

# AVIATION WEEK

OCT. 22, 1951

50 CENTS

A MCGRAW-HILL PUBLICATION



## Their measure of fuel is minutes!

When unforeseen weather or other flight conditions keep a plane in the air longer than planned, its fuel gauge becomes a mighty important instrument. Fuel gauges that read either "too much" or "not enough" become extra weight — dangerous weight. But a fuel gauge that's *really dependable* can be counted on to help insure the safe arrival of crew, passengers and cargo.

That's why the aircraft types shown here — plus 24 others — are now equipped with individual adaptations of the Honeywell Electronic Fuel Gauge. Reading this

wonderfully precise instrument, the pilot or flight engineer can accurately determine down to a very few *minutes* how much "flying time" is left in the tanks. You see, it measures by *weight* rather than by volume, is unaffected by the attitude, altitude or motion of the plane.

This is only one of many Honeywell products now in use by the aviation industry. We expect the list to grow longer in future years. Because automatic controls are so important to aviation progress. And Honeywell has been the leader in controls for more than 60 years.

AERONAUTICAL DIVISION  
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MINNEAPOLIS  
**Honeywell**

*Aeronautical Controls*



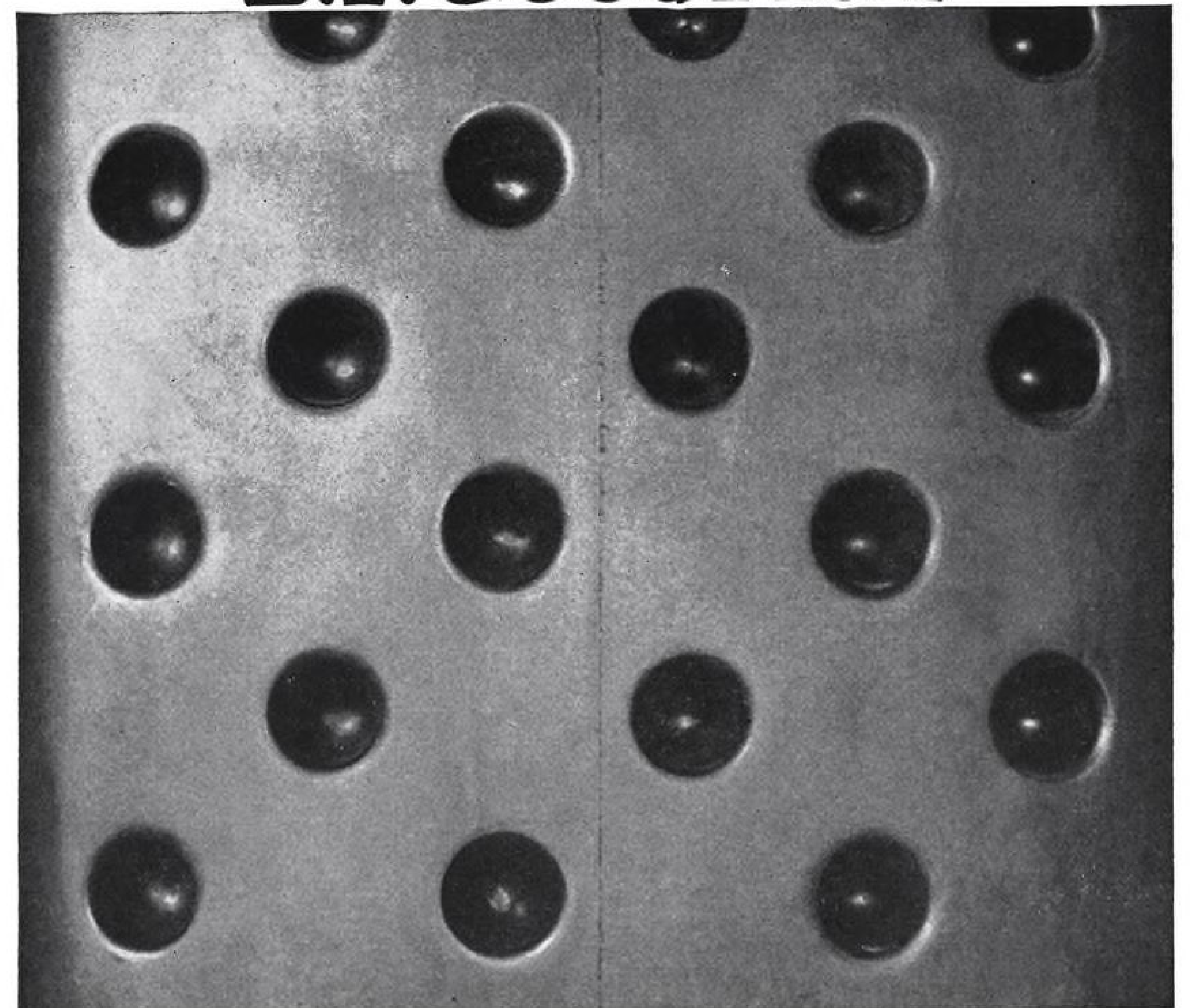


# Hydro-Aire



**In the army, too...**  
every fighter, every bomber,  
every transport,  
is Hydro-Aire equipped.  
*Hydro-Aire Inc.,*  
Burbank, California.

## B.F. Goodrich



## New kind of tire outwears all others in airline tests

**A**IRLINES who have used a new B. F. Goodrich tire in actual service have now reported it outwears all other tires they have used.

It has a new kind of tread design with round, dimple-like indentations in the rubber. The dimple indentations provide better distribution of the tire load and reduce exposure to tread cutting. The tread design is a complete departure from conventional ribbed treads.

A typical report from an airline using DC-3 equipment: "We removed

the tires after 400 hours, 1200 landings. In the process of recapping, we discovered that there was enough rubber left for about 100 hours more, a total of 1500 landings. These tires have given us longer service than any we have used."

Some of the airlines that tested the new tires and are now using them as standard equipment are Braniff, United, American, Continental, Frontier, West Coast and National. Others are beginning to make the switch.

Tooling up for production of the

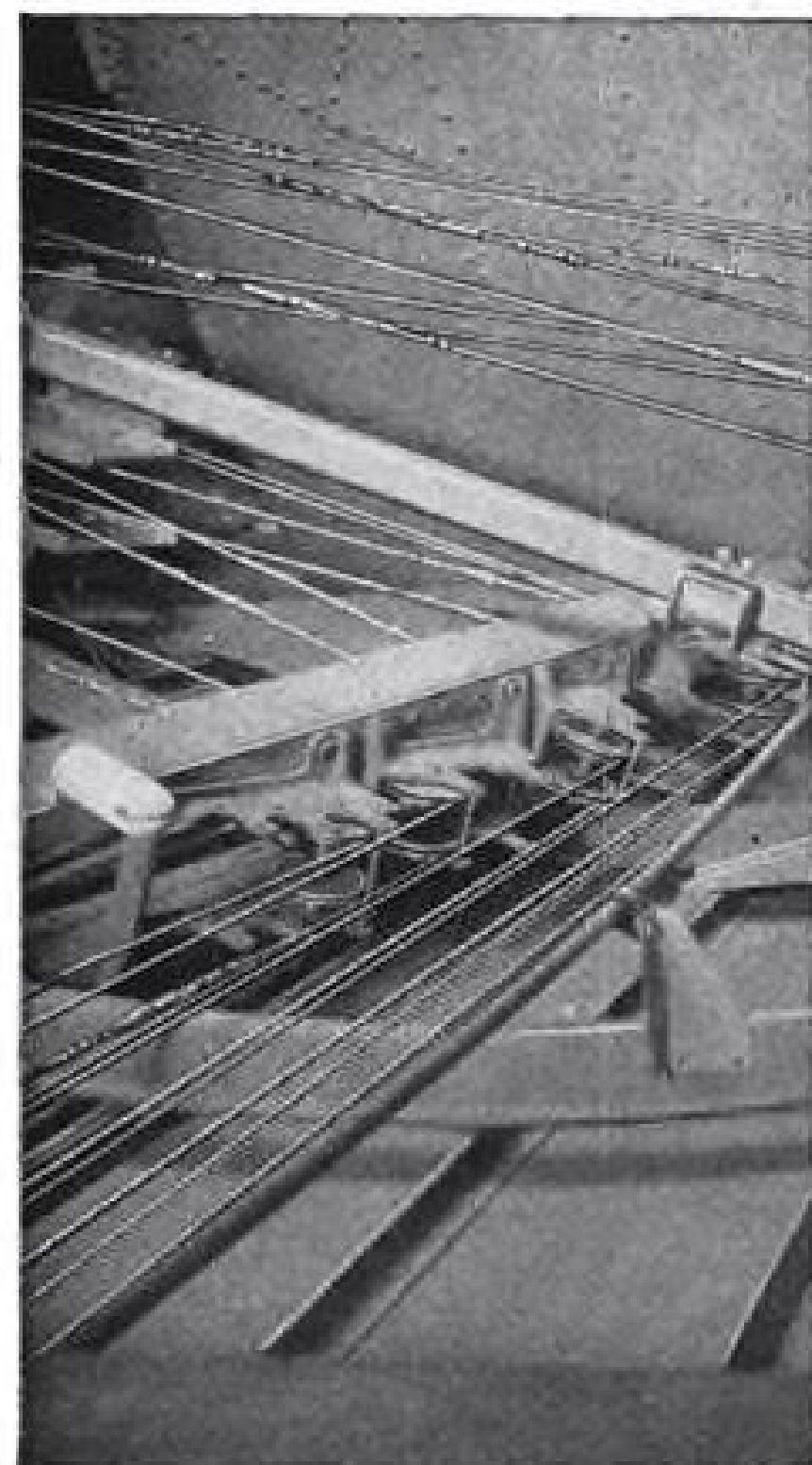
new tire in four additional sizes is now underway at B. F. Goodrich. The new, longer wearing B. F. Goodrich tire is the latest "first" in aviation tires from B. F. Goodrich, leader in rubber research and engineering. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

**B.F. Goodrich**  
FIRST IN RUBBER



# AIRCRAFT CONTROLS

There's almost no "constructional stretch" in Roebing Aircord



BEYOND MEETING today's most stringent specifications, Roebing Preformed Aircord for controls contains practically no troublesome and unpredictable "constructional stretch." For this reason, Roebing Aircord always affords maximum uniformity of control and minimizes the need for periodic take-ups.

Roebing Preformed Aircord, made of steel or of stainless steel, comes in a full range of sizes and can be furnished in complete assemblies with swaged terminals that possess the full strength of the cord itself.

Write for complete information about Aircord and other test- and time-proven Roebing aircraft products. And call on Roebing's engineering staff for any desired suggestions and assistance. John A. Roebing's Sons Company, Trenton 2, New Jersey.

Branches and warehouses in principal cities.

# ROEBLING

# Aviation Week



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# What's doing at JACK & HEINTZ

## Military Capitalize on Wide Range of J & H Inverters

### CAPACITIES FROM 250 TO 2500 VOLT-AMPS OFFERED!

J & H Rotary Inverters blanket the aviation industry, providing 400-cycle a-c voltage output for 30 different military aircraft and many commercial planes as well.

A typical example of the value of the wide range of J & H Inverters is on the Boeing B-47 Stratojet. This plane requires the use of five inverters—three F46-2 models and one each of the F20-4 and F35-4.

