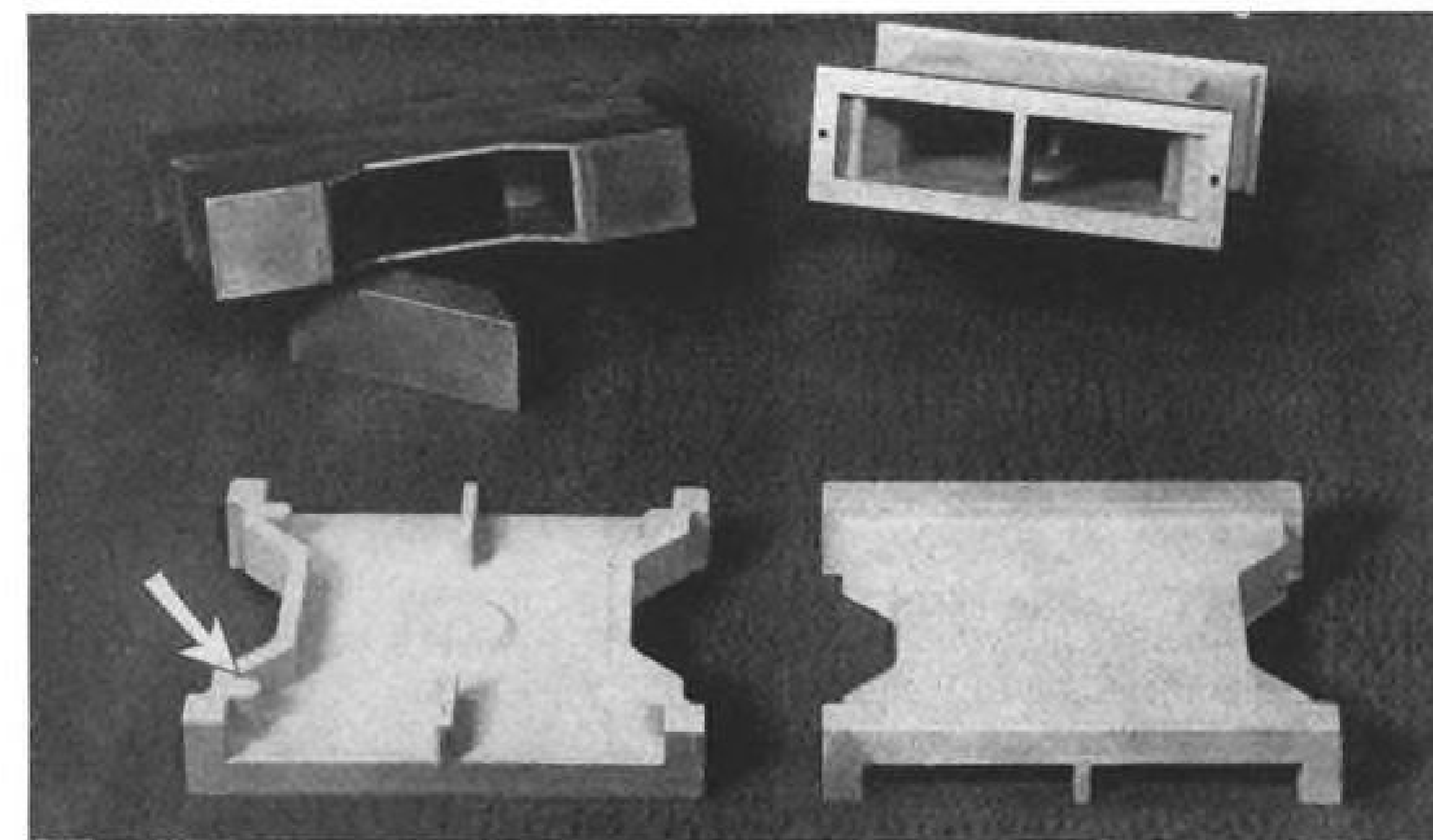
Until about three years ago, the



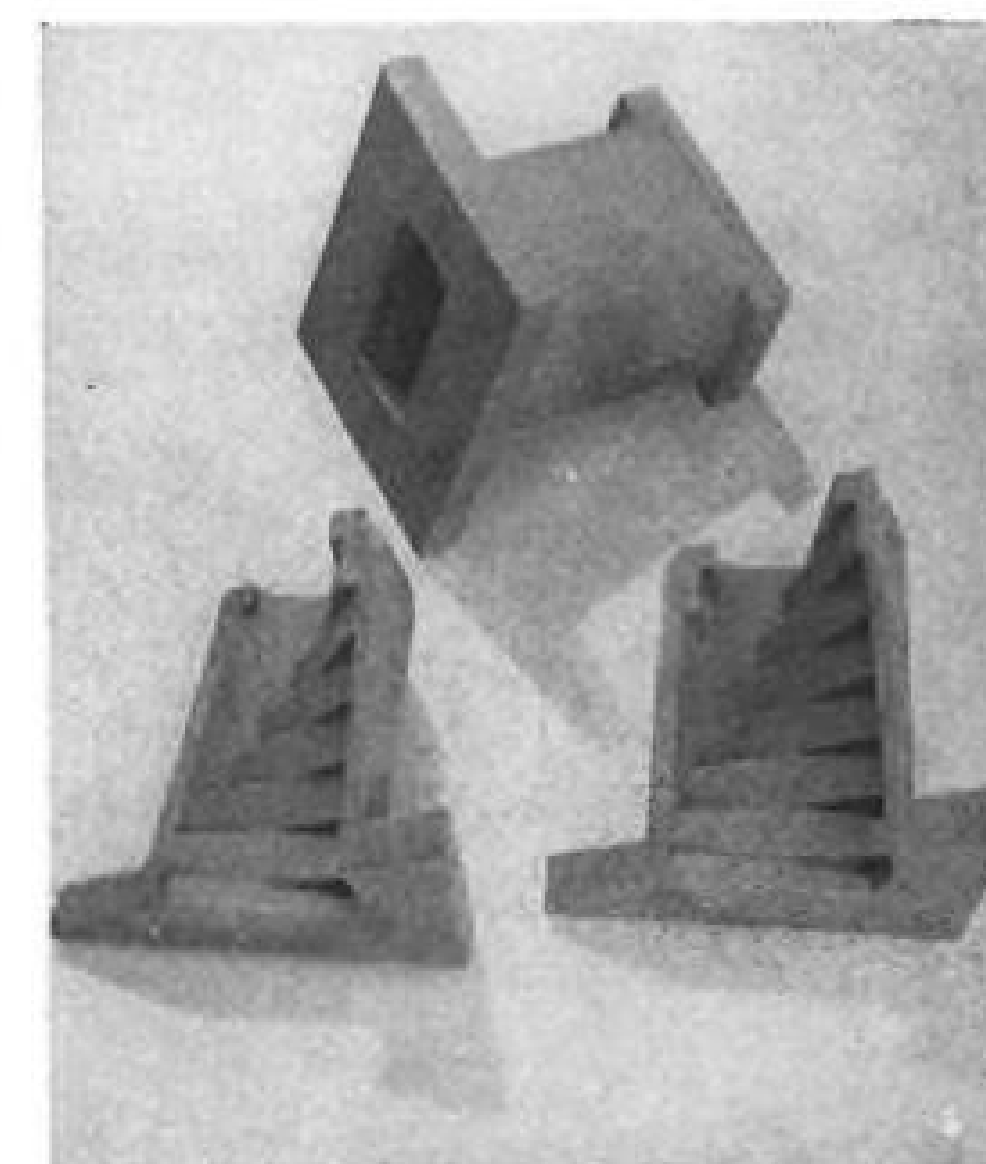
CAST "HARMONICA" antenna feed for longrange tracking radar partly sectioned to show parallel waveguides. Unit is about 50 in. long, 8 in. wide, 2 in. thick.



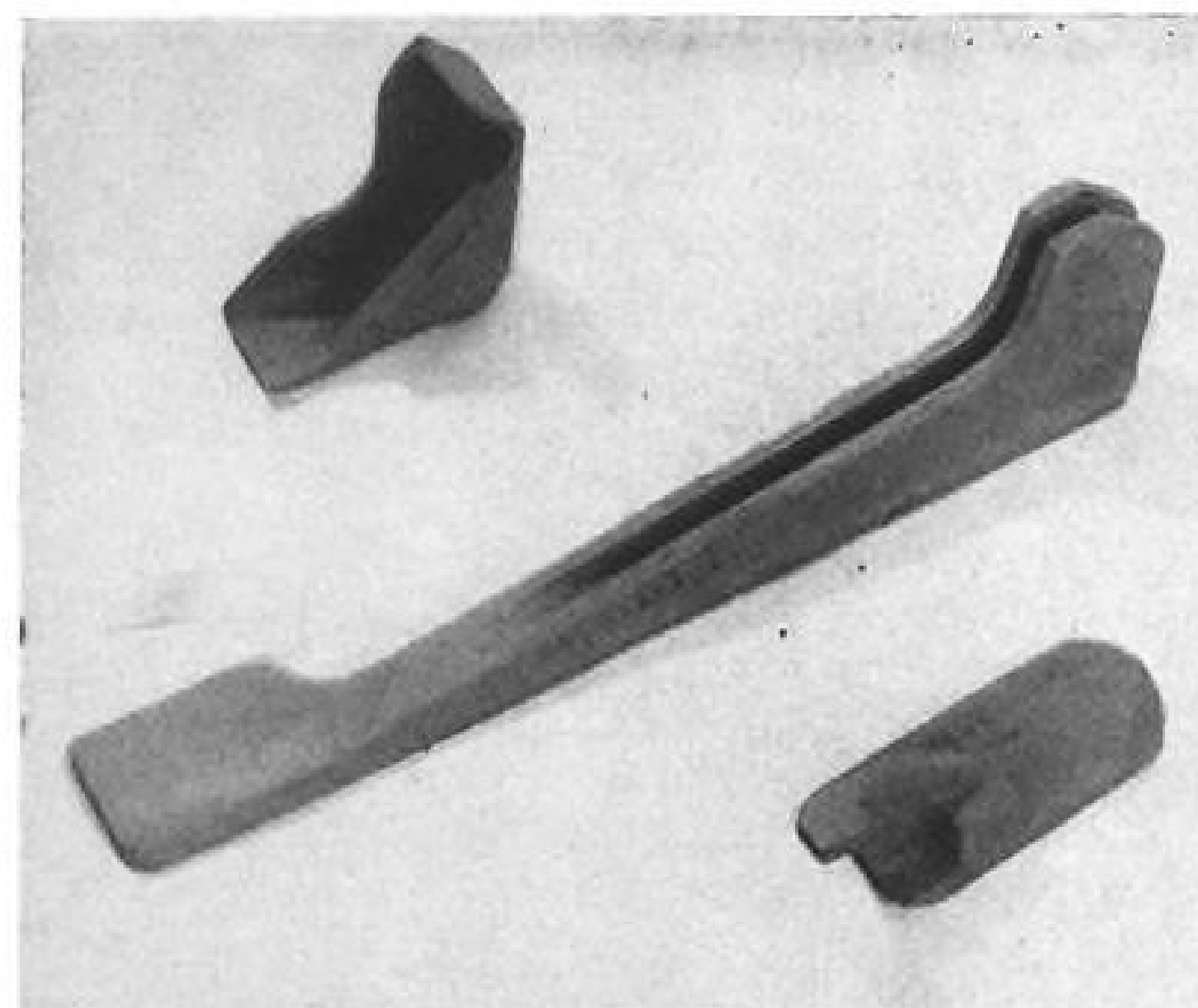
ANOTHER FEED in same system, sectioned to show complexity of casting, is flat within .005 in. This intricate unit, and one above, illustrates difficulty of fabricating part.



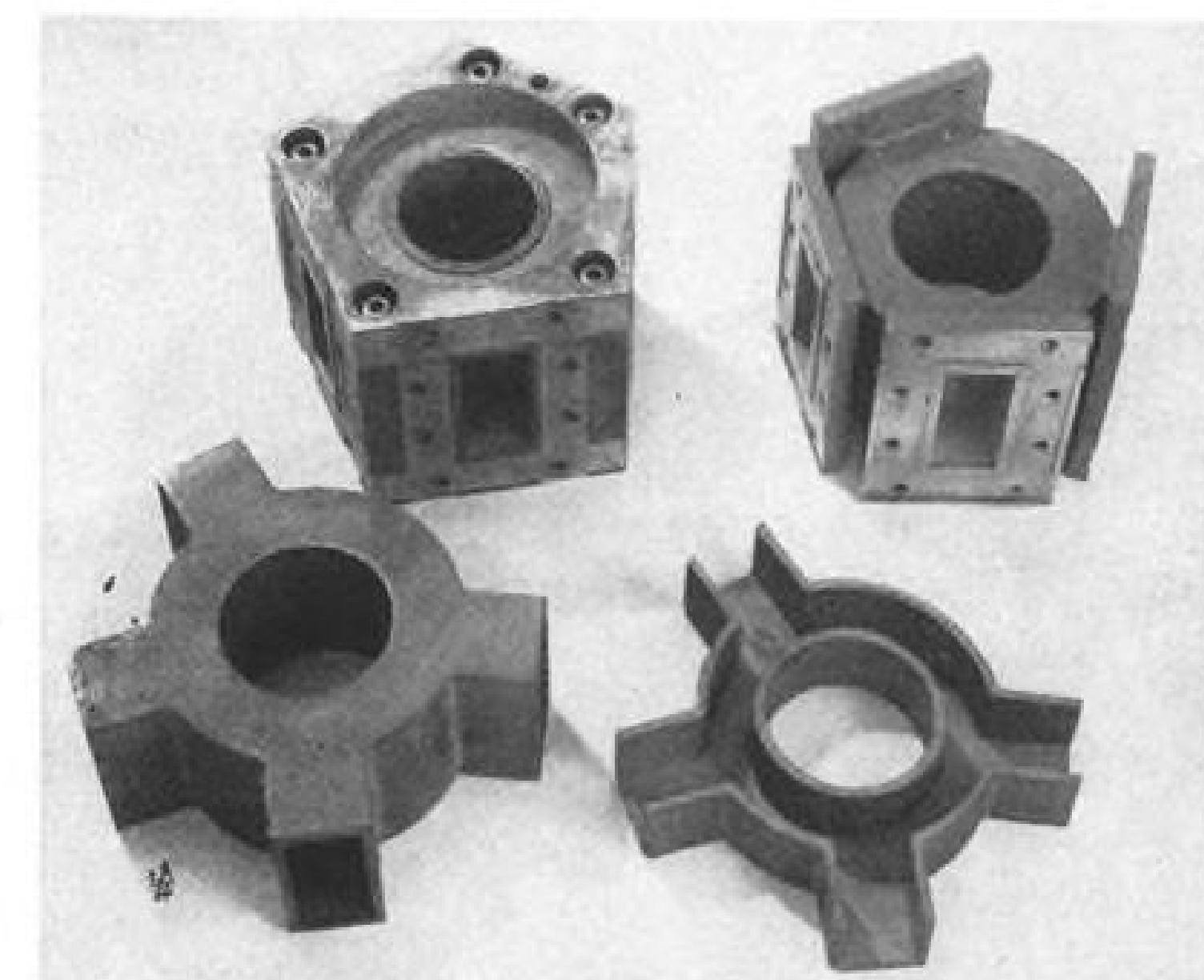
POWER DIVIDER for longrange search radar is cast with sharp corners (arrow). Fabricated counterpart (top, left) has 14 pieces of machined and brazed flat stock.



TWIST SECTION is halved to show spiral steps. Casting cuts cost considerably.



WING-FOLDING FITTINGS are precision sand-cast. Machining is eliminated except for drilling. Parts formerly were forged.



FABRICATED "rat race" ring (top left) has four machined parts. Unit, top right, has cast ring with flanges added at cutoffs.

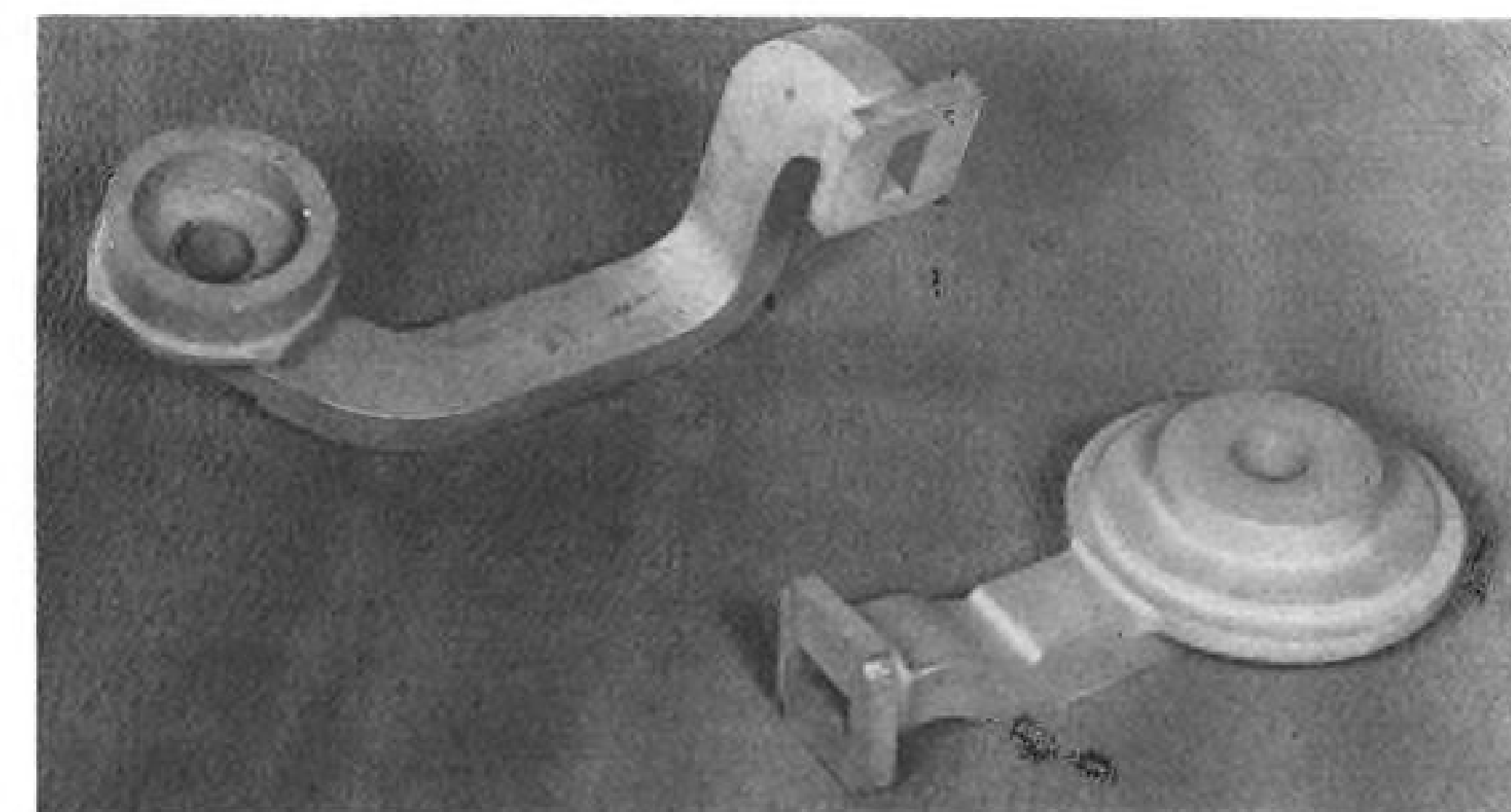
foundry did what is considered "general" sand casting of high quality, when it extended its operation to include "precision" jobs through various refinements in foundry practice and more stringent quality control to keep pace with fast-moving radar development.

For the past year the foundry division has been skippered by Leonard Muller, a veteran of 37 years in Sperry's engineering and manufacturing activities.

► **Strict Requirements**—The waveguide is a prime example of the new precision requirement. In effect this unit is a duct to guide an electromagnetic wave from one point to another.

Surface finish in the waveguide is vital because skin depth of the current is only a few thousandths of an inch, hence all the important electrical and mechanical properties of the guide apply to the surface region. The remainder of the metal in the guide merely serves as a shell for structural support.

The trend in waveguides is toward greater complexity because of the grow-



CAST SCANNER-JOINT formerly was assembled from tubing and machined parts.

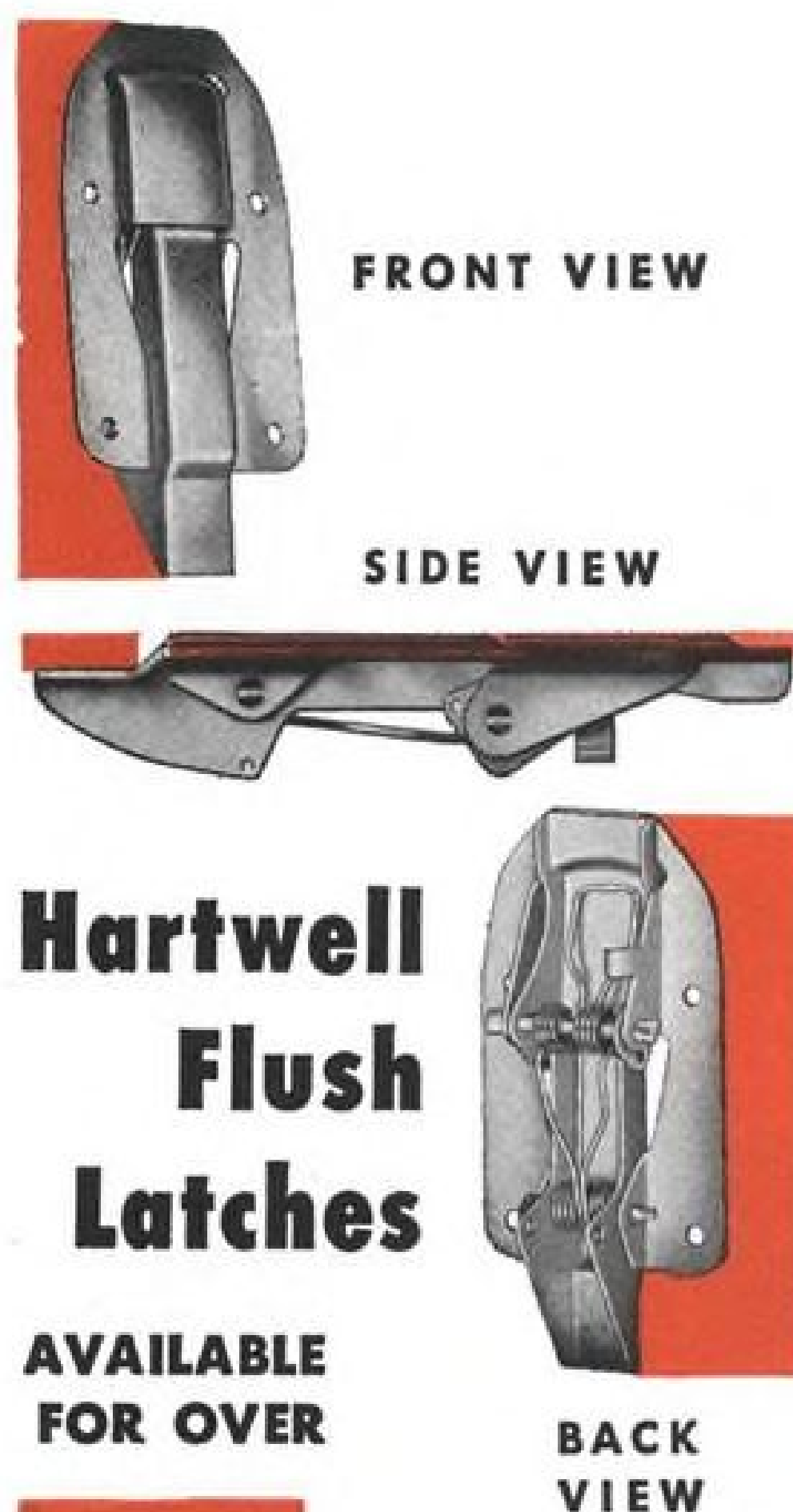
ing requirements for more functions within a smaller space. The precision sand-casting technique fits in with this trend.

Sperry not only turns out production precision parts for itself and other manufacturers, but also is able to supply de-

velopment parts it couldn't get easily from outside suppliers, and in some cases couldn't get at all.

Sperry also has other casting activities—die casting and investment casting—but these are not included in the foundry division because of the differ-





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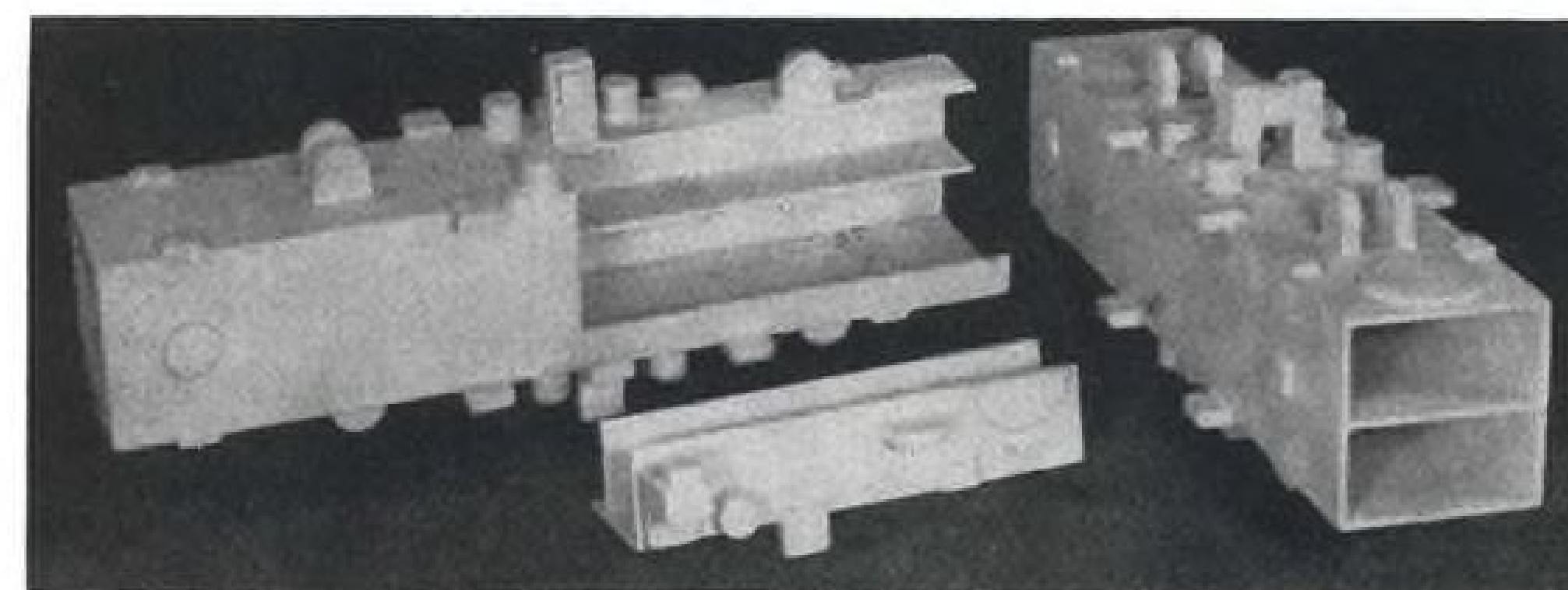


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"PIGGY BACK" variable attenuator section is cast with numerous bosses and pads.

ence in equipment and techniques.

► **Benefits Obtained**—The sand casting technique is reported by Sperry to give these advantages:

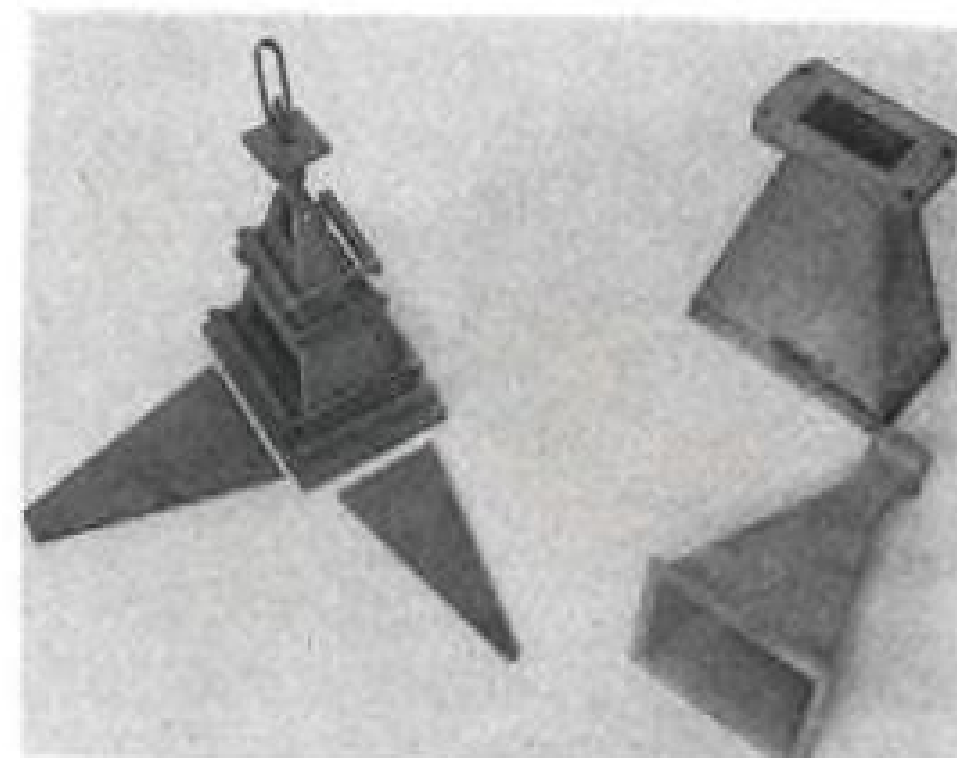
- Dense, minimum-porosity castings.
- As-cast internal finish on wave guides is held to 80 to 100 microinches. This, Muller says, is comparable to a normal machine finish after a semi-smooth cut.
- Close dimensional tolerances can be maintained over a wide range of sizes from small to large—from about ½ in. to about 6 ft. in length. On 1-in.-length dimension, tolerance can be held to about  $\pm .002$  in. On lengths between 1 in. and 3 in., tolerance held is about  $\pm .005$  in. For lengths between 3 in. and 10 in., tolerance maintained is  $\pm .010$ .

On a 6-ft. length, tolerance can be held to  $\pm .065$  in., Muller reports. Sperry is aiming to achieve these tolerances for its general category casting jobs together with a surface finish of about 250 microinches in this casting class.

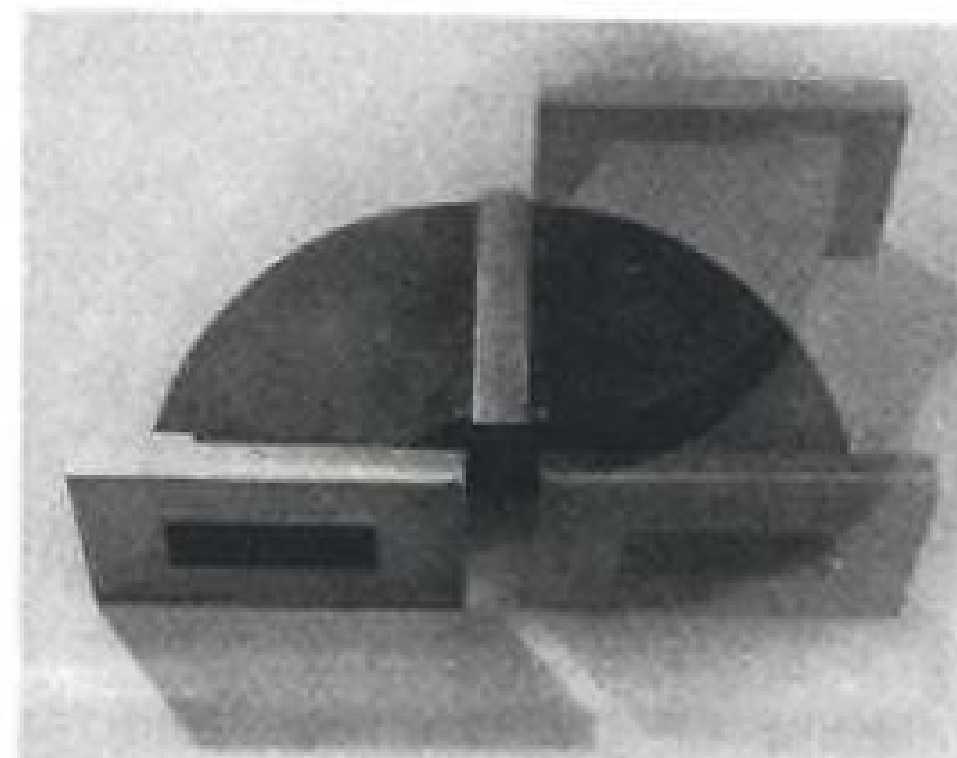
• **Starting cost** for sand casting, including equipment (patterns, core boxes) is generally less than for other methods. It is competitive in price with other casting methods and, compared with fabricated parts, the precision sand-casting technique can produce parts for as little as 10% and, on the average, for 50% of the cost, Muller claims.

► **Production Highlights**—Highlights in the precision sand-casting technique include:

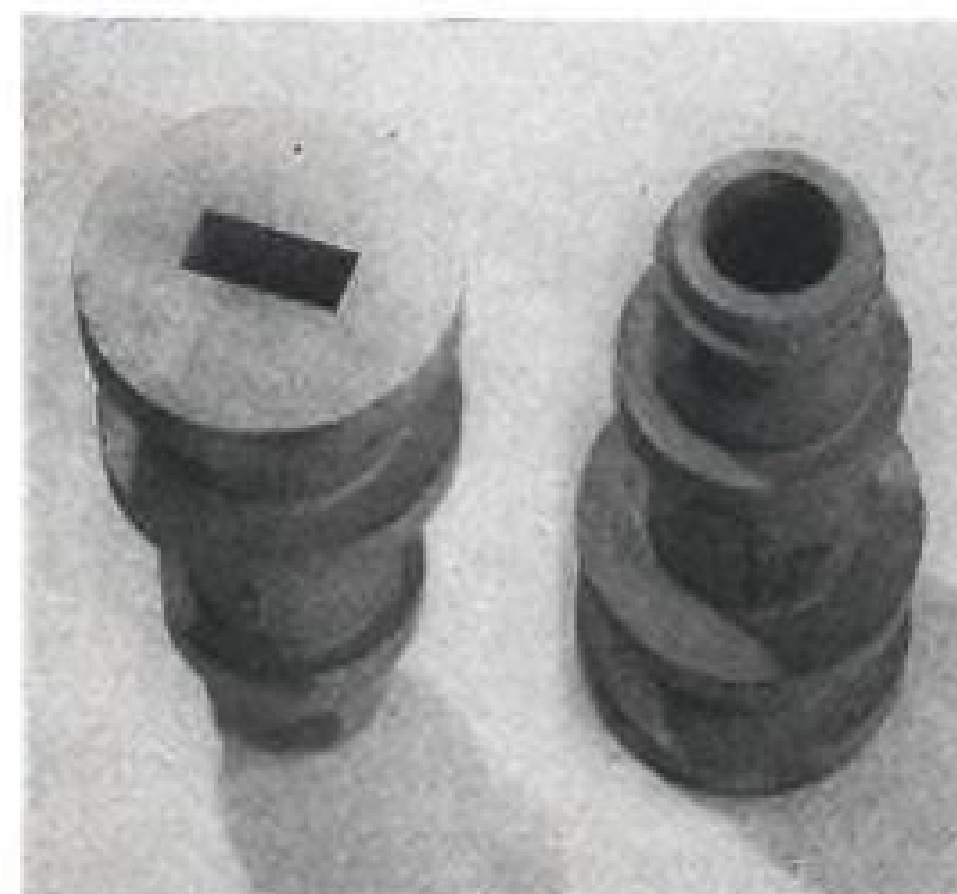
- All cores are made of dry sand specially processed for fineness. Rubbed between the fingers, the sand feels as smooth as talcum. Sperry's sand laboratory controls closely all core mixes of sand with cereal and resin as binders. Molds are made of either dry sand or green sand.
- Special pattern equipment is used. All core boxes are aluminum alloy machined to very close tolerances and have no draft.
- Geometrical factors are closely controlled for accurate waveguide performance. All corners are sharp, surface finish contours are held to very close limits for efficient transmission.
- Pouring temperatures are closely controlled.



**BRAZING FIXTURE** (left) is required for fabricated type horn (top right) made up of many pieces. Cast unit below it costs about one-quarter to make.



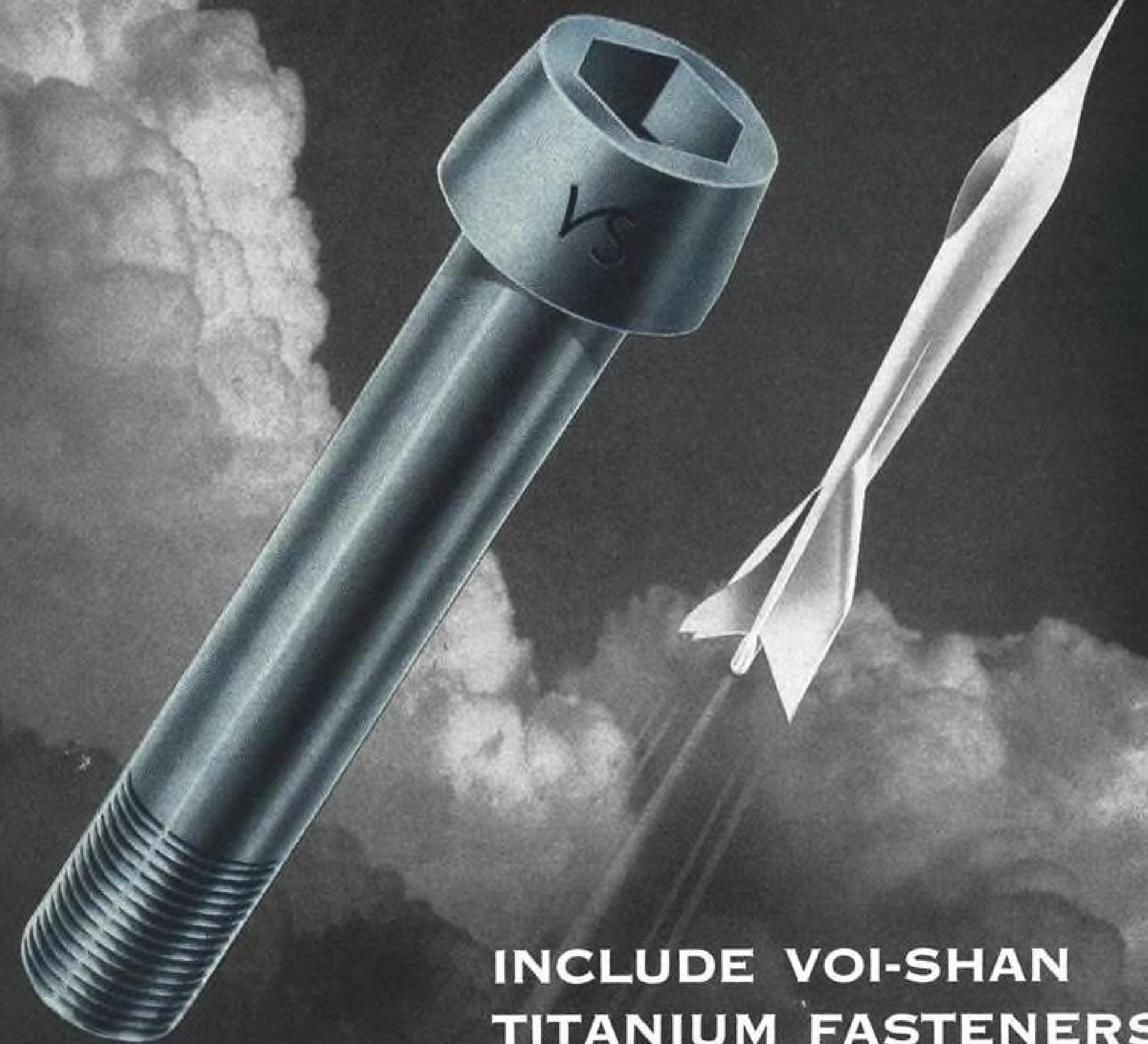
**DOUBLE-EXPOSURE** view shows how cast ends fit together, even after 180-deg. turn. Inside surfaces match smoothly.



**TRANSITION** from rectangular to circular section is simple casting job.

- Complete records are maintained for each job to insure reproducibility and also to build a backlog of data. Records include photos, X-ray pictures, information on sand mixes, and temperatures.
- Gating and risering are permanently

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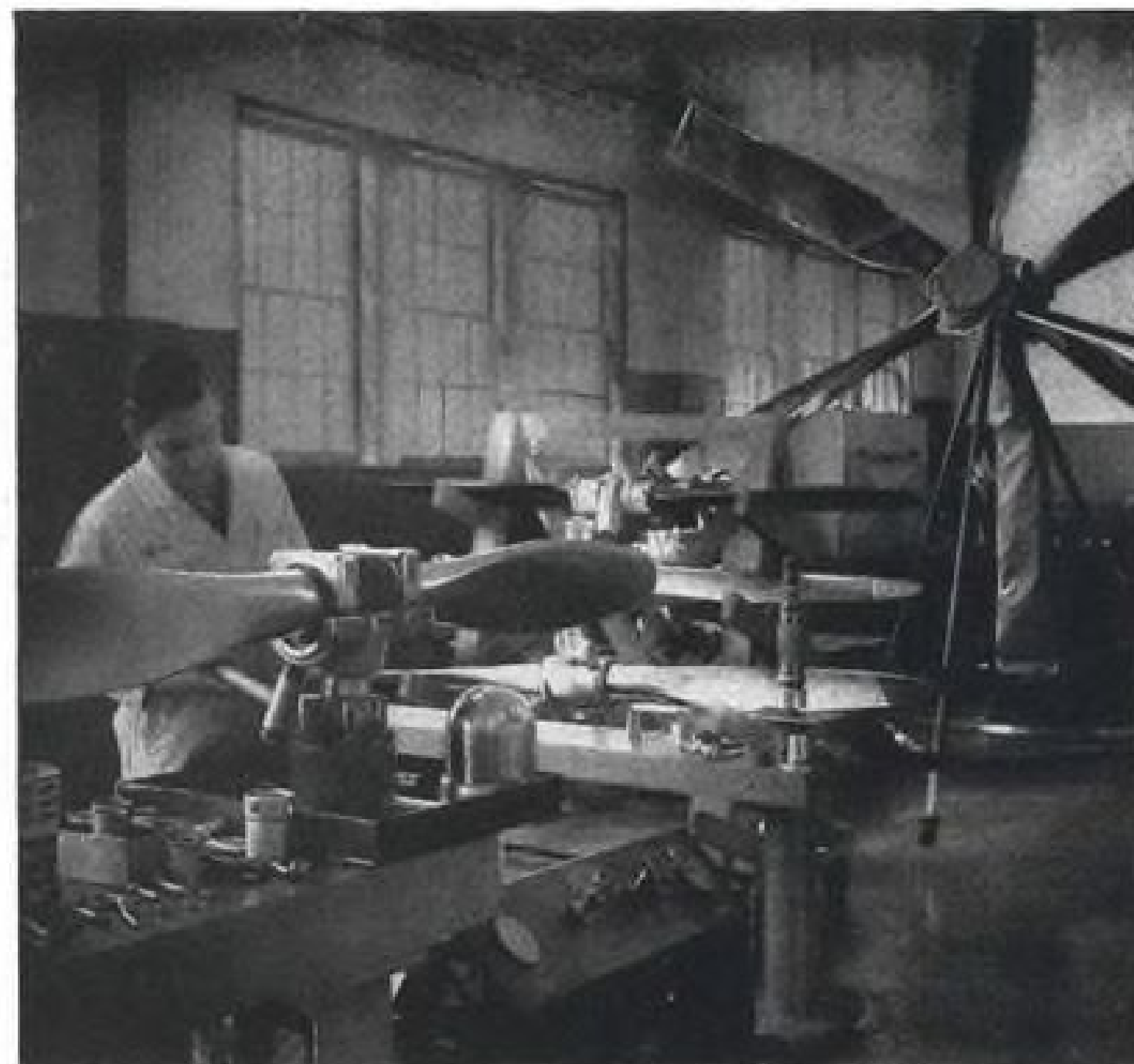
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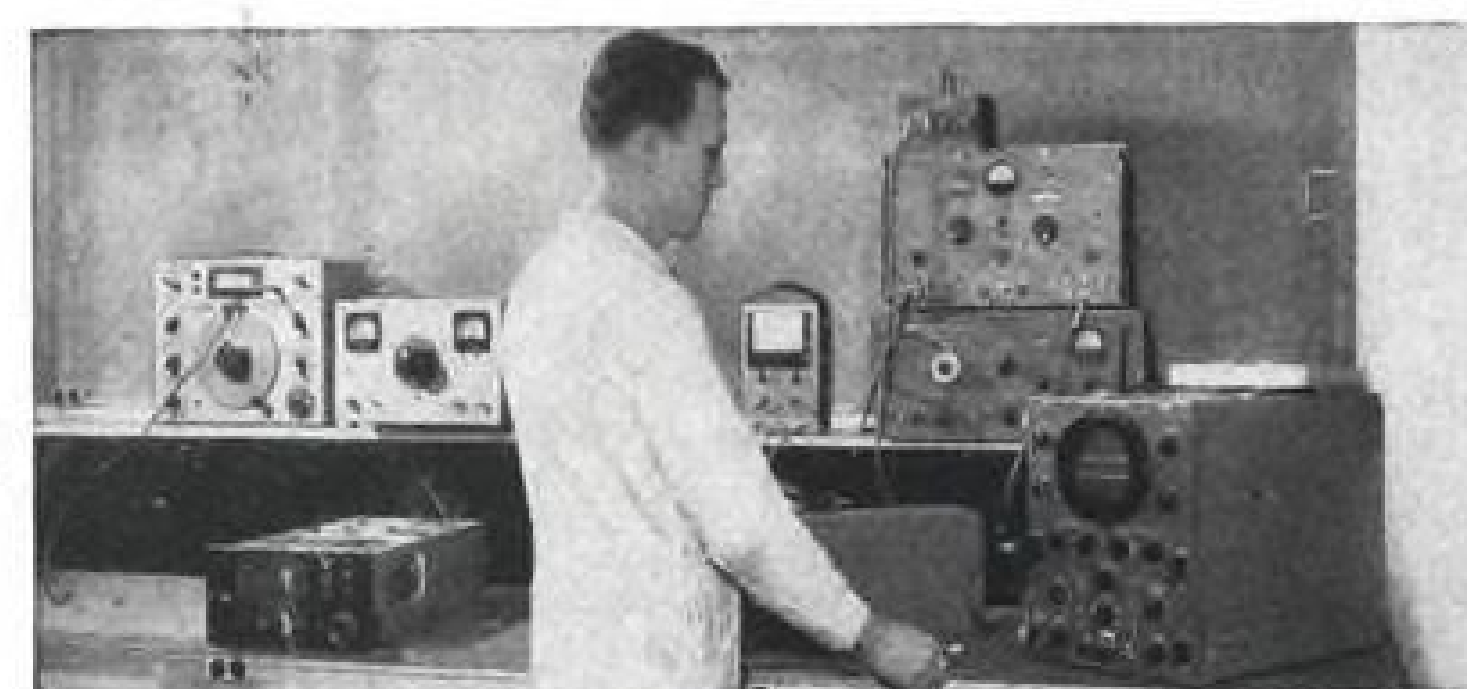
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It is no accident that aircraft come from thousands of miles to benefit from the thorough one-stop servicing of Reading Aviation Service at Municipal Airport, Reading, Pa. Nor is it any accident that RAS uses Cities Service Aviation Products. Says President A. M. Bertolet: "A great deal of credit for our excellent reputation can be attributed to use of only the finest materials... materials such as Cities Service Aviation Products."



Most major inspections completed in a day. Here in the main hangar, a staff of 70 RAS specialists insure fastest, most dependable service. In foreground is twin-engine de Havilland for which RAS is sales agent.



Filling Up with Koolmotor Aero Oil... RAS uses only new Koolmotor because, says Pres. Bertolet: "We've found it reduces oil consumption, valve guide wear and gives better engine protection."

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connected to patterns to insure the same dense casting on a re-run.

• Complete dimensional check is made to insure that there will be no customer-rejections.

About 40% of Sperry's foundry output is for the outside market, about 60% for its own uses. About 60% of total output is for the aviation industry.

Most of the waveguides for airborne work are made of magnesium, some of aluminum. Material for ground installations usually is aluminum. Bronze and copper are used where weight is of no great consideration, as in laboratory components.