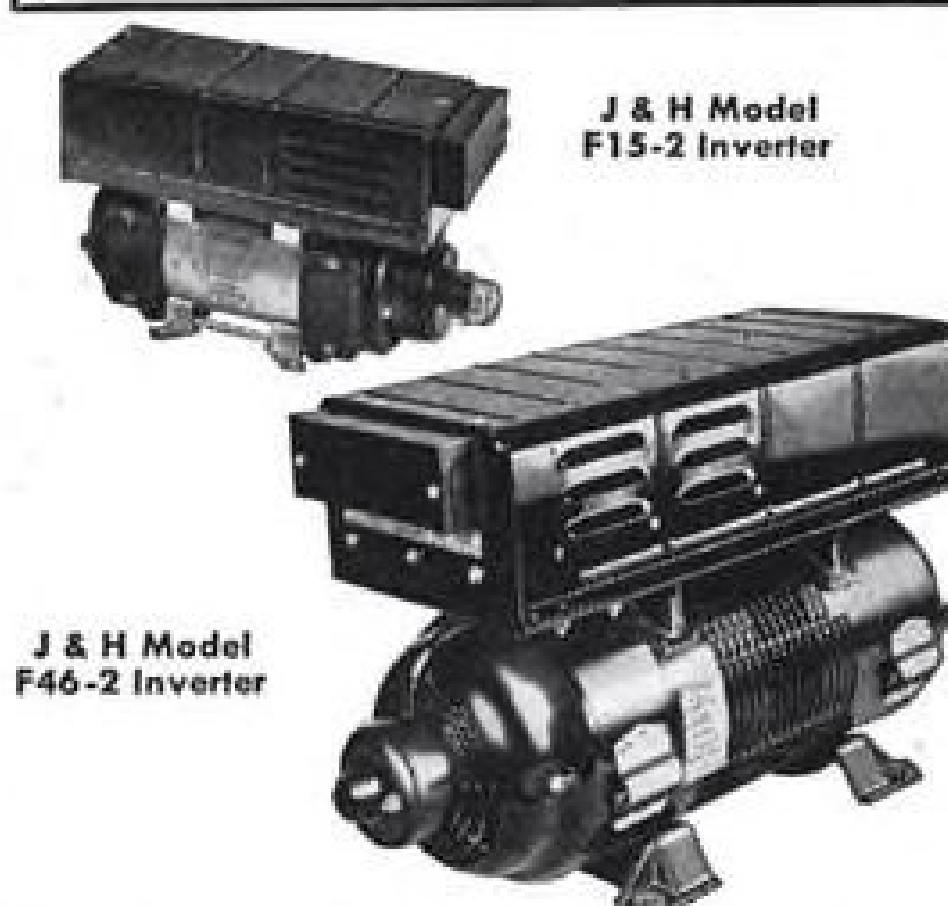
Output capacities are offered in a wide range of models from 250 to 2500 volt-amperes, in either single or three phase. They are designed to operate from a 28-volt d-c input and to deliver a 115-volt, 400-cycle output. Voltage control in J & H Inverters above 750 va's is accomplished

through the combination of a rectifier and a carbon-pile voltage regulator, while an electronic voltage regulator controls those inverters under 750 va. Speed is controlled with a carbon-pile regulator.

Each J & H Inverter is a self-contained power source, self-cooled up to 35,000 feet. Each incorporates a control box having a voltage regulator, relays for control of d-c input and a-c output, and filters for radio interference suppression.

All J & H Inverters incorporate special design features providing compactness, lightweight and close control of frequency and output voltage.

### THE BIG AND LITTLE OF IT



These two models represent the extreme range of output capacities available in J & H Inverters—from 250 va in the F15-2 (above) to 2500 va in the F46-2 (below). The F15-2 is designed for 28-volt d-c input, 115-volt a-c, single-phase output, with electronic voltage control. The F46-2 is designed for 28-volt d-c input, 115-volt a-c, single-phase output, with carbon-pile voltage control. Both are motor-alternator-type inverters.

### Step-By-Step Inspection Rigidly Enforced at J & H!



Because the production of J & H Rotomotive devices is nearly all out of the ordinary, we enforce rigid inspection at every stage.

All machined parts are gauged and checked for critical dimensions to assure uniform precision. Each piece of equipment is completely checked, both electrically and mechanically, before assembly. Each finished device is given a preinspection run-in under an operator's watchful eye. This type of "check and double check," step-by-step inspection reduces your maintenance headaches, means the equipment your J & H devices operate with will stay "on the beam."

Shown above are J & H inspectors using highly sensitive instruments to test inverters before final inspection.

### Chief Engineer's Corner

As electrical requirements of military and commercial aircraft become more exacting, they create a need for special inverters. The B-47 mentioned above is a case in point. The three J & H Inverter models installed on this plane range from 500 to 2500 volt-amperes and deliver both single and three-phase a-c.

The major advantage in coming to Jack & Heintz for your inverter requirements is the fact that we offer this wide range of output characteristics.

We recognize the need for even more precise controls and greater sturdiness than is offered by the

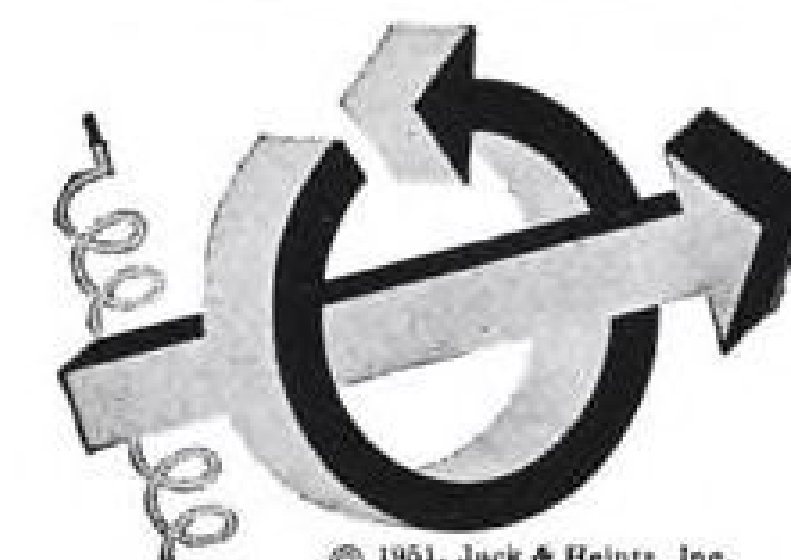
best inverters currently available, and a lot of our people are hard at work solving these and other important problems.

We have development programs under way at Jack & Heintz for inverters capable of operation at higher altitudes, with even closer frequency and voltage controls, longer life and characteristics to withstand excessive shock and acceleration forces. If some of the above improvements interest you, or you have need for an inverter approaching these ultimate capabilities...write JACK & HEINTZ, INC., Cleveland 1, Ohio.

# JACK & HEINTZ

## Rotomotive

# EQUIPMENT



means electrical, hydraulic or mechanical devices designed to solve unusual problems of developing power, controlling it, or using it.



# 'Chuck' O'Connor says: "GIVE 'EM THE PERSONAL TOUCH"



**O'CONNOR AIRCRAFT COMPANY**, Albany (N. Y.) Airport, services Colonial Air Lines and offers executive and personal flyers every facility for fast, courteous and dependable service. Head of this operation, Charles P. (Chuck) O'Connor (below), is widely known to flyers from all parts of the country. He has been in aviation since the "wood-and-wire" airplane days and is the oldest of the flying O'Connor family (five brothers and two sons). 'Chuck' says: "I believe in personal service and when I sell something, it must be a product I believe in myself. That's why I've used, recommended and sold Texaco for years."



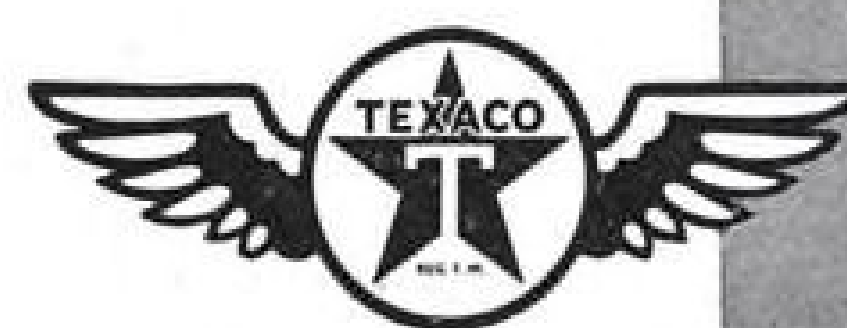
## ...and sell 'em nothing but the best — TEXACO."

You can depend upon an experienced and successful airport operator like 'Chuck' O'Connor to give you the straight word on what builds business: complete facilities, personal service, and a reputation for handling nothing but topflight products like Texaco.

Texaco Aviation Products are available in every one of the 48 States and are first choice with the airlines.

*More revenue airline miles in the U. S. are flown with  
Texaco Aircraft Engine Oil than with any other brand.*

Build your airport business around your own good service and Texaco quality. A Texaco Aviation Representative will gladly help you make the proper set-up. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, Aviation Division, 135 East 42nd Street, New York 17, N. Y.



## TEXACO Lubricants and Fuels

FOR THE AVIATION INDUSTRY

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

## NEWS DIGEST

### DOMESTIC

Continental Air Lines has ordered two 64-passenger Douglas DC-6Bs, to be used on the airline's Houston-Los Angeles and Houston-San Francisco runs, where they will take part in the Continental-American Airlines Houston-West Coast interchange. The cost of the two planes with spares will be \$3 million. Delivery is set for May and June, 1953. Continental-MCA through-flight agreement has CAB approval for daily one-plane service, St. Louis to Denver-Colorado Springs via interchange at Kansas City.

First Silver Falcon, Eastern Air Lines' name for the new Martin 4-0-4 twin-engine transport, has been delivered to the carrier for personnel training. Seven more of the craft will be delivered by Nov. 21 for training and route flying. EAL expects to receive the first passenger service Silver Falcon Nov. 29. (See picture on p. 9)

MATS C-97 Stratofreighter en route from The Azores to Westover AFB with 14 MATS personnel aboard was reported missing last week. Craft was believed to have run into violent air turbulence west of The Azores. Until now, no operational Stratofreighters had been lost.

Lt. Gen. Laurence S. Kuter has been nominated as USAF deputy chief of staff, personnel. Named to succeed Kuter as MATS commander is Maj. Gen. Joseph Smith, who has been director of plans, USAF office of deputy chief of staff, operations.

Northwest Airlines plans to operate flights of a new private Japanese airline called Nihon Koku Kabushiki Kaisha. Operating out of Tokyo, the line will serve Sapporo, Aomori, Yokohama, Nagoya, Osaka, Hiroshima and Fukoka, using one DC-4 and two 2-0-2s. The Japanese owners will operate sales, advertising, ticketing.

Wage talks between the Boeing Airplane Co. and the Aero Mechanics Union will be reopened Nov. 22 at Seattle upon request of the union. Boeing has promised to discuss a cost-of-living increase but action is unlikely until May 22, as the present contract extends until then.

Five more airlines have signed pilot wage contracts including mileage compensation. They are Trans World, Chicago & Southern, Continental,

Robinson and Wisconsin Central. Air Line Pilots Assn. President Clarence Sayen says the C&S contract is "one of the best contracts we ever signed."

Pan American and TWA meet with CAB this week to discuss American position on trans-Atlantic air coach fares and seating densities at forthcoming International Air Transport Assn. meeting next month. PANAM says it is ready to break the IATA fare agreement and go it alone on coach.

A conservator of ALPA funds has been appointed by Federal Judge Walter J. LaBuy as a result of legal controversy between ousted ALPA President David Behncke and the new officers, headed by Clarence Sayen. Behncke had asked an injunction restraining the new regime from having authority over funds and new incoming dues.

### FINANCIAL

California Eastern Airways stockholders approved an incentive profit-sharing plan at a special meeting. The present board of directors was reelected, following a proxy battle.

### INTERNATIONAL

Power Jets, Ltd., British government-owned research and development company, has accepted \$4 million from the U.S. government as payment in full for claims rising from the use of British gas turbine patents. This payment also covers U.S. use of some 200 jet patents over the next 20 years.

Crawford Gordon, Jr., 40-year-old Canadian Co-ordinator of Defense Production, was appointed president and general manager of A. V. Roe Canada Ltd., Toronto, replacing Walter Deisher, vice president and general manager since 1945, and Sir Roy Dobson, who moves from the presidency to board chairman.

South African Airways transport carrying 12 passengers and crew of four was reported missing on flight from Port Elizabeth to Durban.

BOAC Comet flew London to Singapore, 7,748 miles, at average speed of 405 mph. in 19 hr. 8 min. excluding ground time. The 5 hr. 27 min. on the ground brings complete flight average speed to 317 mph. This Comet has flown 445 hr. since April.

## The Right Move for ECONOMY

APPROVED  
TYPE RADIO  
AIDS

GLIDEPATH  
RECEIVERS



SINGLE  
POINTER ADF  
INDICATORS

200-1750 Kc.  
COMPASS  
RECEIVERS

CHOICE OF  
THIRTEEN  
SCHEDULED  
AIR CARRIERS

DUAL POINTER  
ADF  
INDICATORS

MEETS ALL  
REQUIREMENTS  
C. A. R. AMEND-  
MENT 42-8

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200-1750 Kc.  
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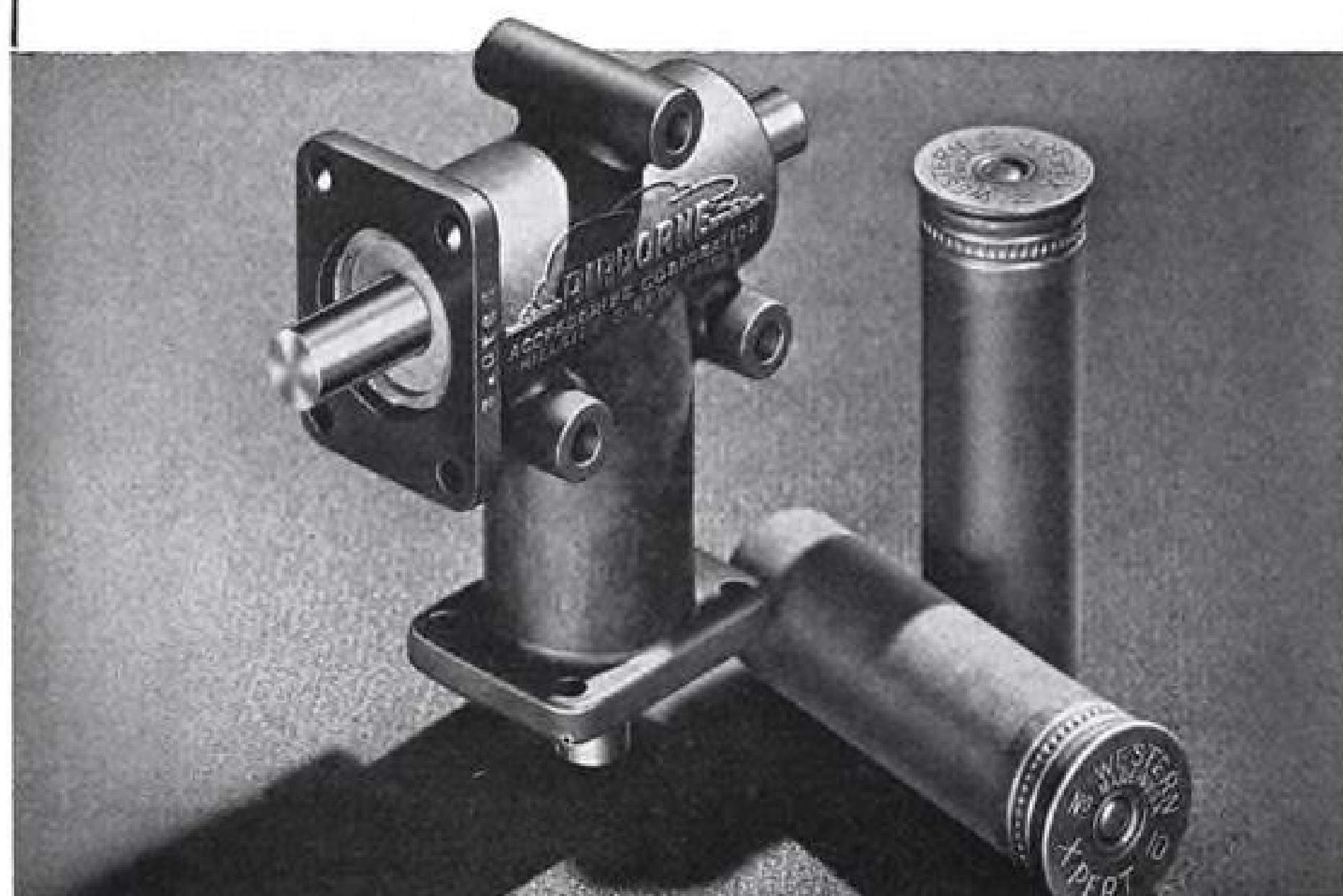
AVIATION ACCESSORIES

INCORPORATED  
P. O. Box 4178 Northcliff 4863  
FORT WORTH 6, TEXAS



## 500 LB.-IN. POCKET-SIZED

**ANGL** *Gear*  
TRADE MARK



The Model R-300-X high ultimate strength ANGLgear is now available to withstand static loads up to 500 lb.-in. For applications where the standard model R-300 with 250 lb.-in. rating is marginal, the R-300-X is the answer. It is especially suited for manual operation of remotely located valves or controls which may develop high break-away torques.

Both the R-300 and the R-300-X are rated for transmission of 1/3 hp at 1,800 rpm. All models are lubricated for life and made with hardened gears, antifriction bearings, three-bolt side and flanged end-mountings with internal pilots.

See IAS Aeronautical Catalog for Dimensions

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## SIDELIGHTS

### Industry

► Bell Aircraft's backlog is nearly \$400 million, financial circles disclose, and the firm is so deep in missiles that that portion of its 1951 business alone will almost equal the company's entire gross in 1950.

### Saucers

► Air Force's announcement that it's getting into the Navy's super-balloon act fuzzed up the "flying saucer" controversy some more. Newspapers a few weeks ago reported USAF pilots had chased an "unknown" object along the East Coast. They were quoted as saying this was no balloon. But friends of Dr. Liddel at Office of Naval Research say he staunchly stands by his previous position that people are seeing either balloons or flights of fancy.

### No Gifts, No Favors

► One major aircraft firm has put USAF's "no gratuities, no favors" regulations into effect with its own executives and employees in their relations with the company's vendors and subcontractors. A few aircraft industry observers put most of the blame for the recent reported irregularities at Dayton on aggressive representatives of new, small electronics firms who have never done business with the Air Force before.

### The Press

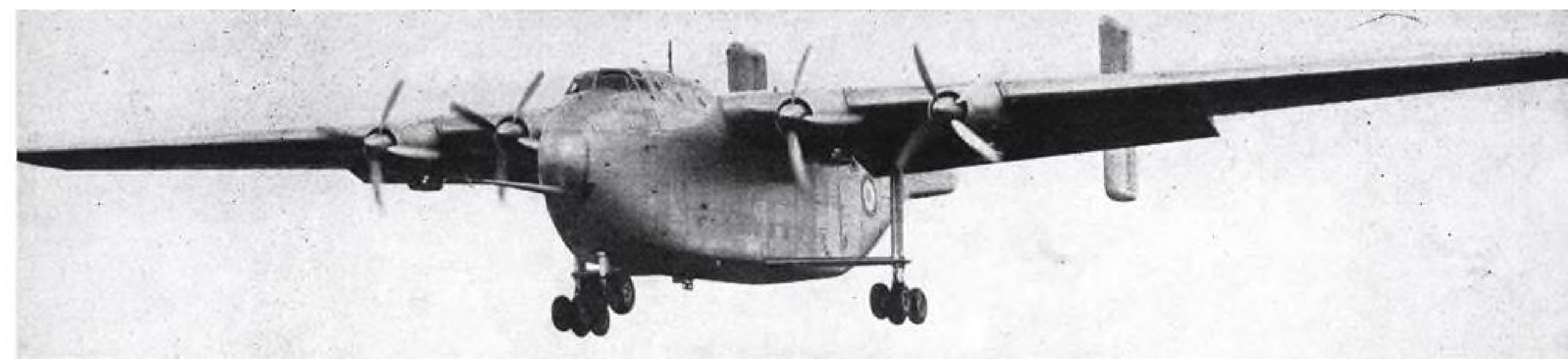
► A top Air Force official has volunteered the statement to the editor of AVIATION WEEK that the recent list of Russian fighting planes appearing in Time magazine is "not accurate." AVIATION WEEK has been withholding stories on Russian aviation that it could not check with reliable sources. Commenting on this policy, a Navy aviation officer with access to intelligence reports says material that appeared in one air magazine recently on the subject was not more than 70% accurate.

► The October Fortune magazine features an article on "Wars of the International Airlines."

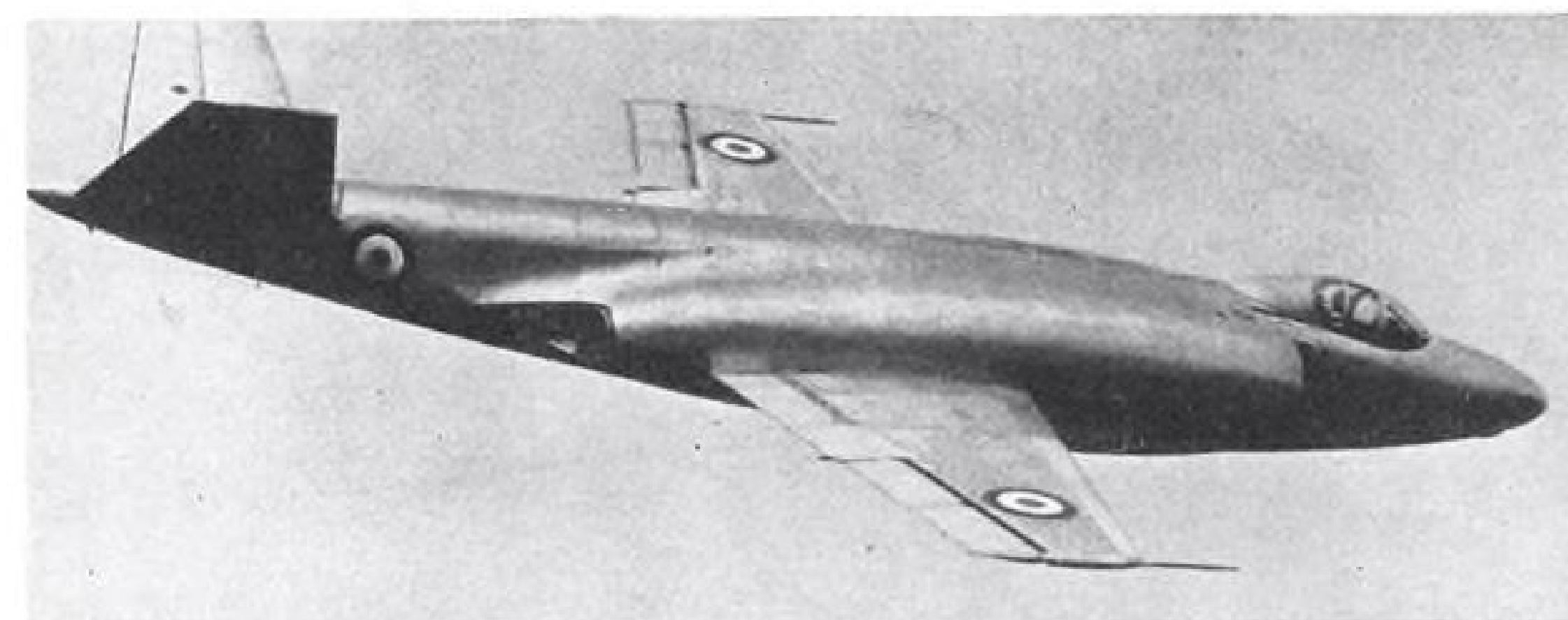
► That new, twice-weekly mimeographed aviation news letter published in London by "Aviation Report Publications," and seeking subscriptions in the U. S., is run by Richard G. Worcester, formerly a full-time writer on American Aviation.