► **Precision Casting Examples**—Outstanding examples of parts Sperry is casting in its precision technique include the following:

• **Wing-folding components** (three) for a Grumman aircraft. The sand casting makes it possible to eliminate all machining except drilling. The parts formerly were forged, then machined all over. The cast piece is lighter, less costly.

• **Fork fairing** for main landing gear on an advanced fighter. This part, scheduled for casting in the very near future, is a slightly dished, rectangular surface encompassing about 350 sq. in. Thickness is about 0.15 in. Surface finish is to be held to 125 microinches. Material is ZK51 magnesium alloy.

• **"Harmonica" antenna feed** for large, long-range tracking radar. Part of a missile system, this cast piece includes 42 identical waveguide sections having common walls. Approximately 50 in. long, 8 in. wide and 2 in. thick, the dimensional tolerance for the unit, from one end to the other of the 42 guides, is approximately 0.015 in. It was found that a unit having satisfactory performance could not be produced by fabricating a piece similar to the cast article.

Another antenna feed, part of the same system, is a casting about 50 in. long, 2 to 4 in. thick, with 36 precision cores. The broad surface, about 1/2 in. thick, is flat to within about 0.005 in.

• **Waveguide bends.** These are used in various sizes in many radar applications. The units, intended for 90-deg. bends, are interchangeable, can be used together to make U- and S-shapes or connect with other waveguide sections. Used with a similar section, the junction of internal surfaces is so smooth that the finger can barely sense the parting line. The only machining required on these castings is on the flange faces and the drilling of pin holes for alignment.

• **Horn** for portable test set used in calibration of X-band gun-laying airborne and surface radars. This unit, cast in magnesium, is a tapered configuration to direct microwave energy into space. Earlier fabricated unit consisted of about 10 pieces of machined aluminum

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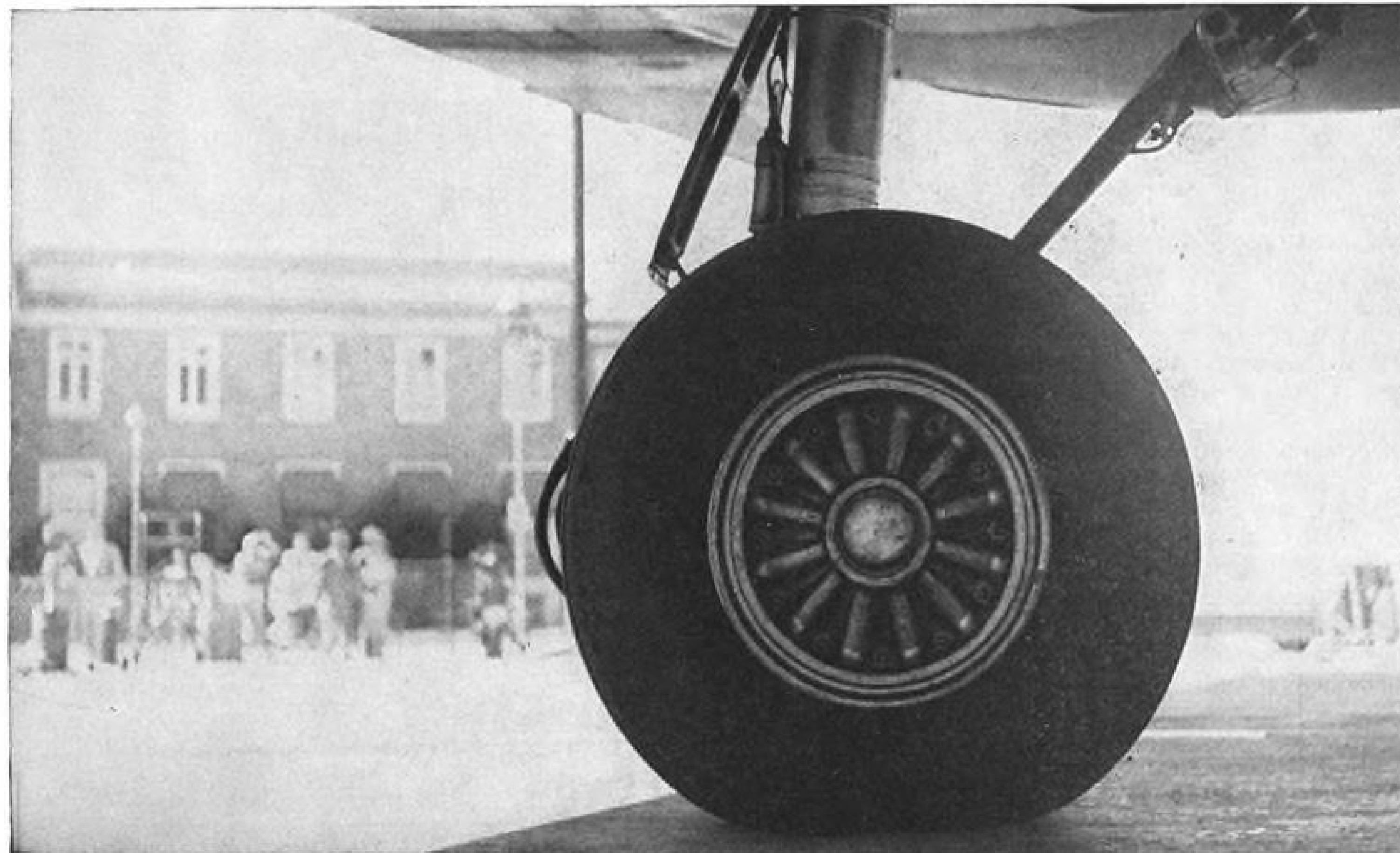
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Skydrol: Reg. U. S. Pat. Off.



flat stock requiring salt (dip) brazing. Fixture used was made of Invar, Sperry says, and had a short life in the salt bath—averaging one fixture for five to 10 horns. Cost saving through casting the part is reported to be more than 50% in small quantities, 75 to 90% in larger quantities.

Quadruple horns cast in one piece of bronze now replace fabricated quadruples which required 17 pieces of machined, brazed flat stock.

• "Rat race." This unit compares two received radar signals with a reference signal to measure frequency and other critical target data, hence must possess very high dimensional, shape and internal surface accuracies to meet systems specs. Earlier fabricated counterpart consisted of four complex pieces machined from solid stock. Part now is cast in bronze, has four collar-flanges brazed to waveguide stems. Casting process permits production of many identical pieces.

• Twist section for missile guidance radar. This part has geometrically accurate steps, much like a spiral staircase, to rotate (through 90 deg.) the broad dimension of a rectangular waveguide. To fabricate this part would be an extremely difficult job. Because it never was fabricated, no cost comparison is available with a cast magnesium unit, but it is estimated that probable savings would run 75 to 90%.

• Serpentine shapes. Some of these use rotating joints, as in the feed for an airborne radar scanner. Formerly fabricated from bent tubing and accurately machined parts, which had to be assembled by several methods, units now are cast in magnesium at a cost saving of approximately 75%. Only boring of the inner flange of the circular piece along with facing and drilling of the square connection flange is required.

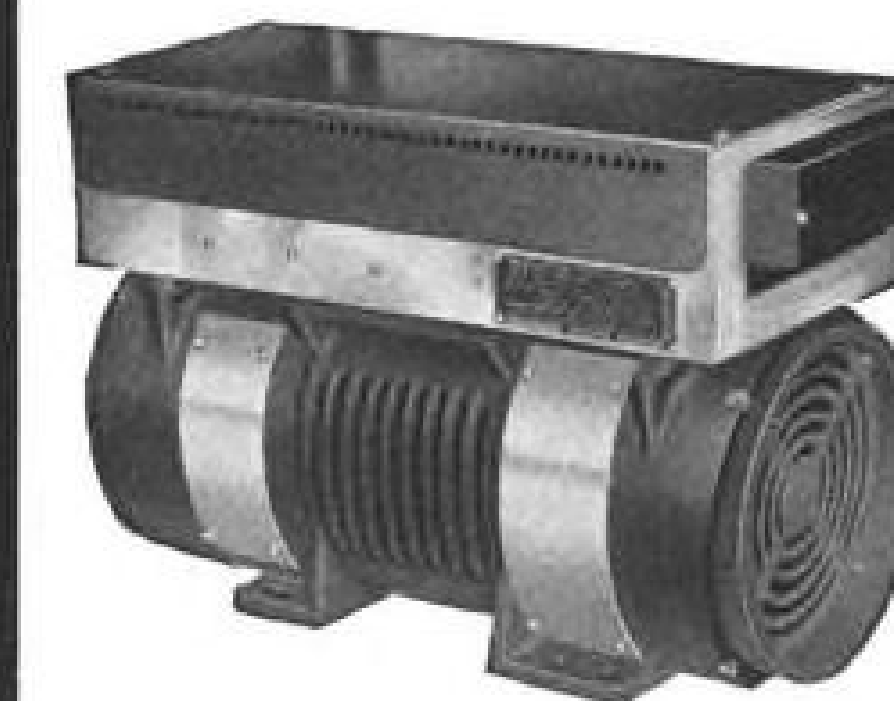
• Rectangular-to-circular transition section. A perfect junction between a piece of rectangular tubing and a piece of circular tubing is difficult to fabricate or machine, because the joining line is a hyperbola. Perfect transitions have been easy to cast, have fine internal finish and accurate dimensions.

• Power divider section. Part of a long-range search radar, this unit serves as a junction for waveguides to exchange power in calibrated amounts. Formerly fabricated from 14 pieces of machined flat stock brazed together, the unit now is sand-cast with high-precision, sharp acute-angle corners and internal bumps. ▶ Experimental Runs—All casting jobs get a trial run in Sperry's small experimental foundry room before units are released for production. Here, also, the gates and risers are engineered into the pattern.

Test pourings are closely checked, castings get physical analysis and X-ray inspection in the foundry laboratory.



## HIGH ALTITUDE INVERTERS



Type 32E03-3

### Specifications Type 32E03-3 (Conforms to USAF drawing 53B6227 and AN-1-10b)

<b>Input DC</b>	
Voltage Range . . . . .	26 to 29
Current Range . . . . .	160 to 180
Current at 27.5 volts . . . . .	165
<b>Output AC</b>	
Volts . . . . .	115±4%
Amperes . . . . .	21.7
Volt-Amperes . . . . .	2500
Frequency-cps. . . . .	400±10
Power Factor . . . . .	.9 lag to .95 lead
Efficiency . . . . .	55%
200% load . . . . .	5 sec.
150% load . . . . .	5 min.

WEIGHT: Approximately 62 pounds.

MAXIMUM OVER-ALL DIMENSIONS:  
7¼" wide x 11¼" high x 17" long.

<b>ALTITUDE</b>	<b>TEMP. RANGE</b>
Sea Level . . . . .	-55°C to +85°C
35,000 ft. . . . .	-55°C to +40°C
50,000 ft. . . . .	-55°C to +20°C

### Type MG-54 (Conforms to Navy drawing E-51A1A9 and MIL-1-7032)

<b>Input DC</b>	
Voltage Range . . . . .	26 to 29
Current Range . . . . .	24.1 to 21.6
Current at 27.5 volts . . . . .	22.8
<b>Output AC</b>	
Volts . . . . .	115/200±4% (115±4%, single phase)
Amperes . . . . .	1.25/723 (2.17, single phase)
Volt-Amperes . . . . .	250 (single phase, three phase, or single and three phase combined)
Frequency-cycles/sec. . . . .	400±10
Power Factor . . . . .	0.8 lag to .95 lead
Watts at 0.8 PF lag . . . . .	200
Efficiency . . . . .	40%
200% load . . . . .	5 sec.
150% load . . . . .	5 min.

WEIGHT: Approximately 17 pounds.

MAXIMUM OVER-ALL DIMENSIONS:  
5½" wide x 8" high x 12" long.

<b>ALTITUDE</b>	<b>TEMP. RANGE</b>
Sea Level . . . . .	-55°C to +85°C
50,000 ft. . . . .	-55°C to -10°C
65,000 ft. . . . .	-55°C to -10°C

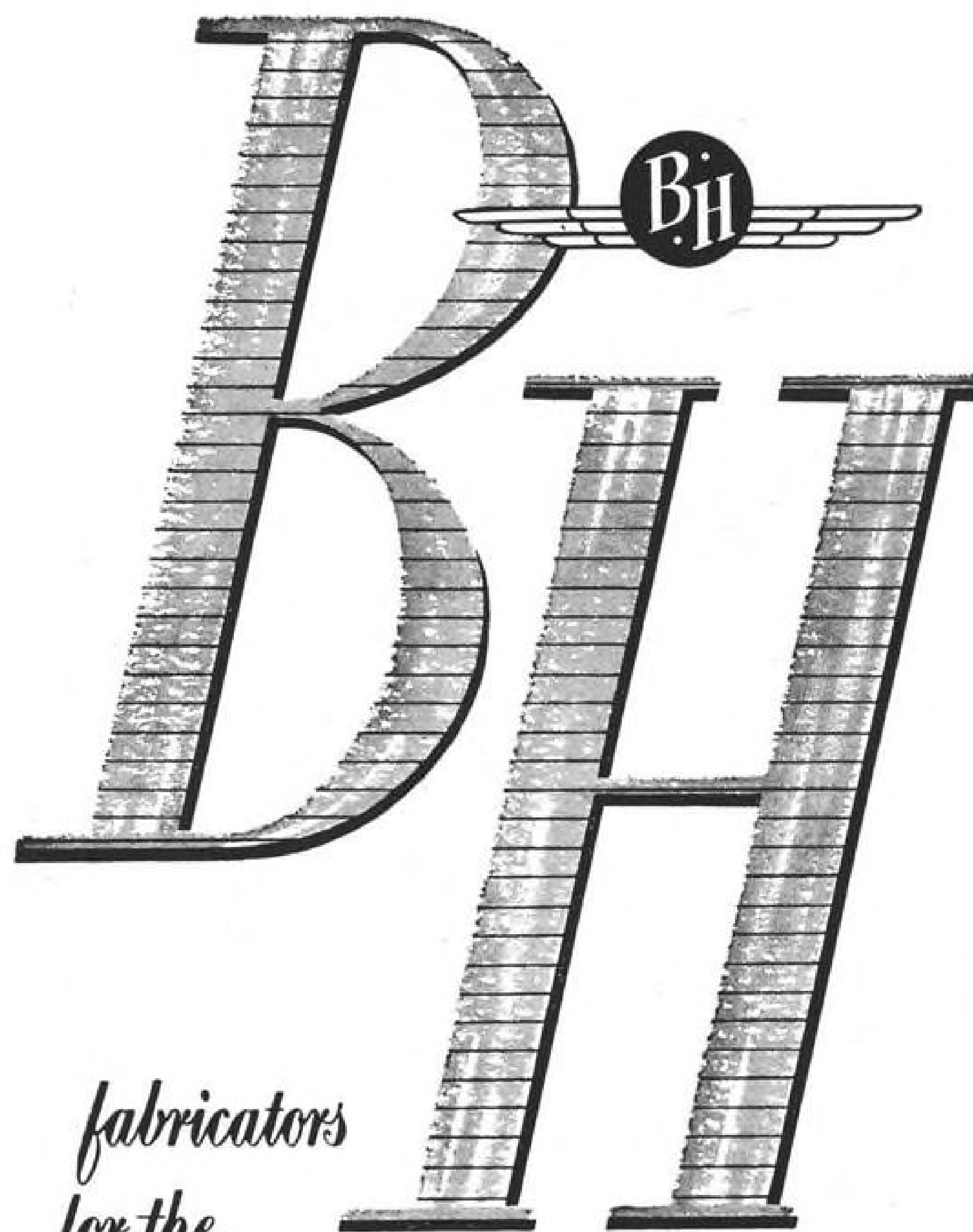


Type MG-54



West Coast Sales and Service: 117 E. Providencia, Burbank, Calif.  
Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.  
Canadian Distributor: Aviation Electric Ltd., P.O. Box 6102, Montreal, P. Q.





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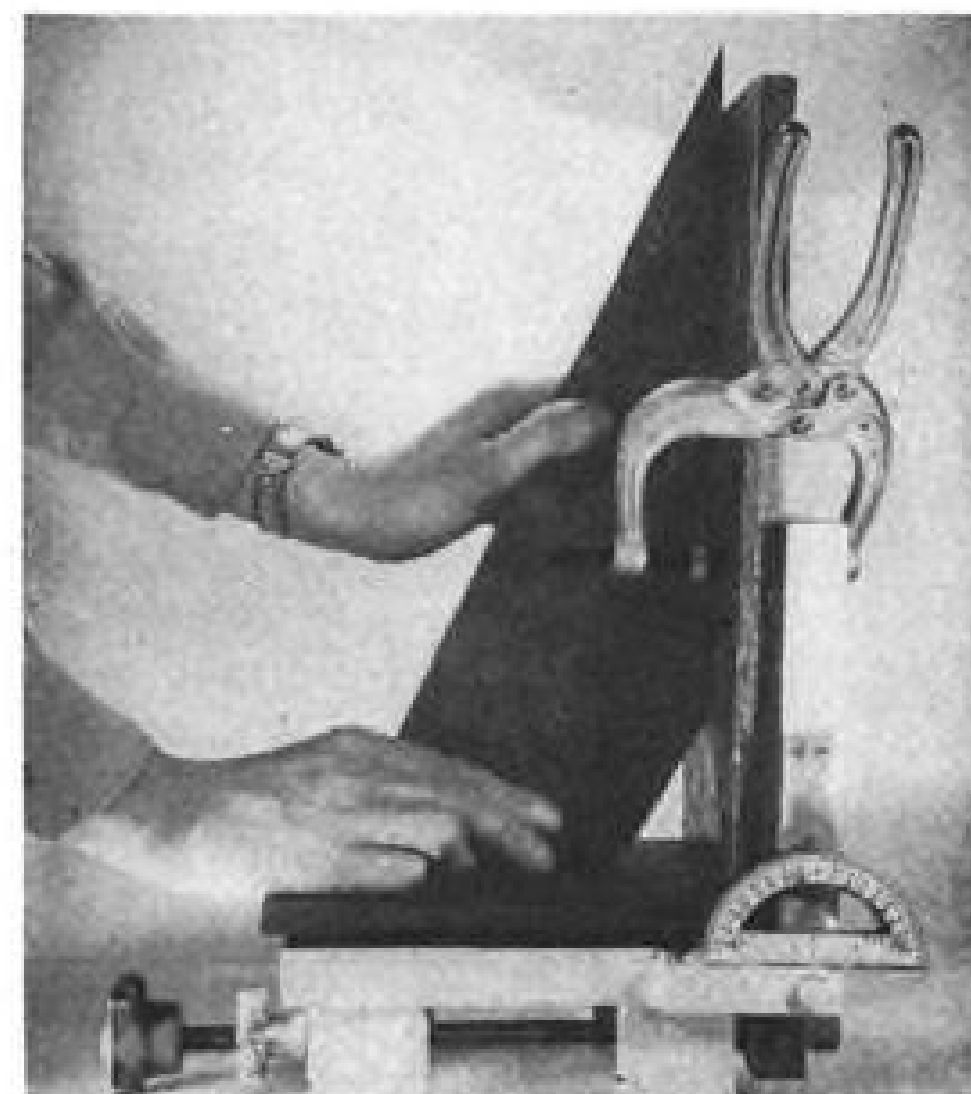


FLETCHER AVIATION CORP. • ROSEMEAD, CALIFORNIA • DAYTON, OHIO • WASHINGTON, D. C.

## PRODUCTION BRIEFING

► Mar Vista Engineering Co. has entered the pneumatic valve field and is offering a complete line of solenoid-operated shutoff and regulator valves for aircraft, guided missiles and industrial uses. Ease of maintenance is noted as a special feature of the new products. Pressure range covers 0-3,000 psi.; less than 1 amp. of electrical current is drawn at 24 v. d.c. continuous duty. Firm's address: 5420 W. 104th St., Los Angeles 45, Calif.

► All American Engineering Co., Wilmington, Del., received a \$500,000 contract for design, development and production of lightweight airborne winches from Goodyear Aircraft Corp., Akron, Ohio.



**EXACT ANGLES** for highly accurate B-52 jigs are turned out quickly and inexpensively by Temco Aircraft Corp. in this home-made weld and check fixture. Angle sides and gussets are fixed in the device by C-clamps. Back plate is tilted to the desired angle by means of threaded rod under the bed plate, a protractor indicating the degree of angle formed by back and bed plate. These angles are true to one degree when ready for machining. The fixture saves an estimated five man-hours per jig.

► Babb Co., Inc., owned by Atlas Corp., is building a plant costing \$550,000 to handle jet engine overhaul on 43 leased acres at Phoenix, Ariz., Sky Harbor Airport. Peak employment is expected to reach 1,500.

► International Harvester Co., New York, has been awarded a \$345,847 contract by Port of New York Authority for 25 aircraft refueling trucks to be used at N. Y. International (Idlewild) Airport. Each four-compartment vehicle will carry 4,400 gal. Volume of gasoline handled by Allied Aviation Fueling of New York, Inc., fuel opera-

*flexibility* in the new **AERO Commander 560**

Flexibility of cabin arrangement is another

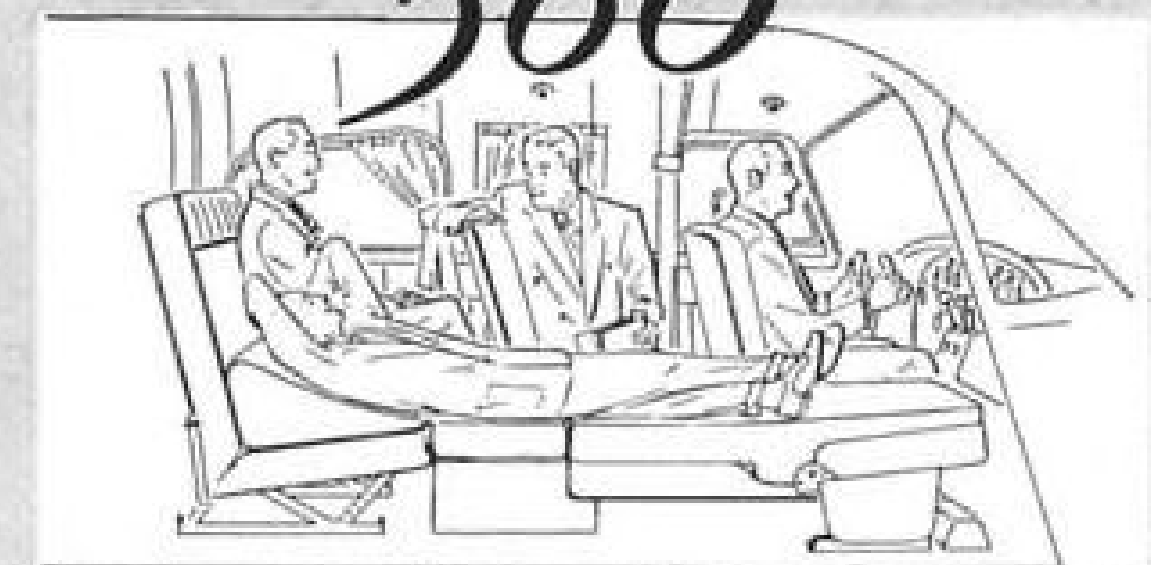
comfort advantage the Aero Commander 560

brings to the flying executive.

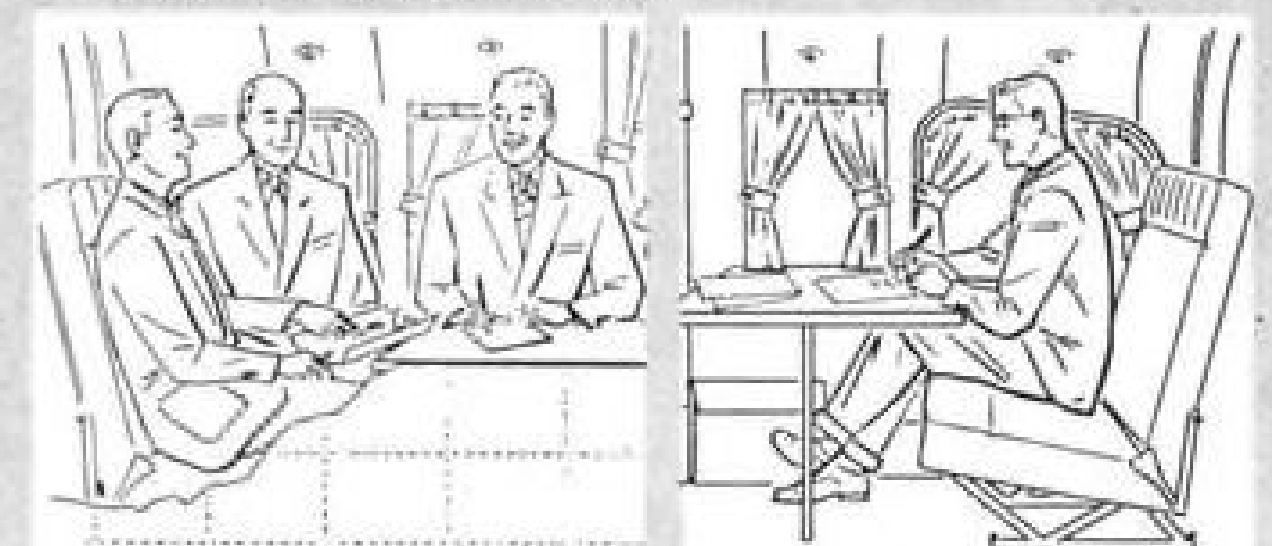
Pictured here are but a few of the optional

features made possible by the long, wide

cabin of this twin-engine business airplane.



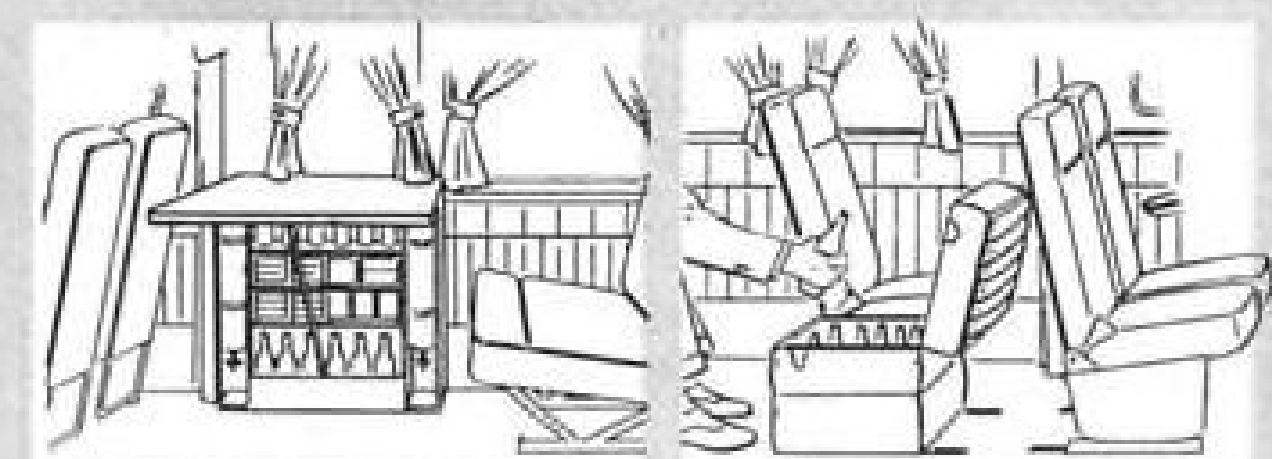
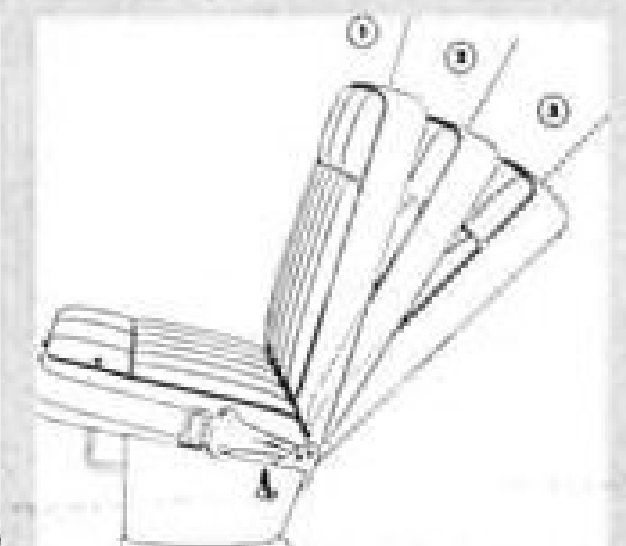
Hassock seat and lowered chair back form comfortable full length couch.



Fold-away table for in-flight use — work, cards, lunch.



Individual chairs with reclining backs adjust fore and aft for added comfort — leg room.



Snack bar and hassock seat ice box are convenient for long hops.



**AERO DESIGN**  
*Commander*  
**560**



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## Another Gas Turbine Milestone



## A new power source for starting jet aircraft

SOLAR'S "MARS" GAS TURBINE ENGINE is the prime mover in this remarkable new 1000 ampere ground power unit for starting of jet aircraft.

The Model T-60M ground power unit is extremely light and compact for its output, weighing less than 700 lb. It can run on a variety of fuels—including gasoline, diesel

oil, or jet fuel—simplifying logistics problems at remote airfields. Fast and reliable starting is assured. The engine requires no preheating in temperatures from -65 F to +130 F, and can carry full load within 15 seconds after the start button is pressed.

These Solar ground power units provide controlled current, constant voltage d-c output for both split bus and common bus aircraft. Controls are completely automatic; fuel tank, storage battery for starting, and output cables are self-contained in the unit.

Solar gas turbine engines—as Mars airborne generator sets have demonstrated—are rugged and trouble-free. A new folder describing the Model T-60M ground power unit is now available. We welcome your inquiries on this and other applications of the Solar Mars gas turbine—a power source of proven reliability.



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Solar specializes in the manufacture of precision products from alloys and special metals for severe service. Solar's experience since 1927 is unduplicated in this field. Solar skills and facilities range from research, design and development through to mass production. Wherever heat, corrosion or difficult specifications are problems, Solar can help you solve them.



**PLANTS.** In San Diego and Des Moines (photograph above). A total of 1,400,000 sq ft of floor space. Approximately 5,000 employees. Annual sales over \$65,000,000.

**EQUIPMENT.** Production equipment for all types of metal fabrication—forming, machining, welding, brazing, casting, coating. Extensive laboratory and testing equipment. Facilities for development, prototype, limited or mass production.

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Current orders include aircraft engine and airframe parts, alloy castings, pneumatic ducting, atomic energy components. Customers include some of the most honored names among aircraft and industrial companies in the U.S. and Europe.

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**Bellows.** "Sola-Flex"® bellows and expansion joints in many designs from 1/2 in. up to the world's largest, 28 ft in diameter.



**Gas Turbines.** Solar "Mars" 50 hp engines for auxiliary generator sets, ground carts, portable fire pumps; Solar "Jupiter" 500 hp engines in variable and constant speed models.

**Ceramic Coatings.** "Solaramic"® is the Solar trade mark for a family of coatings that protects metals from heat, corrosion, galling and abrasion.

**Controls.** Complete control systems utilizing the new Solar "Microjet"® principle for control of gas turbines, jet engines and pneumatic devices.

### FURTHER INFORMATION

Your inquiry regarding any Solar service or facility will receive prompt attention. Address Solar Aircraft Company, Department A-43, San Diego 12, California.

tor, at the field went up 32% this year.

► **Airlines National Terminal Co.** has asked the University of Michigan to approve installation of three more underground aviation gasoline storage tanks increasing tank farm facilities at Willow Run Airport from present 210,000 gal. to 300,000 gal. Increased demands by eight airlines serving Detroit is given as reason.

► **Arma Corp.,** Garden City, L. I., N. Y., has been fully merged into its parent firm, American Bosch Corp., and is now a division, as is American Bosch, Springfield, Mass.

► **Ohio State University's** Radiographic Laboratory has been granted authority by Directorate of Procurement & Production, USAF, to perform X-ray radiography of materials to be used in AF and BuAer contracts.

► **Tiger-Aivex Aerial Survey Co.** is a new aerial photography firm formed by Flying Tiger Line and Aviation Export Co., which has leased a specially pressurized DH Mosquito through Ryall Engineering Co., Denver, to the Army Map Service, Washington, D. C. New survey firm has home office at 3108 Valhalla Drive, Burbank, Calif., and offers mapping planes for lease.

► **Lord Manufacturing Co.,** Erie, Pa., has relocated its New York regional engineering office to 630 Fifth Ave., N. Y. 20. Phones: Circle 7-3326 and 7-3327.

► **Pittsburgh Plate Glass Co.** plans to build a \$34 million plate glass production plant at Cumberland, Md. The firm has received a certificate of necessity from the Office of Defense Mobilization covering 85% of the cost.

► **Techalloy Co.,** Pahns, Pa., has completed a new building as part of a \$250,000 expansion to serve electronics, instrument, industrial wire cloth and electrical equipment fields.

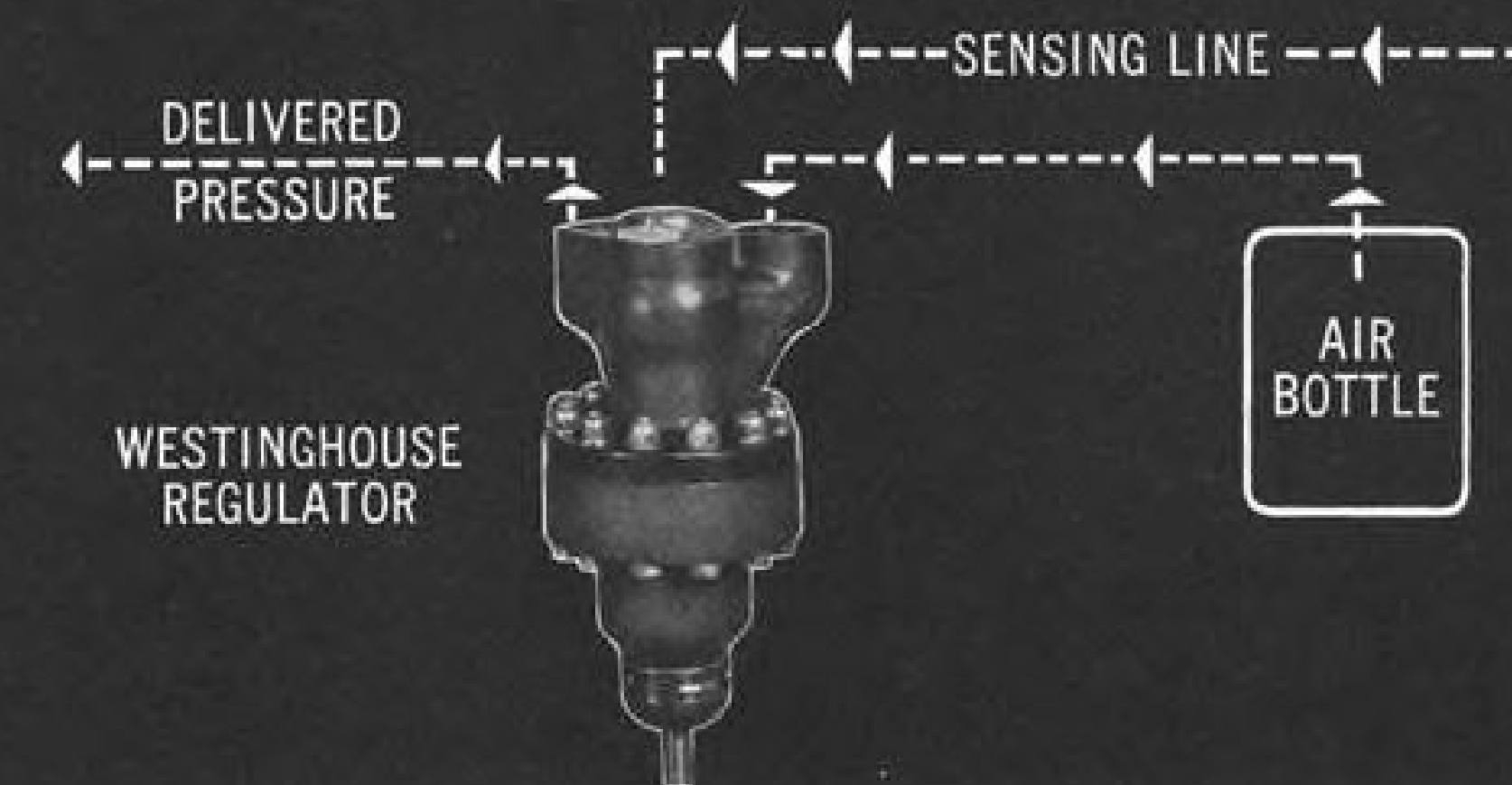
► **Kaiser Aluminum & Chemical Corp.** will build a multi-million aluminum sheet and foil rolling mill on a 2,500-acre site near Ravenswood, W. Va. First stage of the plant is expected to be completed by mid-1956.

► **Northrop Aircraft, Inc.,** Hawthorne, Calif., has granted an exclusive manufacturing and marketing license for its elevating dolly to Consolidated Tool & Products Co., Los Angeles.

► To lick corrosion problems associated with use of jet exhaust stacks, Lockheed Aircraft Corp., Burbank, Calif., is spraying two coats on Super Connie

## How to use pneumatics in aircraft

### TO FORCE FEED FUEL IN PROPORTION TO SPEED



In the diagram above, the speed sensing line carries ram air which is used to control the operation of a Westinghouse Pressure Regulator. The Regulator, in turn, controls the air delivered to a pressurized fuel tank. As flying speed increases, the Regulator increases the pressure on the fuel tank, and fuel is fed faster.

You can vary this basic system in many ways to serve other functions. You need only a source of low-pressure control air. With it, you can accurately and automatically regulate the pressure of delivered air. Pressure of delivered air can be as high as 3,000 psi.

Anytime you need a reliable source of efficient power for intermittent operations, think of Westinghouse Pneumatics. Westinghouse Pneumatics are uncomplicated, rugged, and lightweight, and have been used for years in all types of modern aircraft. Write for specific information.

## Westinghouse Air Brake COMPANY

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- A.I.S.I. 1025.... AN-WW-T-846

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Sensenich PROP SHOP... prompt propeller repair of all makes fixed pitch wood, Sensenich, Hartzell, Beech Controllable, Metal or Wood; Sensenich and McCauley fixed pitch Metal, Magnaflex, etching, anodizing and plating service.

wing assemblies. Coat 1 is normal zinc chromate primer to interior detail parts; Coat 2 is a specially applied catalytic-type aluminized epoxy resin, durable as baked enamel, the company says. Applied to the first 16 Eastern Air Lines Super Connies, the system is slated for all future transports.

► **R. M. Hollingshead Corp.**, aircraft maintenance chemicals maker, is building a new \$1-million plant at Sunnyvale, Calif., which is expected to be in operation early next year.

► **Townsend Co.**, New Brighton, Pa., has purchased West Coast Tool & Supply Co., maker of aircraft weapon flexible ejection chutes.

► **Fairchild Engine Division**, Fairchild Engine and Airplane Corp., has broken ground on its proposed 400,000-sq. ft. engine plant and turbine test laboratory at Deer Park, N. Y. The Austin Co. has been chosen to design and build the new facility, which will replace the division's Farmingdale plant, sold recently to Republic Aviation Corp.

► **Cooper Alloy Corp.** is the new name for Cooper Alloy Foundry Co., Hillside, N. J.

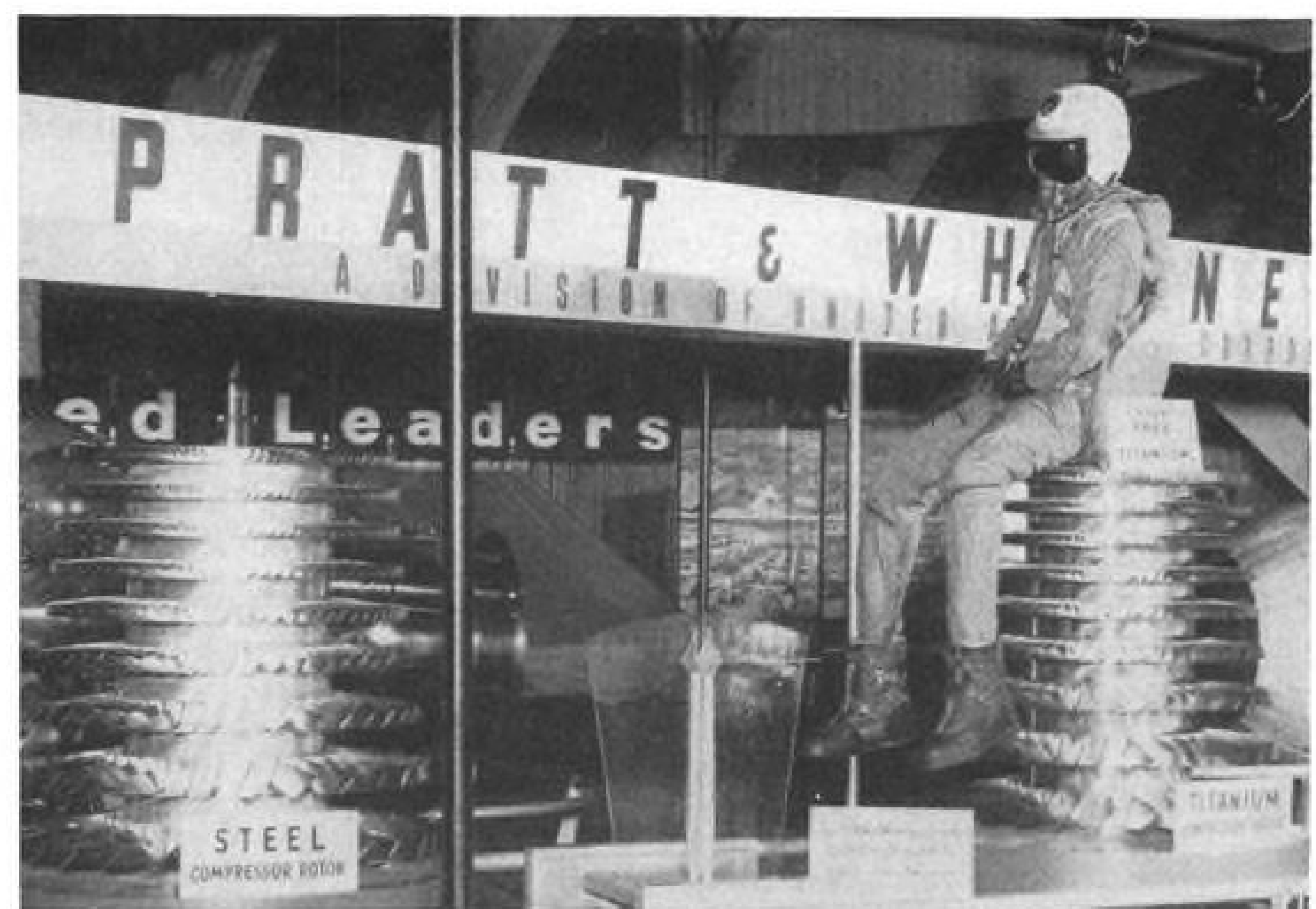
► **Delavan Manufacturing Co.**, West

Des Moines, Iowa, will expand plant space by 6,000 sq. ft., giving it 34,800 sq. ft. Among its products are jet engine nozzles.

► **Vest Aircraft Co.'s Parts Division**, Sky Ranch Airport, Denver, Colo., has purchased all manufacturing rights, tooling, engineering, jigs, fixtures and existing spares for all models of the two-place Ercoupe personal plane from Sanders Aviation, Inc., Riverdale, Md. Vest recently purchased the entire Swift personal plane project from Temco Aircraft Corp., Dallas, Tex.

► **Nut Corp. of America** has been formed for highspeed quantity production of brass, steel and stainless steel machine screw nuts using powder metallurgy processes. The firm will start initial output in a Compton, Calif., plant, expects production by late this year to reach 82,000 units per hour. President is Lee B. Doddridge, also head of Doddridge Screw Corp., Gardena, Calif.

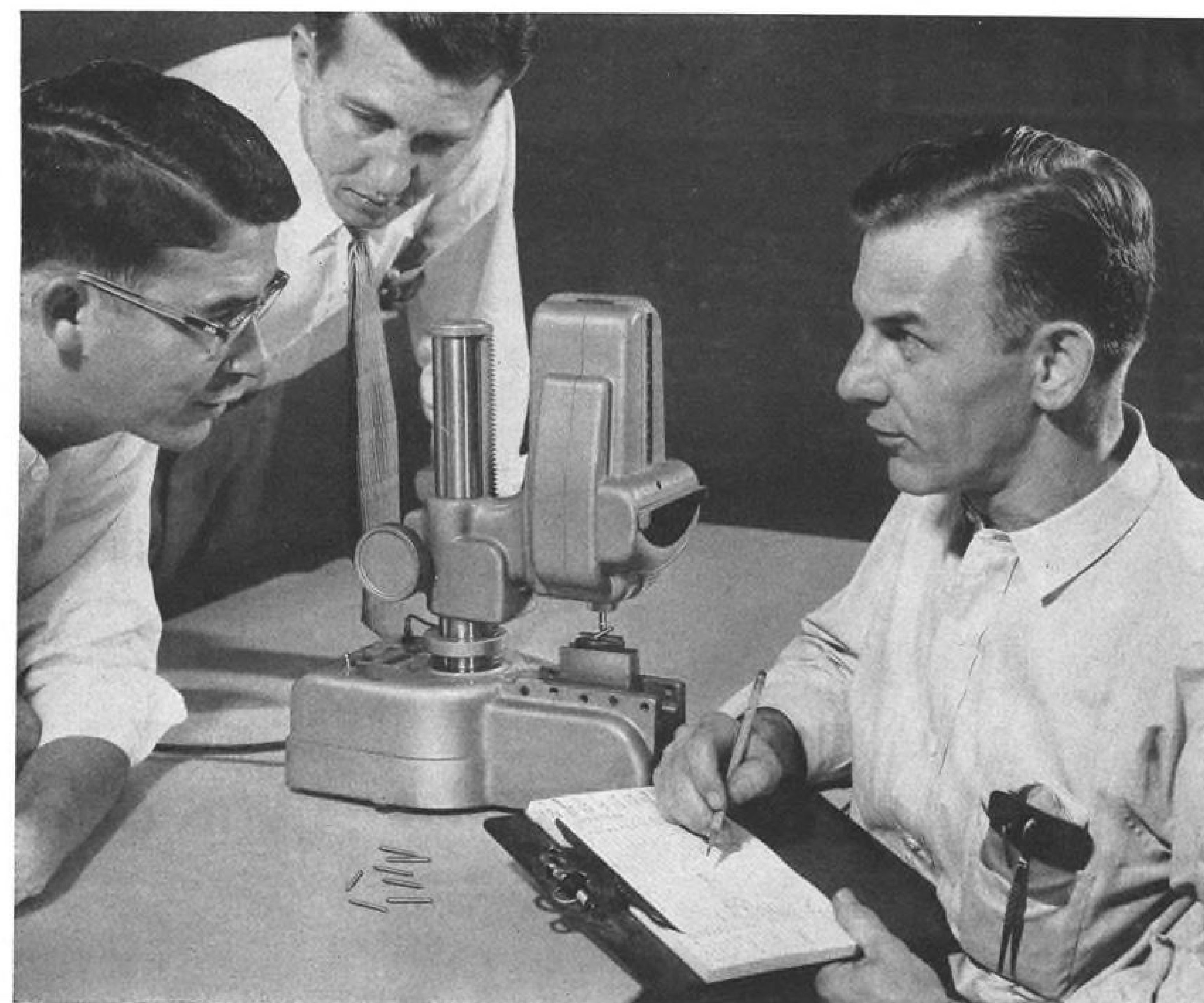
► **Moog Valve Co.**, East Aurora, N. Y., plans to extend its facilities by either expanding its current plant or leasing additional area. Firm, which makes an electro-hydraulic valve used in missiles and planes, has a \$1.5-million backlog. Sales are stated to be currently at the rate of \$2 million annually.



### Pilot Goes 'For Free'

Pilot would be carried "for free" if titanium were used instead of steel in this compressor rotor. Part of Pratt & Whitney's exhibit which showed company's J57 at the National Aircraft Show, Dayton, compressor was not identified, but number of stages (nine) leads to the conclusion that it is low-stage portion of split compressor in J57. No internal details of engine have been revealed by

P&WA, but, according to industry information, there is a total of 16 compressor stages—nine low, seven high—for a maximum pressure ratio of 12.5:1 (Aviation Week, May 3, p. 44). Engine is all-steel, is reported to weigh 4,150-4,200 lb. Estimate is that about 650 lb. per engine could be saved if titanium alloys were substituted for steel in various applications in the powerplant.



Checking Needle Rollers on Shadow Gauge.

## "This triple check means long service life for TORRINGTON NEEDLE BEARINGS"

The workmen who grind rollers for Torrington Needle Bearings constantly check their work against master rollers on a shadow gauge—an instrument sensitive to variations of .000025".