► A group of Americans, headed by Ralph Cohen of the IATA public relations staff in Montreal, is endeavoring to finance purchase of the magazine and daily editions of Inter-avia, Swiss firm.

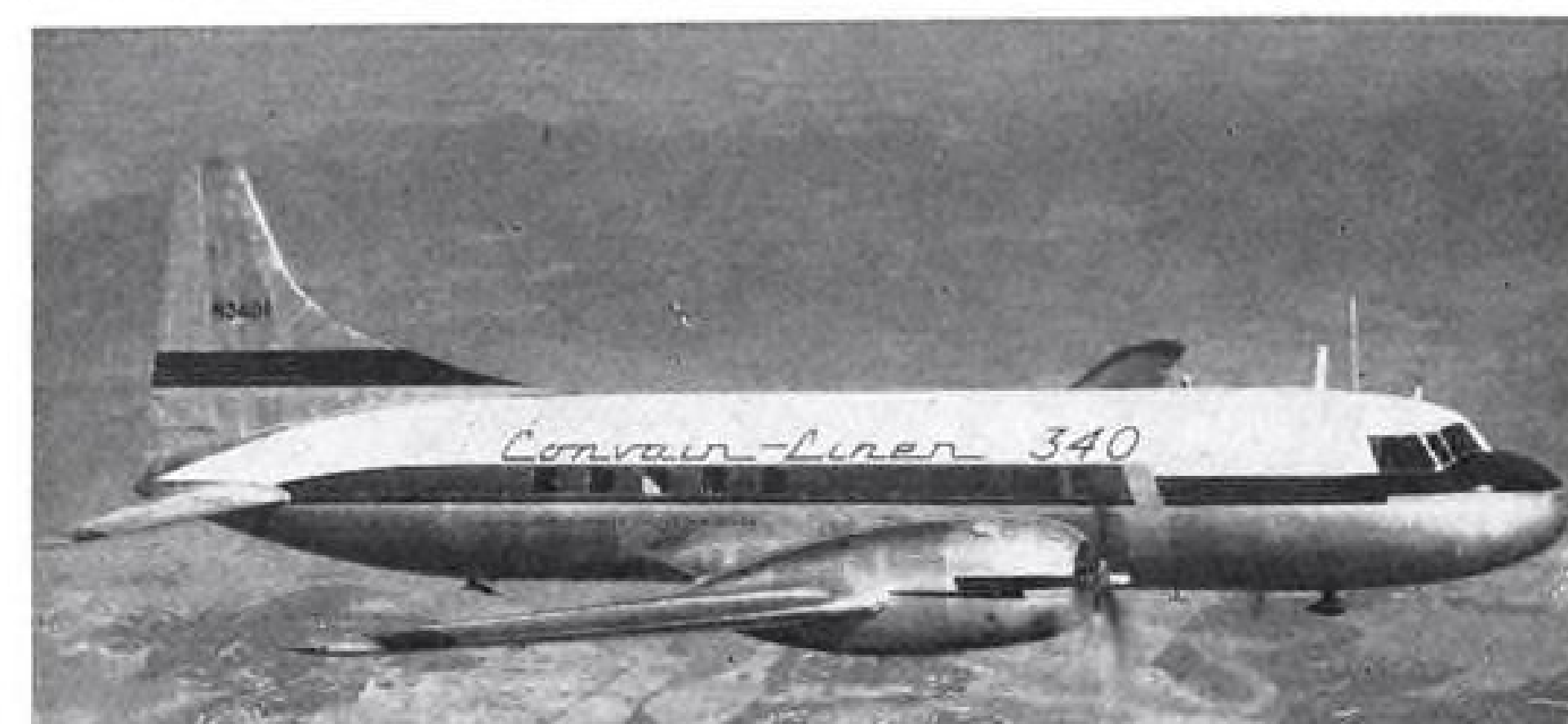
► Peter Edson, Washington writer for Scripps-Howard papers, said that as soon as President Truman rapped the press for publishing data about the B-61 Matador, the Air Force worked all night long at Dayton removing models of the Matador, Firebird, Nativ, Gapa and Tarzon missiles, which were to be displayed the next day to 3,500 members of American Ordnance Assn. and reporters.



**LIGHT-FOOTED GOLIATH**—Blackburn has recently been fitted with bogie landing gear to reduce footprint pressure for improved field use. Reverse-pitch props are fitted for short landing run.



**VICKERS VEE-TAIL**—Type 508, Vickers Supermarine's latest carrier fighter, is powered by twin Rolls-Royce Avons. Very thin wing has droop-snoot, large trailing-edge flaps.



**CONVAIR OVER CALIFORNIA**—On first flight, Convair-Liner 340 shows similarity to 240; but 340 is bigger, heavier, faster.



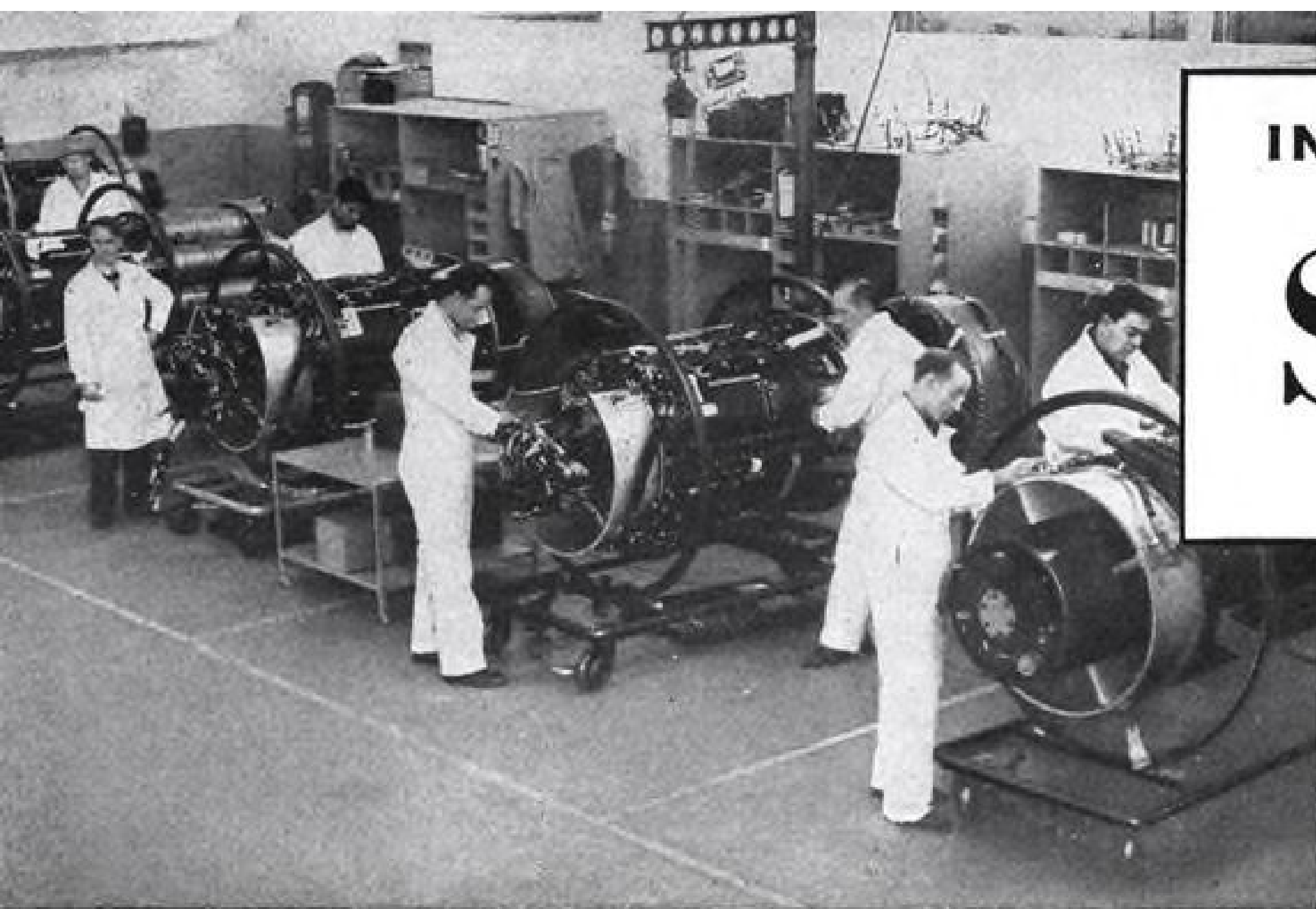
**MARTIN OVER MARYLAND**—Test flight of Martin 4-0-4 in Eastern Air Lines markings. Plane replaces DC-3.

## Plane Pictures In the News

**LOCKHEED'S LARGEST**—The 173 ft. fuselage of the Super Constellation is lowered into a cradle for final assembly. Orders include 68 for seven airlines, more for military.





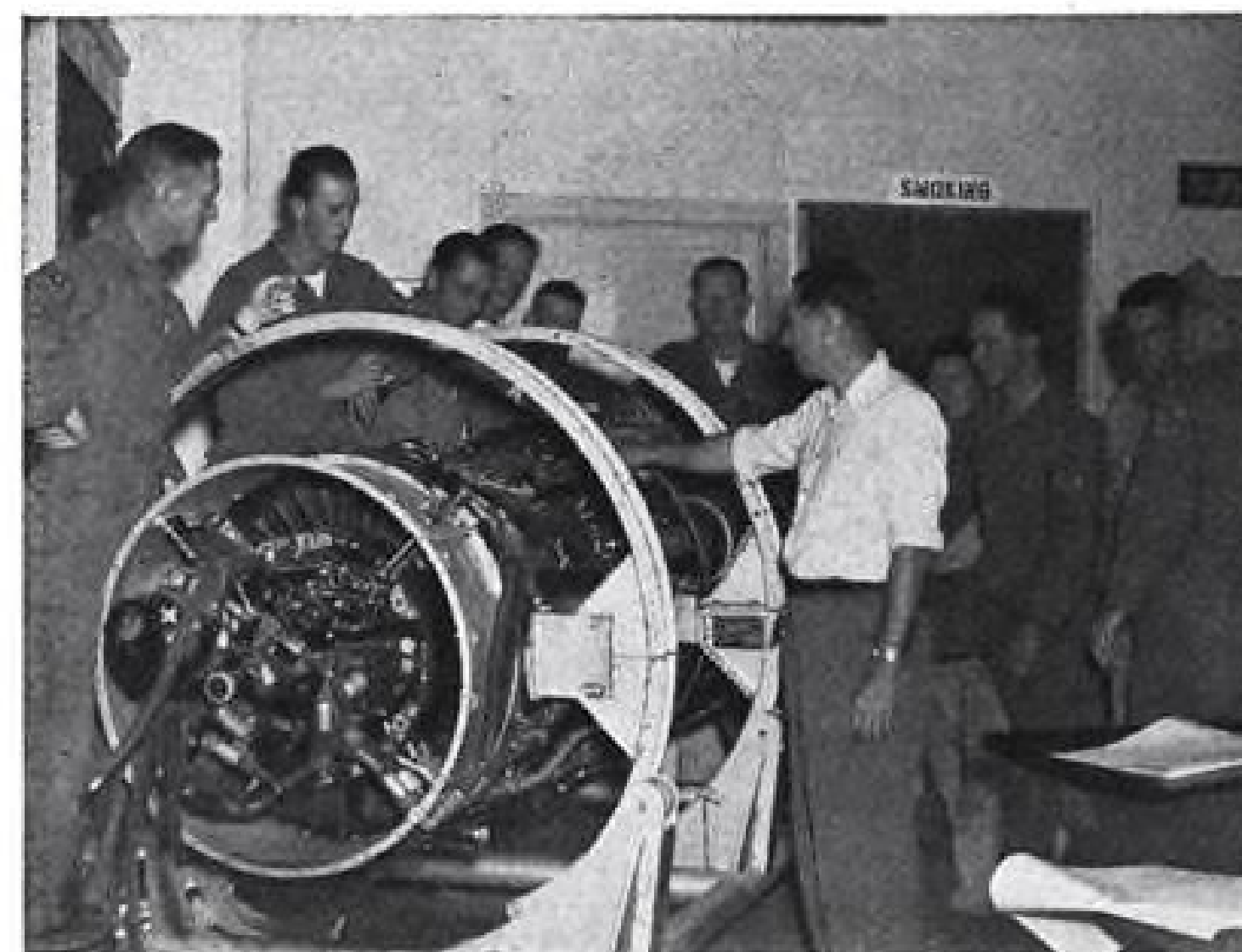


## IN THE NEWS

# SERVICE

Getting top utilization from jet engines requires many techniques. Here are a few of the means used by General Electric to help the Air Force get maximum use from its J47 engines.