Throughout the day, an inspector checks each operator's work and master roller against another master, and plots the production information on a Statistical Quality Control Sheet. As a triple precaution, both the operator's and the inspector's masters are checked daily against "Jo" blocks.

These constant measurements, and the control records they provide, are only a few of the many critical inspec-

tions—from metallurgical analysis of raw materials to running tests of each finished bearing—that assure the long life and high capacity of Torrington Needle Bearings.

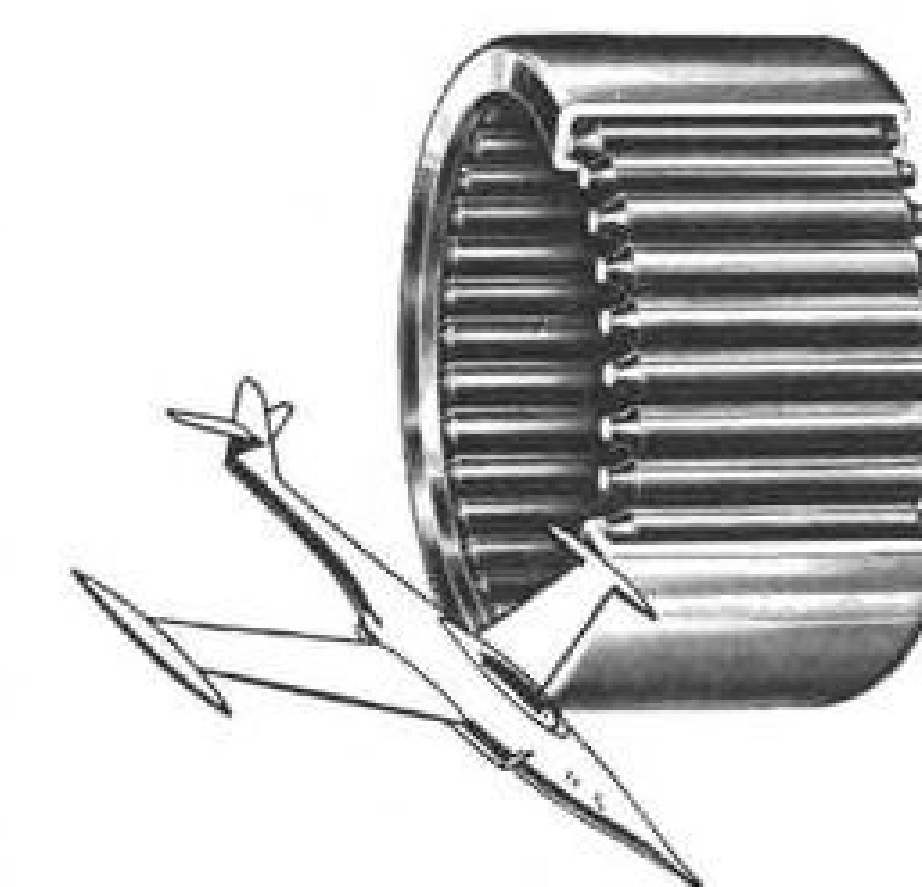
The Torrington Company has helped with thousands of different Needle Bearing applications throughout industry over a period of twenty years. Our Engineering Department offers the benefits of its experience in applying Torrington Needle Bearings to your products.

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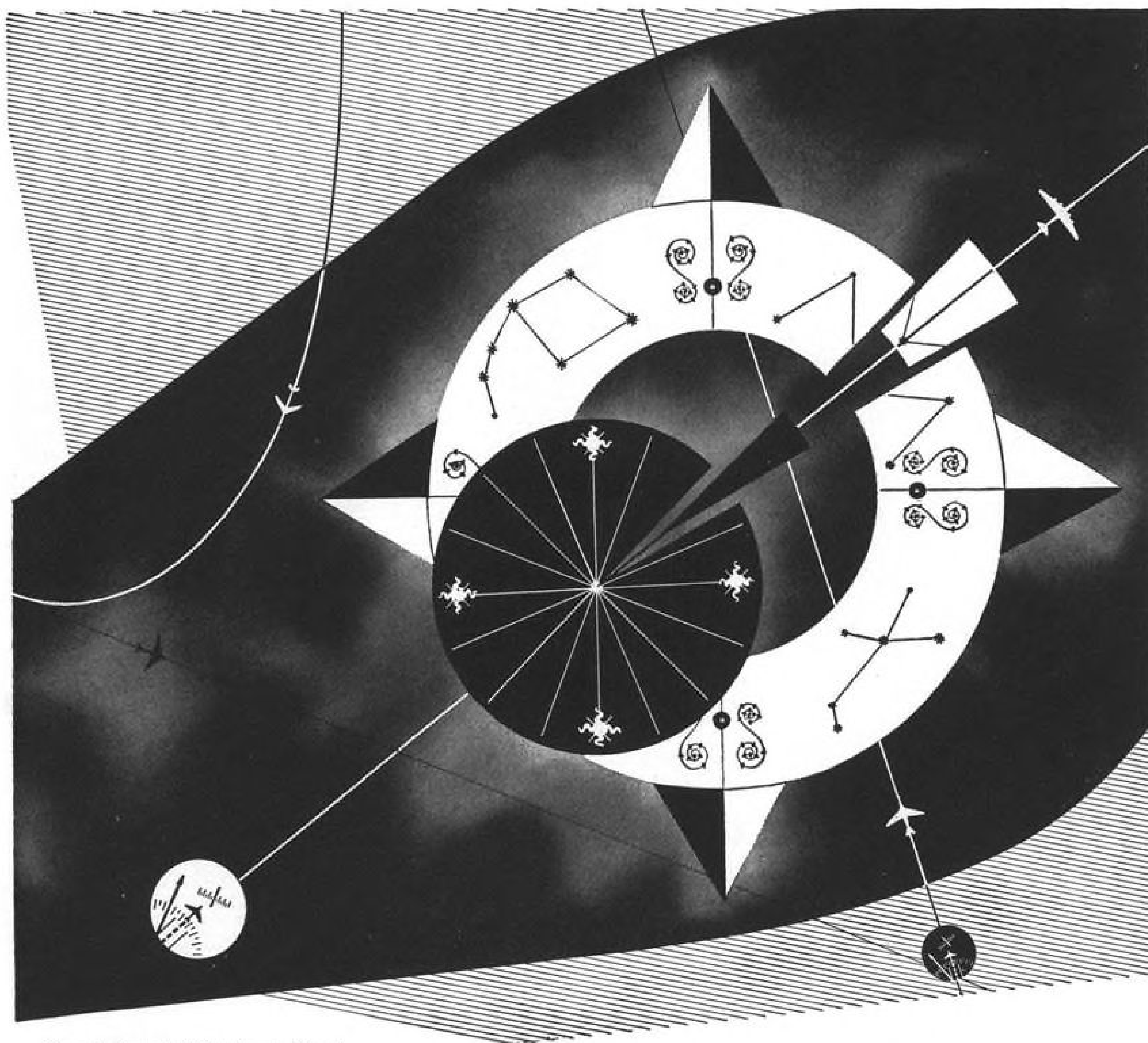
## TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers



Torrington Needle Bearings serve the aircraft industry in many important applications where weight and space savings are vital. On both military and civil aircraft, Needle Bearings give high-capacity anti-friction performance at high speeds, high altitudes and over a wide range of temperatures.





The ancients marked time by sun dial and by earth-bound sightings of the zodiac. Today we check the same sun . . . the same constellations, sight Pole Star or Southern Cross, but now we observe them as we fly in space . . . safe in time and place, with Kollsman instruments.

## seconds to spare

Degrees, minutes, seconds . . . and to spare. The accurate measurement and instant integration of Kollsman instruments gives seconds to spare — where seconds count.

Count on Kollsman for —

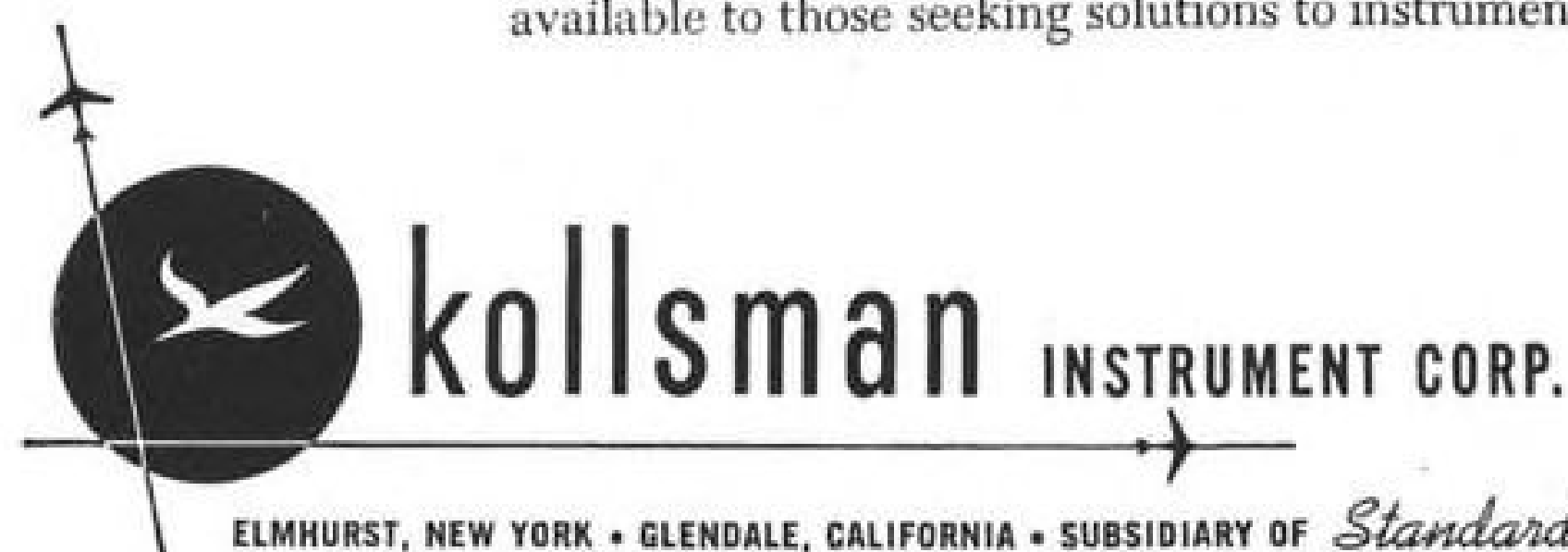
**AIRCRAFT INSTRUMENTS AND CONTROLS**

**OPTICAL PARTS AND DEVICES**

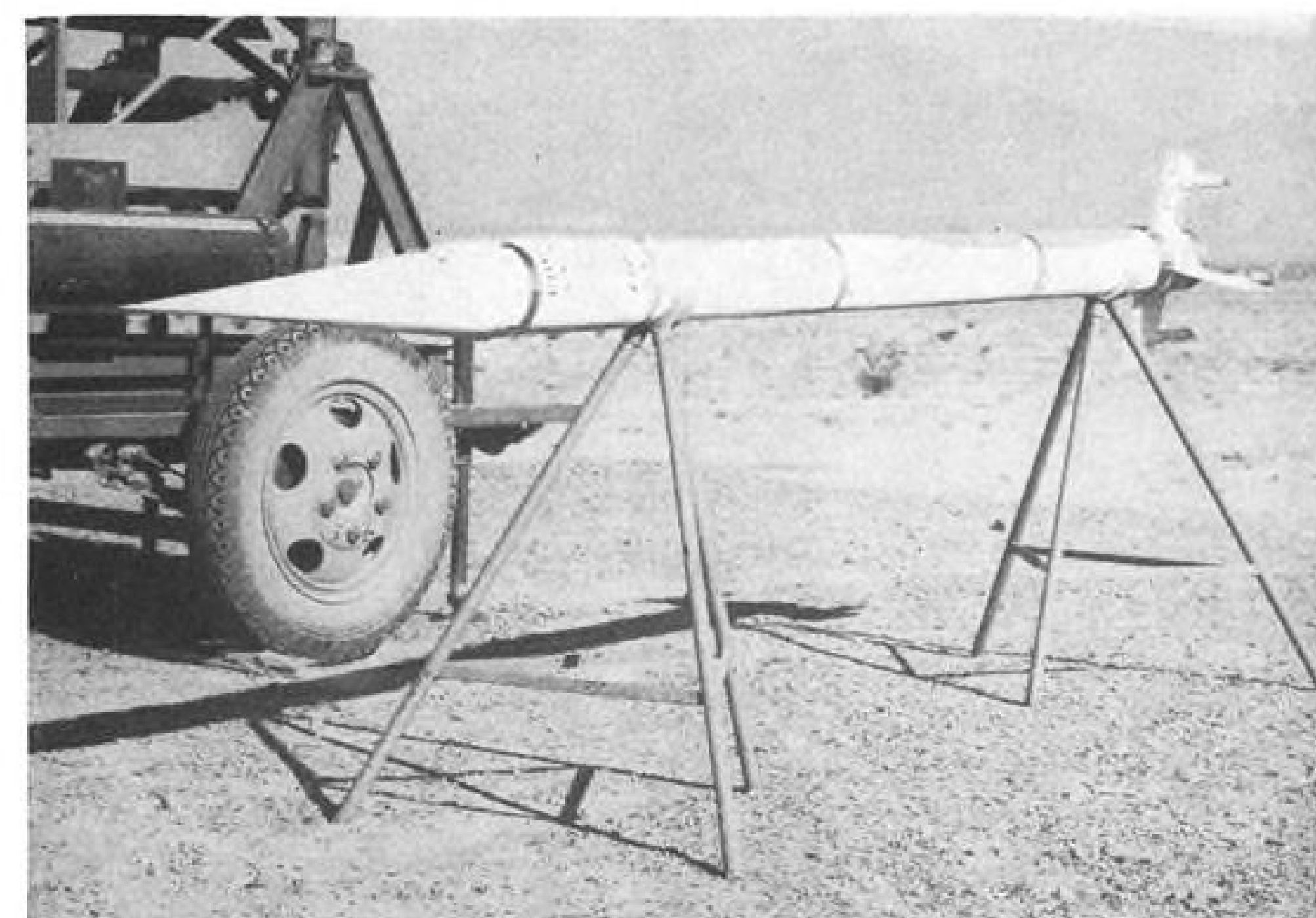
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ELMHURST, NEW YORK • GLENDALE, CALIFORNIA • SUBSIDIARY OF *Standard* COIL PRODUCTS CO. INC.



**POGO ROCKET** is a 14-ft. assembly built around X220A8 Deacon solid-propellant charge. Nose cone contains parachute; rocket is fin-stabilized with four rectangular surfaces. Flares are attached to base of fins for observation.

## Missile-Fired Chute Is AA Target

Add to the list of missile uses a novel one: Carrying a special parachute aloft to serve as a target for anti-aircraft missiles.

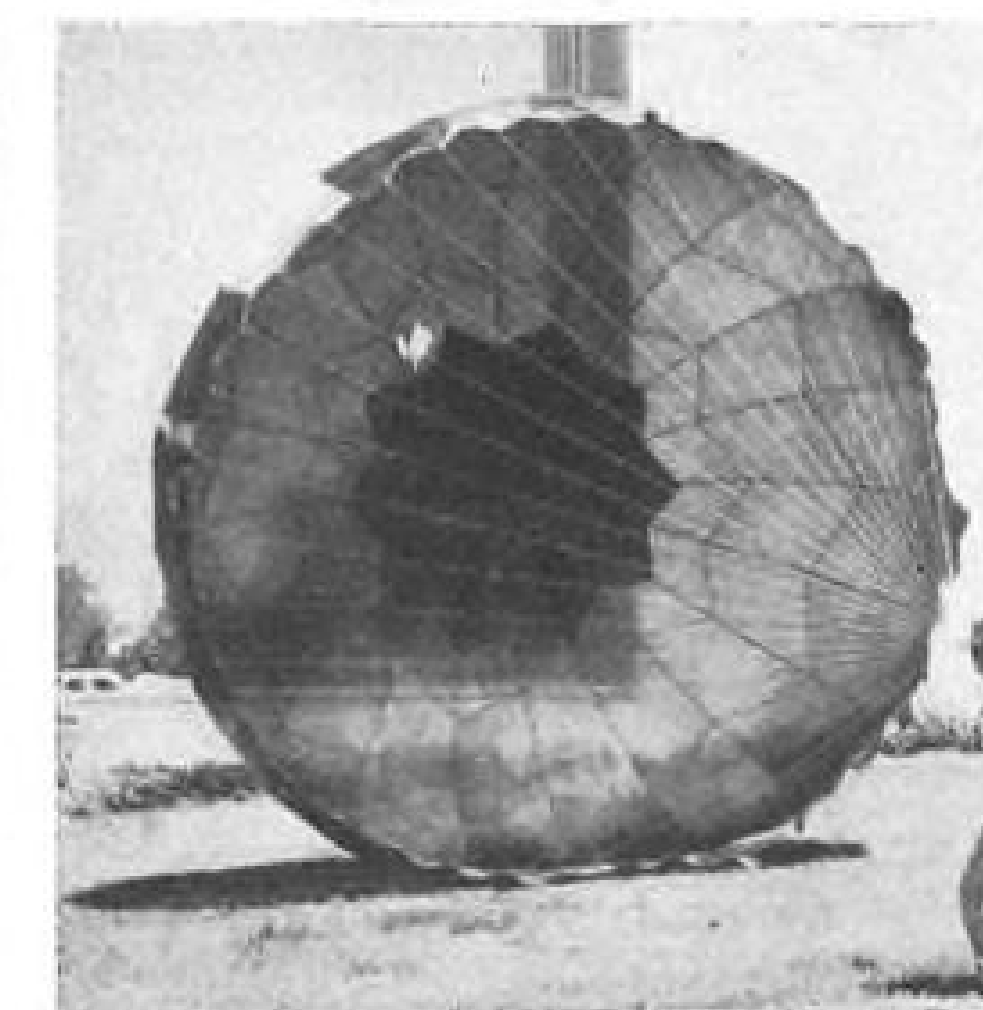
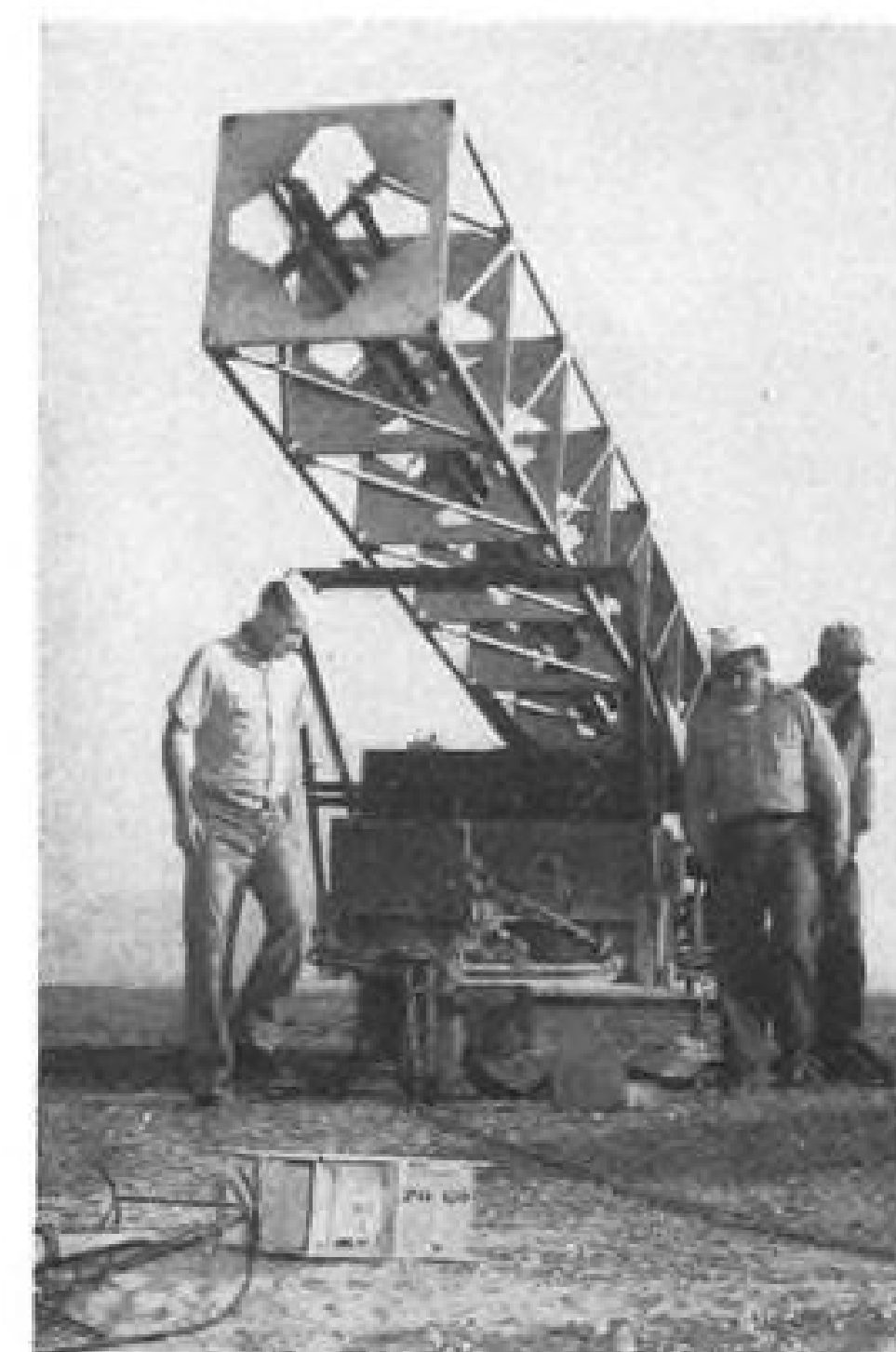
Operation Pogo, a joint effort by the Naval Bureau of Ordnance and the New Mexico College of Agriculture and Mechanical Arts, utilizes a well-proven solid propellant rocket motor to carry a 20-ft. metallized parachute to high altitudes. A spring ejects the chute, and it drifts down, simulating, on a radar scope, a high-altitude bomber attack.

Pogo's launcher is transportable; a crew of six moves it out to any point in the White Sands Proving Ground, currently the site of the test firings. There the missiles are assembled and

loaded. The missile control center asks for a target through a radio link, and about one minute later, the chute blossoms at the desired location.

Size of the chute is about the same as a standard personnel parachute, but its only load is a 17-lb. nose cone. Thus the chute falls slowly, and can be attacked by more than one missile on the way down. Slight damage on impact means the nose and chute can be recovered for re-use.

New Mexico College says that Pogo provides the only currently available very-high-altitude radar target, and that —where target speed is not important— it provides a cheap substitute for pilotless aircraft at the lower altitudes.



**POGO PARACHUTE** is 20-ft. diameter "base-ball" model, made of silk coated with pure metallic silver. Nose cone and timer of rocket are only load carried down.

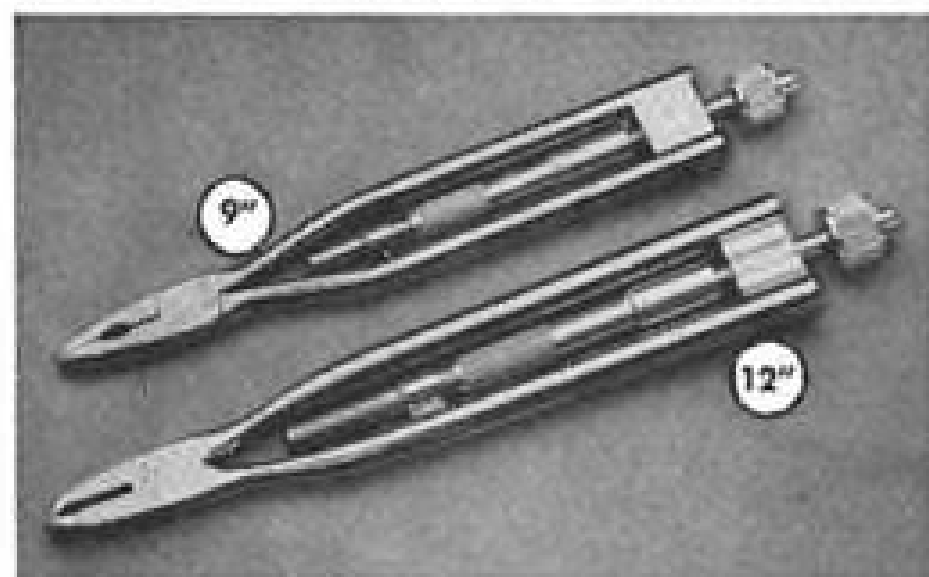
**POGO LAUNCHER** (left) is four-rail, portable type, moved by standard half-track.



**AND AWAY WE GO** to altitude, where Pogo will deploy metallized chute for target simulation and guided missile attack.



## ROBINSON WIRE TWISTER now in 2 sizes!



New 9" Slendernose for bench work on magnetos, carburetors, instruments and sub-assemblies. 12 oz. weight.

12" Standard for assembly line safety wiring. 15 ounce.

Split second whirling action safety wires 3 engines in time formerly required for one. Saves as much as \$140 per engine assembled.

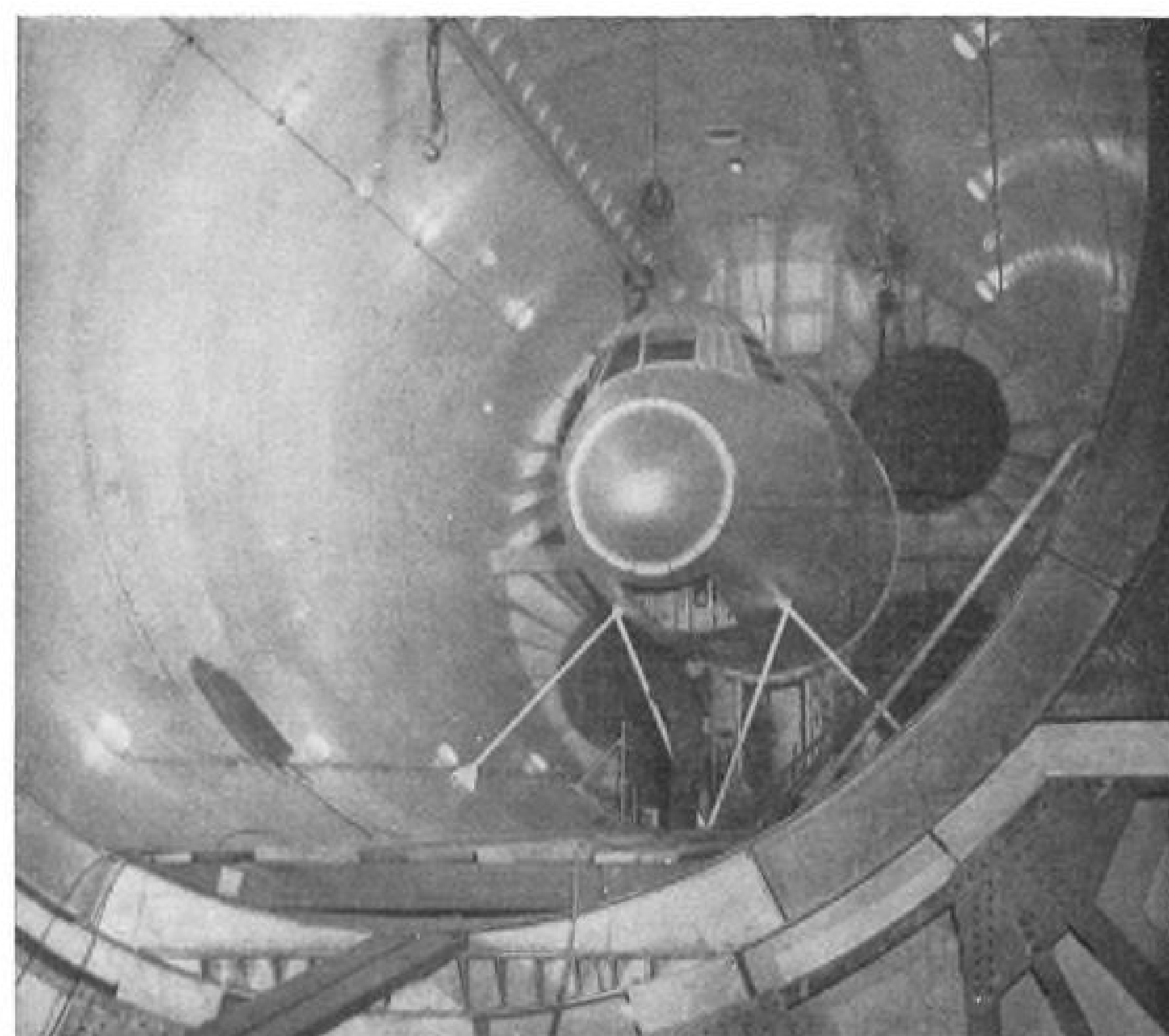
3-tools-in-1 — Pliers . . . cutters . . . twisters.

Side cutting, oil tempered heads. Permanent bronze bearing, no adjustments.

Jaws lock on wire, can't slip off.

Unconditional money back guarantee.

Write for details including prices, testimonials and list of users. RALPH C. ROBINSON CO., Box 494, North Sacramento 15, Calif.



PRESSURIZED NOSE section of turboprop liner is set in chamber for check.

## Viscount Parts Get Altitude Tests

(McGraw-Hill World News)

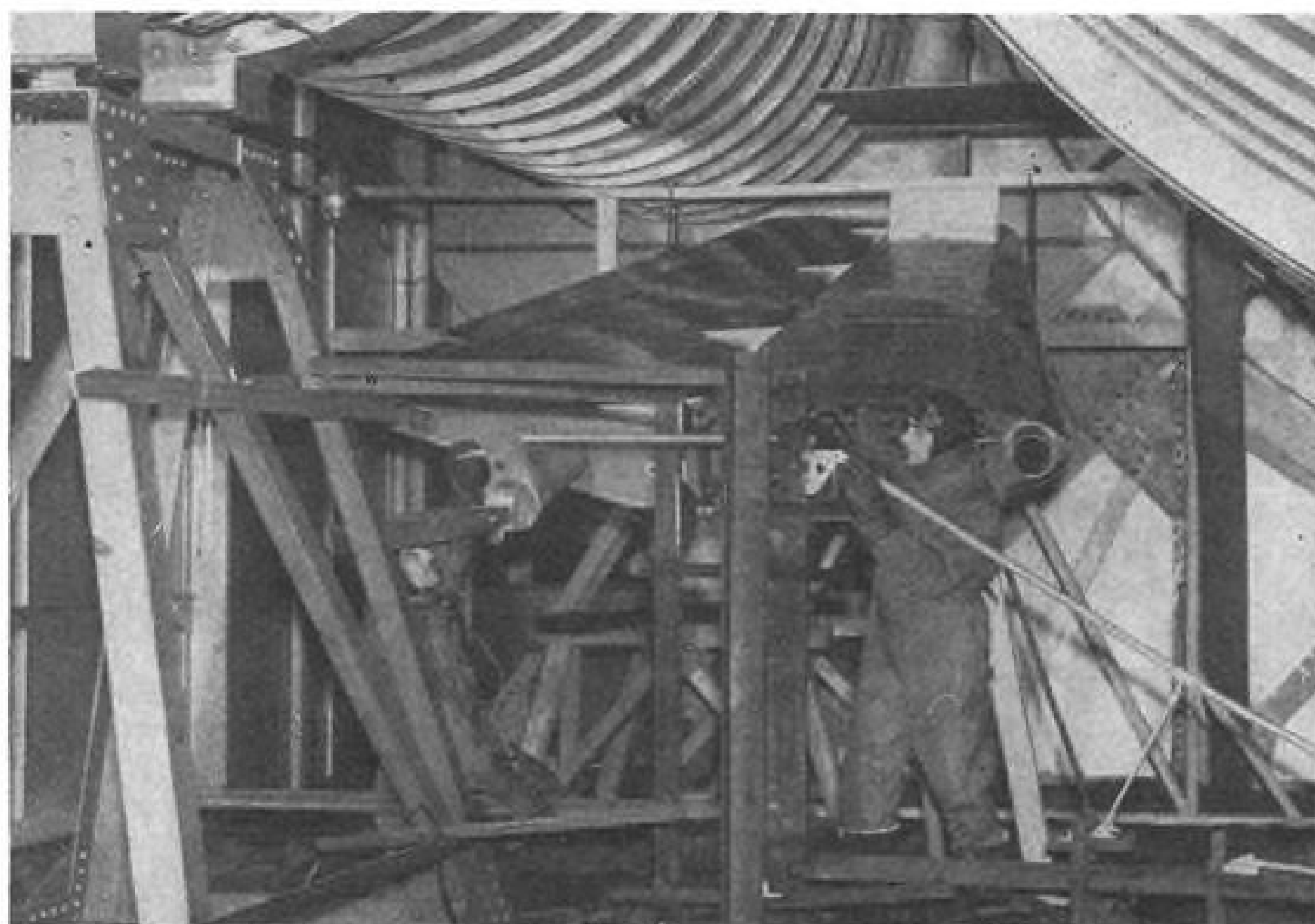
London—The problems of flight at 80,000 ft. are being studied by engineers at Vickers-Armstrongs' Weybridge works in the largest stratospheric test chamber in England and possibly in the world. Big job such setups can do is emphasized by Comet crash findings which show danger of high-altitude stresses.

In this facility have been tested the complete nose section and flight deck

of the Vickers Viscount turboprop transport, and a long list of components for military and industrial use.

Dimensions of the main chamber are 50-ft. long by 25-ft. diameter; the whole unit including insulation and the steel test shell measures 86 by 46 by 34 ft. Design and construction were by Vickers; the unit was built in sections at the shipyards in Barrow and shipped to Weybridge for assembly.

► **Viscount Test**—Vickers has used the



PORT TAILPLANE of Viscount undergoes extreme-cold test in Vickers' chamber.

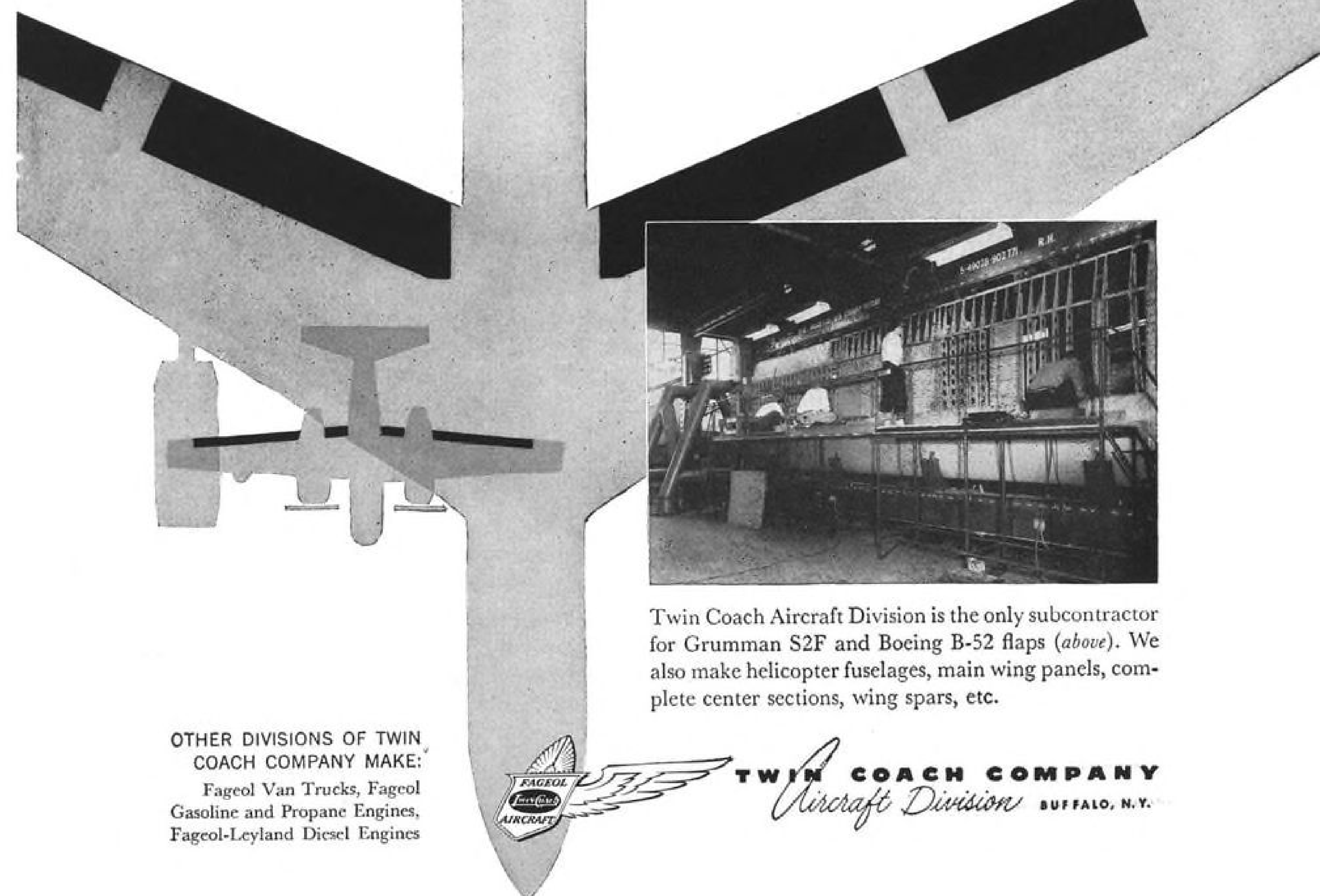
## What's so difficult about making wing flaps?

■ Nothing, really. At least not for Twin Coach Aircraft Division. But then we've established a reputation for making hard jobs easy.

That's because we're *aircraft specialists*. Our five plants, covering 23½ acres, are devoted *exclusively* to production of airframe major assemblies. We build no other product. We do no other work.

So, if you have an assembly you're thinking of subcontracting, call us for consultation. We work right from your assembly prints, can design and make the tooling, jigs, fixtures. And we *do* deliver to specification and on schedule.

AA-58



Twin Coach Aircraft Division is the only subcontractor for Grumman S2F and Boeing B-52 flaps (above). We also make helicopter fuselages, main wing panels, complete center sections, wing spars, etc.

OTHER DIVISIONS OF TWIN COACH COMPANY MAKE:

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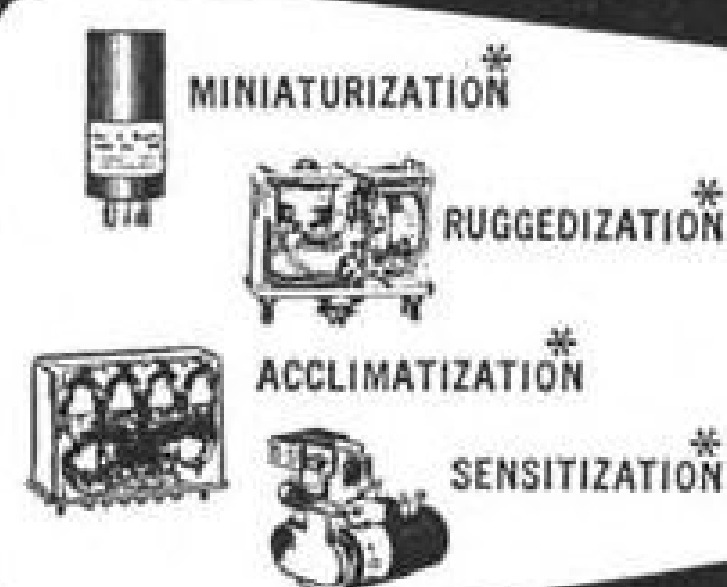


**TWIN COACH COMPANY**  
*Aircraft Division* BUFFALO, N.Y.

## relays

### Potter & Brumfield

... leading manufacturer of relays for every electrical and electronic use. Design, engineering and production facilities geared to your individual requirements. \*



Write for Catalog No. 122 showing complete line of P & B relays.

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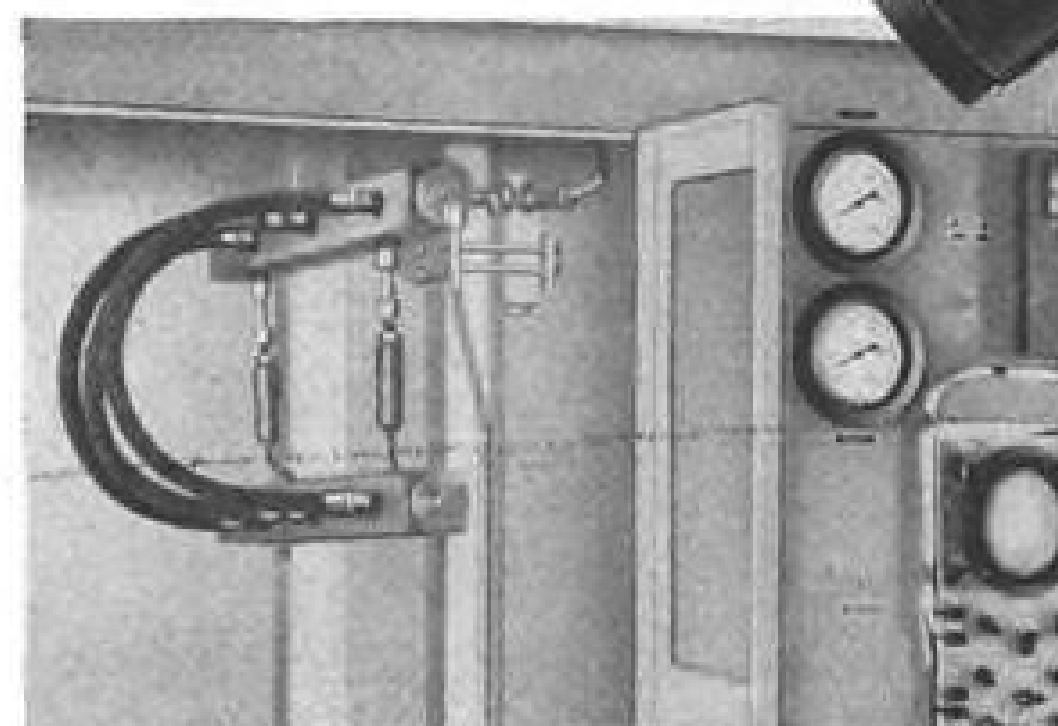
**Amf** New York, N.Y.

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Most rigorous hose tests  
with MIL-L-7808 oil  
confirm high performance



impulse test	no failures
fluid immersion + high ambient temp. test	no failures
circulating hot oil test	no failures
burst pressure at high temp.	7500 to 7700 psi
thermal shock	no failures

\*DuPont trademark for its tetrafluoroethylene resin. ®Resistoflex trademark for products from fluorocarbon resin.

**RESISTOFLEX CORPORATION**  
Belleville 9, New Jersey

**FLUOROFLEX®-T R-3800 hose assemblies offer permanent plumbing designed for any existing oil...and those to come**

• At 450°F, this lightweight "flexible piping" is still wholly unaffected by any of the MIL-L-7808 synthetic oils or JP-4 fuels, aromatic fuels, petroleum oils. Moreover, it suffers no change in flexibility even down to -100°F, or after extended service.

These Fluoroflex-T top quality hose assemblies usher in a new concept in aircraft plumbing—*permanent* lines, no matter what the fluid conveyed. They also withstand vibration, take up misalignments, offer better fatigue strength and are easier to install than rigid or all-metal construction.

Stainless steel wire braid reinforces the Fluoroflex-T (Teflon compound) tube. Specially designed fittings assure blowout-proof connections. Full facts on specifications and tests in Bulletin FH-1—send for your copy.

test chamber to prove the efficiency of the door seal and bolts of the Viscount pressurized nose section and flight deck under icing and high altitude conditions. Through heat and pressure locks leading to the test chamber from the control room, technicians were able to enter and leave the cabin during the tests without interrupting the run.

In addition, the chamber has been used to:

- Check functioning and reliability of electro-hydraulic power-control units in temperatures down to -85 deg. F., with and without simulated altitude (up to 55,000 ft.).
- Check rates of traverse and "lock-follow" response of a gun fire-control director for the Navy at temperatures down to -4 deg. F.
- Develop starting techniques for a 4-cylinder air-cooled aircraft engine which would insure successful starts at all temperatures down to -40 deg. F.
- Check control rod forces on the left horizontal tail of the Viscount necessary to overcome friction at various temperatures down to -76 deg. F. Since low pressure was not a prerequisite, these experiments were carried out in the space within the insulated housing but outside the pressure chamber—while other low-pressure tests were carried in the main test section.
- Determine handling properties of aircraft refueling hose at temperatures down to -40 deg. F.
- Test turbo-starting units, aircraft and missile components and a wide variety of electronic and hydraulic equipment under extreme conditions of temperature and pressure.

These examples emphasize the versatility of this unit, designed primarily as a stratosphere test chamber but adaptable as a climatological test unit. Though its main purpose is to help Vickers solve problems of high-altitude flight, thus minimizing the risk of losing expensive experimental aircraft, it has helped pay much of its keep by doing a great range of outside work on a contract basis.

► **Performance**—The initial rate of climb in the chamber is 1,500 fpm. at sea level pressure and a temperature of 59 deg. F.; this falls off to 1,000 fpm. at 60,000 ft. and -76 deg. F. The chamber's service ceiling is 80,000 ft. (0.395 lb./sq. in.), and its minimum design temperature is -85 deg. F. By opening an emergency valve in the 12-in. vacuum duct, the chamber can "dive" from 50,000 ft. to sea level in two minutes 40 sec.

Silica gel filters are capable of drying 90,000 cu. ft. of air daily—three complete test chamber charges—and thus help simulate the full range of air moisture content actually encountered at all the combinations of temperature and altitude the chamber is capable of producing.

The normal maximum airspeed produced in the chamber is 40 kt. though with special nozzles this can be raised to 60 kt. However, unless there is a special reason for strong winds (it is not supposed to be a wind tunnel) most tests are carried out at only six knots.

Controlling the pressure in the chamber are two 140-hp. two-stage Nash "Hytor" vacuum pumps, drawing air through a 12-in. pipe leading into the fixed end of the main test chamber.

The cooling plant, which can take the test chamber from +59 deg. F. to -85 deg. F. in 30 hr., consists of four 150-hp. two-stage ammonia compressors. These cool methyl alcohol, which in

turn is circulated at a rate of 20,000 gal. an hour through 16 tiers of copper heat-exchange vanes with a total area of 20,000 sq. ft. The maximum rate of heat extraction ranges from over 2.5-million Btu. (British thermal units) at -25 deg. F. to about 400,000 Btu. per hour at -76 deg. F.

Air circulation is provided by four four-blade propellers, one in each air duct, each with a maximum rated output of 150 hp.

All of the above units are electrically driven.

► **Test Setup**—Small test items are brought into the chamber through a series of doors on the floor level of the



#### Research & Development

To design the outstanding HTK-1 and HOK-1 helicopters, Kaman Aircraft has assembled a complete engineering staff . . . men skilled in the fields of mechanical design, electronics and aerodynamics . . . men devoted to the research, development and production of electro-mechanical, aerodynamic, electronic and mechanical devices and systems.

#### Facilities

Their work requires large plant facilities, an impressive inventory of machine tools and technical equipment.

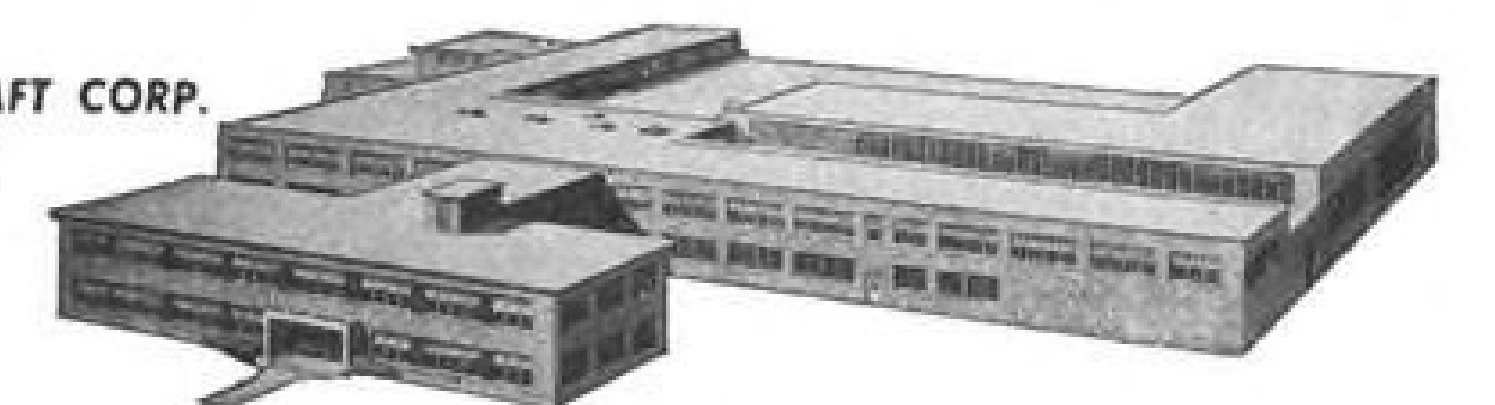
#### Production

Kaman's production capabilities, which utilize materiel from the smallest electronic part to presses of huge capacity, all contribute to Kaman Performance and . . .

all are a part of

**KAMAN**

THE KAMAN AIRCRAFT CORP.  
BLOOMFIELD, CONN.





chamber—first through the insulation barrier and next, the pressure wall. For large test items, the entire opposite end of the chamber can be moved aside, giving full and free access to the 25-ft. diameter opening. This entire mechanism is first pulled back and then rolled, with hand-operated winches, along tracks projecting to the side.