To provide immediate service for General Electric apparatus, more than 30 G-E Service Shops are placed strategically around the country. Four of these shops are currently handling aircraft gas turbine work; more can be adapted as required. Skilled technicians provide rapid and complete repair and overhaul facilities.



At an Air Force base, a G-E representative shows Air Force personnel some fine points of jet engine servicing. To back up this field training, formal G-E jet engine schools have been functioning since 1942. Courses are now presented in familiarization, overhaul, flight test engineering, and line maintenance.



G-E service follows G-E equipment around the globe. Here, "tech reps" from General Electric and North American Aviation Inc. in Korea discuss combat performance of the G-E-powered, North American-built F-86 Sabre. G-E aviation field service representatives cover the vital spots in the world, are always available.

For quality products and dependable service, call on the company that pioneered the aircraft gas turbine industry. Telephone your General Electric aviation specialist or write General Electric Company, Schenectady 5, New York.

AIRCRAFT GAS TURBINES

**GENERAL**  **ELECTRIC**

210-23

## WHO'S WHERE

### In the Front Office

Alexander G. Hardy, Washington attorney and former CAB and OPS counsel, has been appointed executive assistant by National Airlines with offices in Washington. During the war he served with Naval Intelligence in Chungking, China.

Willard R. Blackwood, veteran accountant of Miami, has been appointed to new post of controller for Eastern Air Lines. He formerly was secretary-treasurer and a director of S. A. Lynch Corp., Miami, for several years was treasurer and director of Florida Power and Light Co., and had served as controller for Denver and Rio Grande Western Railroad.

Alvin P. Adams has been elected vice president of Pan American World Airways, Inc., to succeed Adm. John H. Towers, who will retire. Adams formerly headed the aviation management consulting firm of Alvin P. Adams and Associates and at one time was president of Western Air Express Corp., now Western Airlines.

E. J. (Bud) Huber, former director of public relations for Piasecki Helicopter Corp., has been elected vice president of Gyrodyne Company of America, Inc.

### In the Plant and Field

Dr. L. T. E. Thompson has been named consultant and special deputy for technical operations to the president of Norden Laboratories Corp. He formerly was technical director of the Inyokern, Calif., Naval Ordnance Test Station. . . . William Rowley is new manager of Aeroquip Corp.'s office at Dayton, O. . . . H. Arnold Cowan is new production manager for Canadian Aviation Electronics Ltd. . . . CAE also has announced appointment of Wing Cmdr. G. C. Cunningham as managing director of its overseas subsidiary in London. . . . F. N. Owner is new deputy chief engineer of deHavilland Engine Co. Ltd., and W. F. Shaylor has been named company's commercial manager.

Cleveland Graphite Bronze Co. has announced promotion of eight engineering division members—Edwin Crankshaw as chief engineer for product and design; Joseph Palsulich and Richard J. Schager to assistant chief engineers; Joseph F. Cerness to chief metallurgist; W. N. Goldenbogen to chief chemist; Wilbert H. Morrison to director of research, and Harry Pochapsky to chief electrochemist.

### Honors and Additions

Frank Piasecki, chairman of the board of Piasecki Helicopter Corp. will receive the 1950 TWA Club's Aviation Award for distinguished service in the development of Philadelphia aviation.

Dr. Walter P. Schreiber, native of Berlin and wartime chief of medical science in the supreme command of the Wehrmacht, has joined the faculty of the Air Force School of Aviation Medicine, San Antonio.

## INDUSTRY OBSERVER

► Boeing Airplane Co. has made USAF a proposal to build two turboprop versions of its C-97 Stratofreighter double-deck military transport and refueling tanker, one powered by Allison T-40 double-unit engine, and the other powered by Pratt & Whitney's T-34 single-unit turboprop. Both have power ratings in the 5,500-to-6,000-hp. bracket.

► Contrary to local Ft. Worth reports, General Electric does not intend to build its atomic aircraft engine at Ft. Worth near the Convair plant where the airframe will be built. A small GE installation set-up at Ft. Worth will probably be opened after the engine is fabricated and assembled at Lockland, Ohio, home plant for the new atomic engine.

► First deliveries of the production Avro CF-100 Canuck twin-jet night-fighter are scheduled this month to Royal Canadian Air Force, out of some 80 now on order. And Avro Canada Ltd. is also developing two advanced versions of the big nightfighter. The first, CF-100 Mark 4, will incorporate improved armament and radar, and later models of the Orenda turbojet engine. The second version, designated CF-103, will have swept wings instead of straight and will be powered by super-Orenda engines of much greater power.

► United Auto Workers' request that the Department of Labor open new proceedings to set an aircraft industry minimum wage of \$1.35 an hour (the current minimum is \$1.05) has been tentatively rejected within the department—at least for the time being.

► Air Force is preparing to run service tests on a quantity of British-built self-contained jet engine starters. If satisfactory they may eliminate or curtail the requirements for ground auxiliary power units for ground starts and for starter-generator methods now used.

► First practical application of the Bell X-1 supersonic research test plans as a military aircraft may be in an air-to-ground guided missile developed from the rocket plane. A special launching gear to kick the missile down and forward from a mother-plane—a B-29 or B-50—is being prepared for the missile, which probably will be designated Rascal.

► British tests on molded plastic aircraft wings indicate that their scientists are still not producing pure plastics strong enough for primary aircraft structure. Use of metal reinforced plastics is the aim of their current research.

► Nine flight tests flown by Navy pilots on the big double-deck Lockheed Constitution XR60-1 for NACA study indicate time lag between control motions and the resulting airplane response more noticeable than for smaller airplanes. The 153,000-lb. airplane uses hydraulic boost on all its controls. The tests which sought to investigate critical tail loads included maneuvers in pitch, yaw, and rolling pullouts with speeds for some maneuvers as high as 290 mph.

► Actuators built by Aeroproducts division of General Motors are coming into use on some interesting new aircraft, including the McDonnell XF3H-1 Demon and the Bell X-5 research variable-sweep-wing plane. A new hydraulic horizontal stabilizer actuator with an electrical standby system is supplied for the Demon's all-moveable stabilizer. Two electro-mechanical actuators of special design are supplied for the X-5 to vary the sweep of the wings and, at the same time, vary the position of the wing to compensate for the shift in the center of gravity of the airplane.

► Use of the single-point ground refueling system for B-36 and B-50 bombers, has gone into service operation at Castle AFB, Calif. Process makes use of the same fuel inlet on the receiver plane that it uses in air-to-air refueling. New method requires a new type F-6 fuel truck, and eliminates need for jumping the hose nozzle from one fill-point to another. The new system pumps 600 gal. min. and is considered faster, with a single truck, than the old plan, even when two trucks were used.



## Washington Roundup

### Wilson vs. Sawyer

Growing behind-the-scenes friction between Defense Mobilization Director Charles Wilson and Secretary of Commerce Charles Sawyer is breaking into the open.

There's general Administration agreement, in principle, that Wilson's policy-setting Defense Production Administration ought to be merged with National Production Authority, the operational agency in Commerce Department under Sawyer.

The issue: whether control goes to Wilson or Sawyer. The President is putting off decision.

When and if it comes, observers are sure it will go in favor of Wilson. They point out:

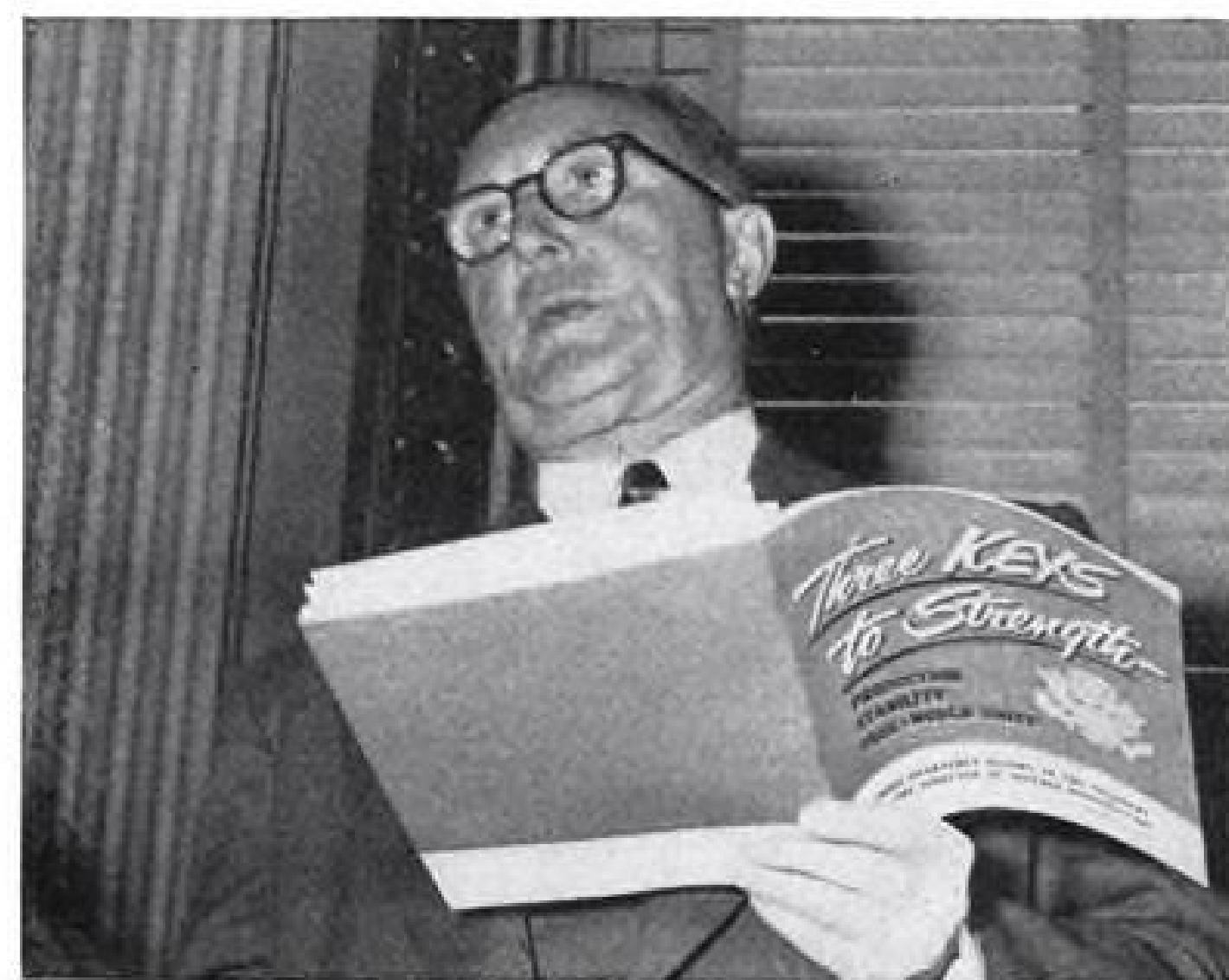
- Of the two, Wilson's resignation would be the greater loss to the Administration. He symbolizes the mobilization effort.