The control room is remarkably clean and free of clutter. Access to the test chamber is possible through heat lock and pressure locks. There are observation windows in the inside door of the pressure lock so that visual reference is possible without actually entering the test chamber. Observation ports also

line the walls of the main pressure hull.

In the control room are all the necessary controls for creating any possible range of conditions within the test chamber. It also contains 260 pairs of electrical terminals whose leads go into the chamber itself, thus allowing any desired combination of instrumentation and remote control to be established. A number of pressure and temperature gages are permanently built in and readings can be taken at the push of a button. Facilities are available for remote control photography, remote control of the tests, taking special readings of pressure, temperature, humidity, stress and strain.

The test chamber is equipped with a number of oxygen and intercommunications stations. A special lighted panel in the control room shows which ones are in use, thus providing a general indication of the movements of technicians within the chamber.

## ODM Approves More Fast Writeoffs

Although the program to stimulate expansion of industrial facilities through tax benefits to meet mobilization goals is tapering off, the Office of Defense Mobilization approved numerous aviation and related projects in recent weeks.

Certificates of necessity and the percentage allowed for accelerated tax amortization for the Sept. 28-Oct. 6 and the Oct. 7-20 periods included:

Oct. 7-20

**Boeing Airplane Co.**, Seattle, military aircraft, \$348,041 certified with 60% allowed.  
**Fairchild Engine & Airplane Corp.**, Farmingdale, N. Y., aircraft engine components, \$11,175 certified with 65% allowed.

**Cornelius Co.**, Minneapolis, aircraft components, \$5,493 certified with 70% allowed.  
**Douglas Aircraft Co.**, El Segundo, Calif., military aircraft, \$55,977 certified with 65% allowed.

**Empire Tool Products, Inc.**, Garden City, N. Y., aircraft parts, \$6,405 certified with 70% allowed.

**Stiger Precision Products, Inc.**, Chicago, aircraft components, \$15,623 certified with 70% allowed.

**Delavan Manufacturing Co.**, West Des Moines, Iowa, aircraft components, \$60,000 certified with 45% allowed.

**Extruded Hinge Co.**, Ypsilanti, Mich., aircraft components, \$45,000 certified with 45% allowed.

**Hansen-Lynn Co.**, Burbank, Calif., aircraft components, \$6,134 certified with 70% allowed.

**AlResearch Manufacturing Co.** of Arizona, Division of the Garrett Corp., Phoenix,



## No Wrinkles Here

Stainless steel and aluminum alloy parts are being produced at Lockheed Aircraft on plastic-surfaced dies. A resilient plastic, based on Shell Chemical Corp.'s Epon resin, formulated by Kish Resin, Inc., Lansing, Mich., is used on the male part of the die, while a hard-surface Epon is used for facing the mating section. No allowance need be made for the thickness of the sheet being formed. Benefits reported include reductions in tool cost and production replacement time, and fewer wrinkles.

## How electrically-heated Multiplate "NESA"® Glass is used in the windshield of the Republic F-84F Thunderstreak

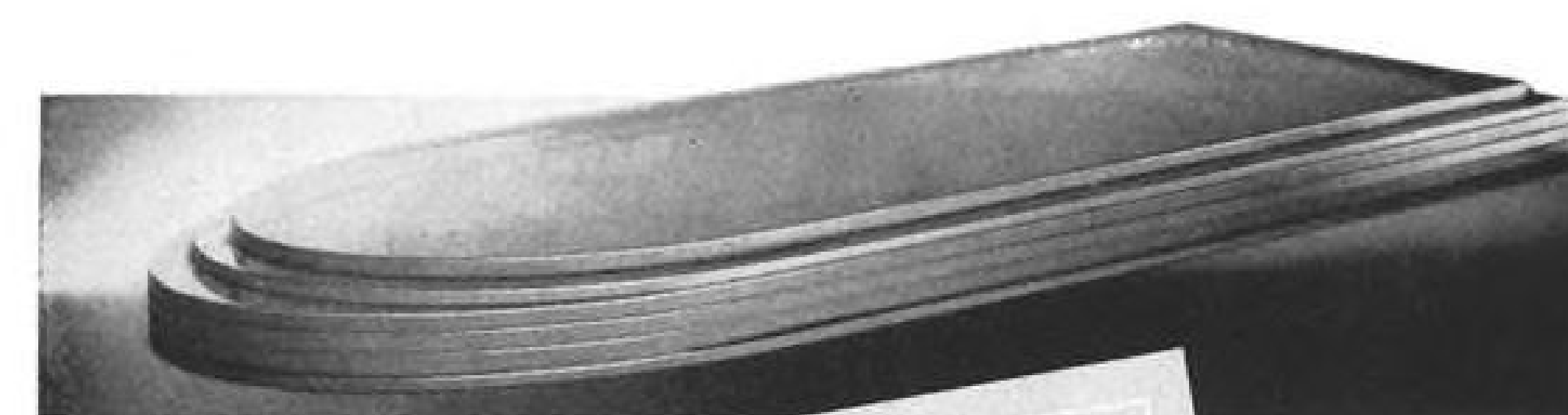
REPUBLIC's new F-84F Thunderstreak is the first Air Force swept-wing fighter-bomber. The plane is rated in the over 650 mph class, and has a combat range far exceeding 1,000 miles.

The windshield of this speedy new jet is made of PPG electrically-heated Multiplate NESA Glass. This special glass will not fog, and it is extra thick to protect the pilot.

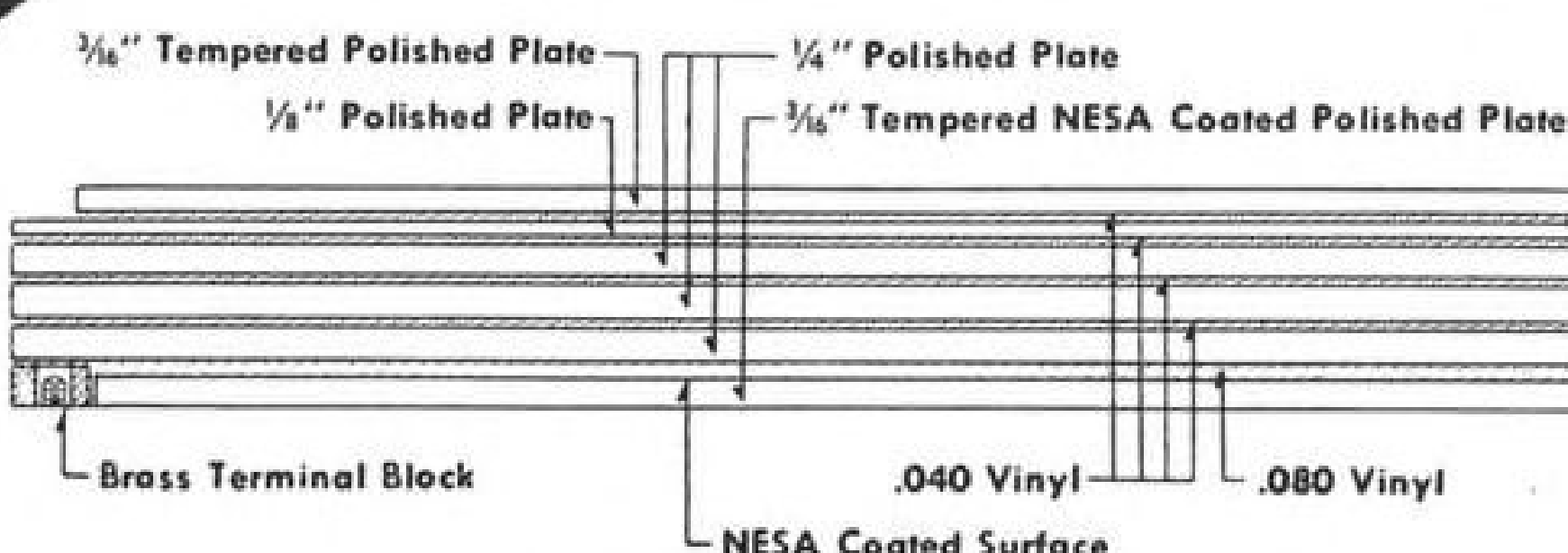
The Multiplate NESA windshield consists of 6 pieces of tempered and annealed polished plate glass with vinyl fillers between. See drawing for details. The outboard surface of the inboard glass is NESA coated and carries electrical current at relatively low resistance between bus bars. Heat dissipation is about 345 BTU/hour/square foot.

Pittsburgh Plate Glass Company makes a wide range of special purpose glasses for aircraft glazing. And a Pittsburgh Technical Representative will welcome the opportunity to work with you on any glazing problem.

For more detailed information, write to Pittsburgh Plate Glass Company, Room 4365, 632 Fort Duquesne Boulevard, Pittsburgh 22, Pa.



*A report from*  
**THE PITTSBURGH**  
**AIRCRAFT GLAZING**  
**FILE**

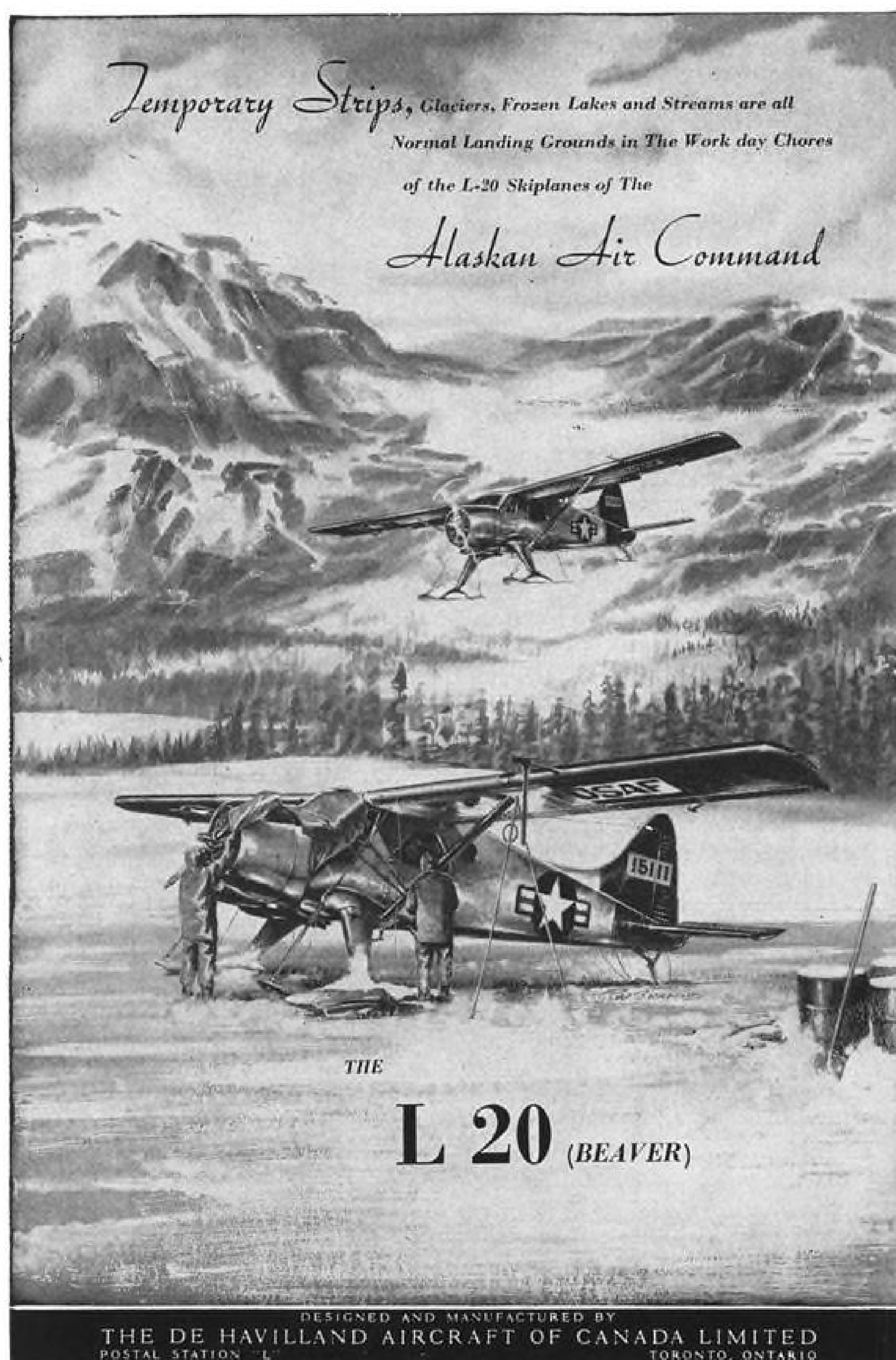


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*Normal Landing Grounds in The Work day Chores*  
*of the L-20 Skiplanes of The*  
*Alaskan Air Command*



THE

**L 20** (BEAVER)

DESIGNED AND MANUFACTURED BY  
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TOMORROW'S AIRCRAFT: *One step closer*

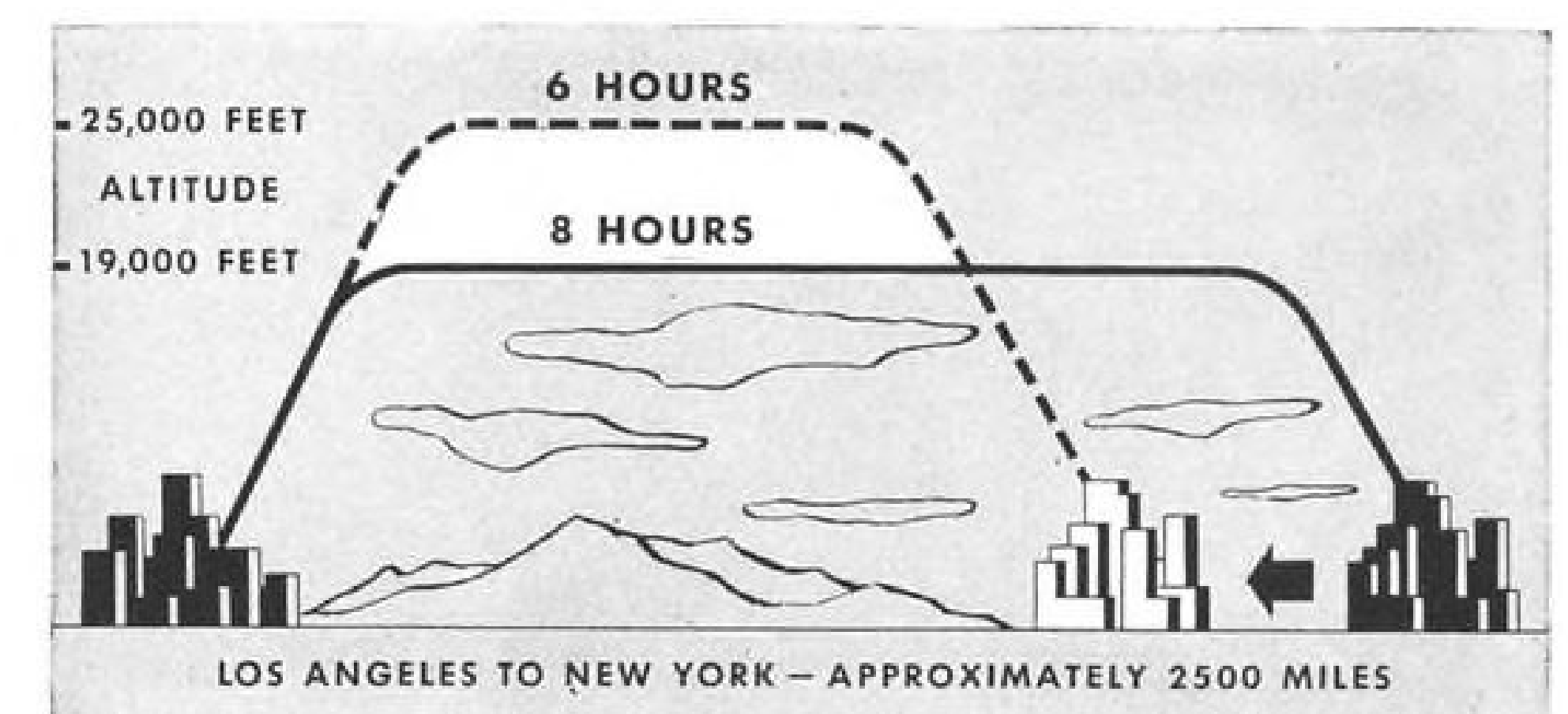
**Jet pods give aircraft  
new speed and range  
...greater utility**

Westinghouse J34's—podded and slung under the wings—give the U. S. Navy "Neptune" extra speed and reduce the take-off run. On missions, they can give the extra margin of power to get on target faster and away quicker. Drag is less and performance even better than anticipated.

The record of the J34 shows it well fitted for such auxiliary use. It has been proved in tough operational service; has advanced to a 720-hour overhaul life; performed up to 56,000 feet; withstood severe battle damage; and is quick to install and easy to maintain. The J34 history shows progressive design changes and performance improvements to its present highly developed state giving the best specific fuel and weight characteristics available in its class.

Westinghouse aviation engineers are ready to give you a wealth of information on the use of J34's to achieve extra speed, range, and endurance for both military and commercial operational requirements—a ready-made opportunity to bring tomorrow's aircraft . . . One Step Closer. Westinghouse Electric Corporation, Aviation Gas Turbine Division, P. O. Box 288, Kansas City, Missouri.

J-91017



**Tomorrow's Aircraft Brings Cities One Step Closer.** The dotted line shows how J34 pods can help aircraft reach optimum altitude faster, maintain more efficient cruise control, and retain extra margins of economy in time and distance. En route time can be drastically reduced; as, for example, the Los Angeles to New York run which might be cut as much as 25%. J34 auxiliaries can give these advantages to aircraft currently in use or planned for future requirements.

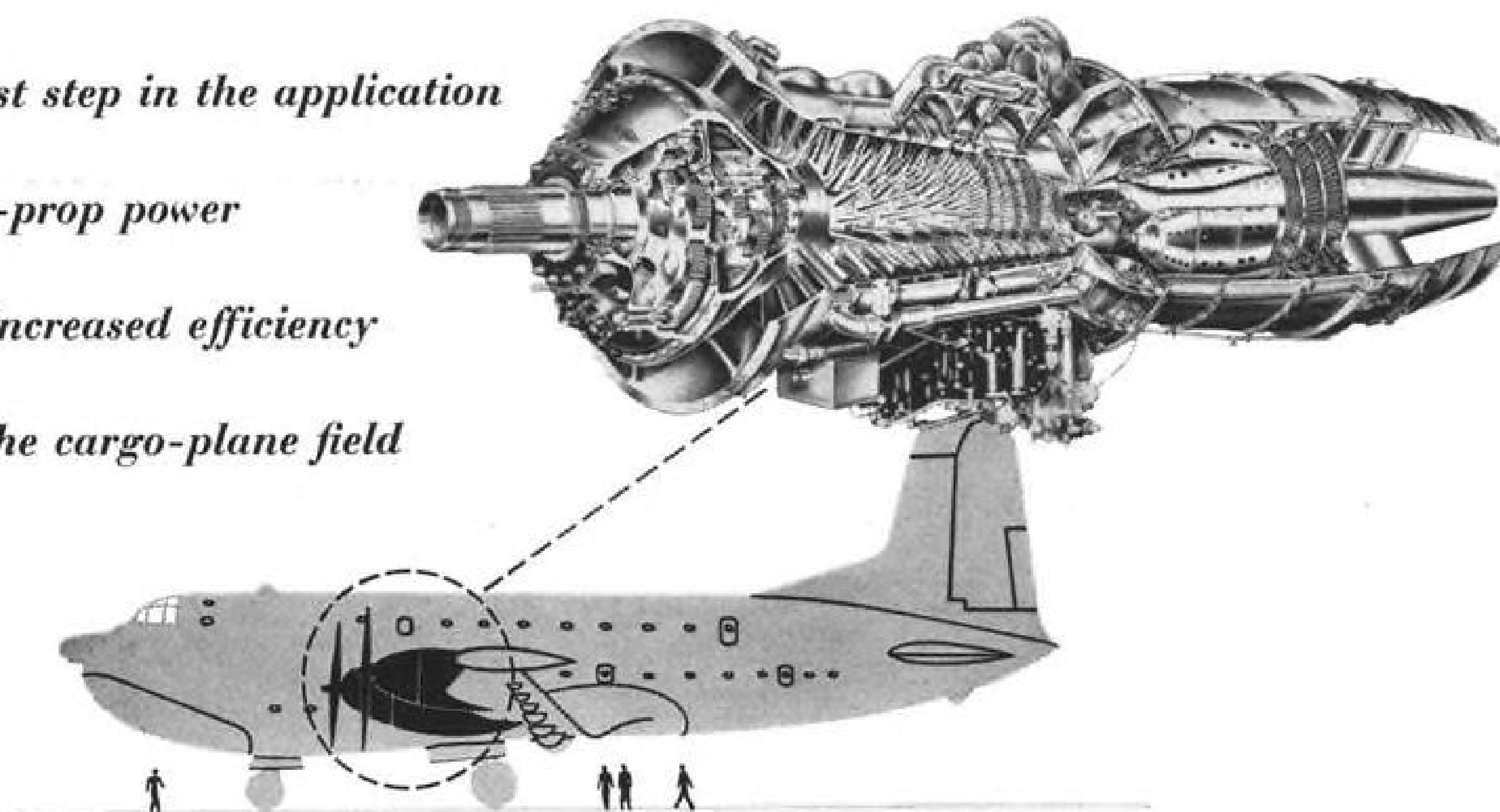
Jet Propulsion • Aircraft Electrical Systems and Motors  
• Airborne Electronics • Wind Tunnels to Plastics

YOU CAN BE **SURE**...IF IT'S  
**Westinghouse**





First step in the application  
of turbo-prop power  
brings increased efficiency  
to the cargo-plane field



— the DOUGLAS YC-124B

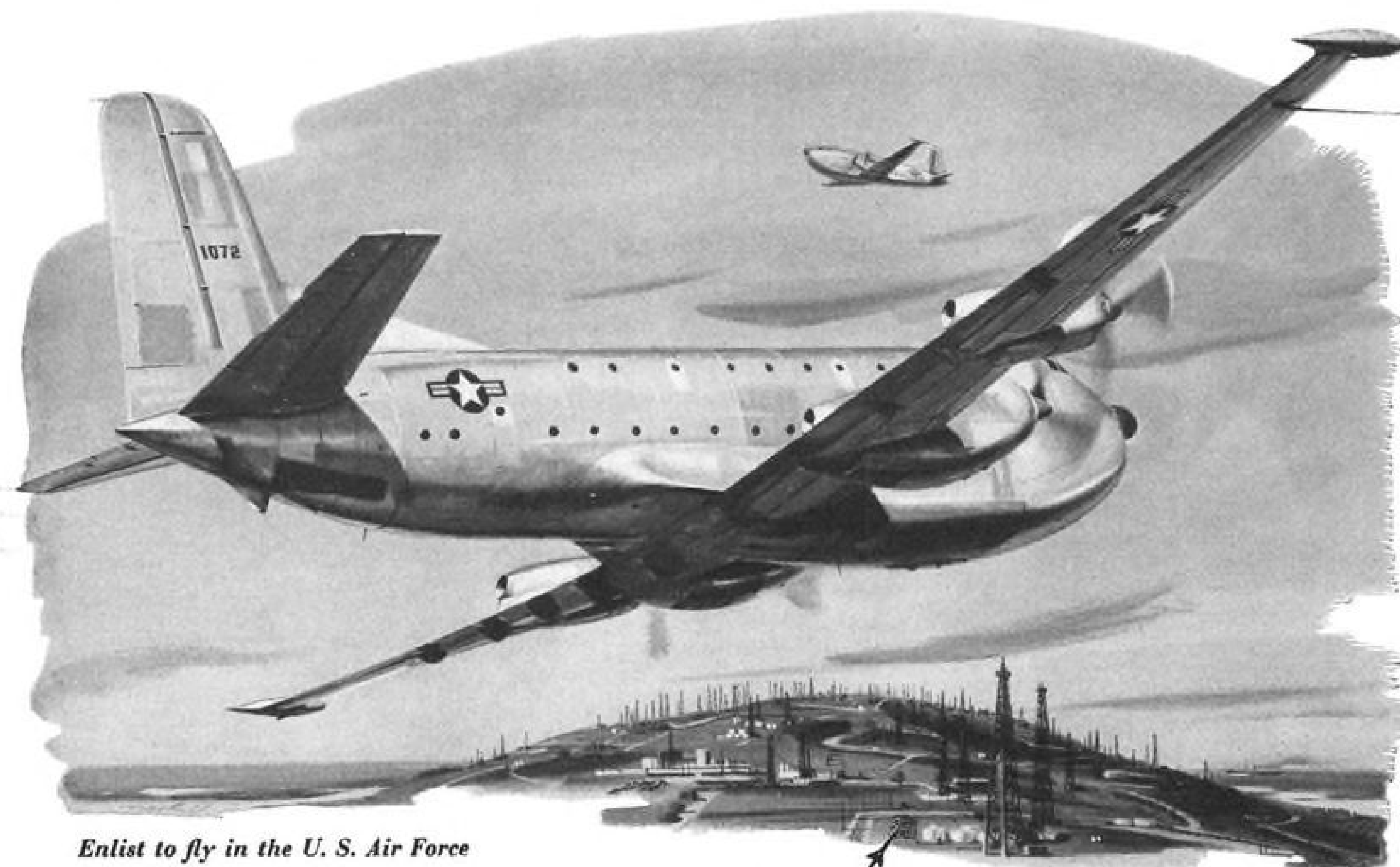
Recently the flight of a 200,000-pound sky giant rewrote air logistics. Here, utilizing turbo-prop power was the Douglas YC-124B Globemaster.

Powered with four P&W engines—22,000 h.p. in all—its most effective operating altitude is six miles up. Pres-

surized quarters for crew and attending engineers let them study engine performance and flight characteristics in comfort. Facts gathered to date include an over-all efficiency gain in terms of power, range, and lift per pound of fuel, and point the way to larger, faster and

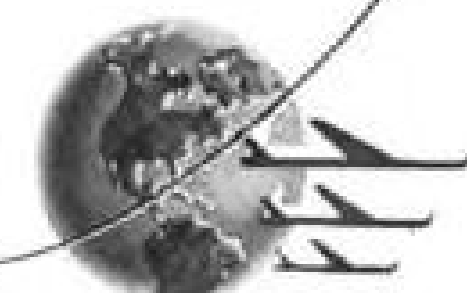
more efficient cargo-carrying aircraft.

This new and advanced application of turbo-prop power is still further evidence of Douglas leadership in aviation. Planes that can fly faster and farther with a bigger payload are a basic rule of Douglas design.



Enlist to fly in the U. S. Air Force

Depend on **DOUGLAS**



First in Aviation

aircraft parts, \$156,581 certified with 65% allowed.

**Gibbs Manufacturing & Research Corp.**, Janesville, Wis., electronic equipment, \$59,452 certified with 70% allowed.

Sept. 23-Oct. 6

**Ryan Aeronautical Co.**, San Diego, aircraft parts and components, \$47,469 certified with 65% allowed.

**Chicago Standard Transformer Corp.**, Chicago, electronic parts, \$306,351 certified with 35% allowed.

**Thieblot Aircraft Co.**, Martinsburg, W. Va., research and development on aircraft, \$60,000 certified with 60% allowed.

**Premier Instrument Corp.**, New York, military electronic products, \$8,698 certified with 65% allowed.

**Protair Corp.**, Los Angeles, experimental parts for aircraft, \$25,415 certified with 70% allowed.

**Austin Screw Products Co.**, Chicago, precision aircraft parts, \$35,000 certified with 45% allowed.

**Wright Machinery Co.**, subsidiary of Sperry Corp., Durham, N. C., scientific instruments for defense, \$47,090 certified with 75% allowed.

**Oliver Corp.**, Battle Creek, Mich., aircraft parts, \$19,117 certified with 65% allowed.

**Chicago Standard Transformer Corp.**, Chicago, electronic parts, \$244,379 certified with 35% allowed.

**Ex-Cell-O Corp.**, Lima, Ohio, components for military aircraft, \$151,341 certified with 65% allowed.

**H. L. Diehl Co.**, Coventry, Conn., components for military aircraft, \$86,500 certified with 65% allowed.

**Alloy Products Co.**, Marion, Ind., components for aircraft engines, \$95,000 certified with 45% allowed.

**Hiller Helicopters**, San Mateo, Calif., military helicopters, \$24,672 certified with 60% allowed; helicopters and spare parts, \$240,248 certified with 70% allowed.

**Lockheed Aircraft Corp.**, Burbank, Calif., military aircraft, \$117,009 certified with 60% allowed.

**Union Carbide & Carbon Corp.**, Ashtabula, Ohio, titanium metal sponge, \$31,500, 000 certified with 90% allowed.

**Glenn L. Martin Co.**, Baltimore, military aircraft, \$68,268 certified with 65% allowed.

**Texas Butadiene & Chemical Corp.**, Houston, aviation alkylate, \$140,000 certified with 15% allowed; \$3,430,000 certified with 45% allowed; \$25,759,000 certified with 100% allowed.

**Aluminum Company of America**, Cleveland, titanium forgings for military aircraft, \$300,000 certified with 65% allowed.

**Niles-Bement-Pond, Co.**, West Hartford, Conn., aircraft parts \$855,000 certified with 40% allowed.

**Goodyear Aircraft Corp.**, Litchfield Park, Ariz., aircraft components, \$30,901 certified with 65% allowed.

**Northrop Aircraft, Inc.**, Hawthorne, Calif., military aircraft, \$100,147 certified with 60% allowed.

**Hansen-Lynn Co., Inc.**, Burbank, Calif., aircraft parts, \$2,622 certified with 70% allowed.

**Bell Aircraft Corp.**, Wheatfield, N. Y., military aircraft, \$70,615 certified with 65% allowed; military aircraft and parts, \$43,500 certified with 60% allowed.

## APMA Bids for 25% Of All Defense Dollars

Los Angeles—Defense Secretary Charles E. Wilson has been asked by the Aircraft Parts Manufacturers Assn. to guarantee that 20 to 25 cents of every defense dollar goes to small business firms.

APMA is one of two small-business organizations recently formed in California (AVIATION WEEK Oct. 18, p. 21).

► **Survival Guarantee**—The plan to set aside mandatorily 20 to 25% of defense spending for small business was put forward by APMA president Merle

**immediate**

**steel**

**aircraft and  
standard "specs."**

Immediate steel is more than a slogan—it's a fact, here at Ryerson.

Here, the world's largest stocks of carbon, alloy and stainless steel await your call. Experienced steel men who know aviation industry requirements are ready to work with you. And unequalled facilities are at your disposal for sawing, shearing, flame-cutting and otherwise preparing steel to meet any need.

So whether you need a single piece or a truckload, when you need steel quickly—call your nearby Ryerson plant.

*Principal products: carbon steel bars, structurals, plates, sheets, tubing—alloy steel bars—stainless steel sheets, plates, pipe, tubing, bars—safety plate, reinforcing steel, babbitt metal, plastic pipe, machinery & tools, etc.*

**RYERSON STEEL**

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA  
CHARLOTTE, N. C. • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO  
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Davis in letters to Wilson, California congressmen, Small Business Administration, Air Force and Navy Bureau of Aeronautics.

Davis told Wilson the very existence of thousands of small firms throughout the nation is affected by pullback and withholding of contracts by prime manufacturers.

He said more than 400 small business firms in Southern California have had aircraft work retracted since January 1954.

This was not due to product quality or cost, Davis said, but resulted from the decision of larger firms to produce the item within their own plants.

He said APMA "advocates the enactment of legislation or departmental policy adoption that will assure a minimum of 20 or 25% of each defense dollar being allocated to small business firms for national defense production."

► **Supplier Shortage**—Davis asserted that continued withdrawals of aircraft work from small firms will force them into other fields and create a shortage of supplier plants in event of another national emergency.

The APMA president also commented that concentration of a major percentage of aircraft production in any one plant is in direct conflict with the government's policy of decentraliz-

ing such work as a security measure.

He urged the adoption of "concrete policies designed to bring succor to the small business firms and permit them to remain in our economic and national defense structures."

APMA also scheduled a meeting with Navy procurement officials for an explanation of how small business firms can take part locally in the Navy's procurement program.

► **SDIA Bid**—Meanwhile, the Small Defense Industries Assn. sponsored a dinner for more than 200 small businessmen at the Institute of the Aeronautical Sciences building to explain the goals of SDIA. Those present included representatives from the Navy, Air Force, Small Business Administration, Aircraft Industries Assn. and major aircraft plants.

Hampden Wentworth, chairman of SDIA, emphasized that the association was not looking for handouts or subsidies but only for an opportunity to compete on a fair basis for available business.

"We do not expect subcontracts if we cannot save the prime money," he said.

SDIA also scheduled a meeting of its board of directors with representatives of major aircraft plants that are located in the area.



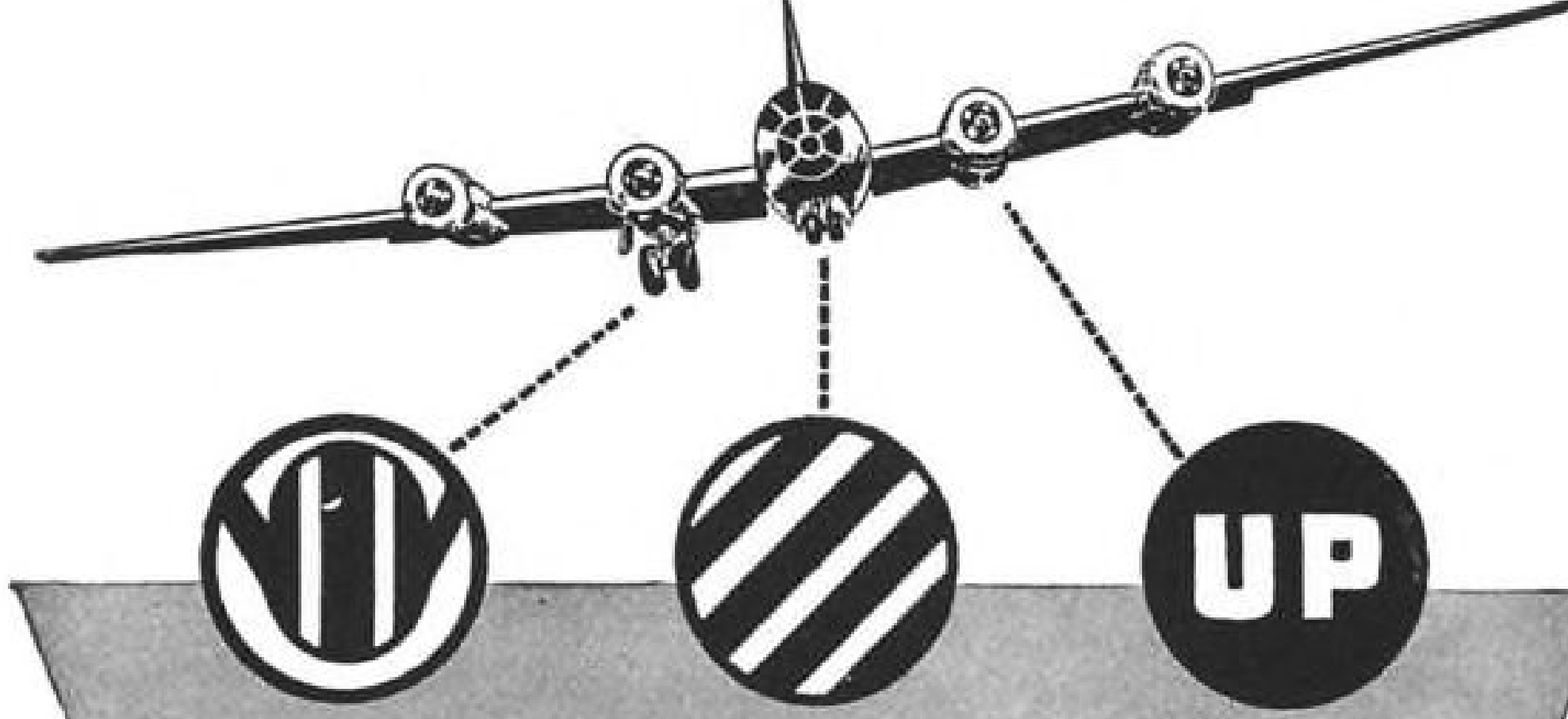
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**Requires but a Small Space  
— Gives a "BIG PICTURE"  
on Operating Conditions**

The landing gear markings shown above are but *one* of eleven different instrument applications. Tells the story "at a glance" on flap positions, oil pressure or temperature, fuel supply and other operating conditions. Economical, easy-to-install in both small and large planes.



**High Quality Construction**

- Impervious to dust, moisture, gases
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- Filled with inert gas

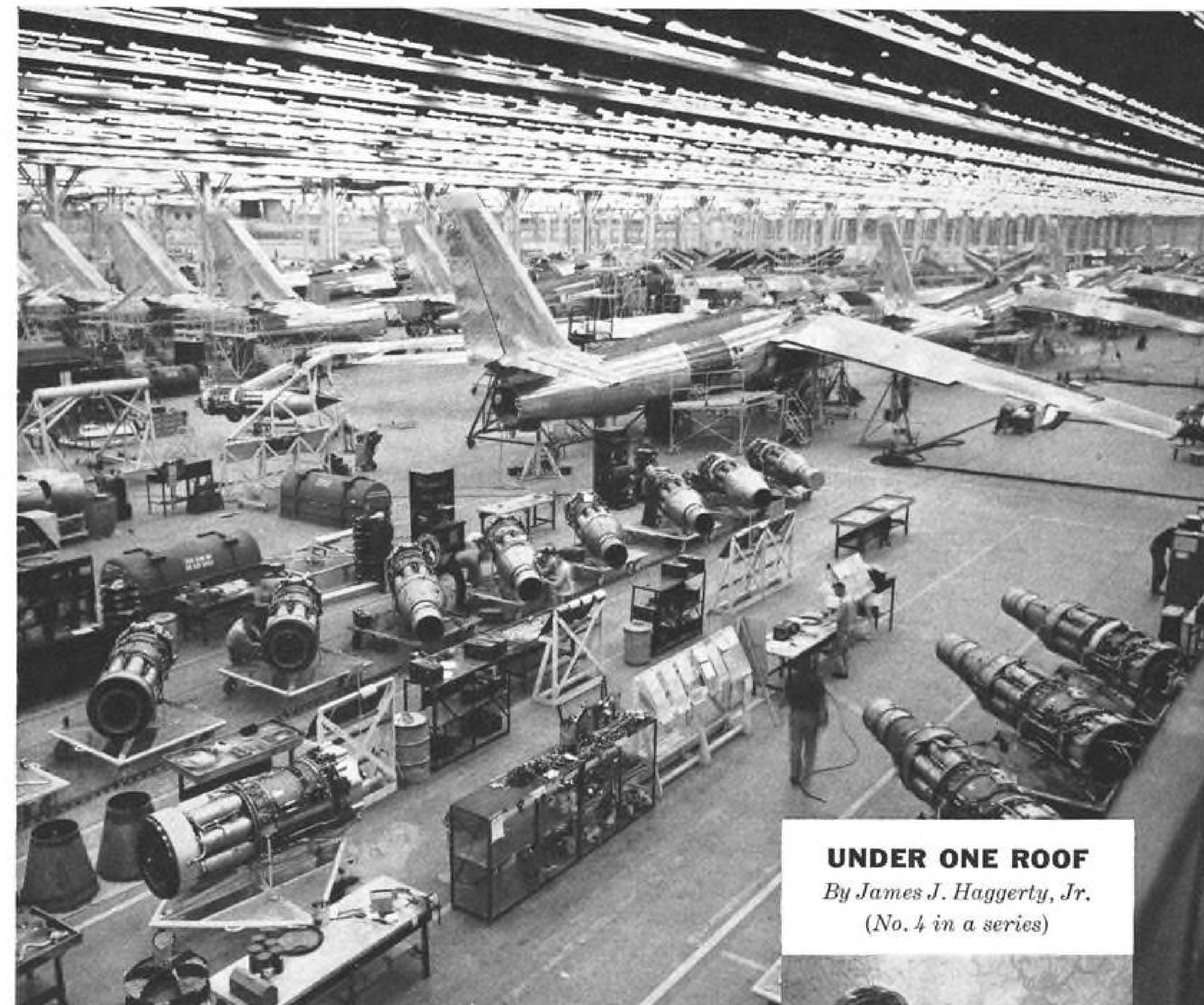
- Optically clear glass window

- Corrosion resistant finish



For additional information, write to:

**KEYSTONE** WATCH CASE DIVISION  
RIVERSIDE METAL CO.  
Riverside, New Jersey



**UNDER ONE ROOF**  
By James J. Haggerty, Jr.  
(No. 4 in a series)



## "Room for four different models of big planes inside Building B-1 at Georgia's GAP-6"

Says James J. Haggerty, Jr., Aviation Staff Writer, Collier's

The main building at GAP-6 (Government Aircraft Plant No. 6), Marietta, Georgia, is big because it was built big by the government for the express purpose of efficiently manufacturing the largest of multi-engine airplanes.

Operated today by Lockheed Aircraft Corporation's Georgia Division with a close-knit team of 14,800 people, GAP-6 is turning out big C-130A assault transports and six-engine B-47 jet bombers, in addition to the modification of early B-47's. Yet

because of the 76 acres *under one roof* there is ample space for straight-line assembly of another multi-engine airplane. And this will still leave floor space on the same level for the convenient manufacture of the majority of parts feeding to the four assembly lines.

Everything about Government Aircraft Plant No. 6 is BIG, and, when bigger airplanes are needed, GAP-6 is ready to produce them in quantity. It can even expand very easily if desired.

**U.S. Air Force**  
Govt. Aircraft Plant No. 6

**Lockheed**  
Aircraft Corporation  
(a Lockheed advertisement)

**Georgia**  
Division, Marietta



# USS Carilloy steel passes rigid tests for propeller blades

**A**n important manufacturer of propellers for military aircraft has found that in stringent magnaflux tests, USS Carilloy steel performs completely satisfactorily.

The high stresses in propeller blades and hubs naturally require extremely high quality steels. Accordingly, the U.S. Army and U.S. Navy have set up rigid quality specifications requiring that every heavily stressed part must be magnafluxed several times during its production.

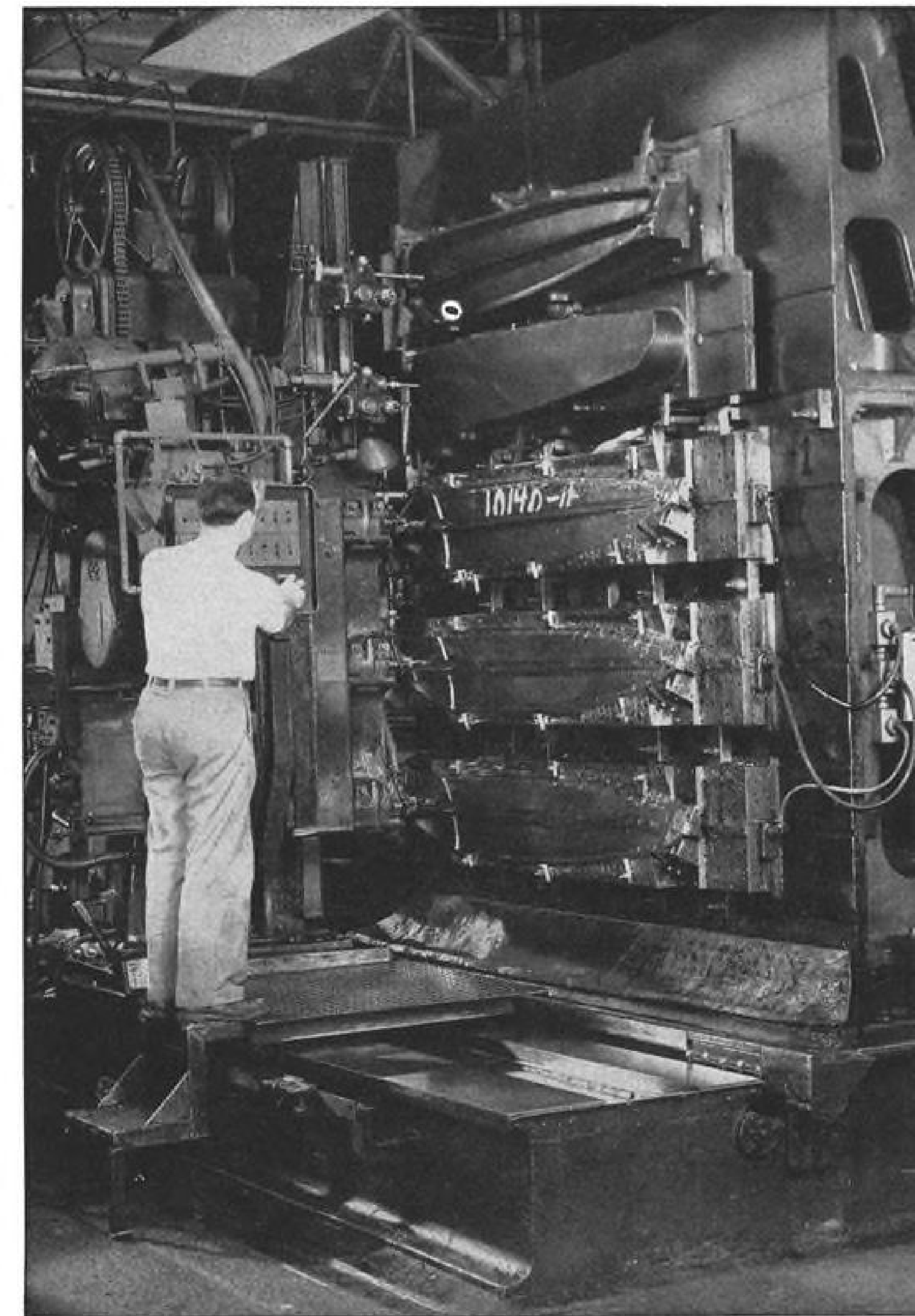
With USS Carilloy 4340 electric furnace aircraft quality steel, this important manufacturer is able to count on the performance required for this severe application. The consistent high quality of USS Carilloy aircraft steel has meant greater savings to this customer through minimum magnaflux rejections of costly fabricated parts.

USS Carilloy steels have established an enviable record for meeting the highest quality requirements. Therefore, when you need a standard AISI analysis or a special steel for an unusual application, it pays to call in a USS Service Metallurgist. He can help you solve any steel problem.

**AFTER FORGING AND MILLING, 750-lb. thrust sections are hogged out on this Kellering Machine. Finished sections weigh about 155 lbs. USS Carilloy steel maintains a No. 1 quality position on these heavy-duty parts.**

**THESE HIGH QUALITY** aircraft propeller hubs are forged and machined from semi-finished Carilloy 4340. They meet extremely tough magnaflux requirements.

**FOR BIG PROPELLERS,** 2 forged sections (a) are welded together to form one blade thrust member. Pieces are then ground and magnafluxed, Kellered, ground, and magnafluxed again (b). Mill camber sheets (c) then are copper brazed to the thrust members. Entire unit is heat treated and polished before final magnaflux test and cadmium plating. Rigorous magnaflux testing assures that every finished blade (d) can withstand the tremendous stresses encountered on the latest high-speed planes.