- Secretary of Agriculture Charles Brannan and Secretary of Interior Oscar Chapman are adamant against lodging materials allocation control in Commerce—it would likely mean preference for business over farm and power requirements.

Meanwhile, Wilson and Sawyer are stepping on each other's toes.

- In testimony on Capitol Hill, Wilson made it clear he isn't satisfied with the way NPA is following through, is doing something about it, and intends to do more.

His report: "It is already becoming very clear that we cannot depend fully on the present functions of NPA,



WILSON: All the bottlenecks aren't in the business build-up.

let us say, with regard to certain industries' efforts. We have to augment that. We have got to put on some trouble shooters. For example, in steel and copper and aluminum and machine tools, we have to augment their (NPA's) present efforts. We have to break the bottlenecks. We are getting small organizations together. Today we are out combing the country to try to get a half dozen experts that we can put on the terrific machine-tool situation, which is a horrible bottleneck."

- And Sawyer is invading Wilson's policy field. In a Toronto speech, the Commerce Secretary advocated letting \$300 million in U. S. defense contracts to Canadian firms. When queried on the hands-across-the-border program by Sen. John Sparkman, Wilson replied: "I don't know anything about it. I just read about it in the morning's paper, too."

The next Wilson-Sawyer skirmish may be over funds. The Senate has okayed a 10% transfer of DPA's \$3 million and NPA's \$30 million—either way. The House will probably go along.

The proposal came from Sawyer and Manly Fleischmann, head of both DPA and NPA. Fleischmann has sided with Sawyer all the way, since the outset of the mobilization program plumping for placement of DPA, as well as NPA, functions in the Commerce Department.

Under the proposal, transfers "may be made by agreement between the Secretary of Commerce and the Administrator of the Defense Production Administration with the approval of the Bureau of the Budget"—which would leave Wilson out.

### No More Entertaining?

A contractor whose representative so much as picks up the lunch check of a procurement officer now risks stiff reprisal.

In its aim to end the "influence racket," Congress has put through a tough law.

It says: Any Defense Department contractor who offers "gratuities (in the form of entertainment, gifts, or otherwise)" to a representative of the department "with a view toward securing a contract or securing favorable treatment with respect to the awarding or making of any determination with respect to the performing of such contract" (1) gets his contract canceled, (2) is subject to breach of contract penalties, and (3) to exemplary damages amounting to from three to ten times the amount of the gratuity—even if it is only "offered."

### What to Expect

- More bars to officers taking higher-paying jobs in industry.

Congress has already put one discouragement in their way: No more retirement pay for regular officers who voluntarily leave the service before reaching statutory retirement age—unless the individual is "unfit to perform the duties of his office" or the Secretary of Defense certifies that retirement is "in the best interests of the service, or is required to avoid cases of individual hardship."

Legislation introduced by Rep. Walter Norblad, a member of House Armed Services Committee, would flatly ban resignations by regular officers before the age of 62, except for physical, moral or mental reasons.

- More obstacles for civil aviation, as military spending and claims on materials, shifts into high gear.

Signs of this:

- Congressional impatience with Undersecretary of Transportation Delos Rentzel's request for \$150,000 for civil aviation mobilization. It was turned down in toto. Rentzel's point that a plan for orderly requisitioning of aircraft for war should be on hand, brought the senatorial reply: "If World War III comes, the Department of Defense will have worked out its plan for mobilization and requisitioning of aircraft from the civil aviation industry. And its plan will be 'the' plan because it is 'the' Defense Department."

- Indications that Defense Department won't back up subsidies to airlines as "essential" to "national defense."
- Office of Defense Mobilization's failure to give air transportation a place in the mobilization program.

—Katherine Johnsen

# AVIATION WEEK

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## AF Reveals Shifts in Aircraft Schedules

- Fighter schedule being switched from Republic to North American due to lack of forgings, engines.

- Other changes, mostly minor, to be disclosed to manufacturers soon in Washington meeting.

- But AF undersecretaries say in interviews that no drastic revisions are needed in current program.

By Ben S. Lee

New USAF aircraft production schedules involving major shifts at two plants and less drastic changes at others are to be spelled out to the heads of aircraft companies within ten days when they are called to Washington to get their revised assignments.

Two of the nation's top fighter producers—North American Aviation and Republic Aviation Corp.—will figure in the most important rescheduling: NAA is being asked to step up production of the new F-86F version of its Sabre to take the place of the sweptwing Republic F-84F which version is being deferred.

In interviews with AVIATION WEEK, both retiring USAF Undersecretary John A. McCone and his successor, Roswell L. Gilpatric, scouted any drastic revision to be made in current aircraft schedules.

According to Gilpatric, USAF is not rescheduling programs to more realistic proportions. There is no need for such a move, he says, because schedules are already in harmony with the military needs. Rather, he states, Air Force is revising delivery schedules in keeping with current and projected industry output capabilities.

"Only two major aircraft companies are to be materially affected," McCone declared. "We are shifting schedules presently calling for considerable quantity of Republic F-84F aircraft to North American and are asking them to step up production of the F-86F correspondingly."

"Except for minor revisions to various schedules, none of which are important enough to comment upon," McCone continued, "no other aircraft manufacturer is to be materially affected. The industrial base for Air Force expansion has been laid."

"In my opinion, the existing base of itself is sufficiently broad and firm, ex-

cept in a few relatively minor instances, to support the aircraft and engine production schedules presently contemplated, without further increase in plant."

► Wing Trouble—Gilpatric explained that production difficulties in manufacture of the F-84F wing had necessitated switch of F-84F schedules to the F-86F. Design specifications of the F-84F call for forge-pressed wing spars which would have taken 100% output of Wyman-Gordon forge press facilities without regard to its commitments to Boeing and other manufacturers. Until redesign of the wing is accomplished, production of the F-84F will be temporarily shelved.

Company officials told AVIATION WEEK that the rescheduling would probably place F-84F production at Farmingdale into phase about the same time that General Motors began production of the plane at Kansas City. This would place production phase-in of the F-84F around September, 1952, officials explained. Air Force spokesmen were a little more conservative and placed initial production at Farmingdale as beginning at year-end 1952.

### Production Blocks

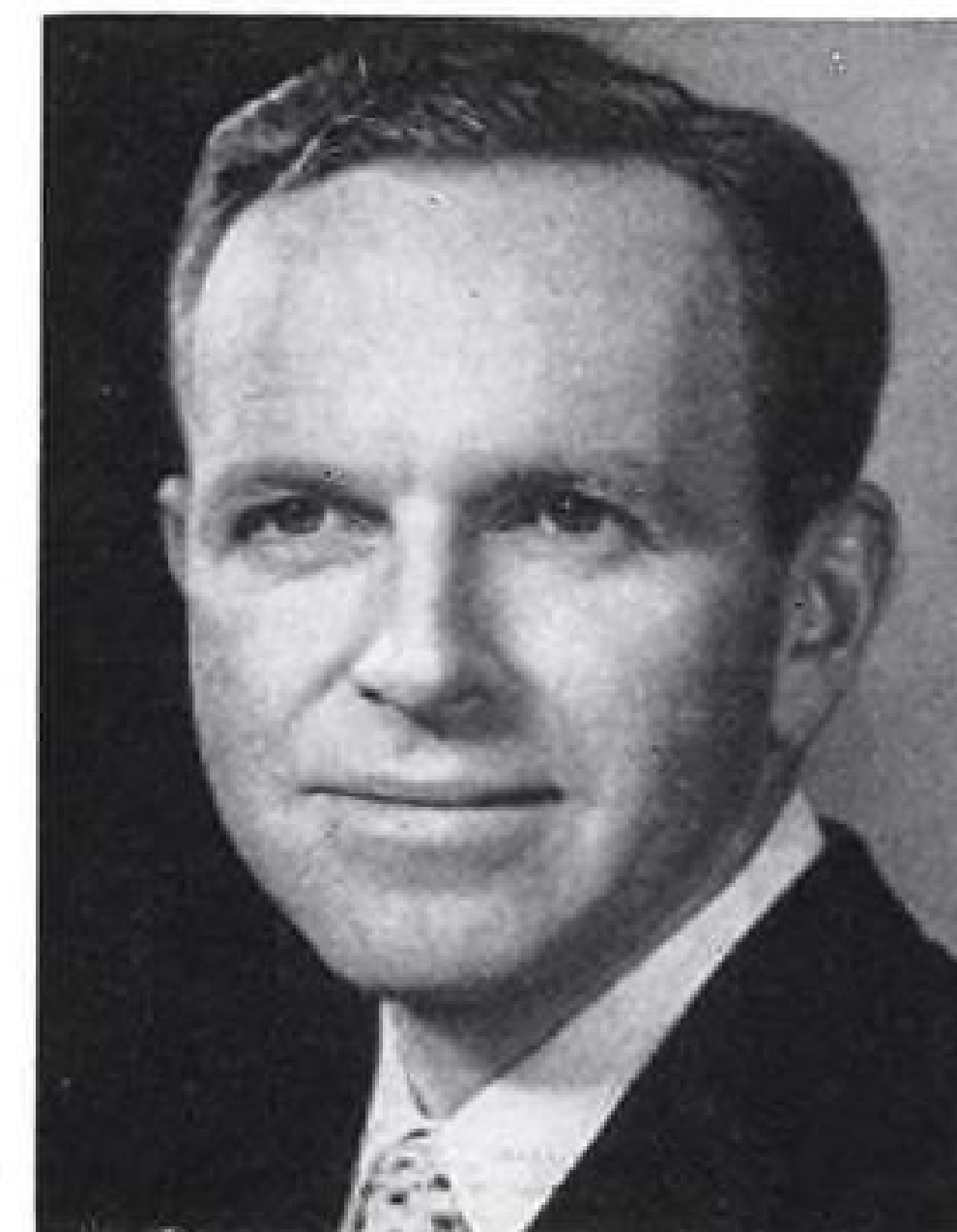
Gilpatric said that even if the wing spar problem had not come up the unavailability of Curtiss-Wright J-65 Sapphire engines would have made the reassignment of the F-84F orders necessary.

It is expected that Republic will continue in production of its current straightwing F-84G fighter for overseas MDAP use until it has discharged these commitments. By that time the F-84F may be ready for phase-in or another look may be taken at the whole situation. But, in any case, continued utilization is expected of Republic's fighter capacity.

Other aircraft scheduled for combat



McCONE: Production is a mixed pattern.



GILPATRIC: No need to reschedule.

wings of the Air Force are pretty much on schedule and with little delay thus far, Gilpatric told AVIATION WEEK.

While precise tally of Boeing B-47 production is classified, deliveries of this medium bomber, in very round numbers, will fall short by something less than 50 aircraft this year. Gilpatric expects that Boeing will be able to pick up those deliveries as production problems are stabilized next year. They have been hit, as have others, by material shortages, labor and components manufacture, particularly in electronics.

This situation at Boeing is typical of the entire industry. Shortages across the board have slowed production temporarily. Air Force is doing what it can



## Box Score on Aircraft Materials and Tools

Tight supplies of aircraft metals and tools have been a major cause of the delayed production of fighters and bombers vital to national defense. The situation in some cases will improve—recent rains have eased the Pacific Northwest power shortage which had hit aluminum production. In other cases materials will continue tight. Here was the outlook last week:

### Tools

Foundry equipment industry has appealed to NPA for increased allotments for expansion of the national foundry capacity to make castings for machine tools, engine blocks and other items. NPA officials have denied the appeal, on account of lack of materials.