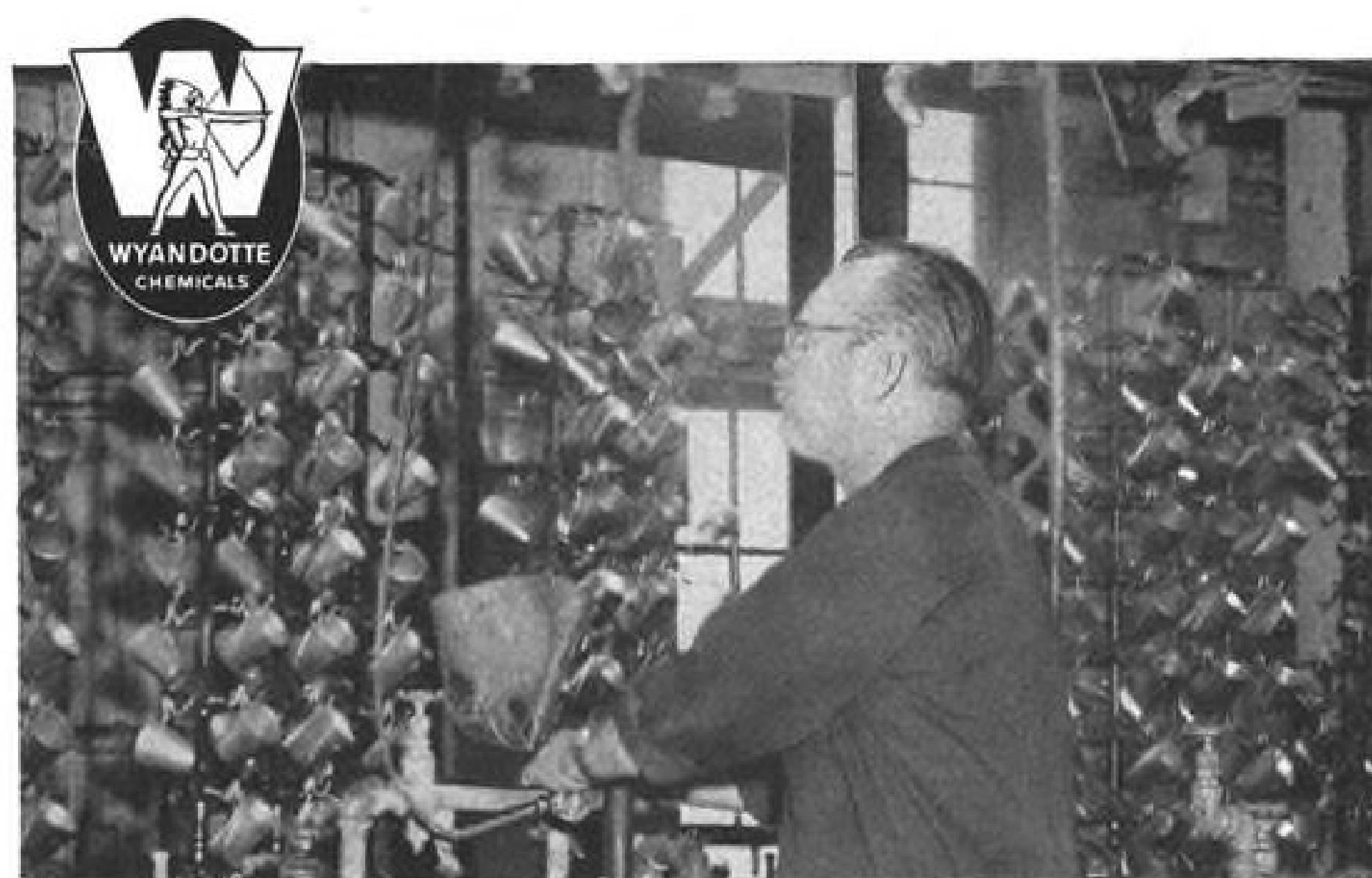


UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO  
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS  
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**Carilloy**  **Steels**  
ELECTRIC FURNACE OR OPEN HEARTH COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

UNITED STATES STEEL





E. C. Holzem, Superintendent, Plating Industries, Inc., St. Paul, Minn.

**"We use Wyandotte products 100% for cleaning prior to ELECTROPLATING!"**

— Plating Industries, Inc., St. Paul, Minn.

"We are specialists in electroplating," says E. C. Holzem, Superintendent, Plating Industries, Inc., St. Paul, Minn. "We have to use the best materials in order to maintain our consistently high quality and service."

"We use Wyandotte products exclusively for our cleaning prior to electroplating."

"Our experience has been that Wyandotte not only has the highest quality products but works closely with our industry, both on a national basis and in its own research department, to constantly improve cleaning products and procedures."

The Wyandotte cleaning products used by Plating Industries are:

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How about *your* business? Do you want research-developed and production-proved products that will improve the quality of your finishes and reduce operation costs? Contact Wyandotte! Mail coupon today for technical folder or for the services of a Wyandotte representative. *Wyandotte Chemical Corporation, Wyandotte, Michigan. Also Los Angeles 12, California.*

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Largest manufacturers of specialized cleaning products for business and industry



Helpful service representatives in 138 cities in the United States and Canada

Wyandotte Chemicals Corporation, Dept. 2226  
Wyandotte, Michigan

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Firm Name \_\_\_\_\_  
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## Safe Test Ejections Made From 50 Ft.

Safe ejections from crippled aircraft at altitudes as low as 50 ft. look possible as the result of recent dummy tests made by the Martin-Baker Aircraft Co., Ltd., of England.

The company has been studying the low-altitude ejection problem for considerable time; test ejections have been made over a range of altitudes beginning at about 150 ft. and working downward.

With the 50-ft. level currently established as a practicable altitude, work is under way to reduce that minimum to 25 ft.

Sequence of events for an ejection is described this way: Pilot jettisons the canopy and then reaches over his head for the face shield of the M-B seat. Pulling the face shield down fires the cartridge and ejects seat and pilot. A small drogue parachute opens automatically, tilting the seat back and controlling the opening of a larger drogue. The large drogue steadies the seat, slowing it down, and allows the pilot to drift clear with his own chute fully opened.

## USAF Contracts

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

Aircraft Engine Div., Ford Motor Co., Chicago, J57-F-13 turbojet engines, 10 ea., 50 ea., \$22,208,200.

Bausch & Lomb Optical Co., Rochester, N. Y., F/6.3 lens aerial camera, 3,500 ea., \$936,700.

Bill Jack Scientific Instrument Co., Solana Beach, Calif., chassis, amplifier, 114 ea., 114 ea., control type F-4, 38 ea., \$652,131.

Cessna Aircraft Corp., Wichita, T-37A aircraft, 11 ea., \$3,962,920.

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J., prop assembly, 3 ea., nacelle control sets, 6 ea., \$149,411.

Allen B. Dumont Lab. Inc., Clifton, N. J., amplifier, type D-1, 183 ea., mount, base and contr., 72 ea., \$147,034.

Eastman Kodak Co., Rochester, N. Y., overhaul, repair and modification of Y-3 vert. periscope bombsights, \$600,000.

National Supply Co., Engine Div., Springfield, Ohio, engines 40-SX-8, 4 ea., \$254,400.

Fairchild Aircraft Div., Fairchild Engine and Airplane Corp., Hagerstown, Md., C-123 aircraft and B-52 sub-assemblies, \$123,600.

Gillilan Brothers, Inc., Los Angeles, maintenance spare parts, AN/GPN T2 radar trainer, \$450,000.

B. F. Goodrich Co., Dayton, wheel assembly, 668 ea., 316 ea., \$37,098.

Stewart-Warner Corp., Stewart-Warner Elec. Div., Chicago, components of SCR-718E radio set, 95 ea., \$120,618.

Sylvania Electric Products, Inc., Radio and Television Div., Buffalo, radio set AN/ARC-49, 1,009 ea., \$1,391,457.

Western Electric Co., Inc., New York, control computer, \$109,541.

Westinghouse Electric Corp., Lima, Ohio, engine-driven type Q-6, 265 ea., \$91,367.

Wright Aero Div., Curtiss-Wright Corp., Wood-Ridge, N. J., maintenance and overhaul tools for J65 engines, \$351,200; spare parts, YJ65-W-1, 1A engine, \$270,000.



**DEPENDABLE CHAMPIONS**  
*keep the "Hummingbird" humming!*



Glider pilots long dreamed of a powered sailplane that would perform well and still maintain excellent gliding characteristics.

Ted Nelson of San Leandro, Calif., made the dream a reality when he produced and built the "Hummingbird" including its four-cylinder, 40-h.p. engine which retracts when not in use.

The "Hummingbird", first powered sailplane to compete in a national contest, won the best two-place ship performance at the 17th National Soaring Contest and the Michael Stronkoff Award for longest goal and return flight. The present U.S. national two-place goal and return glider record is held by Mr. Nelson and Harry Perl flying the "Hummingbird".

"Through our long experimental period we tried out a number of different spark plugs and always found that Champions gave us the best all-around performance", says Mr. Nelson.

Airmen everywhere echo Mr. Nelson's opinion of Champions. From jet fighter to small personal craft there is a Champion expressly designed to provide maximum performance and dependability.

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO



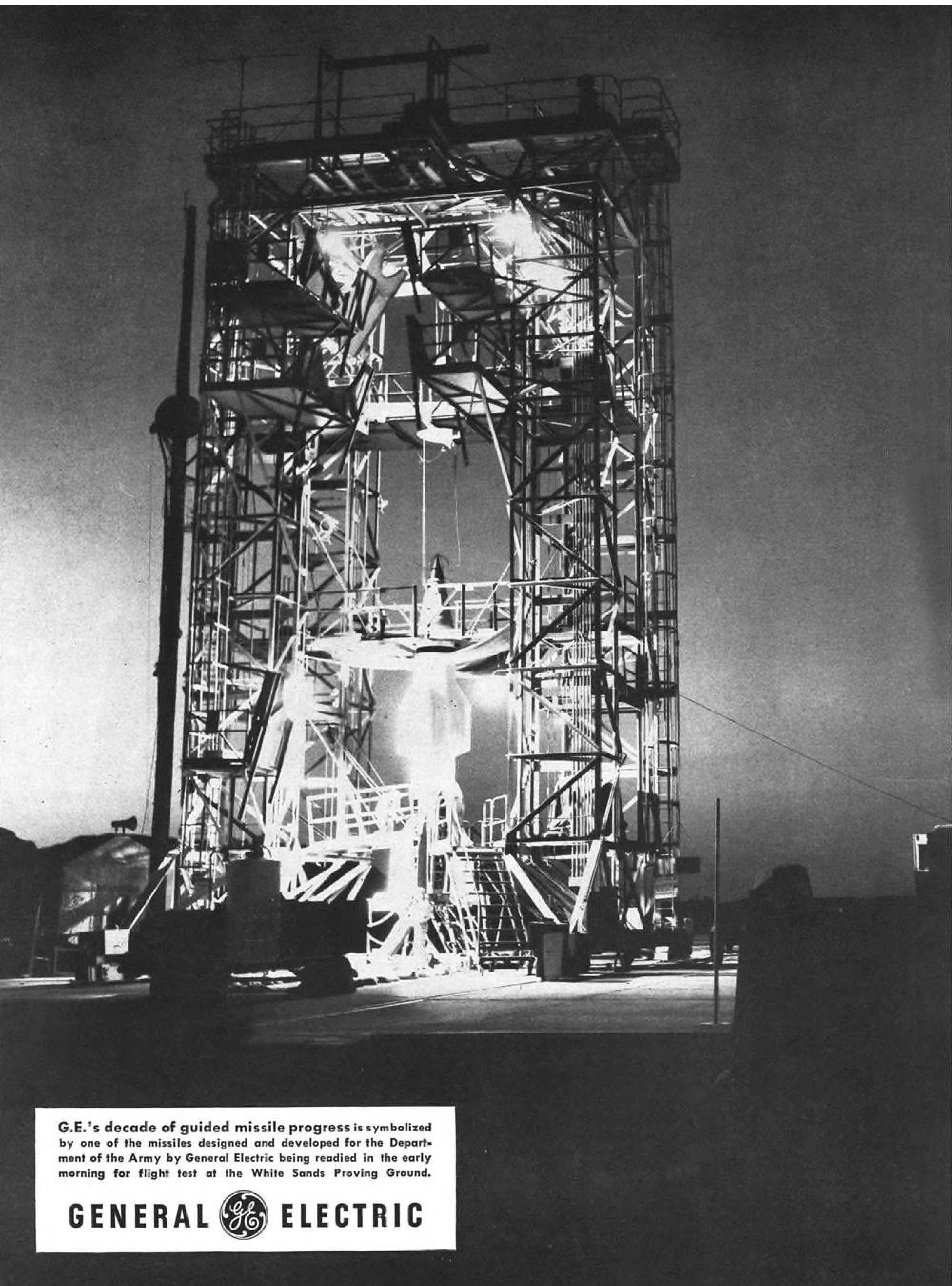
The RC36S and R37S-1 are the most widely used of Champion's complete line of aircraft spark plugs.

AVIATION'S FAVORITE

**CHAMPION**

SPARK PLUGS





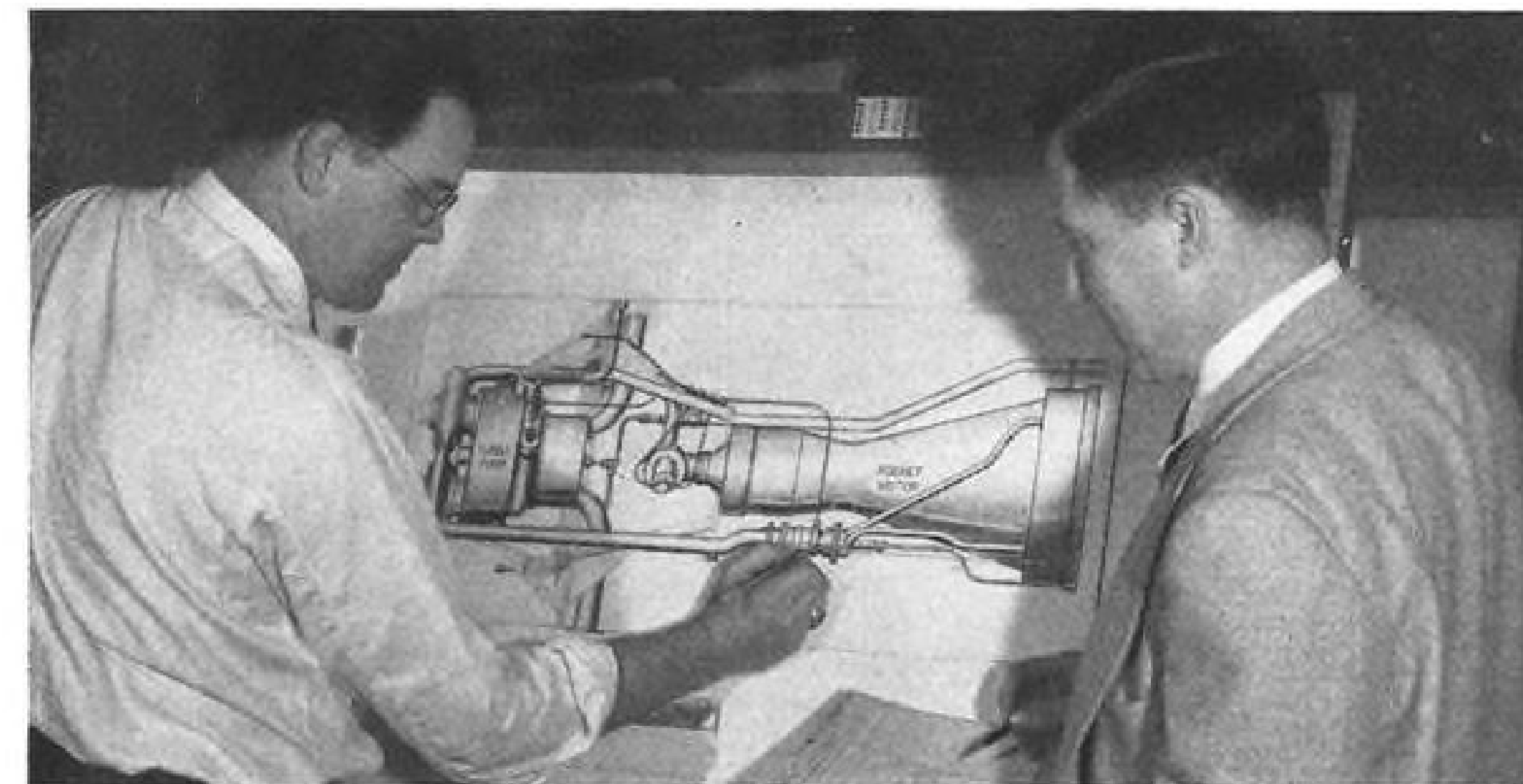
G.E.'s decade of guided missile progress is symbolized by one of the missiles designed and developed for the Department of the Army by General Electric being readied in the early morning for flight test at the White Sands Proving Ground.

**GENERAL  ELECTRIC**

# How G.E.'s decade of guided missile progress can aid your missile project

Starting on November 15, 1944, General Electric scientists, following on the heels of our advancing armies, began a study of German rocket development. Since that date, G-E engineers and scientists, working closely with the Army Ordnance Corps, have obtained much guided missile experience.

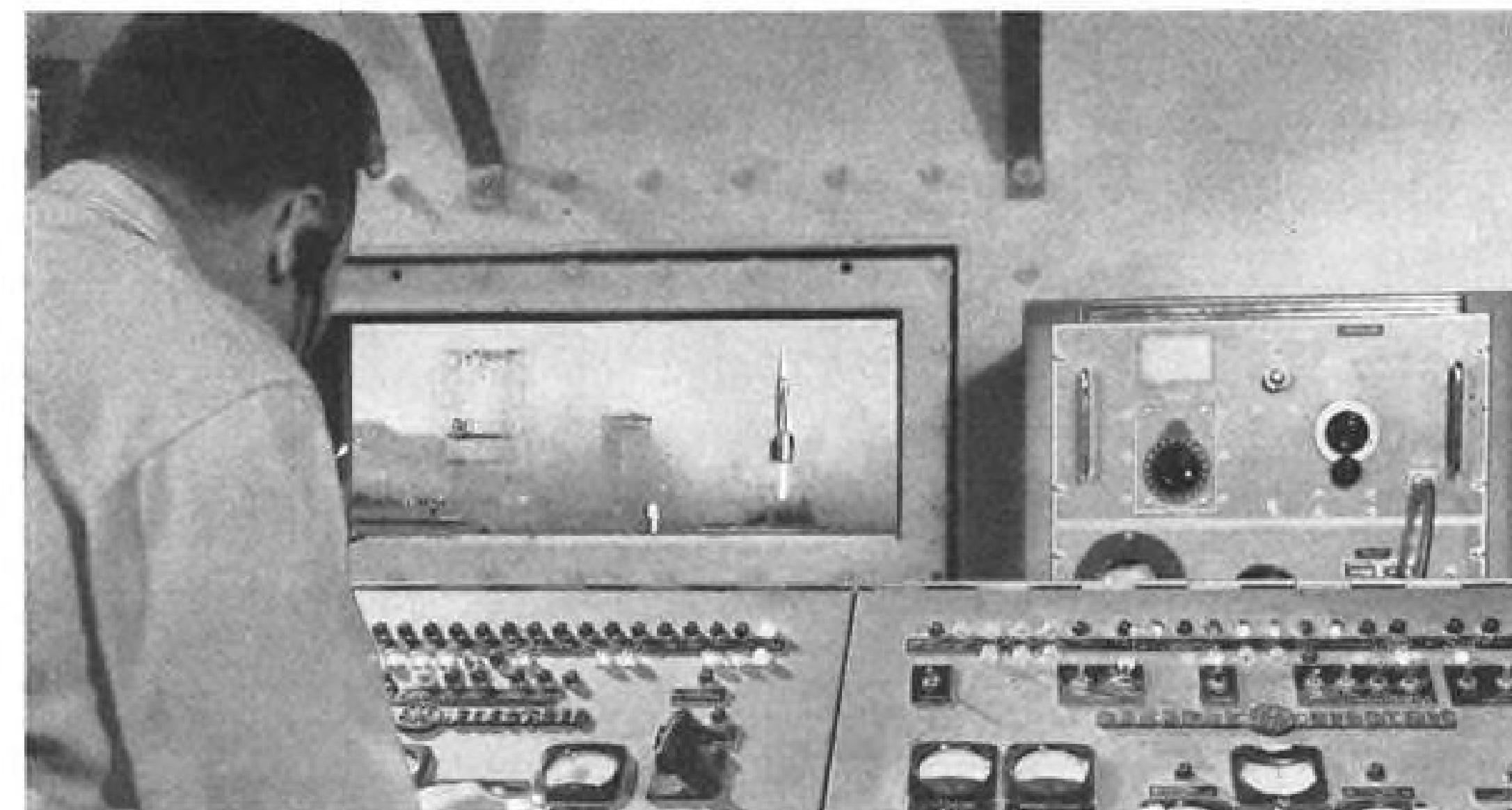
This experience is available to aid your missile project. Having participated in all phases of guided missile development and production, General Electric is well equipped to handle any missile problem. G.E.'s range of experience includes—Propulsion—Guidance—Systems Test—Air Frame.



**PROPULSION** The highest specific impulse in the history of rocket flight was obtained by a G-E designed rocket engine—a preview of more powerful rocket engines for the guided missiles of the future.



**GUIDANCE** General Electric's contributions in programmed, radio and inertial guidance have helped Industry provide our Armed Services with reliable guidance systems.



**SYSTEMS TEST** Over one hundred surface-to-surface missiles, designed for guided missile research and development, have been flight tested by General Electric personnel for the Army Ordnance Corps.



**AIR FRAME** Problems in flying at record speed of 5,000 mph and record altitude of 250 miles were encountered in Project Bumper, where a Wac Corporal rocket was "bumped" from a V-2 in full flight.

For detailed information on how G.E.'s experience in complete guided missile systems as well as sub-system development and production can aid your missile project, contact your nearest G-E Apparatus Sales Office, Section 224-2, General Electric Company, Schenectady 5, N. Y.

*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**





## Giannini ADIABATIC TEMPERATURE PROBE

New, Improved Probe Accurately  
Measures Stagnation Temperature of  
a Rapidly Moving Airstream.

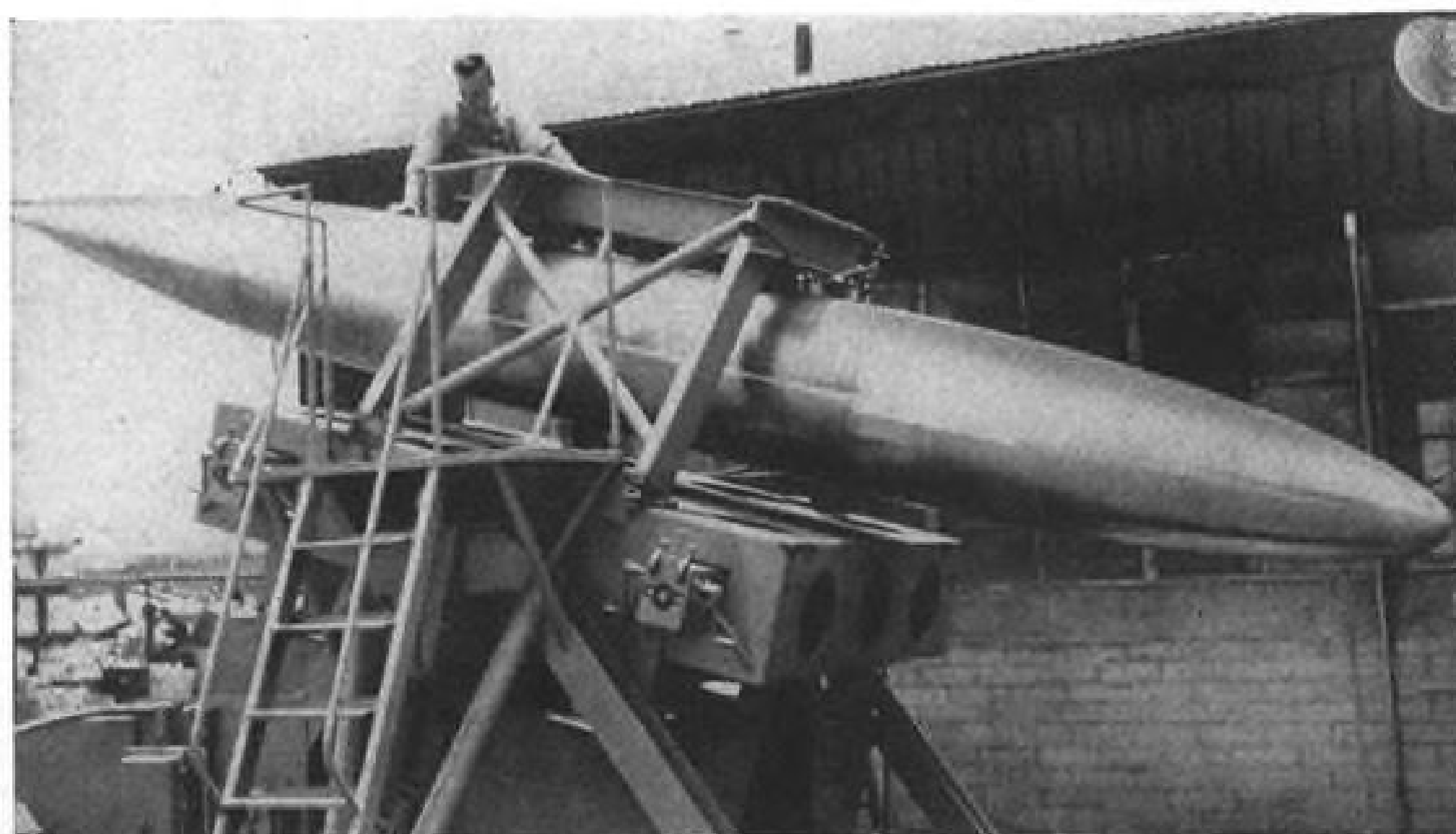
MODEL 49126-A



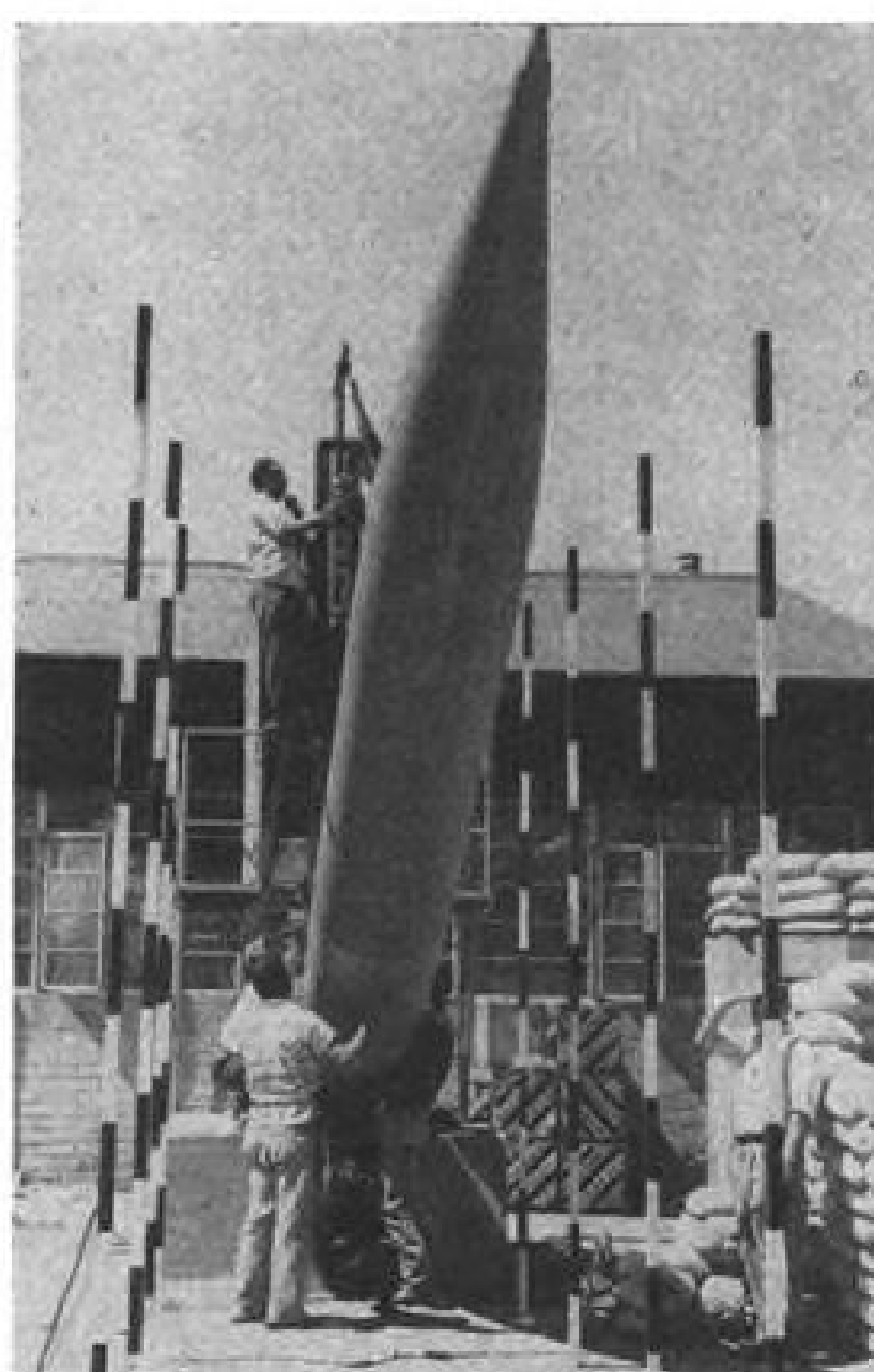
Advanced aerodynamic design of the Giannini Adiabatic Temperature Probe permits rapid, precise temperature measurements in moving air by stagnating samples of Ambient Air in a thermo-isolated chamber. Complete Adiabatic Rise of the stagnated air is captured and indicated by the Giannini "Ultra-Fast Response" (0.5 seconds at speeds greater than 100 mph) Resistance Element, Thermocouple, or Resistance Bulb. Recovery factor of better than 0.99 makes the probe ideal for True Air Speed instrumentation. A heating jacket to provide anti-ice control is optional. Write for complete engineering information.

G. M. GIANNINI & CO., INC.  
AIRBORNE INSTRUMENT DIVISION  
PASADENA 1, CALIFORNIA

**Giannini**



ROCKER tests tank's ability to withstand slosh and vibration load continuously.



FORCE EJECTION separates tank from pylon using explosive. Tank is fixed vertically (left) to ejection tester, is hurled (right) between rows of calibrated poles.



## Fuel Tanks 'Fly' on the Ground

Special test equipment for jettisonable fuel tanks has been developed by Pastushin Aviation Corp., Los Angeles. The company recently received a \$758,657 contract for the production of 15-ft.-long 300-gal. aluminum jettisonable tanks for Northrop's F-89D Scorpion. Another \$250,000 order is for a new system for forcible ejection of expendable tanks on Lockheed's F-94C Starfire.

One of Pastushin's new test rigs is a slosh and vibration machine. Another development is a pair of test stands to check the company's force ejection pylon for use with tanks and stores.

►Slosh, Vibration Checks—The slosh and vibration tests are part of a complete proving sequence for Pastushin-developed jettisonable tanks. The test

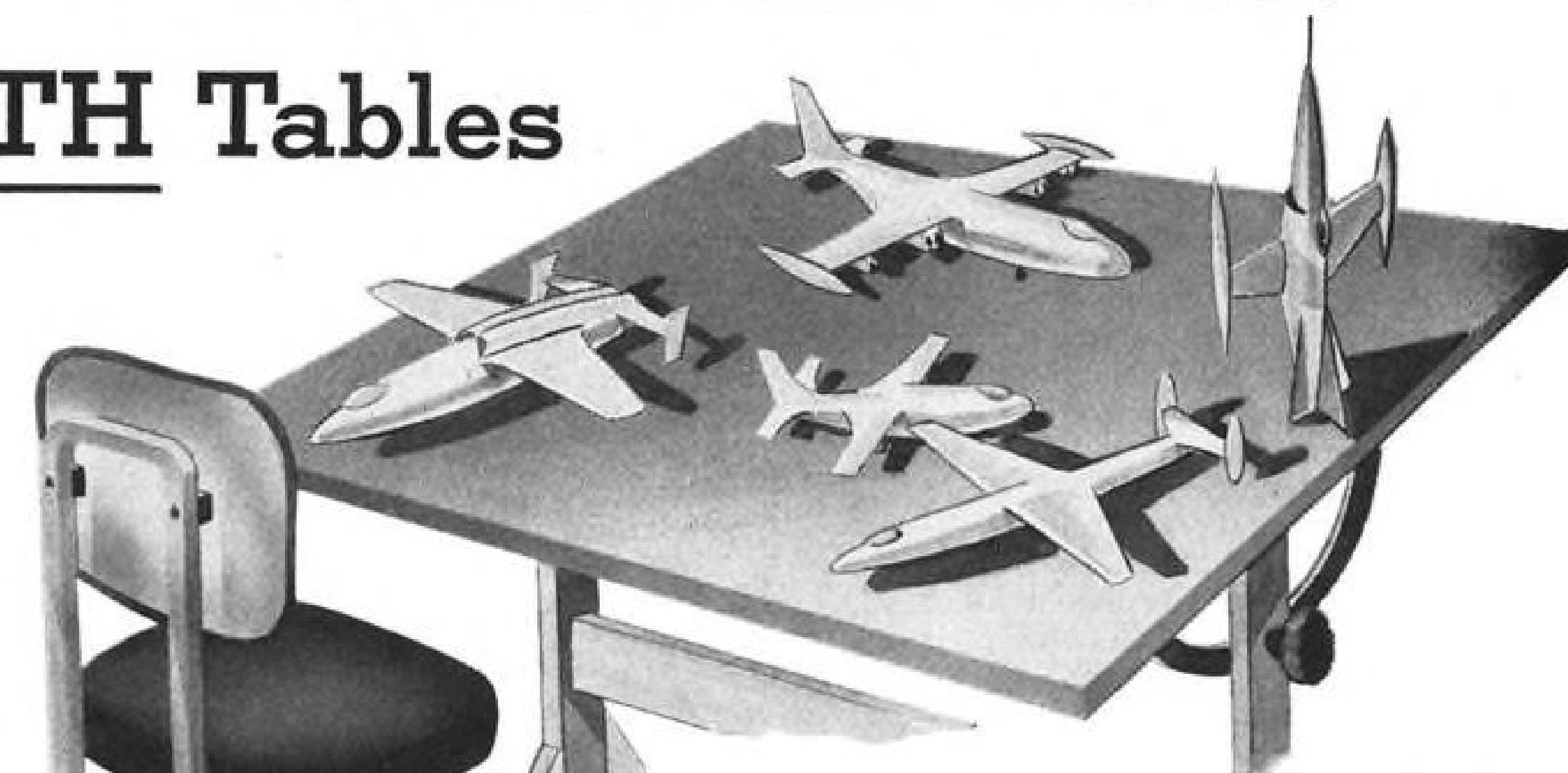
vehicle handles tanks up to 2,000-gal. capacity, shakes and rocks them continuously for 25 hr. to qualify them to military specs. The machine affords these features:

- Vibration speed is established by cyclic rpm. before vibration amplitude is introduced, thus avoiding the possibility of the tank passing through a lower natural frequency that would impose excessive loads. Amplitude and speed may be varied while the machine is operating.

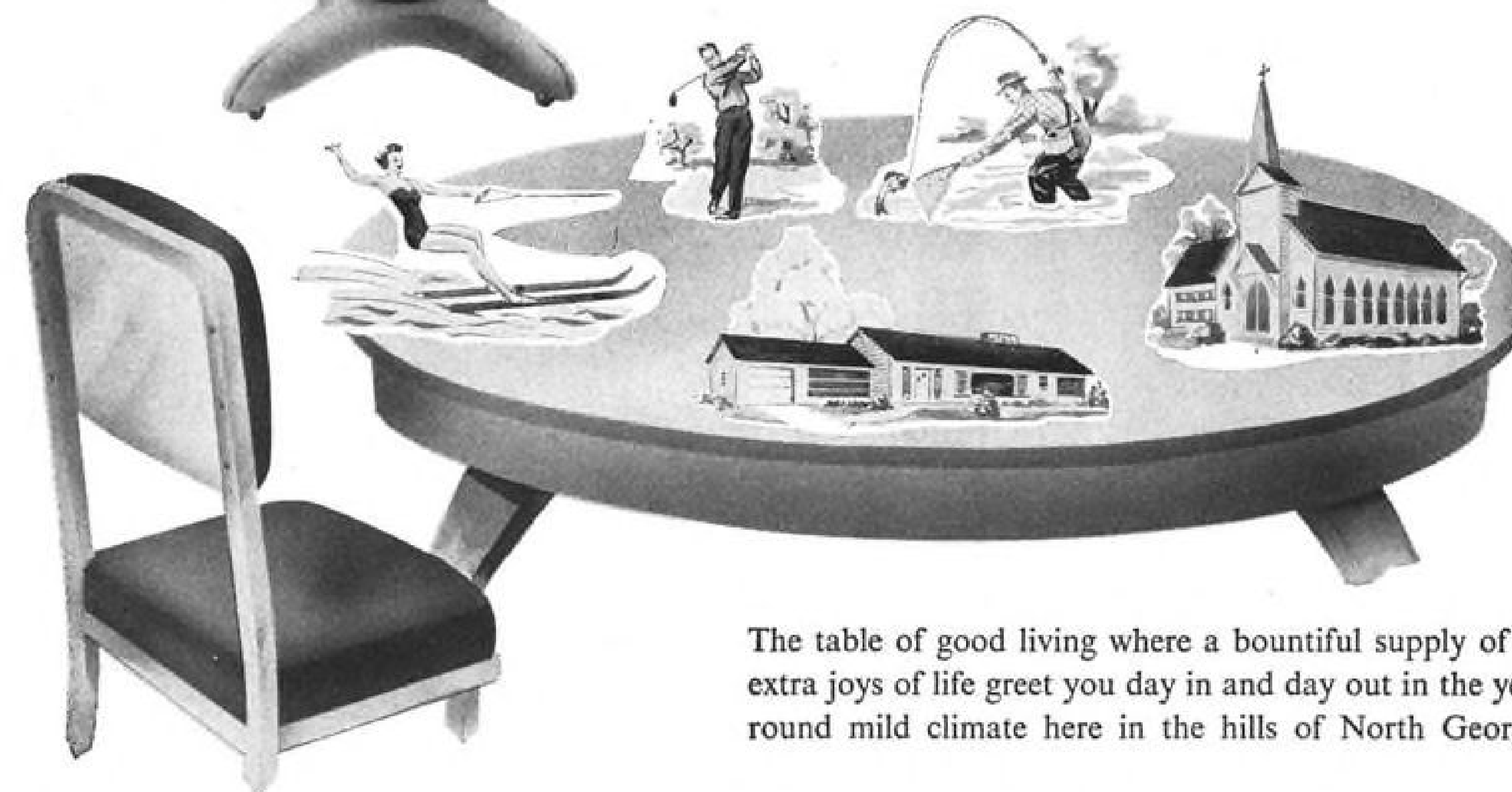
- The tank is vibrated while swinging it within a 30-deg. vertical angle to check the container for ability to withstand structural fatigue and sloshing loads which could result from engine vibration and fast change in flight attitude. In addition to checking strength charac-

## AIRCRAFT ENGINEERS

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## WORLD'S BEST-TRAINED GEARS?

IT TAKES fantastic manufacturing skills to turn out a complicated train of gears like this. Used in the Y-4 Periscope Bombsight made by General Mills for the Air Force's B-47 bombers, these gear trains must show a negligible cumulative error and almost imperceptible backlash. The Mechanical Division of General Mills manufactures and assembles these gears on a production basis to such close tolerances that specially-designed optical and electronic equipment is needed for inspection. To meet these extraordinary requirements, even the finest gear-making machinery is revamped in our plant to give performance exceeding manufacturers' claims.

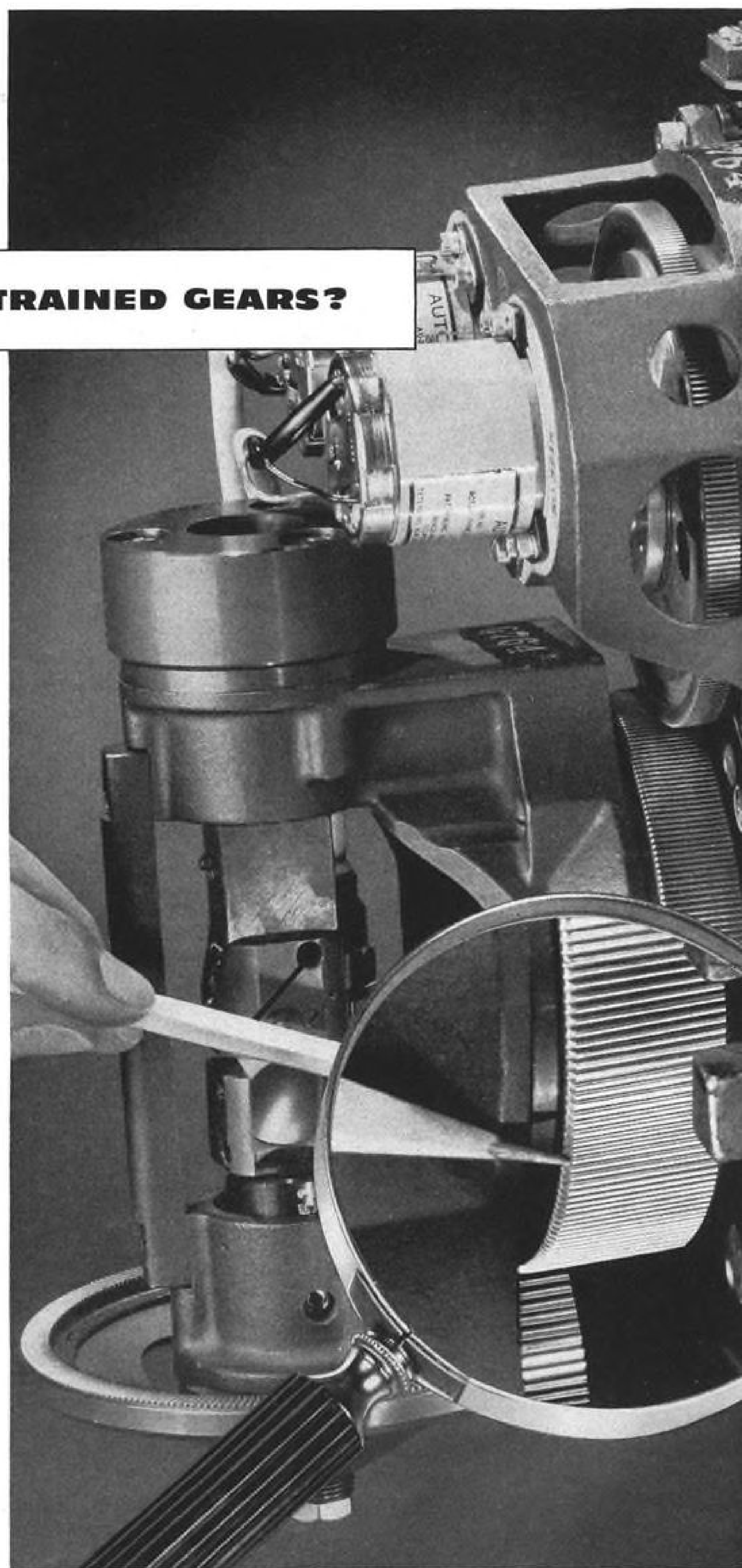
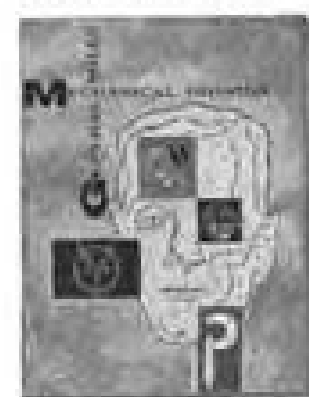
This is another example of the intelligent engineering and precision craftsmanship found in both prime and subcontract production and contract research at the Mechanical Division of General Mills.

### HAVE YOU A PROBLEM in these fields?

General Mills can help you with electronic and electro-mechanical research, design, development, production engineering and precision manufacturing in connection with . . .

☐ aircraft systems ☐ industrial instrumentation and control ☐ specialized precision instrumentation ☐ navigation and missile control systems ☐ electro-mechanical computers ☐ remotely-controlled manipulators ☐ telemetering (radio and wire) ☐ fine-particle technology ☐ meteorological and high-altitude research.

THIS NEW BOOKLET tells the whole interesting story of the Mechanical Division. A copy will be gladly sent in response to your request on your company letterhead. Address Dept. A-2, Mechanical Division of General Mills, 1620 Central Avenue, Minneapolis 13, Minn.



**MECHANICAL DIVISION OF General Mills, Inc.**

teristics, the rig establishes the ability of the tank to withstand leakage.

The slosh and vibration tests complement other checks—outdoor static tests, environmental chamber runs, and in-flight proving.

► **Force-Pylon Tests**—A pair of vertical and horizontal test stands insure reliability of the company-developed force ejection pylon, designed to eject the jettisonable fuel tank at any speed or flight attitude.

The vertical stand allows the store to be fired on a flat trajectory up to 50 ft. into a restraining net, to check the pylon's ejecting power.

On the horizontal stand, stores are fired directly downward. Flat iron plates often are substituted for tanks and fired down 15 to 18 in. to determine force expended. The tests also determine maximum pressure in the chamber and other values which help check minimum limits and design curves.

When accuracy, distance and force have been checked in the outdoor firing stands, the unit is moved to an environmental test chamber, where actual conditions of pressure and temperature are simulated. This is followed by in-flight check.

## Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

**AI Research Mfg. Co.**, 9851-9951 Sepulveda Blvd., Los Angeles 45, services and material to overhaul government-owned compressors, \$26,097.

**Bendix Products Div., Bendix Aviation Corp.**, 401 Bendix Drive, South Bend 20, Ind., maintenance parts for overhaul of various Bendix engines, 15,000 ea., \$521.-310.

**Bendix Products Div., Bendix Aviation Corp.**, 401 Bendix Drive, South Bend 20, Ind., maintenance parts for overhaul Bendix pumps, \$133,337.

**Chicago Aerial Survey Co.**, 1980 Hawthorne Ave., Melrose Park, Ill., parts for electronic timing devices, \$32,928; controller assy., parts used in electronic timing devices for aerial cameras, \$40,226.

**Harley Soap Co.**, Pearce and Orthodox Sts., Philadelphia 37, compound, paint remover, 99,740 gal., \$118,065.

**Holley Carburetor Co.**, 5930 Vancouver Ave., Detroit 4, services and material, \$324,175.

**General Electric Co.**, 1405 Locust St., Philadelphia 2, services and materials, 60 ea., \$45,600.

**Pesco Products Div., Borg-Warner Corp.**, 24700 N. Miles Rd., Bedford, Ohio, maintenance parts for Pesco pump and fluid controls valve, \$38,790.

**Thompson Products, Inc.**, 23555 Euclid Ave., Cleveland 17, pump, hydraulic, for FJ-2, FJ-3 aircraft, 166 ea., \$177,373.

**Wm. R. Whittaker Co., Ltd.**, 915 N. Citrus Ave., Los Angeles 38, hydraulic valve, canopy, 29 ea., \$27,584.

**Air Associates, Inc.**, Teterboro, N. J., items and maintenance parts for T-28B aircraft, \$222,565.

**R. E. Darling Co.**, 6825 Reed St., Bethesda 14, Md., disconnect assy., 1,508 ea., \$67.-498.

**Douglas Aircraft Co.**, 3000 Ocean Park Blvd., Santa Monica, Calif., service and material to overhaul cabin superchargers, 23 ea., \$28,175.

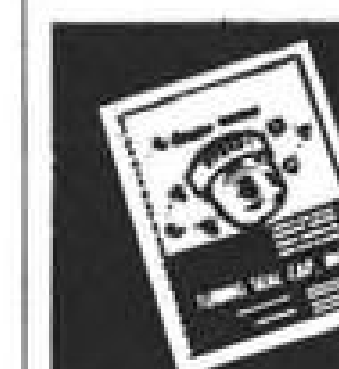
**Goodyear Tire & Rubber Co., Inc.**, 1144 E.

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By

**DAVIS**

### Deck and Wall Fastenings

- Ty-Loc deck plates, convertible from passenger seat to cargo use
- Very thin floor plates
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- Variety of studs and rings
- From 1,000 to 10,000 lbs. plus

### Cargo Nets

- Made from cotton, nylon or dacron
- Variety of hooks, rings and end fittings
- Strengths to 100,000 lbs
- Quickly adjustable
- Easily maneuverable
- Standard and specially built types

### Aircraft Seat Belts

- Conventional cam type
- Newly designed metal to metal type
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- Friction type
- Attractive • Individualized
- CAA and MIL approved

### Ty-Down Gear

- From 100 lbs. to over 15 tons
- Quick connect • Quick release
- Swivel hooks, all strengths
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### Plus

- Davis High Shear Loc Pins
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- and many other new products—Here to stay!