Air Force has invited 150 machine tool builders and 45 tool rebuilders to visit machine tool storage depots at Marietta, Ga., and Omaha, Oct. 18 and 19 to select tools for lease to produce new machine tools.

### Steel

Estimated supply of steel available for all programs military and civilian for first quarter 1952, is 21 million tons.

Structural steel authorized for industrial expansion in the first quarter 1952, will amount to about 50,000 tons more than for the fourth quarter.

### Aluminum

Recovering from the effect of the drought-induced power shortage in the Pacific Northwest, every aluminum potline in that region is now running at capacity, National Production Authority reports. Aluminum Company of America estimates its drought-caused aluminum production losses will be 2.2 million lb. instead of 8 million lb. previously forecast.

NPA has exempted military aircraft manufacturers with A-1 materials allotment symbol from the order given to

other manufacturers to reduce from 60 days to 45 days the supply of aluminum they can keep in inventory.

Direct military demand for aluminum will be 80 million lb. greater in the first quarter 1952, than in the fourth quarter 1951.

### Copper

Defense Mobilizer Wilson has released 30,000 tons of copper from the national stockpile for defense needs in addition to the 25,000 tons of copper which were released Aug. 17.

NPA says it expects no appreciable increase in copper production before 1953 and that with inventories in mills virtually exhausted, current production must supply all needs.

to alleviate the situation as are other government agencies concerned.

► **Engine Output Low—Engine production is critically low, Gilpatric admitted.**

Part of this is due to the comparatively recent introduction of the jet engine into the military picture. Shortages of nickel, titanium, columbium, cobalt, and other metals are taking their toll.

Biggest factor affecting the overall engine picture is labor difficulties—strikes, work-stoppages, etc. The engine program will be discussed at length with the manufacturers shortly in an effort to get at the core of this particular problem.

► **Too Many Spares—One** definite course of action, Gilpatric expects, will considerably ease the engine shortage situation for the aircraft manufacturer. Dr. Edmund P. Learned, of the Harvard Business School, special consultant to the Air Force, has just completed a study of the Air Force's entire engine program, which Gilpatric plans to place in effect.

Dr. Learned has proposed that engines and parts and components which are ordered into storage depots, pipelines, etc., are excessive.

Currently USAF orders spares in quantities assuring six to eight months

supply for each delivered aircraft. Navy requirements in this field are similar. Dr. Learned reports that it would be expedient to lower spare requirements to a more realistic program until the production picture is crystallized and stabilized.

This report indicates that supplies in reserve could be cut virtually in half until production goals are achieved without harming the operational efficiency of the Air Force.

The Learned report does not ask permanent change in policy for spares and components procurement and deliveries to maintenance and storage facilities. It asks only that they be revised as a temporary expedient. But, Gilpatric said, from the long-range view, a fat larder is necessary for military operation.

► **McCone's Views—McCone**, who had just quit the Air Force after serving a year to set up USAF production expansion (as he had agreed to with Air Force Secretary Finletter) is optimistic over progress of Air Force mobilization and expansion.

"As is inevitable within an economy in transition from a peacetime status to a condition of partial mobilization," McCone said, "the present production picture, insofar as it relates to aircraft

for the Air Force is a mixed pattern of achievement and disappointment.

"At the outbreak of the Korean War 15 months ago, the regular Air Force was a 48-wing organization largely equipped with World War II aircraft. Since that time, authorized force levels of the Air Force have been revised upward to 58, then 87 and now at 95 with notification by the President and the Joint Chiefs that it must expand still further.

► **Year of the Tool-up—**"This past year might be described, in production terms, as the year of tooling up. By and large, the original modest goals have been met, without serious collision with the competing demands of the civilian economy and without undue strain upon the manpower supply. Deliveries of aircraft, today, are running at a rate twice that of a year ago.

"If the present pace is maintained, I am confident that the rate of production can be doubled again by next spring and more than tripled by the end of next year.

"When consideration is given to the fact that military air expansion is being brought off in the face of a revolution in aircraft and engine design resulting from the advent of jet propulsion and the penetration of the sonic barrier, I

believe a remarkable job has been done," McCone said.

### Expansion Blocks

Three hard facts will control the progress of the expansion program from this point on, McCone said.

• **Shortage of machine tools.** The present stringency in this crucial sector, McCone said, is the result of two circumstances. First the machine tool industry was depressed for several years prior to the onset of the present emergency. Some machine tool manufacturing plants had been shut down; others liquidated partially or entirely; and the industry as a whole was operating at a loss.

Secondly, the extraordinary demands resulting from the revolutionary design changes have in turn created a requirement for many new and unique machine tools hitherto unknown.

"The responsible government agencies, recognizing the critical nature of this particular situation, have begun to apply remedial action. But still more vigorous action is needed forthwith. Even if such action is forthcoming, six months to a year will pass before pilot line production of machine tools can start in many of the new sources, and it will be longer still before these sources themselves are fully tooled up for production.

"Fortunately the Air Force's reserve of machine tools has helped to tide the program over the first critical year. But by the first of next year, the Air Force's entire reserve will be in use. Substantial immediate relief could be had, first, by recourse to additional and as yet idle machine tools still held elsewhere in the military reserve, and next by the taking over of essential tools in private plants not yet participating in defense production.

"The right actions now would do much to break this particular bottleneck. But even so, I venture to say that we won't hear the end of the machine tool problem for another two years.

• **Critical Materials.** "Hard fact number two relates to the intensifying shortage in certain materials. Here again the difficulty arises primarily from the fact that the defense program must still compete, all too often to its disadvantage, with the civilian demand for prime materials.

"For example, the crisis in aluminum, precipitated in part by the hydroelectric power shortage in the Northwest, is almost certain to force a considerable cut-back in the allocation of this essential material for aircraft production, even if we empty our dwindling stockpile.

"And the tight squeeze in copper, as yet unrelieved by the development of

any important new sources, is hindering the Air Force program in many ways, particularly in the matter of electronics equipment.

"In addition, the rarer industrial metals—notably nickel, titanium, Columbium and cobalt—which were in short supply during the last war, are now in still shorter supply because of the ever-increasing quantities needed in jet engines.

"The jet engine program alone could conceivably exhaust the entire visible supply for some years to come, even though a series of ingenious changes in engine design have in many instances made possible the substitution of more plentiful metals.

"The alternatives seem plain enough: Either we master materials, or materials will master us. If the country is to have adequate air power, the control and allocation of critical materials must cut deeper than is presently the case.

• **Strikes and stoppages.** "Hard fact number three—the current wave of strikes and work stoppages that already approach industry, have reached wide proportions. These constitute an obstacle to defense production as formidable as that of the machine tool and critical materials shortages.

"The summer strikes among many major producers of materials and component parts have hit the aircraft industry particularly hard, most notably as regards the production of jet engines. The slow-down in production which thereby resulted has been further compounded by other strikes affecting machine tool producers and the aircraft industry itself.

"More ominous still, new strikes of crippling proportions are already on the horizon.

"I do not propose to attempt to pass upon the merits of these management-labor disputes. But in a time as perilous as this, the consequences of intransigence, whether on labor's or management's side, can no longer be tolerated. The public interest demands, it now seems plain to me, that at least during the critical months ahead, while the military establishment is being brought up to strength, nothing less than full and uninterrupted production shall be acceptable."

### Navy View

Replying to an AVIATION WEEK query, Navy Bureau of Aeronautics last week stated that it does not anticipate calling in representatives of the aircraft industry "en masse" to confer on production status or plans for any production re-scheduling.

BuAer, it was explained, has been operating on a balanced airframe-engine schedule basis for some time. When slippages occur either in engine or air-

frame production, the Navy contractors affected are notified and their schedules adjusted accordingly.

For example, there is at the present time some slippage in connection with McDonnell F3H production programming which is under study. Contractors concerned will shortly be notified and their scheduled readjusted, BuAer said.

## It's Definite Now: CAA Takes a Slash

Sharp retrenchment of Civil Aeronautics Administration funds is now definite for 1952.

The \$155-million fiscal 1952 outlay for CAA which Congress forwarded to the White House for final action last week compares with the \$214 million allotted for 1951.

The President had asked for \$200 million. The House voted \$160 million; the Senate \$158 million. But joint conferees came out with a final version below that originally voted.

Civil Aeronautics Board fared better. The \$3.6 million finally approved compares with \$3.5 million the Board had last year. The President had asked for \$3.9 million.

This is what CAA has to spend during the 1952 fiscal year:

• **Establishment of air navigation facilities—**\$10.5 million, plus \$12 million to liquidate contracts already entered into. CAA had \$19 million for new obligations last year.

• **Air navigation development—**\$1,874,562 to wind up the long-range program now being abandoned, which looked to an all-weather flying system.

• **Airports—**\$18.7 million, plus \$10 million to liquidate old contracts. This will mean a slowdown on projects already underway, and in CAA plans for moving ahead with new projects. CAA had requested \$24 million for new projects, and in addition planned to spend \$30 million this year for liquidating contracts. CAA had \$24 million for new obligations last year—\$5.5 million more than it will have this year.

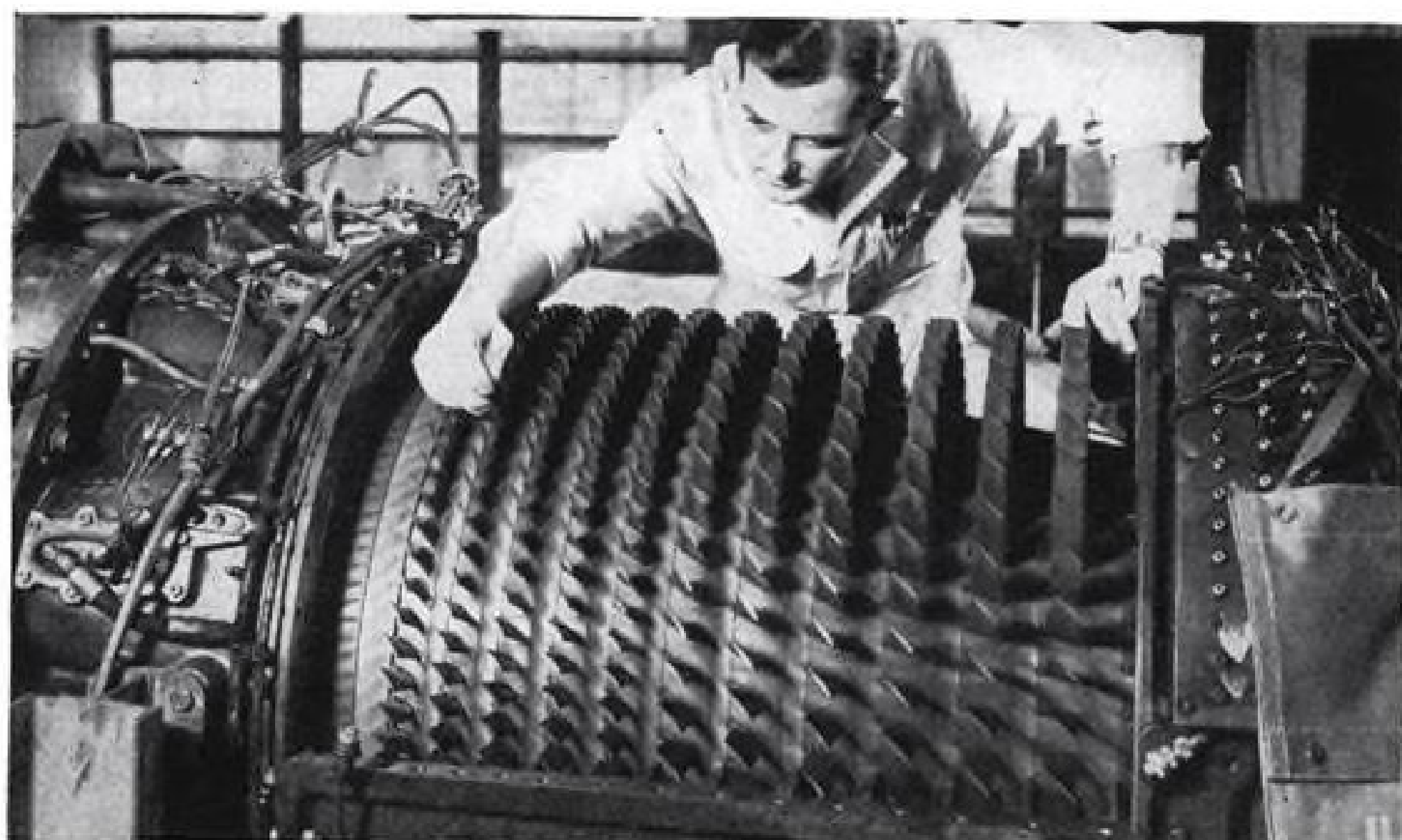
• **Administration—**operation of the airways, safety enforcement, etc., \$99,100,000. CAA spent \$99,699,524 on these activities last year, when it didn't have the burden of additional mobilization traffic.