## DAVIS AIRCRAFT PRODUCTS INC.

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Market St., Akron, Ohio, wheel and brake assys., \$50,869.  
 Haloid Co., 2-20 Haloid St., Rochester 3, N. Y., photo-copying paper, \$66,512.  
 Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids 2, Mich., actuator, and spare parts, \$64,664.  
 Revere Camera Co., 320 E. 21st St., Chicago 16, actuator, 62 ea., \$38,174.  
 Superior Paint & Lacquer Works, 6231 Maywood Ave., P. O. Box 271, Huntington Park, Calif., enamel, 24,000 gal., \$46,560.  
 Western Hydraulics, Ltd., 10918 Burbank Blvd., North Hollywood, Calif., hydraulic valves, \$43,730.  
 Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, compound, 85,340 gal., \$96,227.

## OVERSEAS SPOTLIGHT

### Getting Out Under Water

LONDON

A British company has developed a means of jettisoning fighter canopies, even under a considerable depth of water.

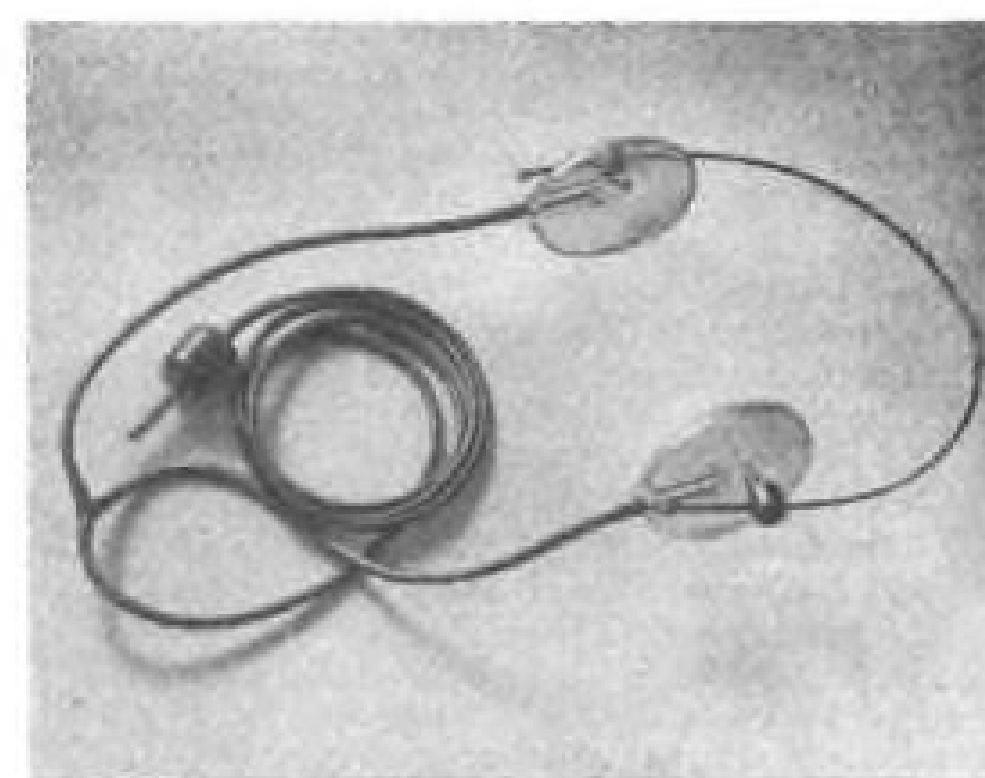
The device, now flying on de Havilland Vampire trainers and Sea Venoms in service with the Fleet Air Arm, has been tested successfully under more than 10 ft. of water, in all attitudes, and with a total pressure on the canopy of more than three tons, Flight magazine reports.

The jettison mechanism can be applied to any clamshell-type of canopy that is hinged at the rear and secured at the front by an orthodox latch. Maker is M. L. Aviation Co., Ltd., White Waltham, Berks.

### Verdon Passes 370-Hr. Test

PARIS

Hispano-Suiza reports that the 7,700-lb.-thrust Verdon jet engine has successfully finished 370 hr. of testing at Villacoublay. The last 150 hr. were



### Light and Loud

New durable plastic headset weighs only 1.6 oz. It consists of a sensitive plug-in mechanism, thin stainless steel headband, and two transparent Plexiglas air cushions that fit over the ear. The cushions slide on the band for length adjustment. Ball and swivel joint at the base of each cushion permits position adjustment. Sound is piped to the cushions from the receiver through hollow plastic tubing. Telex, Inc., Dept. KP, Telex Park, St. Paul 1, Minn.

# THOUSANDS OF DOLLARS SAVED YEARLY BY OUR NEW SPARE PARTS PLAN

**Modern technical research puts spare parts stocking on a scientific basis... reduces your present inventories by 65% without affecting operations.**

If you are concerned with the operation or financing of an airline or overhaul shop, this new approach will save you money. There is no magic in the method. It merely establishes two levels of parts stocking, then transfers the second level so that the parts are held for you... but *not with your capital or occupying your warehouse space!*

It takes a month of technical studies by a trained team of parts supply technicians to establish proper spare parts levels... *but that costs you nothing!* Your lead time will be reduced as our inventory takes over. For example, we reduced the lead inventory time from 120 days to 60 days for one of the leading airlines without creating a single operational delay. Within a few months, that lead time was further reduced to 30 days... releasing capital for other uses while *increasing their security of supply.*

AIRWORK technicians have the background needed for a survey of this

type. We are one of aviation's major engine and engine driven accessory overhaul bases. We live with the problem of spare parts inventory... maintaining a million dollar revolving inventory at all times. We know what shelf-life deterioration means. And what a shelf-bound inventory costs in terms of idle capital.

To put it bluntly, it is profitable for us to save money for you. Our technical studies produce a provisioning plan that lets you keep a minimum parts investment. But it also shows just how much we need to carry to meet your maximum demands.

AIRWORK, with its own stock for overhaul needs, plus the demand from organizations such as yours, then acts as a central spare parts bank. You can draw at any time from this bank... from our warehouses in Washington, Millville, or Miami. The practical effect is a type of *spare parts insurance policy* where the varying stock needs of all types of customers are equalized

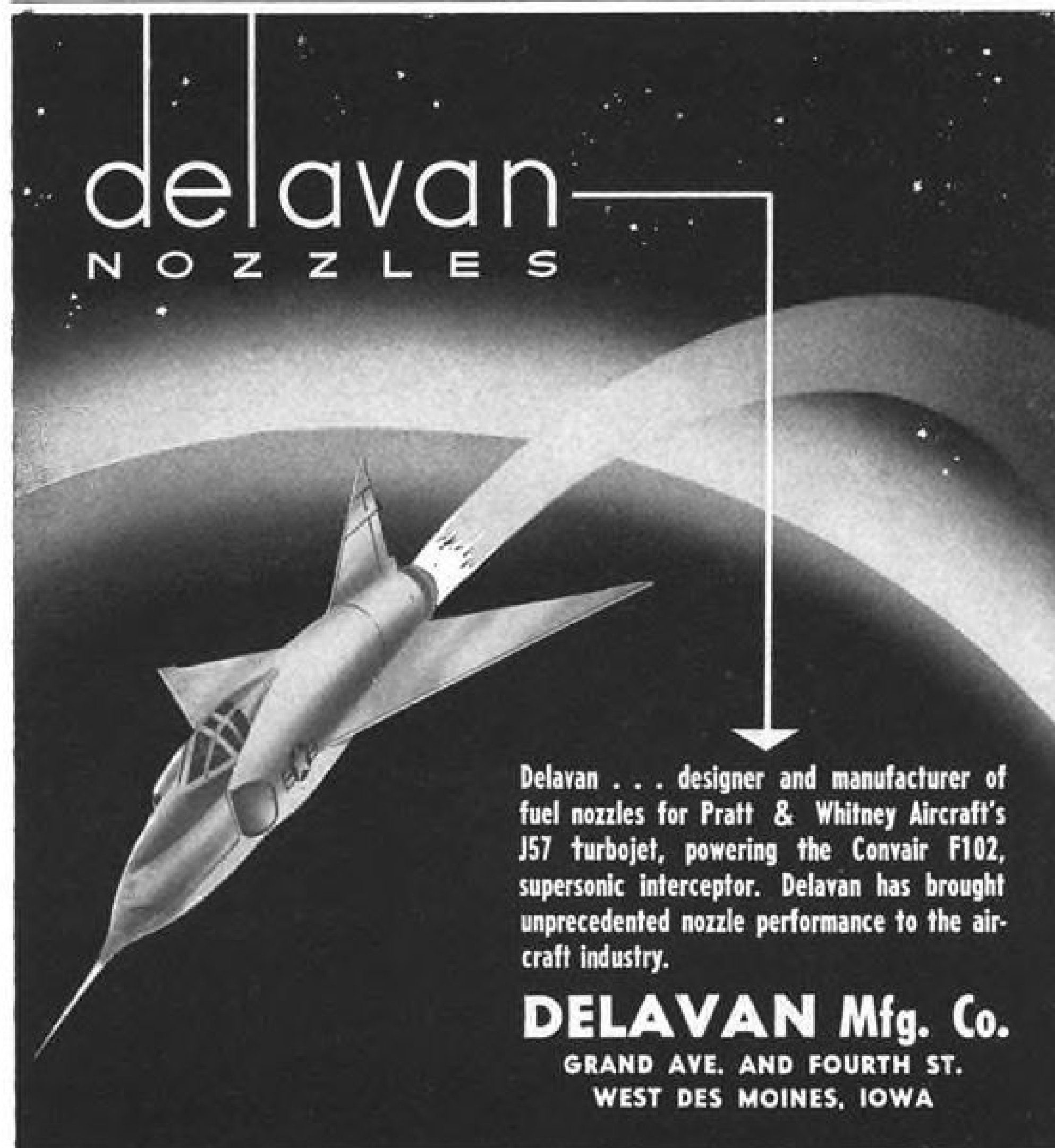
through combination. The central stock is smaller... is always fresh... and always adequate... yet never costs more than you now pay for each item!

We would like to sit down with you and talk over the details of our spare parts supply plan. Our method of saving your money is simple, uncomplicated, easy to explain—backed with success stories. Give us just 15 minutes of your time to prove it. Why not call or wire AIRWORK at Millville, Washington, or Miami today?

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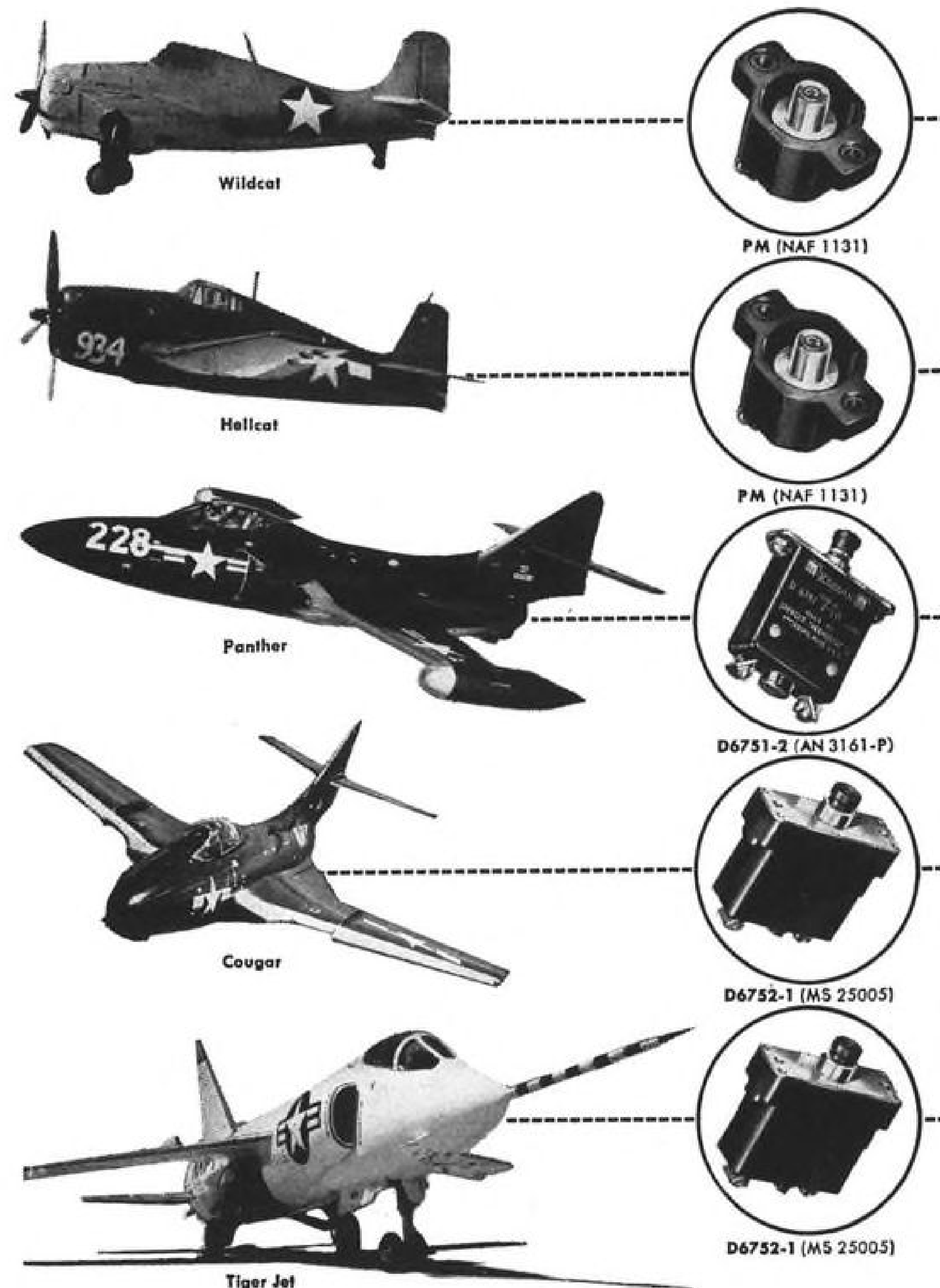
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NOZZLES



Delavan... designer and manufacturer of fuel nozzles for Pratt & Whitney Aircraft's J57 turbojet, powering the Convair F102, supersonic interceptor. Delavan has brought unprecedented nozzle performance to the aircraft industry.

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### KLIXON AIRCRAFT CIRCUIT BREAKERS

From their very inception, the famous Grumman "Cats" have made history as terrors of the blue. . . And today's deadly Tiger typifies the forward advance at Grumman.

First to design and manufacture the aircraft circuit breaker, Spencer too, has progressed throughout the years to the new high rupture capacity D6752-2 . . . unexcelled in circuit breaker design and performance.

All Klixon Circuit Breakers receive the exclusive 100% ultimate trip test plus a 200% short time calibration test and X-ray inspection.

Write for specifications data which gives complete information.

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2811 Forest St., Attleboro, Mass.

performed under the conditions of a homologation test. It is reported that the thrust exceeded the rated 7,700 lb. during the entire test period.

The Verdon is slated to replace the Rolls-Royce Tay as the powerplant in Dassault's Mystere 4A.

### Reds to Return Airline

VIENNA

The Soviet Union is preparing to hand over to the Hungarian government all joint Soviet-Hungarian enterprises, informed sources here report. This would include Maszovlet, the Soviet-Hungarian airline.

Similar steps have been taken in recent weeks in Rumania and Bulgaria.

### Armagnac Spans Atlantic

PARIS

An S.E. 2010 Armagnac four-engine transport belonging to Sageta-TAF recently set a record as the first transport of French construction to cross the Atlantic carrying passengers. It flew from Bogota to Paris carrying the French Secretary for Air, Diomedé Catroux, and other dignitaries who had been invited by the Colombian government to attend the opening of a Franco-Colombian mining project.

Sageta-TAF has eight Armagnacs. Seven are used normally on the line's Paris-Saigon service. Powerplants of the 77-ton ships are Pratt & Whitney R4360-B13 engines.

The Bogota-Paris crossing, made at Diomedé's request as publicity for French aircraft, required three stops—Caracas, Paramaribo and Dakar. However, there are no plans to use the Armagnac in regular trans-Atlantic service.

### Fleuret II Renamed Paris

PARIS

Morane Saulnier's 760, four-place jet, liaison aircraft, has been following a busy schedule of demonstrations for French aviation and NATO officials.

The plane, formerly known as the Fleuret II (AVIATION WEEK Sept. 6, p. 36), has been officially named the Paris.

### Bad News for Whales

JOHANNESBURG

The South African offshore whaling industry has reported the successful conclusion of a very busy season.

Using an airplane to spot the quarry and radio its position back to the shore-based fleet, the whalers managed to catch a little more than 1,000 whales in three months.

# Lamson + Sessions...

## ...offers all three in Aircraft Fasteners

### BOLTS

Bolt—Aircraft, AN3 to AN12  
Bolt—Clevis, AN23 to AN32  
Bolt—Aircraft, Drilled Head, AN73 to AN81, AN73A to AN81A  
Bolt—Aircraft, Close Tolerance, AN173 to AN182  
Bolt—Hex Head, AN101001 to AN101900  
Bolt—Hex Head, Drilled Shank, AN101901 to AN102800  
Bolt—Drilled Hex Head, AN102801 to AN103700  
Bolt—Drilled Hex Head, 6 Holes, AN103701 to AN104600  
Bolt—Shear, Close Tolerance, NAS464  
Bolt—(Phillips) 100° Flat Head, Close Tolerance, High Strength, NAS333P to NAS340P

### NUTS

Nut—Castellated, Airframe, AN310  
Nut—Plain, Airframe, AN315  
Nut—Check, AN316  
Nut—Plain Hex (Fine Thd.), 325  
Nut—Castle (S.A.E.), 330  
Nut—Plain Hex (Coarse Thread), AN335  
Nut—Light Hexagon (Coarse Thread—Fine Thread), AN340—AN345  
Nut—Engine—Slotted, AN355  
Nut—Plain Engine, AN360

### PINS

Pin—Cotter, AN380  
Pin—Cotter (Corrosion Resisting Steel), AN381  
Pin—Flat Head, AN392 to AN398

### 1. SOURCE INSPECTION

### 2. BONDED STOCK

### 3. STATISTICAL QUALITY CONTROL

### SCREWS—Slotted

Screw—Fillister Head (Coarse Thread—Fine Thread), AN500—AN501  
Screw—Fillister Head (Drilled Head) (Coarse Thd.—Fine Thd.), AN500A—AN501A  
Screw—Drilled Fillister Head Machine (Fine Thd.—Coarse Thd.), AN502—AN503  
Screw—Machine, Round Head (Coarse Thread—Fine Thread), AN515—AN520  
Screw—Washer Head, AN525  
Screw—Machine, Truss Head, AN526  
Screw—Sheet Metal Round Head, AN530

### SCREWS—Phillips Recessed

Screw—Machine, Flat Head, 82° (Coarse Thd.—Fine Thd.), AN505—AN510  
Screw—Machine, Round Head (Coarse Thd.—Fine Thd.), AN515—AN520  
Screw—Machine, Truss Head, AN526  
Screw—Machine, Flat Head, 100°, AN507  
Screw—100° Flat Head (Structural), AN509  
Screw—Brazier Head, NAS220 to NAS224  
Screw—Sheet Metal Round Head, AN530  
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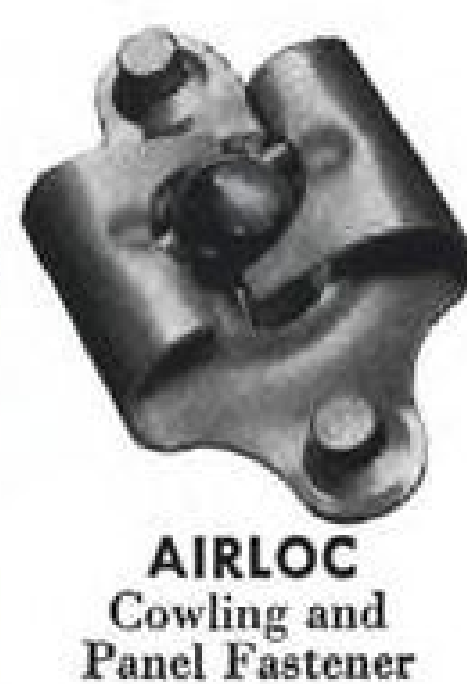
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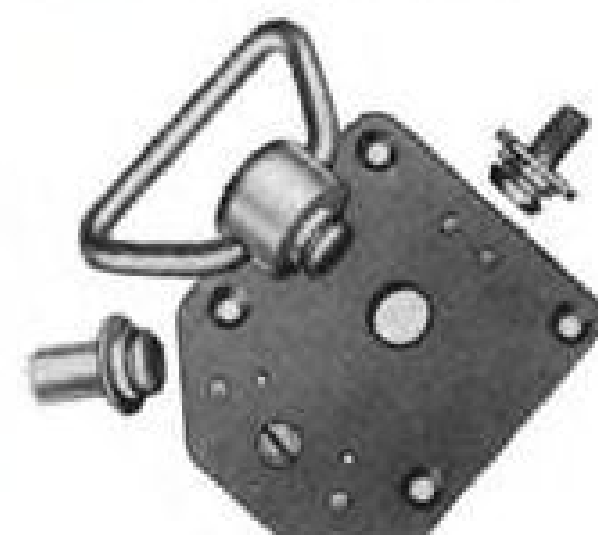
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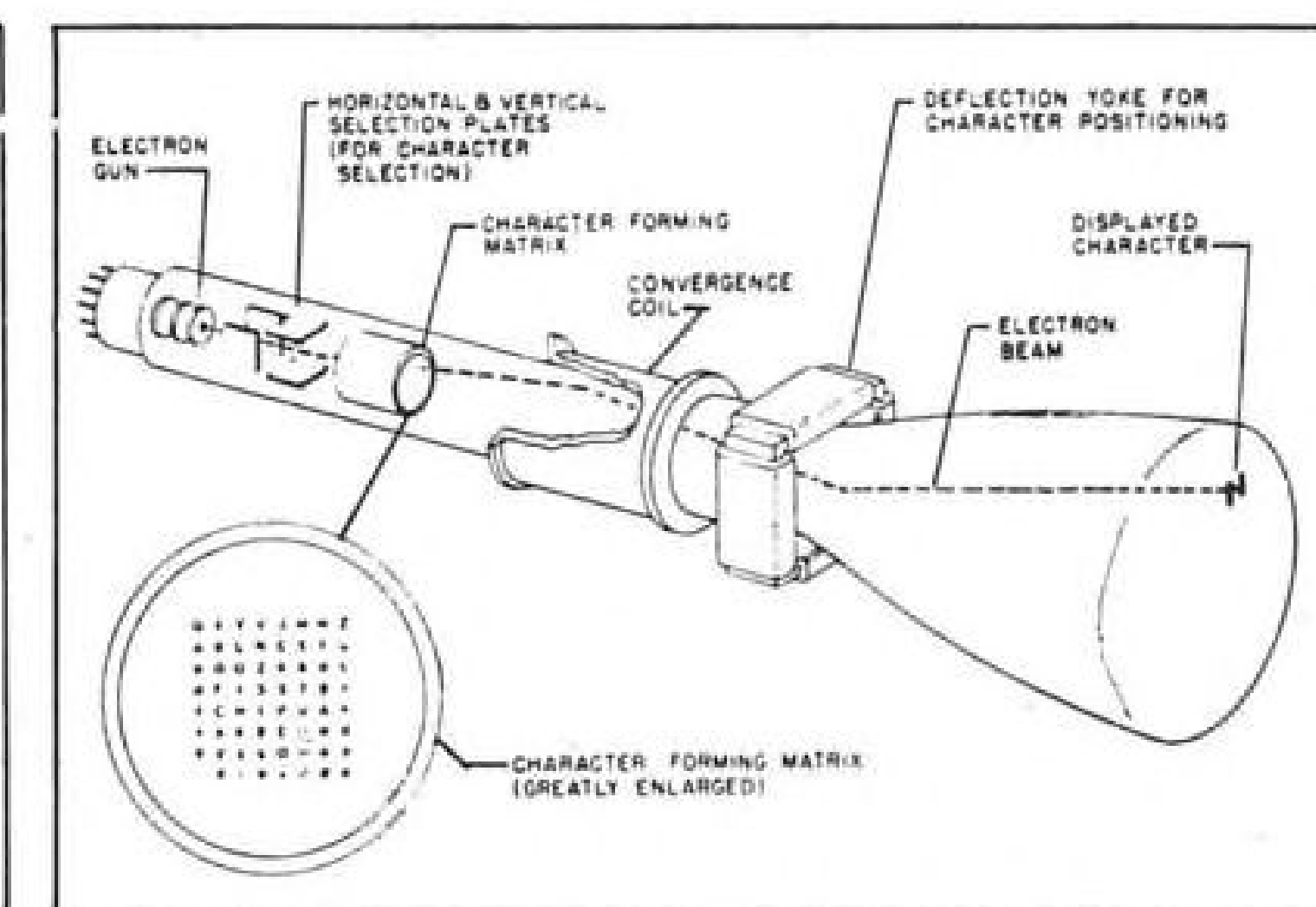
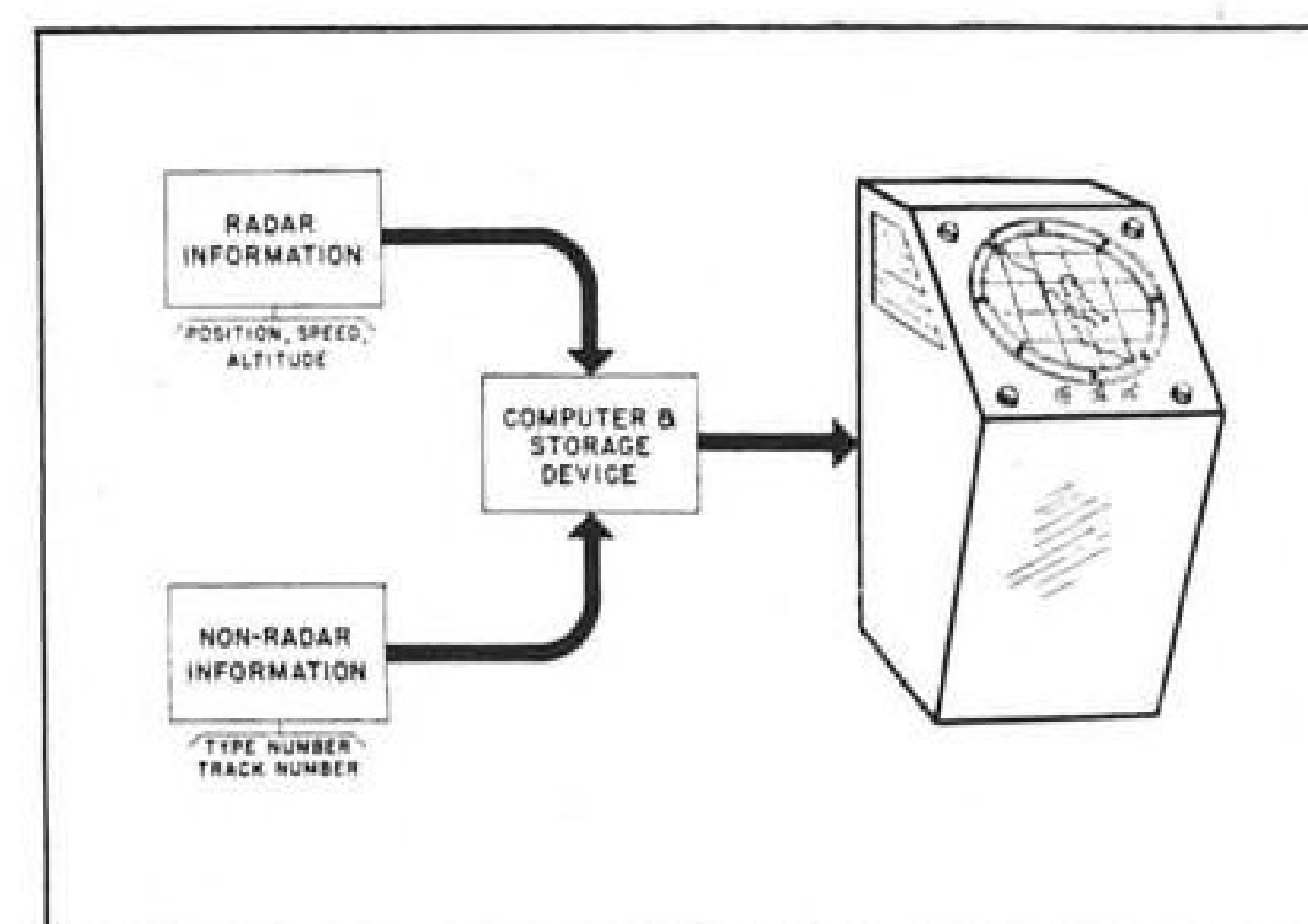


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## AVIONICS



WRITING COMES EASY to Charactron. Left panel shows how radar and operator data are combined; tube operation is shown at right.

## 'Educated' Tube Will Aid Air Defense

By Philip Klass

San Diego—Convair's Charactron, the "educated cathode ray tube" which can print out up to 25,000 letters and numerals per second on its face, has taken on an important new military job: Used in air defense equipment, it identifies targets on radar scopes by displaying coded information as to aircraft type, friend or foe, speed, altitude, and track number.

Charactrons are being built for Air Force and Navy. In addition, the Charactron should have similar important applications to civil air traffic control.

First unveiled nearly three years ago at the National Institute of Radio Engineers convention by Joseph T. McNaney, its inventor, Charactron created quite a stir (AVIATION WEEK Mar. 24, 1952, p. 35). Some publishers viewed it as the key to a new rapid printing process. Then it dropped from public sight.

In the intervening period, Convair has been quietly perfecting and setting up to produce the new tube. Troubles which the electronics industry first encountered in setting up to make conventional TV-type cathode ray tubes were multiplied many fold at Convair because of the Charactron's added precision and complexity. The company's lack of experience in this field also made the learning process more painful. However, Convair expects to be turning out four 19-inch-diameter tubes per day in the near future.

►How Charactron Operates—In the Charactron, a small matrix with 64 (or more) different letters, numerals, and symbols cut in it (stencil fashion) is located between a conventional electron gun and fluorescent tube face. By ap-

plying appropriate voltages to a set of vertical and horizontal deflection plates, located between the gun and matrix, the electron beam can be squirted through any of the matrix characters. In passing through, the beam's cross section is formed into a corresponding shape. The beam is then centered by a convergence coil.

By applying another pair of appropriate voltages to a second deflection system, located between the matrix and screen, the character-shaped beam can be deflected to position the letter, numeral, or symbol at any desired spot on the screen (see sketch, above, right).

By proper selection and sequencing of the two pairs of deflection voltages, any required intelligence can be written on the Charactron screen. The tube's rapid scan rate, and the persistence of its fluorescent screen, make it appear to the human eye that all characters are printed simultaneously.

►Radar Display Problem—The Charactron may solve one of the most pressing problems of air defense and civil

traffic control radar operators: how to keep track of a variety of targets on their scopes. Present PPIs show only target azimuth and distance, plus, in military radars, whether the target is friend or foe. (When civil aircraft are equipped with radar transponder beacons, civil controllers will also be able to identify targets.)

But there is other important information, particularly for military radar operators, such as airplane altitude, speed and track number. Military heightfinder radars and tracking computers can determine this information, but displaying it on a conventional PPI is the problem.

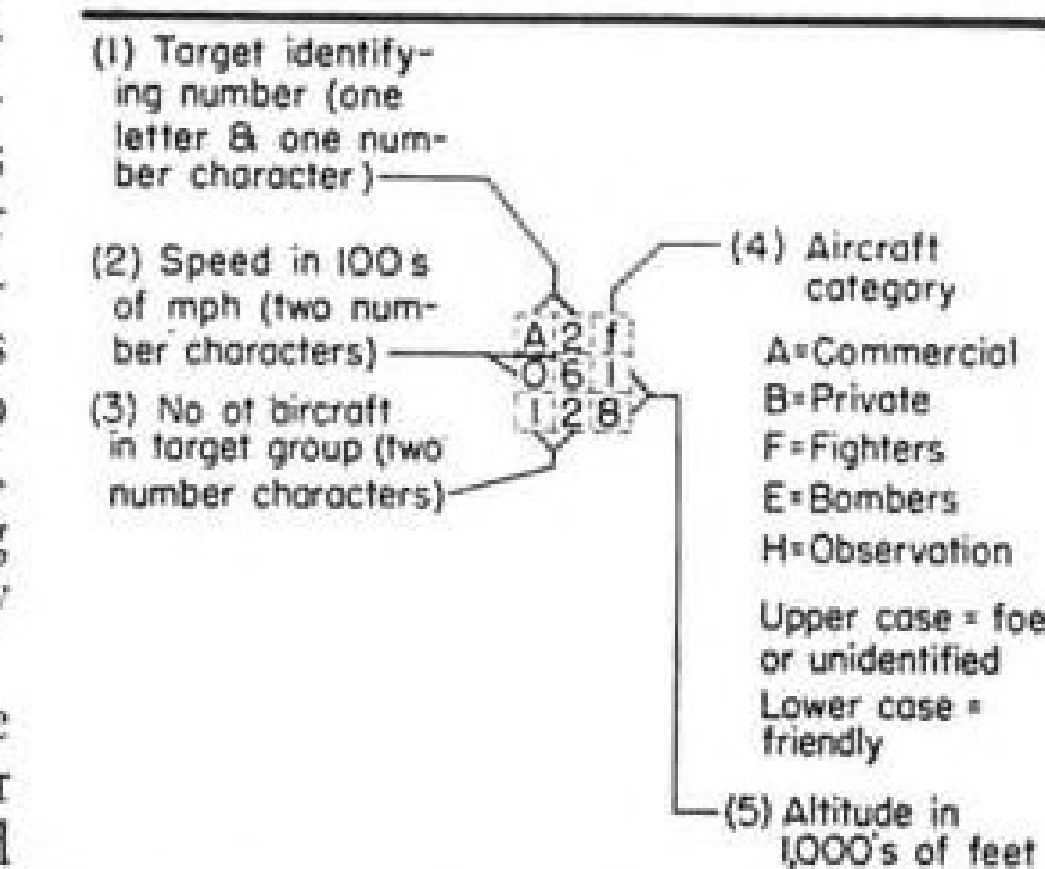
In the past, the ground controller has had to assimilate information from several scopes simultaneously, or else resort to plotting boards to which the data is manually transferred and combined.

►Charactron Solution—The Charactron, and its associated electronic converters, can automatically combine and display information from surveillance and heightfinder radars, from tracking computers, plus manual inputs such as the number of aircraft in a flight, on a single PPI. Several hundred aircraft can be displayed in this manner, Convair reports.

This explains why the AF's air defense (Lincoln Lab) group, the Navy, and the Army reportedly are keen on the new tube.

In one typical arrangement, five different bits of information about the target can be displayed in a nine-character group, three characters wide and high.

The center of this three-by-three character group will appear on a PPI in a position corresponding to the

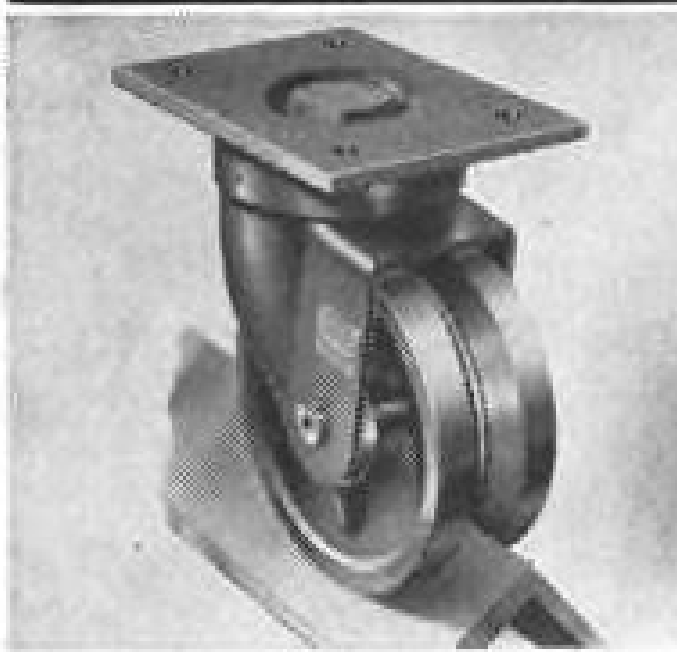


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target's azimuth and range (see sketch, top, right).

The two top left-hand characters identify the target by track number. The two middle left-hand characters show its speed in hundreds of miles per hour. The bottom two left-hand characters show the number of aircraft in the target group.

In the extreme right-hand column, the top character shows the type of aircraft, i.e., commercial, fighter, bomber, private, or other, with capital letters used if it is a foe, lower case if friendly. The middle and bottom right-hand characters show target altitude in hundreds of feet.

► **Conventional Display Possible**—If the radar controller so desires, he can instantly switch the Characteron to a conventional display in which targets appear as single blips, but with certain advantages over even a conventional PPI. For instance, the Characteron and its associated equipment can be designed to place a circle (or other symbol) around unfriendly or unidentified target blips, as shown on sketch, alongside.

Or the brightness of the target dots may be set to produce visible "trailing" on the scope face, as shown below, right, to indicate past movements.

The target display format, three-by-three in the example cited, can be made any size and shape, within practical operating limits. The display format described is one used on a position display equipment which Convair built for the Navy.

► **Airborne "Private Line" Display**—Another important use for the Characteron is in the long-awaited "private line" type ground-to-air communications.

Instructions from ground controllers could be transmitted to individual aircraft by radio data link, then displayed in the cockpit on a small storage-tube version of the Characteron (Hughes Aircraft has developed a small airborne storage-tube version of the Characteron).

Instructions for each plane could be transmitted in a fraction of a second, using a relatively narrow bandwidth.

► **How It Started**—The keen military and civil interest in the Characteron is in marked contrast to the situation in 1941-42 when McNaney patented the basic idea. Convair's first interest in the device occurred in 1949, three years after McNaney had joined its staff. The company was submitting a proposal for the AF's advanced interceptor fire control system competition and the Characteron seemed like a useful device in such a system.

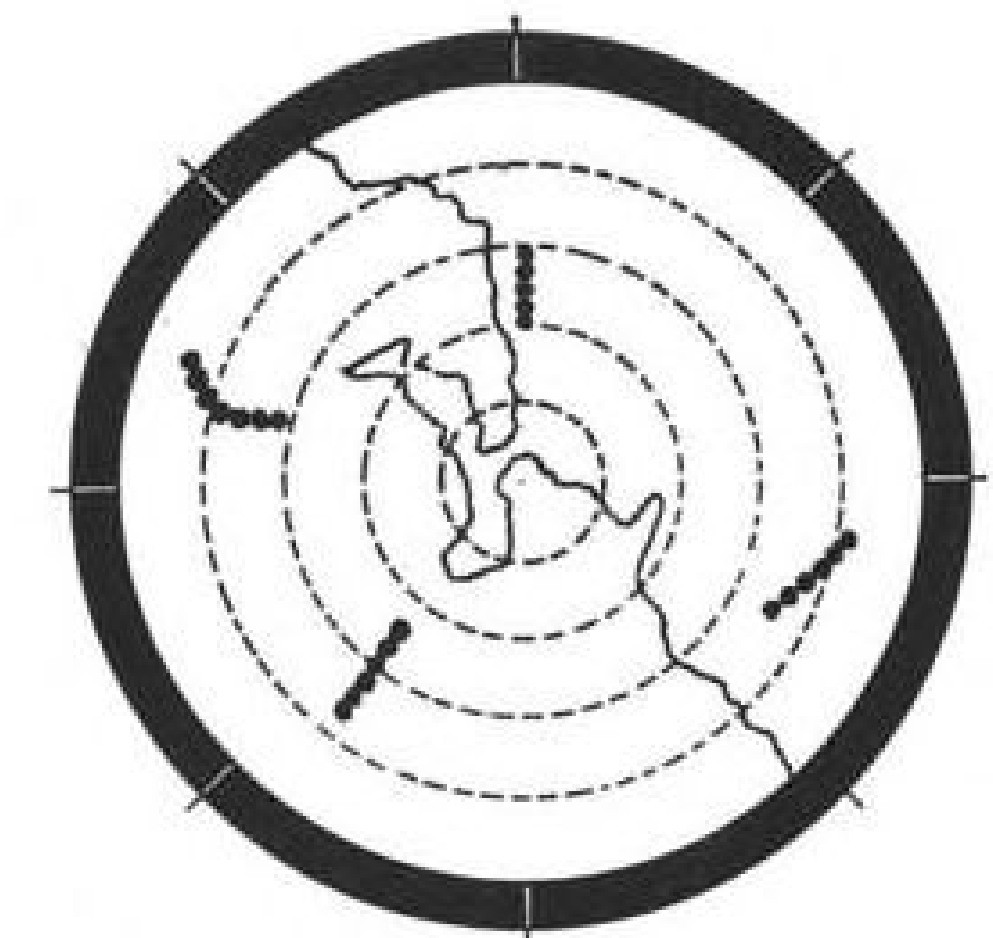
Although Convair lost out to Hughes in the competition, its proposal brought the Characteron to the attention of G. T. Gerlach, Convair's patent counsel. Gerlach had been recommending that the company set up separate projects to exploit patentable ideas outside the air-



**FOUR TARGETS** are shown on PPI in one arrangement used with Convair Characteron.



**CIRCLE AROUND BLIP** (lower left) indicates foe or unidentified target.

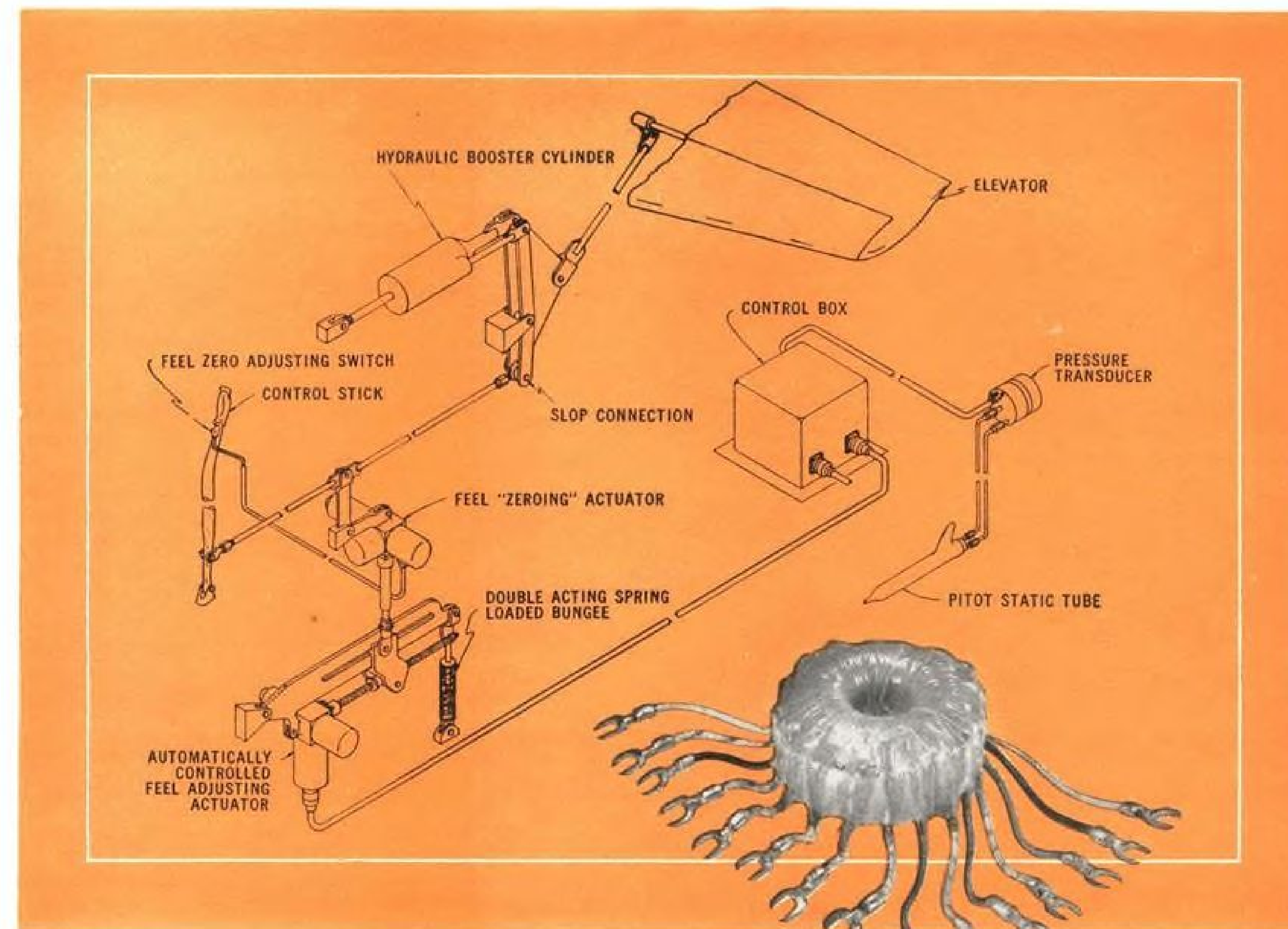


**TARGET'S COURSE** may be shown by producing visible trail of blips on scope.

frame business conceived by its engineers.

Using the Characteron as an example, Gerlach made his pitch again. This time, Floyd Odium, then Convair's chief, gave the approval to set up a separate Characteron project and named Gerlach to head it.

► **Enthusiastic Reception**—When Convair first publicly disclosed the Characteron in March 1952, it played up the tube's potentialities as a rapid read-out device for electronic computers and its rapid printing process possibilities. At the time the company had considerably



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CHARACTRON CATHODE RAY TUBE has vacuum of  $2 \times 10^{-7}$  microns. That is one reason the 19-in. tube costs so many more times than a TV tube of the same size.

more optimism than actual experience in converting Charactron output to permanent printed form.

However, the company was deluged with inquiries from business machine firms and publishers, Gerlach says. A market survey by two research organizations confirmed that there was an excellent market, "if and when" a suitable dry-printing process for reproducing Charactron output was developed. In-

vestigation indicated that this was a fairly long-term development.

► **Military Interest Develops**—Meanwhile Convair learned that Navy Bu-Ships was working on a semi-automatic aircraft identification system to provide information such as friend or foe, airplane type, altitude, airspeed, and track number. Further investigation showed that the Air Force and Army had similar problems. The Charactron

seemed like a natural for displaying such information.

Deferring its commercial market aspirations, Convair farmed out the development of a dry, highspeed printing process to Horizons, Inc., Cleveland, in order to concentrate on the military market.

► **Learning the Hard Way**—The art of building CRTs, a closely guarded competitive secret in the electronics industry, was something Convair had to learn the hard way. In fact, Lincoln Labs people actually urged the company to avoid "contamination" with techniques employed in producing low-cost TV picture tubes, Gerlach says. The reason was the much higher order of reliability which the military services required.

For example, a TV picture tube is guaranteed against failure for one year, which means about 700 operating hours in the average set. However, Lincoln Labs wanted the Charactron to operate for a minimum of 4,000 hours without failure, and for 10,000 hours if possible.

The added design and manufacturing care are reflected in the difference in price between a TV picture tube and the Charactron. A 19-inch TV tube sells for around \$30-40, whereas it will be some time before Convair gets the price of the 19-inch Charactron below \$2,000.

► **More Money for Less Air**—One factor which affects tube life (and cost) is the degree of bulb evacuation. Gas left in the tube ionizes and bombards the cathode, eventually destroying it. Whereas TV picture tubes are evacuated for a mere 45 minutes, the Charactron goes through a 24-hour cycle of heating and evacuation that brings bulb vacuum down to  $2 \times 10^{-7}$  microns, Gerlach says (a micron is 1/1000th of a millimeter of mercury).

Following Lincoln Lab's advice, Convair has tried to learn the CRT art rather than hire people with know-how in this field. For instance, of its 10 tube makers, only two have had previous CRT experience. On the engineering side, all were newcomers to the picture tube field. Convair has called upon outside consultants and Gerlach credits Massachusetts Institute of Technology scientists for their help in electron optics design and fabrication techniques.

► **Doubting Thomases**—Some segments of the electronics industry were skeptical as to whether an airframe manufacturer could bootstrap itself into this ultra-precision business, Gerlach says.

When an air defense system contractor had a requirement for more than 100 radar display tubes, Convair was given only 60 days to produce three prototype Charactrons to qualify for the business. This came at a time when the company had not yet set up its manu-

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The Coaxial Mechanism making these improvements possible represents a new Marion concept in the mechanical design of moving coil mechanisms. The Coaxial assembly provides a self-shielded magnetic field of great strength, uniformity and stability. Ruggedness and stability are inherent in the basic simplicity of the design. Only two fasteners hold the rigid, interlocked assembly together. All critical dimensions are machined from a common center (the bearing axis), facilitating precise alignment of parts.

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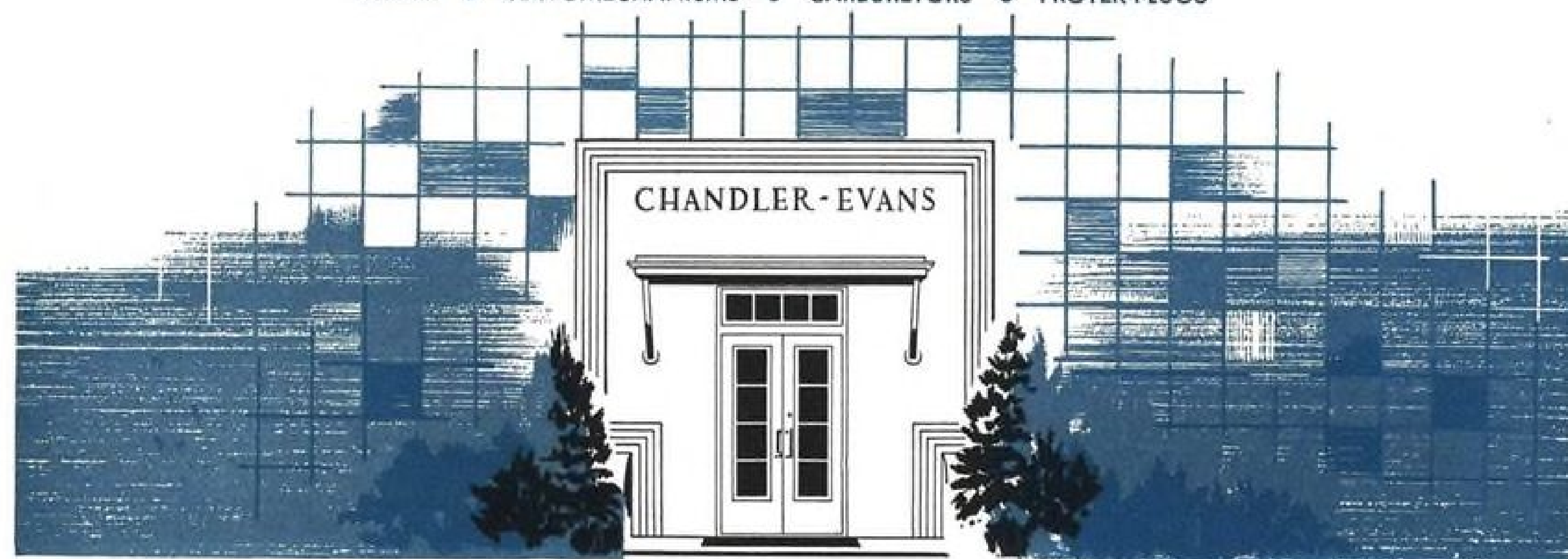
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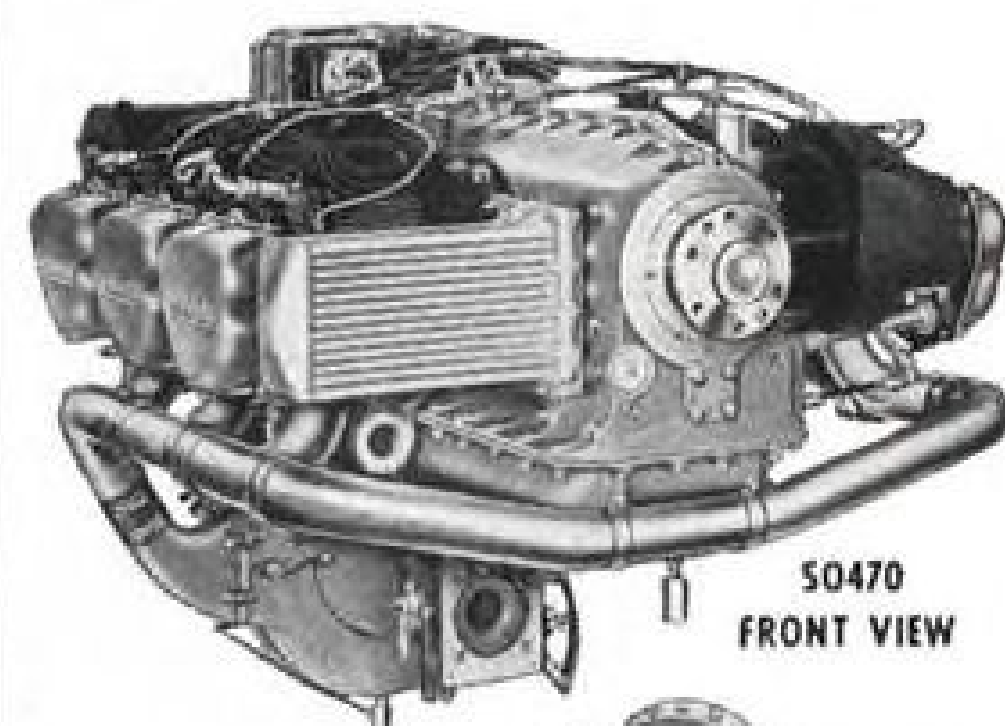
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Height (in.)	30.77	34.81	23.96
Width (in.)	33.62	33.62	34.68
Bore (in.)	5.00	5.00	5.125
Stroke (in.)	4.00	4.00	4.25
Displ. (cu. in.)	471	471	526
Comp. Ratio	6.0:1	6.0:1	6.0:1
Total Dry Wt. with Accessories (lbs.)	512	550	578
Type of Prop. Drive	Direct	Direct	Geared .688:1
Recom. Fuel Octane	91/96	91/96	91/96
Supercharger Ratio	12.45:1	10.13:1	12.0:1
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facturing operations and lacked many of the necessary machines.

However, fortunately for Convair, a small Eastern TV tube manufacturer had recently gone out of business and all of his machinery was up for auction. When the opening gavel sounded, Convair representatives were in there bidding. Before it was over, they had the machinery they needed.

► **Brute Strength Approach**—Working days, nights, and weekends, Convair people were able to meet their 60-day deadline. The big production order then followed. Gerlach admits that the brute-strength approach has been necessary but costly, with a high number of tube rejects at the start. Out of one batch of 50 "bottles" received from the glass tube manufacturer, Convair rejected 22 even before it started to make them into Charactrons, Gerlach says.

Fabrication of the Charactron's complex electron optical system, with its double set of deflection plates, electromagnetic lens system for converging the beam, and deflection yoke assemblies, coupled with a stringent display linearity requirement, has posed many difficult problems.

In some cases, Convair reports it has had to pioneer new techniques, then design the machine to employ them. For example, the helical accelerating winding (used to increase display brightness) is "inked on" the sloping throat of the tube, using a Convair-developed machine.

By keeping the size of the character matrix small, tube design problems are simplified, but this introduces manufacturing problems. In a typical matrix, the characters are only 0.012 in. high, yet must be clean-shaped. This require-



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ment forced Convair to develop an improved photo-etch process for making the matrix.

► **A Separate Operation**—The Charactron project has been set up as a separate entity, with its own 13,000-sq. ft. building located several miles from the main Convair plants. The project maintains its own set of financial books, establishes its own overhead rates.

The present staff numbers around 70, of whom approximately 45 are electronic and mechanical engineers, physicists, chemists, and technicians.

Many of the electronics people developed the associated equipment which is required to convert input analog or digital signals into correct deflection voltages for the Charactron. One novel experimental converter accepts Morse code and automatically translates it into corresponding letters and words on a Charactron.

► **Over the Hump**—Although Convair may not yet be out of the production woods on its Charactron project, Gerlach believes the clearing is in sight.

If this appraisal is correct, the company justifiably can be proud of having made a place for itself in one of the toughest phases of electronics.

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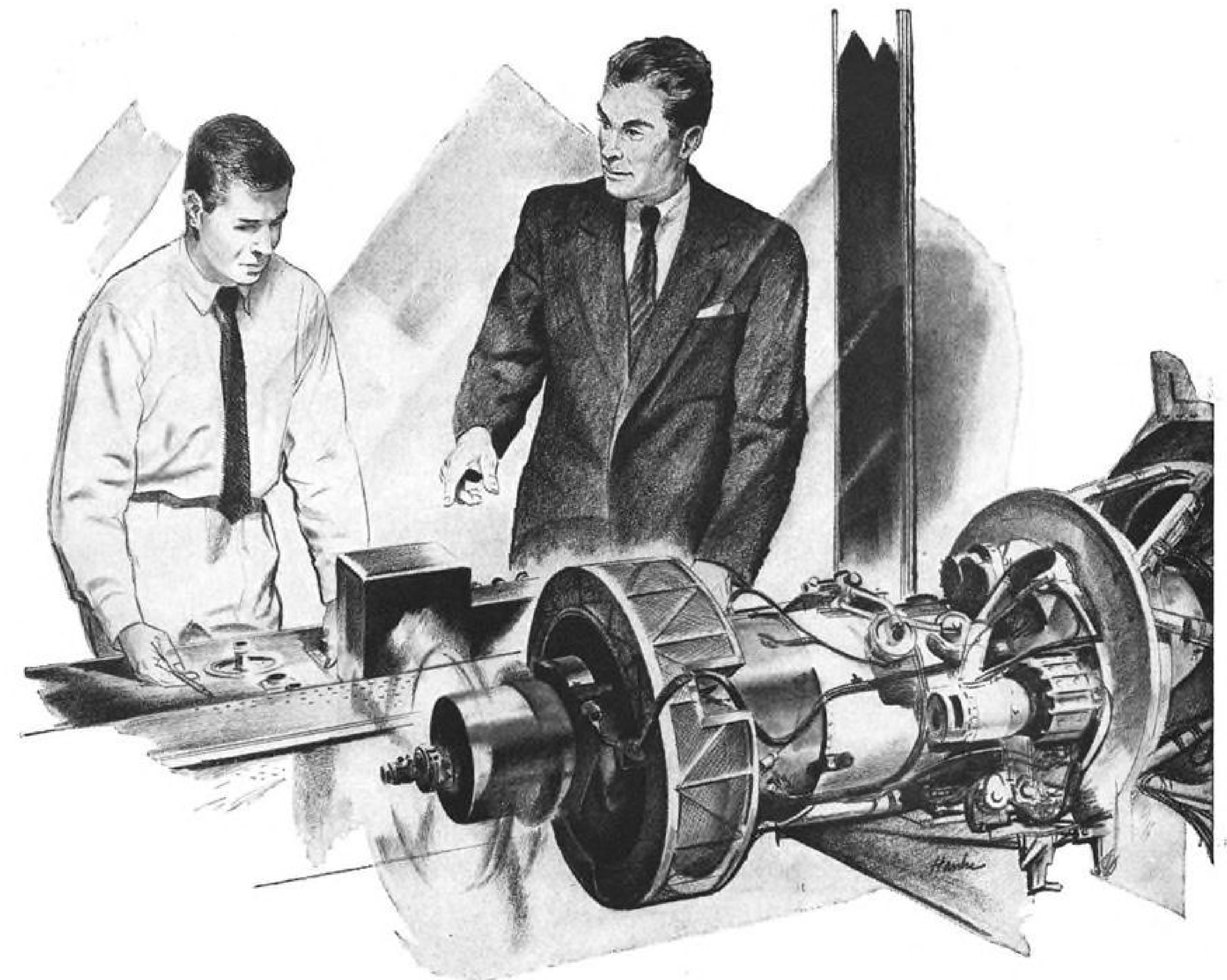
► **PPI Pinpointer**—Better resolution of closely grouped targets on airborne radar scopes should be possible with new General Electric 5-in. cathode ray tube whose beam width is only half as great as its predecessor—0.25 mm. vs. 0.50 mm. The new GL-5FP14-A has magnetic focus and deflection, medium-long persistence phosphors, and is interchangeable with the earlier GL-5FP14.

► **New RTCA Reports**—Radio Technical Commission for Aeronautics has issued new reports on minimum performance standards for airborne avionics equipments:

- Radiomarker beacon receiver, paper 87-54/DP-57; 30 cents.
- ILS glide slope receiver, paper 88-54/DP-58; 30 cents.
- ILS localizer receiver, paper 89-54/DP-59; 30 cents.
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► **Rent a Flying Avionics Lab**—Avionics manufacturers looking for a flying laboratory in which to test their products can rent Martin 2-0-2s with an option to purchase from William C. Wold Associates, 516 Fifth Ave., New York 36, N. Y. The 2-0-2s are from the fleet of Pioneer Air Lines. —PK



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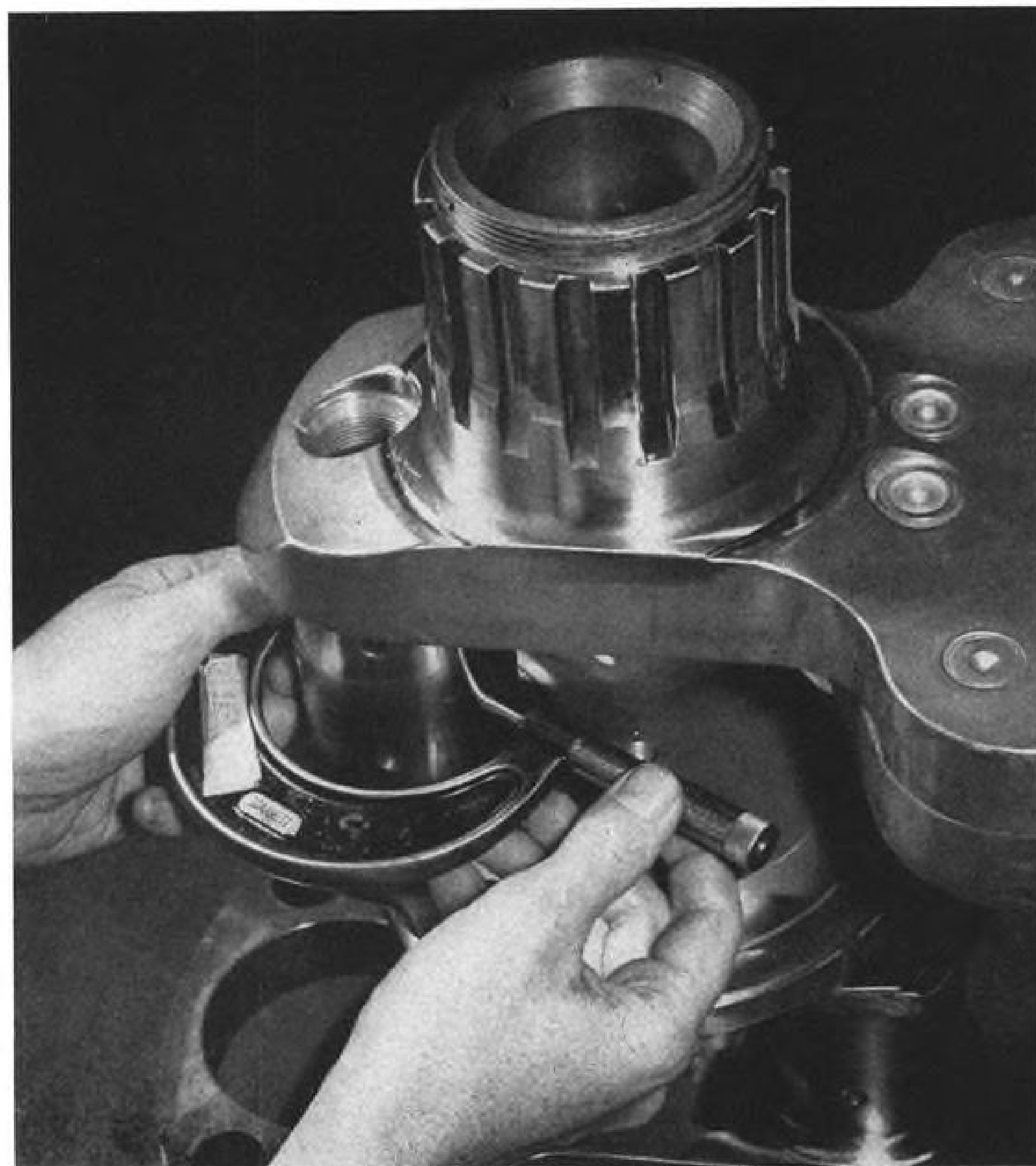
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Your Pratt & Whitney Aircraft engines and Hamilton Standard propellers deserve the best care possible, so take them "home" for service. It can cost less, too, in the long run.

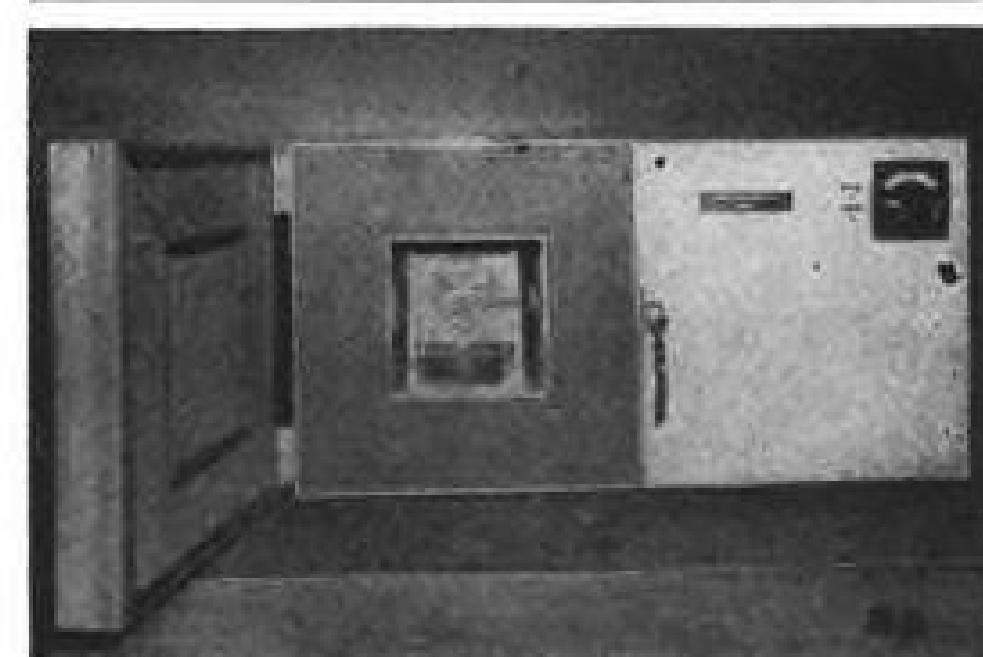
Complete Overhaul and Repair Service for  
**ENGINES and PROPELLERS**

AIRPORT DEPARTMENT  
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## NEW AVIATION PRODUCTS



TESTING UNIT gets as cold as -100F.

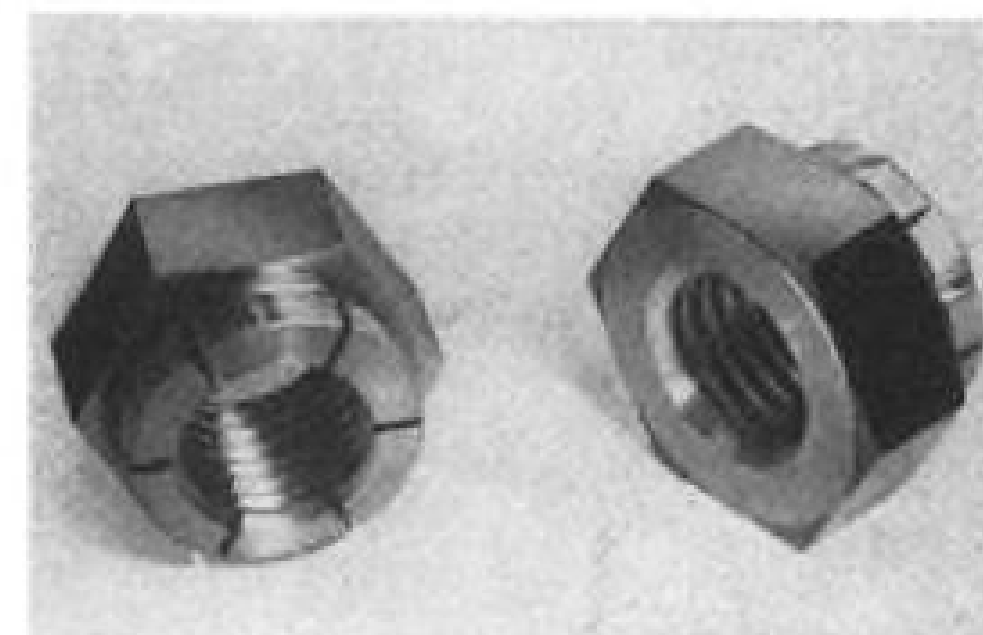
### Low-Temperature Chamber Comes in Table Model

A self-contained, table-model, low-temperature test chamber, weighing 450 lb., is capable of ranges from -100F to 212F. It can dissipate 1,000 Btu./hr. at -80F.

Measuring 29.5x57x30.5 in., the device uses the cascade system of refrigeration to permit inclusion of all operating equipment in a limited area. The refrigeration tubing encircles the 1x1-ft. work space, conserving space as well as providing more uniform temperature than if it were arranged on a bank on one side, as is usual.

Automatic controls start and stop refrigeration and heating equipment to maintain predetermined temperatures within  $\pm 2$  deg.

Tenney Engineering, Inc., 1090 Springfield Rd., Union, N. J.



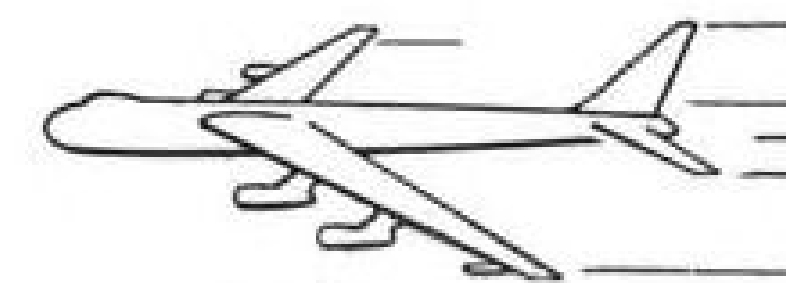
SELF-LOCK nut for jet or piston engines.

### New Plane Engine Nut Usable to 500F

A series of self-locking aircraft engine nuts having immediate applications for piston engines or the cold end of jet engines or compressors—anywhere temperatures do not exceed 550F—is being offered by Standard Pressed Steel Co.

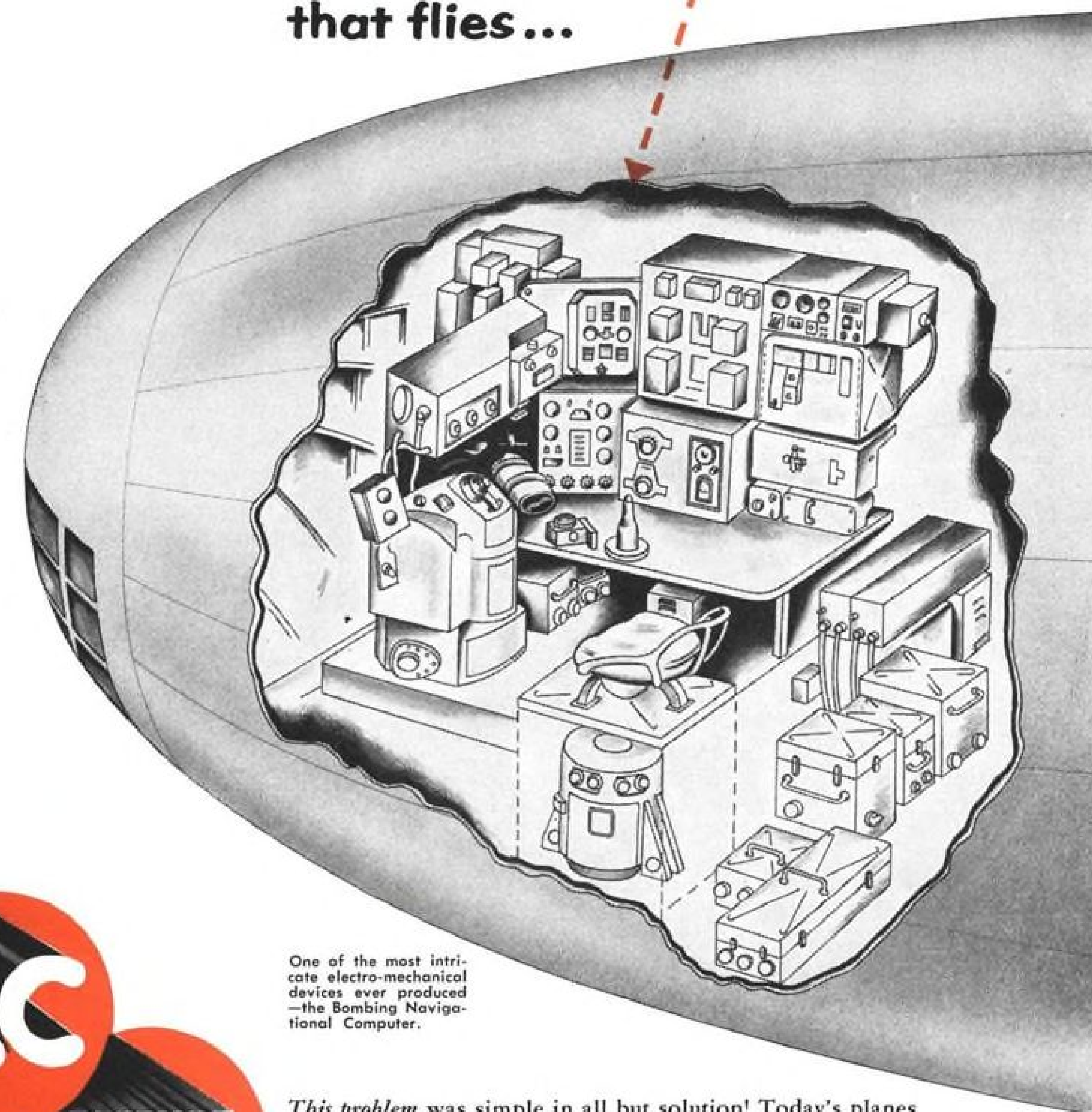
The new item can be distinguished from the company's standard line of Flexlocs by an integral metal washer on the seating side. This circular collar is about  $\frac{1}{2}$ -in. thick and is stated to be capable of machining to much closer tolerances than the full seating face of a standard item.

Squareness of the washer face with



# SOLVED:

the problem of the  
"thinking machine"  
that flies ...



One of the most intricate electro-mechanical devices ever produced—the Bombing Navigational Computer.



AC SPARK PLUG DIVISION  
GENERAL MOTORS CORPORATION  
FLINT, MICHIGAN

*This problem* was simple in all but solution! Today's planes and plans have outgrown the scope of human minds. A device had to be developed to solve complex aerial navigation and bombing problems with superhuman speed and accuracy. Yet, this device must still be light enough to fly. *The answer* is now coming off the production lines of AC's Milwaukee plant—the Bombing Navigational Computer. Through miles of complex wiring, electronics now can home planes in on targets with unerring skill.

AC's contribution—in the three fields of research, development and production—is another example of know-how in action. AC's exceptional engineering staff and unique facilities are as close as your phone. Why not consult AC?

**DEFENSE PRODUCTS of High Quality at Low Cost DELIVERED ON TIME**



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50 pages of drawings and information to help you choose the right solenoid for your application...

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Provides complete cross-sections — plus helpful information on hundreds of WesCo-designed DC aircraft solenoids. Many of these are adaptable without change to your specific applications.

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on  
time



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the nut's pitch diameter is held within .005 in. for sizes through  $\frac{1}{8}$  in. and to within .006 in. on the half-inch diameter nut. The SPS engine nut series is being made in sizes from .190 to .500-in. diameter and has National Fine threads. Nuts are of AMS 5024C alloy steel, cadmium-plated against corrosion. They are stop nuts as well as locknuts, so that they lock in place whether seated or not, the maker states.

Standard Pressed Steel Co., Jenkintown, Pa.

### ALSO ON THE MARKET

**Rugged thermocouple** which measures very rapid temperature changes of metal surfaces such as aircraft skins, gun bores, piston walls, etc., owes rapid response to plating only 0.00004-in. thick at junction. Maker reports that junction temperature reaches 63.2% of amplitude of a step change in about  $\frac{1}{4}$  microsecond. Device has been operated satisfactorily at very high pressures and under severe mechanical vibration.—Midwest Research Institute, 4049 Pennsylvania, Kansas City, Mo.

**Expansible resin** for silicone foam structures comes as ready-mix powder that requires nothing but heat to activate it. Only negligible pressure is exerted during expansion, so lightweight molds may be used. No preheating is required. Density may be controlled. Mixes are labeled R-7001, R-7002, R-7003, cost up to \$5 a pound.—Dow Corning Corp., Midland, Mich.

**Organic welding material** known as Tygoweld joins metal to glass, metal to porcelain, metal to metal. Tygoweld comes in rod form and can be applied with moderate heats and little or no pressure, but forms very powerful union. Powder and paste adaptations are available.—U. S. Stoneware Co., Research and Development Labs., Akron, Ohio.

**Vacform Mobile Pump Wagon** provides a flexible source of vacuum that may be moved around the shop to wherever it is required. The unit weighs 900 lb., is 3.5 ft. high, and requires only 4x2.5 ft. of floor space. It has a 3-hp. motor and dual-V-belt drive. It operates from ordinary electrical connections.—Vacuum Forming Corp., Port Washington, N. Y.

**Air scrubbing chamber** in new spray paint booth is said to be practically 100% effective in removing paint particles from the exhaust air. High efficiency is due to specially designed spray header mounted in two curved baffle plates.—Despatch Oven Co., 619 8th St. S.E., Minneapolis 14.



whatever the job...

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**PERMACEL<sup>®</sup> TAPES**

In our complete line, there's a self-sticking tape for every job...write Permacel Tape Corporation, New Brunswick, N. J.



## Are You Interested In WEIGHT REDUCTION?

### WIGGINS COUPLINGS SAVE 88 POUNDS ON LOCKHEED C-130

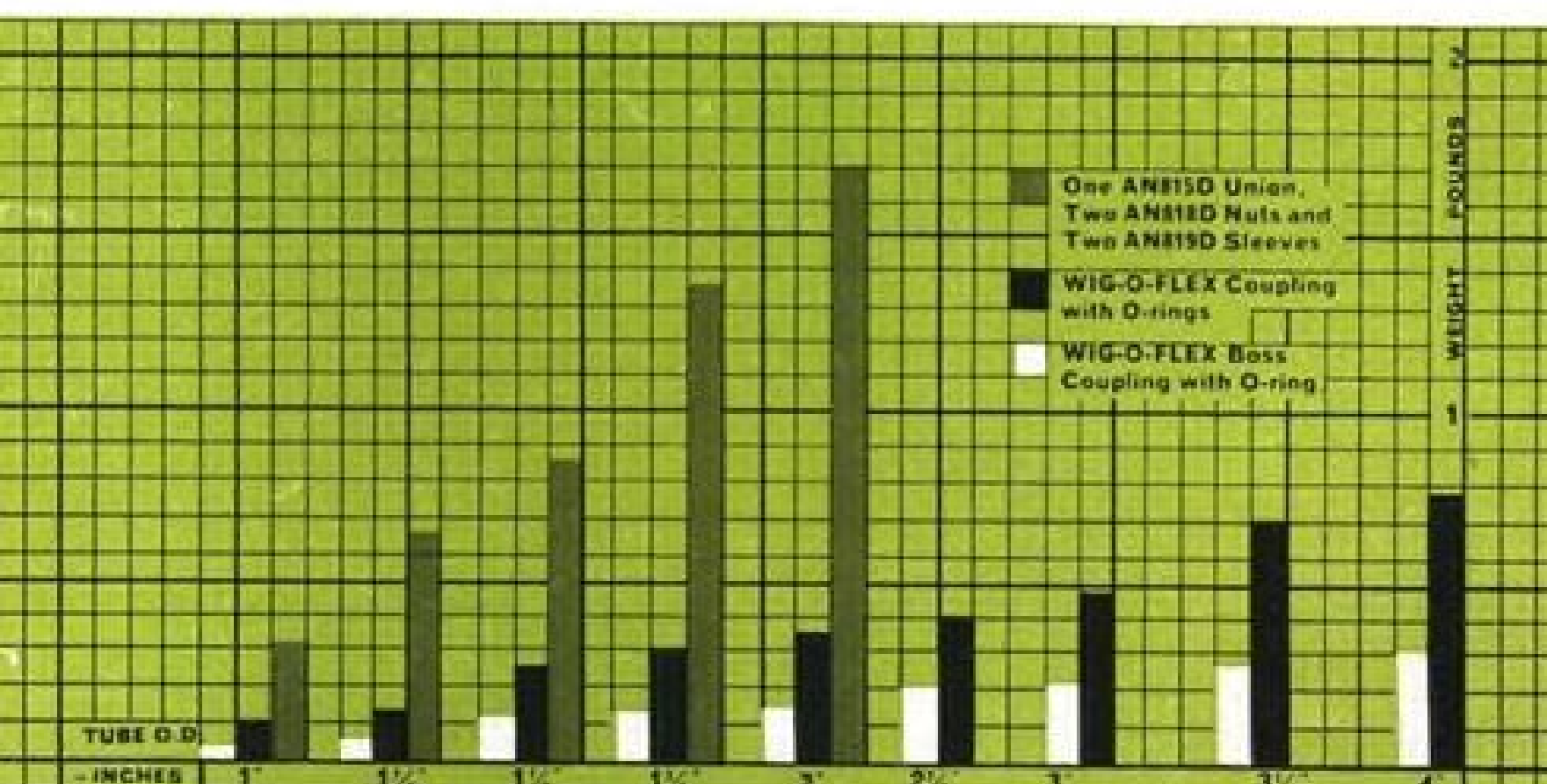
America's first turbo-prop transport—the Lockheed C-130—is 88 pounds lighter because WIG-O-FLEX Couplings replaced standard AN connections and cut hose.

WIG-O-FLEX Couplings weigh 1/5 as much as the standard AN connections they can replace.  
(See Weight Chart for exact comparisons.)

#### WIG-O-FLEX COUPLING



flexible union for connecting  
rigid tubes



WEIGHT COMPARISON CHART  
WIG-O-FLEX COUPLING & AN STANDARD FLARED TUBE CONNECTION

WRITE FOR FURTHER INFORMATION

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- Withstands more than 1000 psi burst pressure.
- Accommodates 4° tube flexure.
- Installs locally. 80% lighter.
- Temperature range -65°F to +250°F.

SIZES: 1", 1 1/4", 1 1/2", 1 3/4", 2", 2 1/2", 3", 3 1/2", 4"

# Wiggins

E. B. WIGGINS OIL TOOL COMPANY, INC.  
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## LETTERS

### Over the Waves On One Engine

Thought you might be interested in the technical details of our recent 25,000-mi. flight in the "Tatu." In making the trip, we became the first husband-and-wife team to cross the Atlantic both ways in a single-engine aircraft.

It seems the country needs a real selling job on the safety factor of single-engine aircraft. Our successful and efficient flight across the Atlantic would make a good starting point to bring back to the people the low percentage ratio of engine failure. We of the aircraft industry must jointly do a job to rebuild the faith in our small aircraft.

Most of the responses to our flight have been: "Wasn't it terribly risky?" People assume that the engine will quit automatically once over water.

The story of Tatu is a fascinating one of an airplane that has flown during its lifetime the total miles equal to around the world about forty times.

Tatu is a Beechcraft D17S, Serial No. 200, manufacturing date Mar. 10, 1938; engine, Pratt & Whitney 985; maximum speed, 200 mph.; cruising speed, best range, 165 mph. true airspeed; maximum range 1,500 miles for nine hours; surface ceiling, 24,000 feet; landing speed 55 mph.; flight and landing characteristics, excellent; total fuel capacity, 170 gal.; total usable, 160 gal.

Typical of what can be done with an aircraft of this type was demonstrated during our recent flight to Europe and the Middle East. The flight originated in Los Angeles, Calif., and covered the following areas:

New York City; Bangor, Me.; Goose Bay, Labrador; DW 1, Greenland; Reykjavik, Iceland; Prestwick, Scotland; London, England; Frankfurt, Germany; the Italian peninsula; Greece; Turkey; Egypt; Jordan; Syria; Lebanon; Crete; Sicily; Majorca; Spain; France; Holland; England; and return to Los Angeles via the same route.

Total miles covered were approximately 25,000; total hours flown 160, including local tourist hops. Cost of gasoline ran approximately \$950, oil \$30; parking, tie-down and customs service payments \$60; aircraft repair including radio, engine, oil changes and plug changes \$140; total cost of aircraft and allied expenses \$1,190, or approximately 4 1/2 cents per mile.

The longest over-water hop was from Reykjavik, Iceland, to Prestwick via Weather Ship India, total time over water of 6 hours and 5 minutes.

The longest single hop was from Barcelona, Spain, to Prestwick, Scotland, against head winds, 7 hours, 15 minutes.

Weather generally south of the European plain was excellent, visibility and ceilings unrestricted the entire time, excepting very local 30-mile-wide cold front shower formations. Weather generally crossing the North Atlantic was clear from Goose Bay to Weather Ship Alpha, a low stratus deck from Weather Ship Alpha to the coast of



RECORD-BREAKING TEAM

Mrs. Wentworth was co-pilot on this trip. Pilot was her husband, Hampden Wentworth, who is president of Longren Aircraft Co.—Ed.

Greenland. Clear until 100 miles east of Greenland, rain showers and ceilings varying from 1,500 to 3,000 feet from there until Reykjavik.

Reykjavik to Prestwick rain showers all the way, ceilings varying from 500 feet to 4,000 feet. Icing conditions were found above the freezing level and all flights were made for that reason below freezing level.

Survival equipment on board included two one-man rafts, completely waterproof exposure suits, each had one Mae West with the normal die markers attached, each rubber boat contained water, rations, radar reflectors, signal mirrors, etc., and one Gibson Girl radio and parachutes. Radio equipment included two VHF transmitters, one VHF receiver, one low-frequency receiver with a direction finder. Radio equipment was perfectly adequate for the entire trip when operating.

England, France and Holland weather normally messy with ceilings varying from 200 feet to 2,000 feet, varying up and down every six hours, associated with fast-moving small frontal activity. Radio facilities throughout Europe were excellent; everyone speaking English, complications of customs, flight permits, etc., were strictly minimum. Filing of flight plans from one country to another was adequate in all cases excepting a flight from Holland to Paris which required approval of Paris Control for our departure. Approval was denied because VFR night flying is not permitted in France.

Weather forecasting information was excellent everywhere. Every place from Goose Bay on furnished excellent meteorological studies prior to departure indicating a cross sectional view of weather with freezing levels, percent cloud cover, wind aloft various altitudes along route with lovely colored pictures and a plan view of the general frontal weather activity. In most all cases the predictions were excellent and the service prompt and efficient. In all cases it was



no wiring... no hydraulics  
fast, easy installation  
on new or existing seats

Operating on a proven principle, the new Pacific Harness Reel works instantly and automatically on any force which tends to throw the pilot or crew member from the seat—in any direction! It permits full comfort and mobility—yet, when body accelerations exceed the Reel setting, the user is snubbed to a safe position within less than 1/2" of movement.

JUST SIX BOLTS... and the Pacific Harness Reel is ready to operate. It's quick and easy to install... entirely mechanical. Simply mounted in any position on the seat, it is connected to the usual shoulder harness... no switches; no hydraulic, electrical or other power is needed, and the complete installation is the lightest in the field!

The Reel may be locked manually when desired and is designed to provide automatic locking on ejection seats. Whether locked manually, by ejection or by accelerations, the Pacific Reel is locked positively to provide complete pilot protection, and will not release until actuated by the manual control.

The automatic function of the Pacific Reel may be checked in seconds, at any time, by manually applying sufficient G loading to the harness.

Now in volume production, the Pacific Harness Reel conforms with type MA-2 of MIL-R-8236A(A.S.G.).

**Pacific SCIENTIFIC CO.**

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WRITE  
FOR DETAILS  
TODAY!



## CONVAIR XFY-1 NAVY FIGHTER



**"New Twist"**  
in  
take-offs



"It will take off, fly, and fight like a hummingbird," says Convair test pilot Coleman. Made to take-off vertically, hover like a helicopter or fly like a conventional fighter, the Navy's new XFY-1 is a formidable weapon indeed.

Camloc fasteners, incorporating special shear type grommets, fulfill the rigid "quick access" requirements on this revolutionary aircraft.

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advisable to notify the air traffic people our exact time of departure so they could prepare all of the miscellaneous data.

I would recommend the trip to anyone in a single-engine airplane with proper range if the pilot has 500 hours and an instrument rating and is properly equipped with survival equipment.

CHRISTINA WENTWORTH, Vice President  
Longren Aircraft Co.  
2576 W. Carson St.  
Torrance, Calif.

### Praise

Many thanks for the story George Christian did on the Bendix Flying Show Case in AVIATION WEEK.

You did make one slight error, however. You stated, "Resin-impregnated Fiberglass bottles for liquid oxygen, such as Bendix is providing for the Republic F-84F, Boeing B-47, etc. . . ." Actually the fibre glass bottle is a new device for storing air at 3,000 psi. and presently is used in conjunction with the Eclipse-Pioneer Fuel Air Combustion Starter. The Liquid Oxygen Converter which converts oxygen in a liquid form to a gaseous form for breathing was a separate display item aboard the airplane.

All other items were reported with your usual precise degree of accuracy.

CLARK SMITH, Advertising Manager  
Eclipse-Pioneer  
Division of Bendix Aviation Corp.  
Teterboro, N. J.

The article, "Vacuum Melting Improves Jet Alloys," by Irving Stone, which appeared in the Sept. 6 AVIATION WEEK was well done and certainly should be of great interest to your readers. We would like to publicize this article and would appreciate being informed of costs of reprints in 1,000 and 1,500 quantities. . . .

JAY STEINER  
Asst. Advertising Manager  
F. J. Stokes Machine Co.  
Philadelphia 20, Pa.

. . . I would like to congratulate you on the high standard of your publication. It is, in my opinion, unexcelled.

C. A. BUTLER, Chairman & Managing Director  
Butler Air Transport Limited  
Kingsford Smith Airport  
Mascot, New South Wales

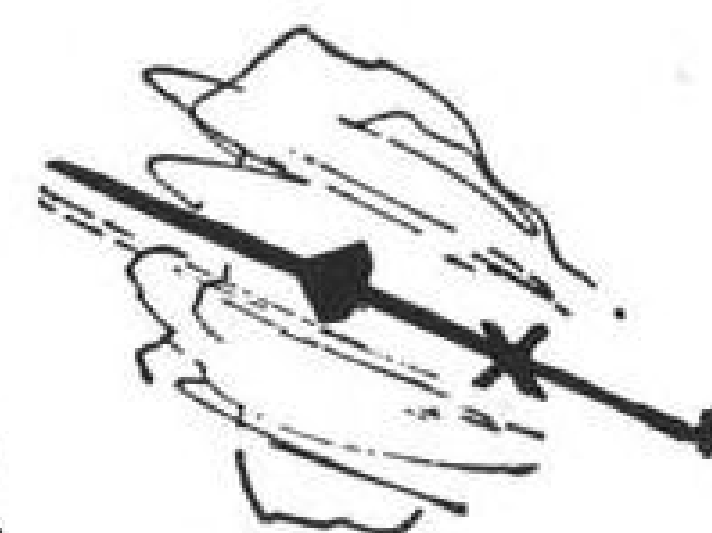
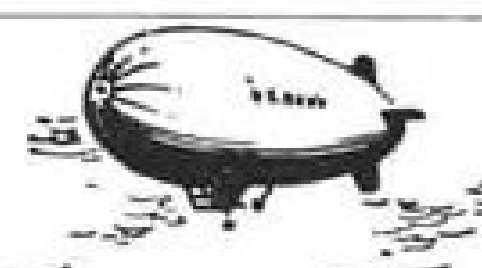


"I told you these seats were right on the fifty yard line!"

Hiller Copter News

AVIATION WEEK, November 15, 1954

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**GOODYEAR AIRCRAFT CORPORATION**, pioneer and leader in lighter-than-air craft, offers you a new employment opportunity with a well-established and fast-growing company where "careers are planned."

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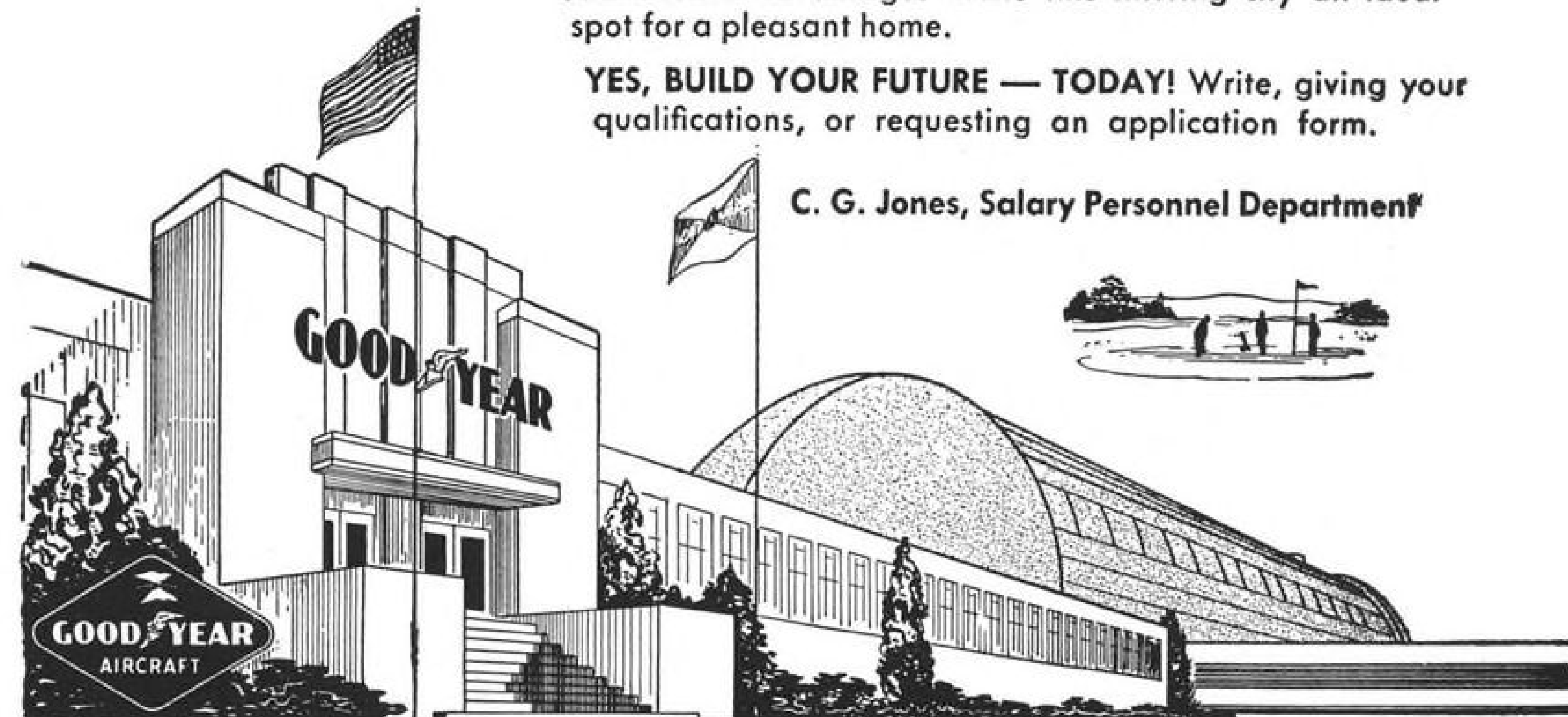
**POSITIONS ARE OPEN** at several levels in various fields with salaries based on education, ability and experience.

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**YES, BUILD YOUR FUTURE — TODAY!** Write, giving your qualifications, or requesting an application form.

C. G. Jones, Salary Personnel Department

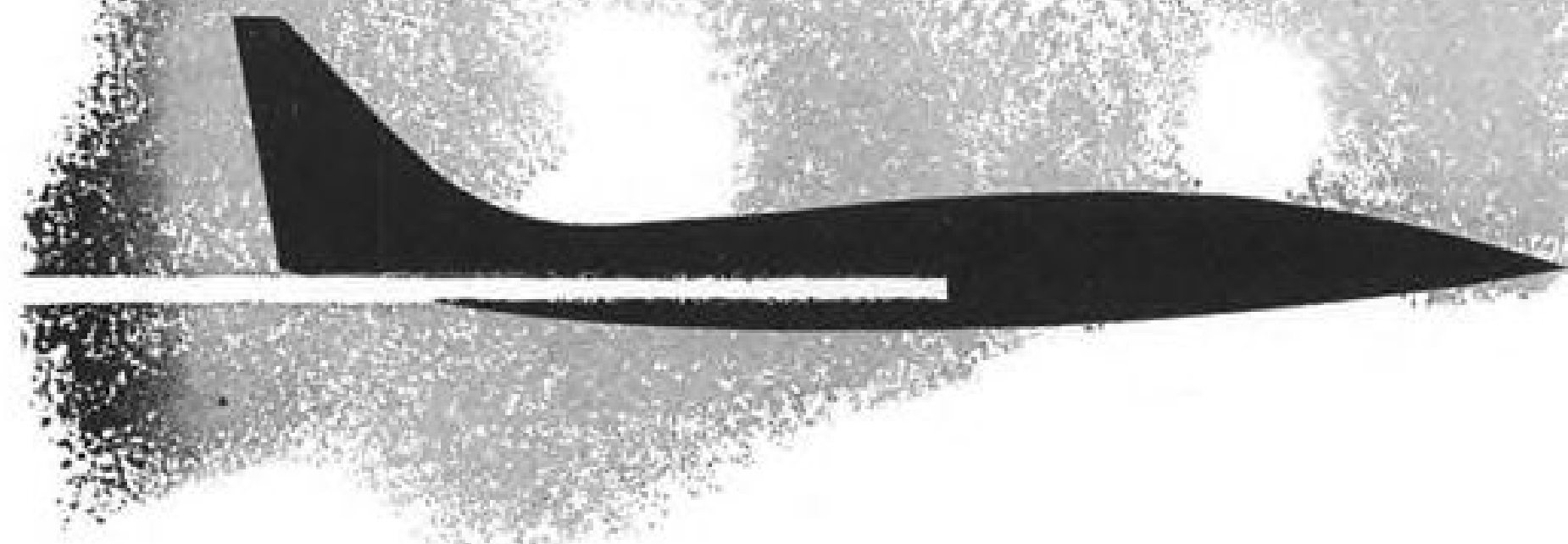


**GOODYEAR AIRCRAFT CORPORATION, 1210 MASSILLON RD., AKRON 15, OHIO**

AVIATION WEEK, November 15, 1954



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BO-4463, Aviation Week  
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#### POSITIONS VACANT

**CERTIFIED PUBLIC Accountant** — Must be well versed in all phases of fixed base service and have commercial pilot's license. Applicant must have the ability to assume duties of chief financial officer. Give resume of experience and salary desired in first letter, to P-4484, Aviation Week.

**SYSTEMS ENGINEER, M.E.** This position involves the study and solving of problems in design of jet engine controls for fuel system cooling, methods and augmentation modulation, rigging methods, etc. It offers an excellent opportunity to become associated with a large, well-known jet engine manufacturer (located in the midwest) where you can be certain of working at your top abilities. Submit complete resume to: P-4528, Aviation Week.

**WANTED: EXECUTIVE** Engineer experienced or conversant with acoustics and have knowledge of jet engines and jet engine test procedures. Knowledge of mechanical, structural aerodynamic and thermodynamic engineering helpful. Background should include experience as Chief Engineer or executive engineer. Duties will include direction of engineering program and supervision of sub-contractors for young, financially sound, expanding firm. Replies confidential. Send short resume, P-4596, Aviation Week.

#### SELLING OPPORTUNITY OFFERED

**MANUFACTURE'S REPRESENTATIVE** wanted to sell Die-cut Pressure Sensitive Tapes. Substantial commissions; constant re-ordering potential. Every aircraft and electronics manufacturer is your prospect. Write Printed Cellophane Tape Co., 521 No. La Brea Avenue, Los Angeles 36, Calif. for information.

#### POSITION WANTED

**RETIRED USAF PILOT** with college education and three years experience in Technical Manuals desires position as spares representative or liaison engineer. Write PW-4562, Aviation Week.

#### FOR SALE

**Largest stock in the U. S.** of new, used and overhauled engines, propellers, accessories and airframe parts. Free lists by makes. Vestco., Dept. F, Box 5306 T.A., Denver, Colo.

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P-4511, Aviation Week  
520 N. Michigan Ave., Chicago 11, Ill.

AVIATION WEEK, November 15, 1954



Carl Vrooman, icing tunnel group head, studies hot-air cyclic de-icing test on wing section of C-130 transport. The tunnel has a temperature range of  $-40^{\circ}$  F. to  $+150^{\circ}$  F. and maximum air speed of more than 270 mph.

## New icing tunnel speeds thermodynamics research at Lockheed

Designed to meet a constantly increasing volume of thermodynamics work, Lockheed's new icing research tunnel now provides year 'round testing in meteorological environments normally found only in flight. It is the first icing research tunnel in private industry.

Lockheed thermodynamics scientists are now able to study in greater detail problems such as: thermal anti-icing; cyclic de-icing; various methods of ice removal; distribution of ice; rate of temperature changes in aircraft components; thermodynamic correlation between laboratory and flight testing; and development and calibration of special instrumentation.

C. H. Fish, design engineer assigned to the tunnel, measures impingement limits of ice on C-130 wing section. The tunnel has refrigeration capacity of 100 tons, provides icing conditions of 0 to 4 grams per cubic meter, droplet sizes from 5 to 1000 microns.



## Thermodynamics Career Opportunities

Increasing development work on nuclear energy, turbo-prop and jet transports, radar search planes and supersonic aircraft has created a number of positions for Thermodynamics Engineers and Thermodynamicists.

Lockheed offers you increased salary rates now in effect; generous travel and moving allowances; an opportunity to enjoy Southern California life; and an extremely wide range of employee benefits which add approximately 14% to each engineer's salary in the form of insurance, retirement pension, sick leave with pay, etc.

You are invited to write E. W. Des Lauriers for a brochure describing life and work at Lockheed and an application blank.

B. L. Messinger, department head, analyzes test results with Thermodynamics Engineer E. F. Versaw (right) and Thermodynamicist Tom Sedgwick (left).



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## TOOL DESIGNERS

Lockheed Aircraft Corporation is tooling up for the:

- 1 F-104 Supersonic Superiority Fighter
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- 3 A number of classified projects

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You are invited to write for a job application blank and brochure describing life and work at Lockheed in California. Coupon below is for your convenience.

# Lockheed

### Tool Designer Program

Mr. E. W. Des Lauriers  
Employment Manager, Dept. T-1  
Lockheed Aircraft Corporation  
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Dear Sir: Please send me a job application blank and brochure.

Name \_\_\_\_\_  
Number of Years \_\_\_\_\_  
Tool Design Experience \_\_\_\_\_  
Address \_\_\_\_\_  
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W-4566, Aviation Week  
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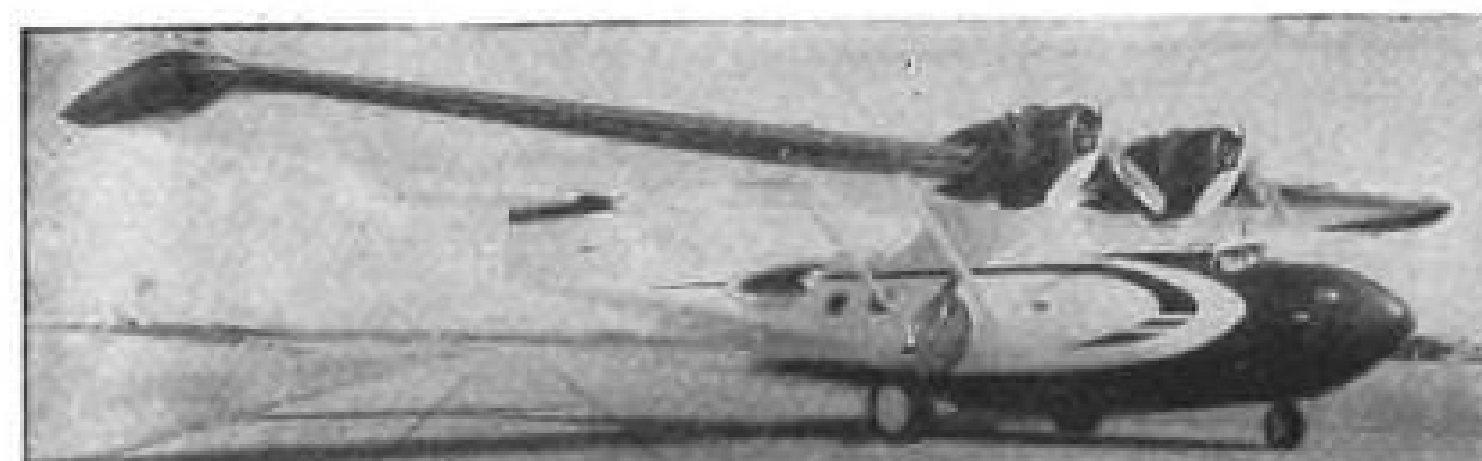
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3	1181-1	Valve	
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50	AN6213-2	Valve	
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27	401856-4	Valve	
30	401856-5	Valve	
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63	SP2-1046-76
49	SP2-1046-78
5	SP2-1546-1
3	2-1644-8
23	PL2-1846-77
127	PL2-2547-75
123	PL2-2546-76
620	PL2-2546-77
540	PL2-2546-78
16	3-342-21A
52	PL3-541-15
179	3-1140-20A
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49	PL3-2047-80
45	DP4CA-1A (Primer)
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139	PL4-445-75 (525-FG-1/4D)
70	SP4-545-3
31	4-743-2
9	4-748-2 (Cap)
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2	PL4-1846-2
238	SP4-2746-76
67	SP4-2746-77
105	SP4-2746-78
40	SP4-2746-79
48	SP4-2746-80
60	SP4-2746-81
4	5-743-3
90	5-2340-8
13	6-243-1
68	6-746-10
8	SP6-1346-75
16	SP6-1346-77
16	SP6-1346-78
8	SP6-1346-79
3	SP6-1346-80
20	SP6-1846-1M4
18	6-2243-6
91	SP6-2646-15
73	PL7-346-2
354	7-943-1
47	7-1343-5
47	7-1441-16
84	7-1444-2
45	7-1741-14
18	7-1950-75
651	7-2646-12
117	8-334-6
54	8-344-7
120	PL8-444-5
39	PL8-444-6
3	8-1540-17
5	9-148-75
16	9-340-25
156	PL9-546-2 (Float Assy.)
23	PL9-2749-9
54	9-8145-75
11	10-1540-2
41	10-1647-77
17	10-1741-17
3	10-2142-9
10	10-2142-14
25	11-746-77
109	12-144-6
12	12-2341-11
34	525-1-FG-1-8D
57	702-FG-8D
423	703-13-4D
65	705-CD4-1D
62	707-G-2-8D
122	709-GG-3-8D
18	709-GG-6-5D
52	709-FG-10D
7	709-GG-12D
32	710-5-4D
5	713-3-8D
7	715-FT-6D
6	717-CY-4D
30	4150-1-1/4-3S
285	AN5830-1
149	AN5831-1
3	AN6249-4 (10-1547-4)

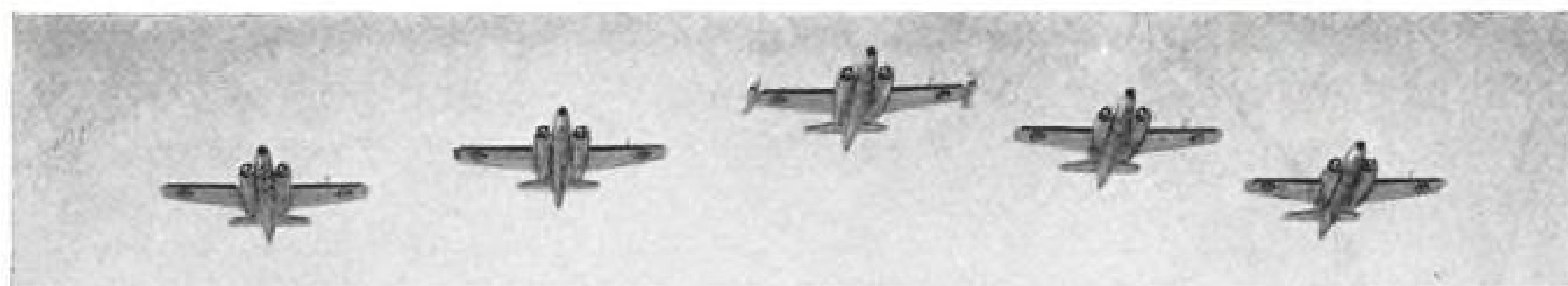
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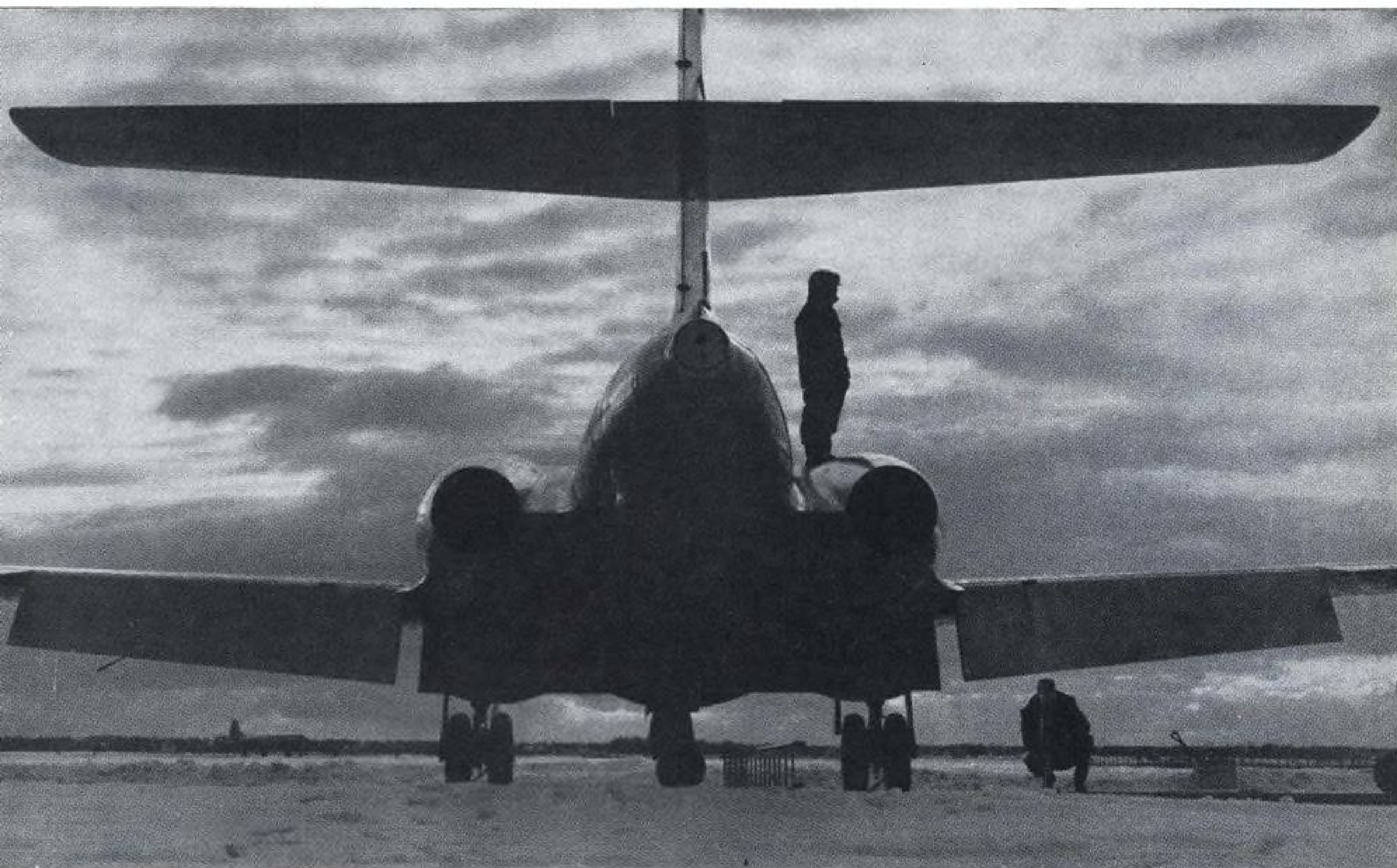


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## AIR TRANSPORT

### ICAO Sets Up New Air Navigation Plan

- **Montreal conference revises North Atlantic system to meet technological advances and transpolar routes.**
- **Changes also provide for introduction of turboprop and turbojet transports, increases in airline traffic.**

International Civil Aviation Organization's air navigation plan for the North Atlantic has been completely revised to meet advances in aviation technology, inauguration of transpolar flights and the potential introduction of turbojet and turboprop transports.

Delegates to ICAO's North Atlantic regional air navigation meeting in Montreal also said traffic has increased greatly, and they forecast total trans-Atlantic crossings this year in excess of 60,000. A 50% increase over this figure is anticipated within the next five years.

Present longrange navigation aids, while allowing aircraft to navigate safely, do not permit extremely accurate position fixes at all times. This necessitates a wide separation between aircraft in flight, inevitably resulting in delays for aircraft ready to takeoff.

► **Longrange Chain**—To improve the longrange navigation system, the meeting recommended that consol radio beacons be installed in Iceland, southern Greenland, The Azores, eastern Newfoundland, Labrador and at Nantucket Island and Atlantic City in the U.S.

With the existing consol stations in Europe, this will provide a complete longrange navigation chain for the North Atlantic and make it possible for aircraft in flight to report their positions back to traffic control with accuracy and regularity.

Until these new facilities are provided, the meeting recommended that, in general, a minimum separation of 30 min. flying time should be maintained by two aircraft on the same or converging tracks. There also should be a lateral separation between aircraft on parallel tracks of 120 nautical miles, it was noted.

► **Improved Forecasts**—Recommendations also were made for improvement in the surface and upper-air meteorological observational networks and for increasing as much as possible the observations program of the North Atlantic Ocean station vessels.

To provide for future high-altitude operations, upper air observations up to 55,000 ft. were recommended.

A general speedup in the exchange of

meteorological data is required to meet increased demands, delegates said. They asked the World Meteorological Organization to explore, as an urgent matter, the possibility of transmitting radio-sound and radar/radar wind data obtained at stations in North America, Western Europe and in the North Atlantic within 30 min. of the time the balloon reached its maximum reporting height—correlating the schedules of the weather exchanges so that maximum benefit may be derived from the advanced filing time of these reports.

WMO also was requested to include reports of surface and upper air observations in synoptic exchanges between North America and Europe in time to allow them to be delivered to the meteorological offices, providing service for North Atlantic and polar flights within one hour of the time they were filed on board the ocean station vessels.

► **Communications Network**—In a separate session on communications, the existing aeronautical fixed telecommunications network plan for the region was reviewed in detail. Required improvements were considered, and a number of circuits were found to be deficient. Recommendations were made for their immediate remedy.

The possibility of setting up a southern communications route between Europe and North America as a protection against periods of poor radio propagation was investigated, and it was agreed

that tests would be undertaken to see if this might be feasible.

The communications committee also prepared a complete plan for radio-navigation aids for the region, including existing aids and those new aids considered necessary for operational requirements.

► **Water-Based Fields**—Scotching rumors of possible establishment of water-based airfields, the meeting found that there is no requirement for such installations for use by international airlines at the present time for traffic or refueling purposes.

It also examined the requirements for alternate airfields and noted that the installations planned for regular use in the region would, in many cases, meet the requirements for alternates.

Recommendations also were made for installation at certain airfields of additional approach and lead-in lighting and of navigation and bad-weather landing aids.

► **Traffic Problem**—The high-density traffic problem at Gander Airport came in for wide discussion at the meeting. It was noted that difficulties were being encountered by overflying aircraft in obtaining desired flight levels in the vicinity because of the high traffic density in the Gander terminal control area.

Delegates considered the desirability of easing the diversion of flights around Gander, and invited Canada to consider installation of a number of visual omniranges. Installation of such ranges on the Canadian portions of routes between New York and Gander, New York-Goose Bay and Montreal-Gander also was suggested.

► **Transpolar Data**—Noting the introduction of transpolar service by Scandinavian Airlines System, it was pointed out that a considerable number of gaps exist in the chart coverage of the north polar areas.

In addition, there are certain deficiencies in available charts, particularly concerning the elevations of the Greenland ice cap.

In order to improve chart accuracy, it was recommended that all nations producing such charts arrange to exchange basic data.

Additional discussion was devoted to altimeter setting procedures for the entire North Atlantic region, involving changes in procedures currently in use in Iceland, Bermuda and the Azores. Introduction of suitable transition procedures was suggested for the eastern boundary of the region.

#### New Merger Deadline

Pioneer and Continental Air Lines have extended the deadline on their merger contract from Dec. 10, 1954, to June 10, 1955.

The original contract was signed Dec. 10, 1953, to cover the proposed consolidation. Subsequently, the two airlines applied to Civil Aeronautics Board for approval. The Board has held hearings and oral argument, and a final decision is pending.

The stockholders of both companies approved the consolidation last February.



## Rentzel Takes Over Slick Management

Management control of Slick Airways was turned over to Delos W. Rentzel, former Civil Aeronautics Board chairman, and Roy Woods, his associate in two Southwest trucking firms, at a meeting of the all-cargo airline's directors last week.

Rentzel was named chairman of the board and "chief executive officer" (AVIATION WEEK Sept. 27, p. 14). As chairman, he succeeds Earl F. Slick, founder of the company. The post of president is vacant. It formerly was held by Thomas L. Grace, who left Slick two months ago.

► **Executive Committee**—Rentzel and Woods, partners in Auto Transports, Inc., and Texas Auto Transports, Inc., were made directors. Rentzel will continue his association with these two firms.

A newly created executive committee to act for the board of directors consists of Rentzel, Woods and two representatives of the old management—Slick and Lewis J. Moorman. A fifth committee position is vacant.

Rentzel and Woods have an option for purchase of 100,000 shares, or 20% of Slick's stock.

► **Rentzel's Goals**—In taking over control of the airline, Rentzel made these points:

- Cargo airlines should cooperate for

the common goal of getting a bigger slice of the freight traffic now moving by surface carriers. Rentzel declared: "We enter this phase of further development of the airlift potential of the U.S. with every desire to cooperate with other air carriers."

He told AVIATION WEEK that, specifically, he hoped there would be no more rate wars. He said the new management has not decided whether to pursue Slick's \$30-million anti-trust conspiracy suit against American, United and Trans World Airlines.

- Numerous new techniques in freight handling will be introduced.

- Additional DC-6A and C-46 cargo planes probably will be purchased by Slick. The fleet now consists of two DC-6As and 10 C-46s. (It had been kept small in anticipation of a merger with Flying Tiger Line, and the utilization of FTL's fleet of 36 aircraft.)

- All-freight carriers should be authorized to transport mail—or any other commodity—"in bulk," Rentzel maintained. He qualified that by saying there were "other areas more attractive" to the all-freight lines.

## Bunker Ties Subsidy To Copter Success

Los Angeles—Success of future commercial helicopter service for passengers and freight is dependent upon subsidization, Col. William B. Bunker,

commandant of the Army's Transportation School at Ft. Eustis, Va., told the western section of the American Helicopter Society here.

Some 300 helicopter manufacturers, operators, engineers, designers, pilots and aerodynamicists gathered for the first full two-day forum of the western section of the AHS.

► **Impossible Task**—Bunker said he believes that a new transportation medium that did not receive subsidization of its operations would face an almost impossible task.

"Transportation generates a demand for its service over a period of years by offering a frequent, safe and dependable operation, but this service can only be built up gradually as experience is gained and the public demand is created," he said.

"The helicopter has many operational and equipment problems which must be developed during the first years of its operation. During this period it must be liberally fostered by some sponsor in order to survive."

He said reliance on present experiments and current philosophies of federal subsidies does not appear likely to result in a rapid growth of helicopter transportation.

► **Industry Support**—Subsidies, he said, should come not only from the government but also from those who would profit most from helicopter service—including cities, manufacturers, local service airlines and trunklines with shorthaul segments.

Bunker urged the Aircraft Industries Assn. and Air Transport Assn. to form a joint committee to develop a concrete plan to insure the early introduction of the helicopter as both an urban and shorthaul transportation vehicle.

► **Copter Experiment**—David E. Postle, director of research for Mohawk Airlines, told of experiences as the first scheduled airline to operate a helicopter over a route originally certificated for fixed-wing aircraft.

Scheduled passenger service was inaugurated with a Sikorsky S-55 between Newark, N. J., and Liberty, N. Y., for the "season" trade to the Catskill Mountain area, Postle said. Mohawk started its scheduled helicopter passenger service with a rate of 19.56 cents per mile, marking the introduction of the lowest helicopter passenger fare in the United States.

"Even though it would take eight passengers on each trip to break even with expenses, it seemed to us that it was the highest rate we could charge and expect to achieve at 50% load factor," Postle said. Thirty days of operation on such a tariff basis proved they were wrong.

"Passengers complained of high prices," he said.

► **Tripled Volume**—Mohawk then re-

duced its one-way helicopter passenger fare to \$12.95 without federal tax, or 14 cents per mile.

"Within one week our passenger volume nearly tripled," Postle said. "The ever-present factors in air transportation still govern transportation by helicopter: Passenger convenience, time saved and a passenger tariff measured in relation to time saved and other competitive means or travel."

## Sabena Fights Slump With New Schedules

Sabena Belgian Airlines will combine an expanded winter schedule with an intensive sales campaign this winter in an effort to offset the usual off-season slump.

For the first time, the airline will offer through flights from New York to Paris, Frankfurt, Munich, Milan, Athens and Tel Aviv. It will operate six trans-Atlantic flights per week from New York, with a trip every day but Wednesday until the spring.

► **Combination DC-6**—Sabena also will emphasize combination-class service. Five of the six DC-6 flights from New York will carry both classes, 44 aircoach forward and 12 first-class in the aft cabin.

The Thursday flight from New York will be all-tourist DC-6C service to Manchester, Brussels and Milan.

In Sabena's European network, first-class service will be re-introduced on several schedules. All flights were aircoach last year. This service will be furnished in combination-class aircraft.

► **Copter Cuts**—The airline plans some reduction in flight frequency on its helicopter network during the winter. The first departure in the mornings will be fixed somewhat later and the last service of the day somewhat earlier so all copters will be hangared by sundown.

On the Brussels-Lille service, the number of flights will be reduced from two to one on Tuesdays, Thursdays and Fridays—leaving two flights on remaining days.

On the Brussels-Rotterdam route, the thrice-daily service will be maintained only on Mondays, Wednesdays and Saturdays; on Brussels-Cologne-Bonn, there will be one flight daily.

► **Aircoach Cutbacks**—Within Europe, Sabena also will reduce frequency on some routes carrying largely aircoach traffic, such as those to Nice and Salzburg. Naples service too will be suspended until spring.

The carrier will offer improvements in connections between northern Europe and Spain and Portugal. Hamburg, for example, will have a semi-direct link with Barcelona, reducing the overall time for the run to 6.5 hr.

## Lufthansa 340s

BONN—The Allied High Commission here has sent a letter to German Federal Chancellor Adenauer granting permission to import four Convair 340s for delivery to Lufthansa.

According to reliable sources, the letter specifies permission to import only and restricts Lufthansa to training flights over Germany. Permission to resume commercial operations will be granted in "due time," the letter reportedly said.

(In New York, a Lufthansa spokesman told AVIATION WEEK the airline will take delivery on its first 340 this week.)

Belgian Congo service will be reduced from 13 to 10 weekly flights, all combination-class service.

## North Central to Get Chicago-Detroit Route

Local flights between Chicago and Detroit would be shifted from American to North Central Airlines under a recommendation filed by Civil Aeronautics Board examiner Curtis C. Henderson, who claims the switch would be more economical and provide better service.

North Central, Lake Central and Ozark Air Lines, the local service carriers in the area, all had applied for the route.

American now flies one roundtrip daily between Chicago and Detroit, offering local service to South Bend, Kalamazoo, Battle Creek, Jackson and Ann Arbor. In addition, nonstop service is offered between the two cities by AA, Capital and United Air Lines.

► **DC-3 vs. 240**—The examiner's report says American operates what essentially is a local service operation over the route. AA uses a Convair 240 with an average load factor of about 46%. This same traffic would provide a load factor of about 78% on the DC-3s used by local airlines.

In addition, DC-3s can beat Convair schedules because of greater ground time required by the 240 and the short distances between stops.

Use of DC-3s would permit direct service to Kalamazoo, now served through Battle Creek because the Kalamazoo Airport cannot handle Convairs.

► **Expanded Service**—The Detroit-Chicago segment fits well into both Lake Central and North Central's systems, but NOR got the nod because it appears best able to serve the route.

Ozark's route system lies in the opposite direction from Chicago, so the segment would amount to a stub end.

North Central plans three roundtrips

daily over the seven-city route. The belief is that better scheduling and faster and more frequent service will generate enough additional traffic to warrant the expanded service.

## BOAC, KLM to Benefit From U.S.-India Split

British Overseas Airways Corp. and KLM Royal Dutch Airlines are expected to benefit immediately when Trans World Airlines and Pan American World Airways pull out of India Jan. 16, effective date for expiration of the bilateral agreement between that country and the U.S.

India has insisted on limiting the number of Indian passengers traveling by foreign airlines as well as the frequency of scheduled services. Britain, France, Holland and Italy have given in, but the U.S. has refused to amend the present air agreement.

For the time being, removal of U.S. competition will not help Air-India International. It will not have enough equipment to handle any additional traffic until three Lockheed Super Constellations on order arrive from the U.S. sometime next year.

A former director of India's Tata Airlines has been quoted as wondering "what would happen if the U.S. somehow found itself unable to meet the Super Connie order." Both of AII's Super Connies, delivered this year, spent most of their time on the ground for lack of spare parts—necessitating continuous overtime for the remainder of the fleet.

## Board Sets 18-Cent Rate for Mail Tests

Civil Aeronautics Board has set a temporary rate for air transportation of surface mail in an expansion of the Post Office experiment to 19 cities on the West Coast (AVIATION WEEK Oct. 18, p. 116).

CAB set 18.98 cents a ton-mile as the rate to be used by airlines until a permanent rate is set for the service. Northwest, United and Western Air Lines are interested in participating in the project.

The new payment is about the same as the 18-to-20-cent rate used in the year-old surface-mail-by-air experiment between Chicago and Florida and Chicago and New York and Washington.

The Post Office Department wants the program to start before the Christmas rush. Originally, a Nov. 1 starting date had been set. Board action will allow the department to get the project underway immediately unless unexpected opposition develops.



## Houston Opens \$5-Million Terminal

Approximately 100,000 sq. ft. of usable floor space is available to airlines, concessions and administrative offices in the new \$5-million terminal facilities dedicated recently at Houston (Tex.) International Air

Terminal. A feature of the installation is a 13-room hotel on the terminal's first floor. The "double-finger" loading stations can handle 16 planes. The terminal is located 10 mi. from the downtown area of Houston.



## Air Policy Boost

- **Weeks says he will push ACC recommendations.**
- **Report serves as guide, not law, he points out.**

Recommendations made by the President's Air Coordinating Committee last May will be implemented to the fullest extent, Secretary of Commerce Sinclair Weeks told AVIATION WEEK.

In an exclusive interview, Secretary Weeks said ACC's report is not a "meaningless compilation of ideas, as some people would like to think."

Weeks emphasized that the ACC report is a concise statement of the Administration's air policy, and attempts will be made to see that its recommendations are followed.

► **Major Controversy**—Although it now is over six months old, the ACC report still is a major subject of controversy in airline and Washington circles. Critics, chiefly Democrats, hold that the Administration has stepped out of line in claiming any power of policy decision over Civil Aeronautics Board.

Big contention is that CAB is a quasi-judicial agency, established by Congress under the Civil Aeronautics Act. They claim that when Congress wants the Board to change its policies, Congress will amend or revise the Civil Aeronautics Act.

Weeks replied with the argument that the ACC report is the chosen Ad-

ministration policy "to serve as a guide, not as a law, in formulating civil air policy."

► **'Healthy, Economically Sound'**—Critics also attempt to make the point that the report favors monopolistic practices among the larger airlines, especially in the international field.

"Nothing could be further from the truth," said Weeks. "We have clearly declared ourselves in favor of healthy, economically sound competition over all airlines. What the Administration is out to squelch is uneconomic, wasteful and unnecessary duplication, the cost of which comes out of the taxpayers' pocketbooks."

Queried as to the validity of rumors that he favored eventual establishment of a single U. S. airline in international competition, Weeks was emphatic:

"Again, I am definitely against uneconomic duplication. But there are many routes currently being operated by our flag airlines that warrant the existence of more than one carrier. I'm in favor of consolidating the weak routes, at the same time fostering competition on those routes where the traffic will stand it."

► **S&WA Certificate?**—The Secretary left no doubt as to where he stood on the question of certification for Seaboard & Western Airlines as a trans-Atlantic all-cargo carrier.

"Again, it's a question of economics," he said. "Since the war we've had four all-cargo airlines in this country. It wasn't too long before this was whittled down to two. Now, just recently, the two became one. Then they split again, one going out of business."

"That's the history of our all-cargo operations. You be the judge."

Weeks declined comment on any other specific route cases, either domestic or international. He also declined comment as to the tone of the recommendations on transport, scheduled for release by the special Cabinet Committee on Transport Dec. 1. Weeks is committee chairman. —FS

## CAA Sets Up Viscount Certification With ARB

Civil Aeronautics Administration and Britain's Air Registration Board have agreed on conditions under which the Vickers Viscount will be certificated for service in the U. S., according to William H. Weeks, chief of CAA's Aircraft Engineering Division.

He said Capital Airlines' first Viscount will be certificated automatically when the turboprop transport arrives in the U. S. next spring, carrying a British ARB certification plus a statement that CAA requirements have been met.

Weeks said performance of the Viscount will be based on CAA standards just as any aircraft made in this country. The ARB, he said, has agreed to monitor fulfillment of a list of 26 points on which ARB and CAA have different requirements.

CAA's demands, Weeks said, will have no practical effect on the payload of the Viscount in operation on Capital's routes. Climb performance, he said, must meet CAA standards on a standard day but has been reduced for conditions of full temperature accountability.

Agreement was reached at Washington meetings attended by David Jamison of the ARB and representatives of both Vickers and Rolls-Royce, manufacturers of the turboprop engine.

## Feederlines Name Floberg Chairman

John Floberg, former Assistant Secretary of the Navy for Air, has been selected chairman of the Conference of the Local Service Airlines by the presidents of the 14 member lines. He will continue as a member of the Washington branch of the law firm, Kirkland, Fleming, Green, Martin, and Ellis.

He succeeds Donald Nyrop, who resigned to become president of Northwest Airlines.

A graduate of Harvard Law School, Floberg served in the Navy during World War II. He was appointed a Navy Assistant Secretary in 1949, following the Navy's revolt against Air Force's B-36 program, and served until 1953. He also was a member of Air Coordinating Committee and R&D.

## SHORTLINES

► **Allegheny Airlines** reports a 32% gain in traffic over last year for the third quarter of 1954, carrying 886,660 passengers 13,787,000 passenger-miles. Traffic for the first nine months increased 35% and commercial revenues climbed 32%.

► **British Overseas Airways Corp.** finds heavy equipment its top category in U. S. cargo trade. Machinery, electrical equipment and vehicles together total 32.1% of U. S. cargo revenue. Scientific, professional and precision instruments and supplies come next with 19.1%.

► **California Eastern Airways** has leased two DC-4s to Resort Airlines and has contracted to do all heavy maintenance on Resort's entire fleet.

► **New York Airways** has started the first year-around scheduled air express service with helicopters between points in the New York area. . . . NYA is the 31st scheduled airline to work with railway express to express service.

## CAB ORDERS

(Oct. 22-29)

### ORDERED:

Permission for Mohawk Airlines to temporarily omit service at Pittsfield, Mass., on flights in excess of one daily roundtrip.

Permission for Huron and Rapid City, S. D., to intervene in the application by Western Air Lines for amendment of its certificate on Route 35.

Deferral of action on application by Hawaiian Freight Forwarders, Ltd., and Airborne Flower & Freight Traffic, Inc., for exemptions authorizing operations as intra-Hawaiian airfreight forwarders.

Permission for Southern Airways to omit service at Gulfport-Biloxi, Miss., on one scheduled flight daily.

Issuance of an amended certificate to Trans World Airlines for Route 2.

Permission for Capital, Eastern and Trans World Airlines, the Ft. Wayne (Ind.) Chamber of Commerce and the city of Toledo to intervene in an application by Delta-C&S Air Lines for amendment of its certificate on Route 54.

### APPROVED:

Intercompany agreements involving Northwest Airlines, Pan-American World Airways, various other airlines and carriers.

(Oct. 28-Nov. 3)

### GRANTED:

Pan American World Airways' application for a temporary exemption to serve Nuremberg, Germany, once a week as an intermediate point between Frankfurt and

Stuttgart on PAA's all-cargo flight, until a decision is issued on an application to be filed for permanent authority.

Leave to intervene in the commercial charter resolutions case to American Airlines, Capital Airlines, Delta-C&S Air Lines, Eastern Air Lines, National Airlines, Pan American World Airways, Trans World Airlines, Northwest Airlines and certain designated common carrier railroads.

Northern Consolidated Airlines' application for authorization to continue serving Cape Romanzof, Alaska, until a decision is reached on the intra-Alaska air service case.

### APPROVED:

New York Airways' flight pattern setting up passenger service between White Plains, N. Y., and New York's LaGuardia Airport

and between Stamford, Conn., and LaGuardia.

### AMENDED:

Wheeler Airlines' authorization to conduct aerial photographic survey flights to terminate Dec. 1, 1954, instead of Nov. 1.

Photographic Survey Corp.'s authorization to perform aerial photography and airborne profile recorder flights to terminate Nov. 30, 1954, instead of Oct. 26.

### DISMISSED:

Standard Airways' application for authorization to negotiate mail service with the Post Office during the emergency created by the strike of American Airlines pilots, since the emergency no longer exists.



## Oil Firm Buys Plush Convair 340

Stylish interior of Convair 340 business plane owned by Phillips Petroleum Co. includes a television set (rear, center), only one of the luxurious appointments that brought the

bill for the twin-engine craft to \$800,000. Chicago Tribune also has a new Convair 340 that cost the newspaper about \$1 million. There are 18 executive 340s.



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## News Sidelights

Amphibious twin-float landing gear again is in the works at Edo Corp., College Point, N. Y., with a Cessna 180 getting the equipment. Edo made several models of small-plane amphibious float gear prior to World War II and installed them on a cabin Waco and a Beech E17. Large floats of this type were built during the war and fitted to a USAF Douglas C-47.

Boeing 707 jet tanker-transport prototype has a rate-of-roll equal to the F-86 Sabre jet fighter's, says a company spokesman.

Delta-C&S Air Lines reports it is "making progress" in ironing out engine problems in its DC-7 fleet. President C. E. Woolman says the Wright R3350DA2 Turbo Compound is "a good engine and ultimately will be a fine engine." He says: "We're having a lot less trouble than some of the other operators, but there still are some bugs—as in any new engine—to be worked out."

Change from four-blade to three-blade props is slated for Allison's Convairst Turbo-Liner. New props, also by Aeroproducts, will have same 13-ft. 6-in. diameter, but chord is increased to 18 in. Switch will reduce number of blades passing cabin, thus reduce interior noise, Allison hopes. Props now account for 90% of all cabin noise.

New quality control system for Republic Thunderstreak has been instituted by the Farmingdale, N. Y., firm. Four control stations have been set up on final assembly line and sections checked at each of these points will be sealed and detailed overall inspection eliminated after completion. Republic thus hopes to complete each stage of Thunderstreak construction within the responsible area.

A plaintive plea, via telegram, that we mention that "dependable Lycoming engines," specifically 0320s, each producing 150 hp., powered the Piper Apache flown across the Atlantic recently by Max Conrad, came from Avco Lycoming Division's public relations director Paul A. Deegan, just as we were closing this issue. Apparently this important fact was overlooked in all the publicity the flight achieved.

Retractable auxiliary ramjet engine for copters is slated for testing soon by Marquardt Aircraft Co., Van Nuys, Calif. The new engine will weigh only four or five pounds and will turn out 40 lb. thrust at a rotor tip speed of 650 fps. Three of these ramjets on a three-blade rotor would about double the payload of a copter having a normal gross of 6,400 lb. powered by a 550-hp. engine, Marquardt notes. Powerplant measures 16.5 in. long by 2.5 in. thick and spanning 15 in. Development of the little ramjet has been going on nearly a year.



**TRIGGER-HAPPY GUARDS** atop Costa Rica's new terminal building at San Jose fired a shot over the head of McGraw-Hill World News correspondent Marshall Bannell after he snapped this photo. When Bannell complained, he found out for the first time that an invasion was expected from Nicaragua and it was feared the opposition might fly troops onto the new multi-million-dollar airport, which is scheduled to open next June. Bannell's bill, for Assignment No. 263: out-of-pocket expense (one print only due to military censorship), \$3.60; fine for taking pictures at airport, \$10; miscellaneous (transportation, mailing, etc.), \$8.70.

## AVIATION CALENDAR

- Nov. 15-17—Aviation Distributors and Manufacturers Assn., 12th annual meeting, Mayflower Hotel, Washington, D. C.
- Nov. 15-17—Magnesium Assn., 10th annual meeting, Hotel Chase, St. Louis.
- Nov. 17—Clifford B. Harmon Trust, luncheon honoring Jacqueline Cochran and Maj. Charles E. Yeager (USAF), 1954 winners of the Harmon International Trophies, Hotel Statler, Washington, D. C.
- Nov. 17-19—California Association of Airport Executives, semi-annual meeting, Sainte Claire Hotel, San Jose, Calif.
- Nov. 18-19—American Society for Quality Control, ninth Midwest conference, Baker Hotel, Dallas.
- Nov. 29-Dec. 1—Sixth annual ASME air cargo and air logistics program, Hotel Statler, New York.
- Nov. 29-Dec. 3—American Society of Mechanical Engineers, Aviation Division, annual meeting, New York.
- Nov. 30-Dec. 3—American Rocket Society, ninth annual meeting, Hotel McAlpin, New York.
- Dec. 17—Wright Day Dinner, Statler Hotel, Washington, D. C.
- Dec. 17—Institute of the Aeronautical Sciences, 18th Wright Brothers Lecture, U. S. Chamber of Commerce Building, Washington, D. C.; to be repeated Dec. 20 in Los Angeles and Dec. 22 in Cleveland. Lecturer: Bo Lundberg, director of the Aeronautical Research Institute of Sweden.
- Dec. 28-29—National Science Foundation, fourth Conference on Scientific Manpower, Berkeley, Calif.
- Jan. 19-23—World Trade Fair of Aviation, Miami International Airport, Miami, Fla.
- Jan. 24-27—Plant Maintenance & Engineering Show and three-day conference, produced by Clapp & Poliak, International Amphitheatre, Chicago.
- Jan. 24-28—Institute of the Aeronautical Sciences, 23rd annual meeting and Honors Night Dinner, Hotel Astor, New York.
- Feb. 20-22—Institute of Surplus Dealers, trade show and convention, 212th AAA Armory, New York.
- Mar. 11—Institute of the Aeronautical Sciences, National Flight Propulsion Meeting (restricted), Hotel Carter, Cleveland.
- Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Exposition and Congress, featuring aircraft light metals, Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.
- Mar. 31-Apr. 1—Symposium on Boundary Layer Effects in Aerodynamics, Britain's National Physical Laboratory, Teddington, England.
- Apr. 18-21—Society of Automotive Engineers, Golden Anniversary Aeronautic Meeting, Aeronautic Production Forum and Aircraft Engineering Display, Hotel Statler and McAlpin Hotel, New York.
- Apr. 24-28—Airport Operators Council, 1955 convention, Olympic Hotel, Seattle.
- May 2-5—Society of Aeronautical Weight Engineers, annual National Conference, Hilton Hotel, Ft. Worth, Tex.
- May 4-5—Fourth International Aviation Trade Show, sponsored by Aircraft Trade Shows, Inc., 69th Regiment Armory, New York.

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## Railway Age Replies

I thought you might be interested in seeing our analysis of certain Post Office policies with regard to routing of the mail, in an editorial based thereon, which is in the nature of a comment on one of your own editorials.

I suppose it could be said that the railroads' argument is too complicated. But the fact is that they have been given a complicated status.

I believe they will continue to suffer until they are removed from that status and can appeal to the public simply and affirmatively, as your own readers are fortunate enough to be able to do.

WILLIAM H. SCHMIDT, JR.  
Executive Editor  
Railway Age  
30 Church St.  
New York 7, N. Y.

(Mr. Schmidt apparently refers to an editorial in AVIATION WEEK Sept. 27, "Slow Down the Mails." Our answer to Railway Age's editorial is that we believe there are actions the railroads themselves can take to improve their economic status. One such action may be along the lines suggested the other day by the new president of the New York Central. He believes the NYC can no longer afford the maintenance and tax luxury of a four-track right-of-way on its main line for hundreds of miles. He told newsmen he can foresee a three-track line next instead, and eventually a two-track right-of-way efficiently handling all main line traffic. This, we contend, is revolutionary talking in railroading. We concede, however, that some reforms should be offered the railroads by governments. Quoting an editorial on this page last week: "If the railroads cannot accommodate themselves to long-term economic trends and if government policies are deemed responsible to some extent, then the government should change those policies accordingly." This is the Air Transport Assn. position. Both ATA and AVIATION WEEK consider the railroads of vital national importance. The Railway Age editorial of Nov. 1 appears below.—Ed.)

### WHAT THE MAIL ARGUMENT IS ABOUT

Railroads ought to quit getting in the way of progress and should not complain when the Post Office gives first-class mail to the airlines. Railroads relieved the canal boats of their traffic; and they ought to accept the result when a faster method of transportation, e.g. the airplane, takes away the letter mail. Such is the theme of an editorial in AVIATION WEEK—a paper for which this shop has great respect, but (in the present instance) more for its belligerency in behalf of its clientele than for knowledge of transportation economics.

It is not strange that AVIATION WEEK should not have gone very deeply into the economics of the transportation business. The aviation branch of this business hasn't had to worry much about economics—what with all the free engineering development

it has enjoyed, plus the luxury of a special governmental promotion agency all its own, and with practically no regulatory restraints except those which the airlines want, themselves, to protect them from too much competition.

We wonder what AVIATION WEEK would write about the mail fracas if it knew more than it seems to know about other branches of transportation than its own. How about the "partial and contingent" basis on which first-class mail is now being diverted from the railroads?

The railroads do not contend that they have an inherent right to carry the mail. They do insist, however, on the importance of the fact that, while they have been relieved of considerable quantities of the most desirable kind of mail traffic between points of large concentration, they have not been relieved of any of their old obligations to maintain the facilities to carry mail, in any quantity offered, anywhere they run passenger trains, and to give this fluctuating traffic first priority at all times.

In short, railroads bear obligations their newcome rivals have not assumed, as was set forth in a special study in the October 18 Railway Age. They must, for example, provide complete terminal service and move mail between their stations and local post offices. At large terminals where mail is transferred between trains, and between railroads, as many as 90% of all station employees are employed solely in sorting, transferring and loading mail. There are about 50,000 of these employees altogether. The railroads provide large fixed facilities, in expensive downtown property, for performing this service for the mails.

Railroads are required to have on hand enough equipment to handle—not just the quantity of traffic that is convenient for them—but whatever peak loads are offered. For the Christmas rush, for example, extra baggage and freight cars must be marshalled, and extra trains operated. By law, the mail must come first.

The railroads would also like the Post Office to be completely frank about the relative cost of using different kinds of transportation. It is not honestly informative to compare the average cost of postal car service—which covers equipment and manpower to sort mail en route and includes lightly patronized rural runs—with the cost of selected air movement. The air movement is in "bulk storage" only, and between large cities. If the railroads were permitted to take mail on a standby "space available" basis and could, like the airlines, limit themselves only to the "cream" runs, and discard the Podunk business, they could make money carrying first-class mail at charges which would scare all competition away.

Furthermore, with intra-city mail service apparently getting slower every year, the importance of two hours (maybe) between airports vs. 16 hours overnight (dependably) by rail, and between established downtown mail handling terminals at that, somehow loses point. Where is the evidence that the mail patron gains enough in "progress" to warrant the Post Office's paying airlines 18.7 cents a ton-mile for the New York-Chicago service, without handling en route, when it

can get overnight service, with complete sorting en route and downtown terminal handling at each end, on rails, for 8.7 cents, or less than half what it is paying?

In short, the railroads have a right to ask that the mails be allocated on a basis of relative economy. Since they are no longer the preferred carrier, the railroads ought to get paid for the services now provided for nothing; and be relieved of non-profit services—so they can go out and compete, with both planes and trucks, on an exactly equal basis of comparing costs.

President James Carmichael of Capital Airlines discussed this mail wrangle before the Central Railway Club at Buffalo on Oct. 21—expressing much the same views that AVIATION WEEK does. We believe both of them would show greater appreciation of the railroad side of this issue if they would go into it a little deeper than they have.

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Vice President-Operations  
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5036 W. 63rd St.  
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## Praise

We have had a great deal of favorable comment on Irving Stone's story Oct. 11 on the rocket launcher and will send reprints to our entire mailing list. Thanks for a very fine job.

J. A. WILCOX, Contracts Manager  
Century Engineers, Inc.  
2741 North Naomi St.  
Burbank, Calif.

Some of AVIATION WEEK's recent reports have been unusually good, particularly one by Katherine Johnsen, "U.S. Aid Boosts British Civil Jet Projects."

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