• **Technical development—**\$1.2 million CAA had \$1,375,000 last year.

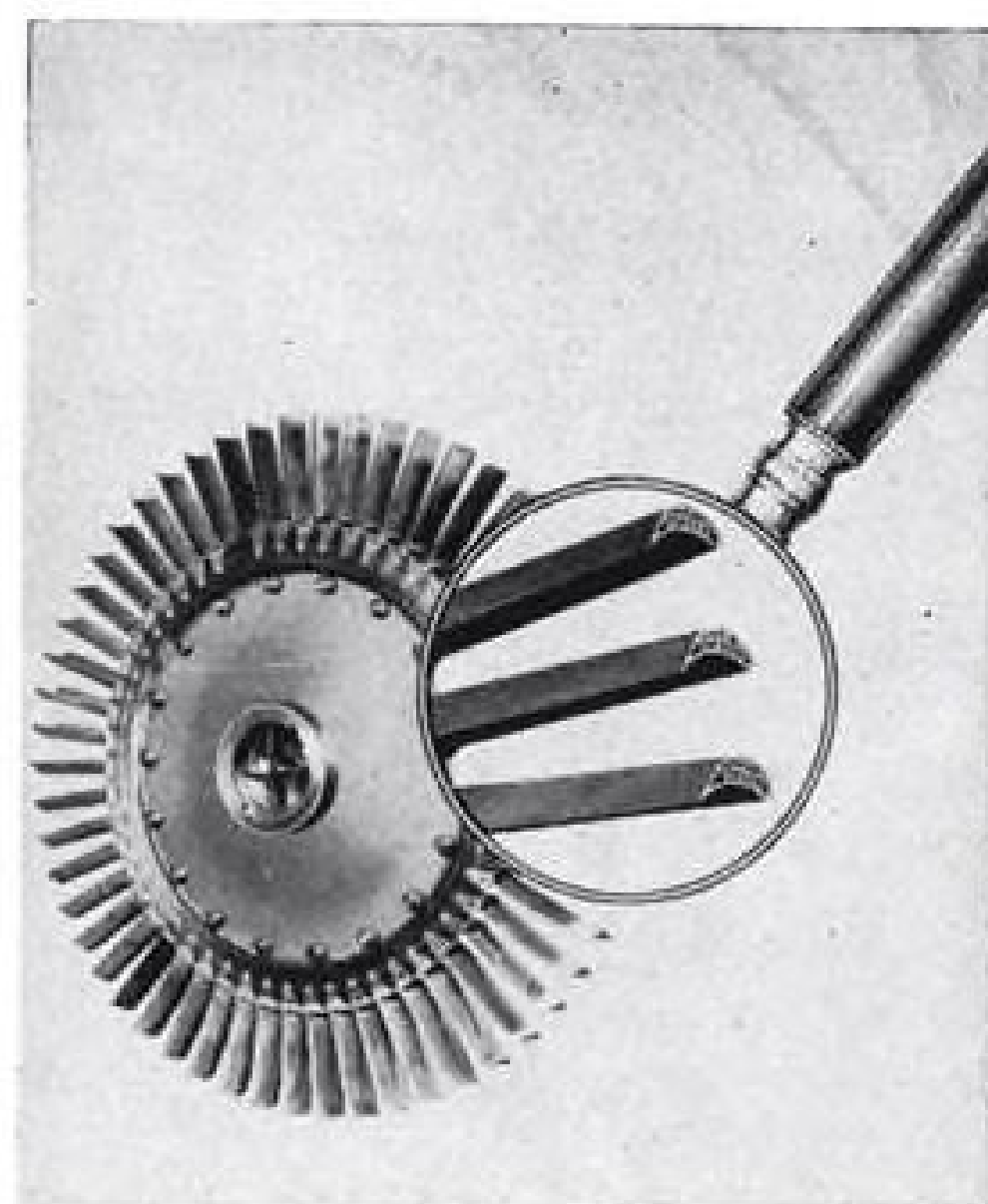
• **Washington National Airport—**\$1,300,000, for operation and maintenance—the amount required last year, plus \$75,000 for construction.

Commercial plane testing is out, probably for another year. Congress turned down the request for \$600,000 to get the program for testing new types of planes for commercial operation under way.

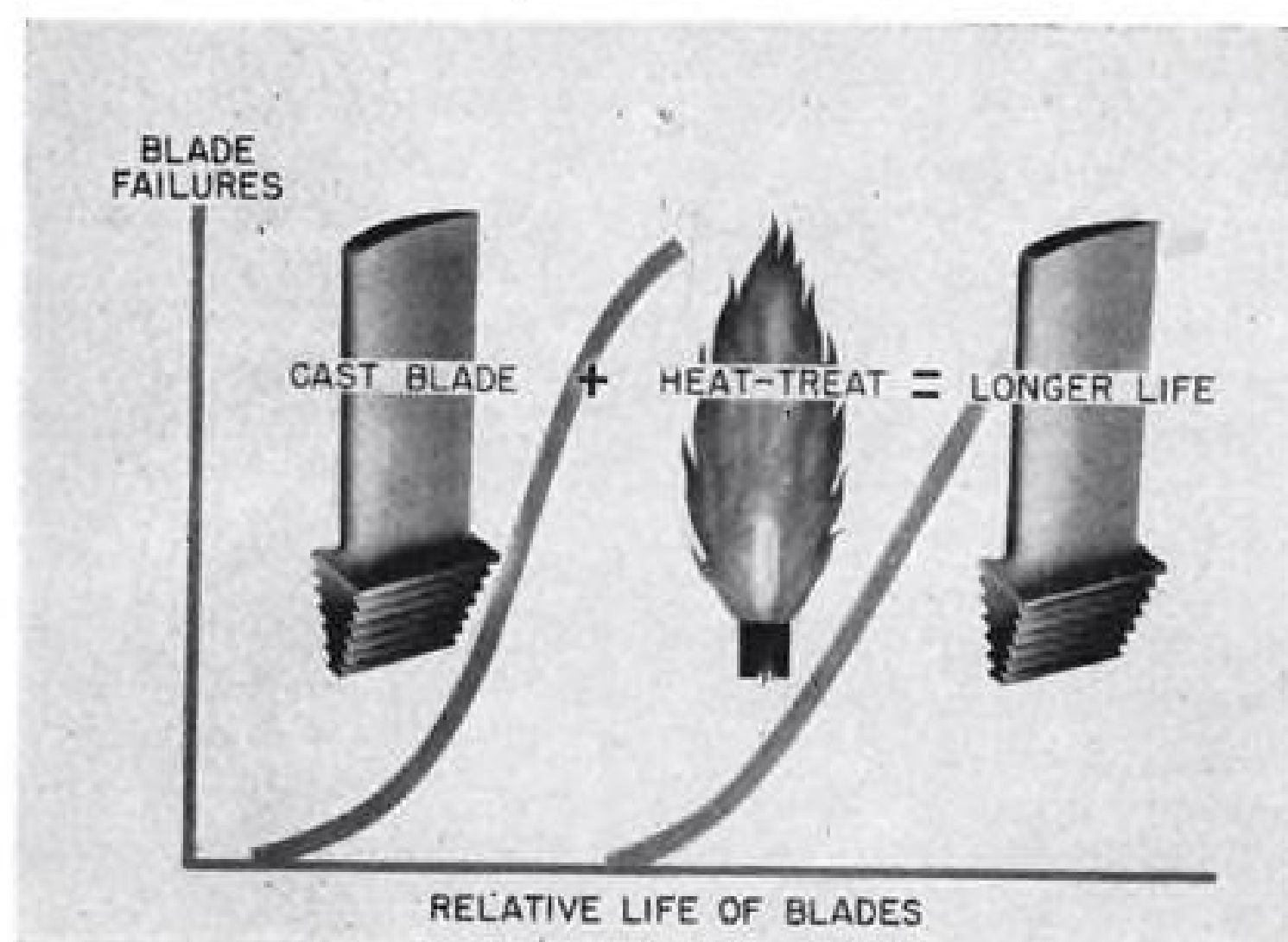




BLADES of this J-47 engine axial-flow compressor would be cooled by . . .



AIR flowing radially from tubular passages.



LIFE of turbine blades has been lengthened by . . .



NACA experiments such as this with oversize model.

## NACA Shows Cooler Blades for Hot Jets

• Higher operating temperatures in jet engines give more power, but require metals that are scarce.

• Now research has resulted in ways to cool turbine blades. Use high temperatures with available metals.

By Alexander McSurely

Cleveland—New methods of cooling aircraft turbine blades and new treatments of turbine blade materials developed through NACA research are available here as answers to problems set up by the materials shortages facing the U. S. aircraft engine industry.

Pressures on airplane engine manufacturers currently applied by DPA Administrator Manly Fleischmann to use fewer critical materials are being tackled by the top brains of government research agencies and they find:

• Experimental studies show that a new method of cooling aircraft turbine

blades by inserting tubes brazed into the hollow interior of a blade will provide sufficient cooling to enable the blade to withstand temperatures greatly exceeding resistance of present day solid blades. Result of these cooling tests is expected to be a finding that the cooling arrangement will make possible use of less strategic materials than has heretofore been anticipated in projecting future aircraft powerplants.

• If properly cooled, low-temperature alloy steels will serve as well as a high-temperature alloy with 97% strategic metal without cooling would do.

• Arrangements to cool the rotor disc using vanes or other devices will make

it possible for the disc to withstand much higher temperatures than it would take without cooling.

• Combinations of ceramic materials and metals now practicable will make it possible to achieve three times the life of current best alloys at current jet engine operating temperatures.

• Use of heat treatment will double the life of non-strategic materials used in jet engine blades.

The problem of substituting non-critical jet engine materials has become one of increasing urgency with the demand for large-scale engine production to build up to the proposed 140-wing U. S. Air Force.

► Cold or Hot—NACA research scientists state flatly that rates approaching the 18,000 jet engines a year which are called for are impossible using the scarce cobalt and columbium materials now specified for blades.

The seemingly paradoxical technique of cooling blades so they can be subjected to greater heat has been devel-

oped from an immediate postwar blade design which was a simple hollow blade cooled by air bled from the main engine compressor through the turbine wheel. After this came an experimental hollow blade with internal fins to increase the cooling area much as the fins on cylinder heads of a piston aircraft engine cool such a powerplant. Packing the blade-cooling cavity with small metal tubes brazed in place was the next step as a practical production method of getting equivalent increase in cooling area without the complications of mass-producing internal blade fins.

The NACA engine testers say that such a tube-filled blade is relatively easy to make and gives satisfactory cooling. It is being suggested to manufacturers and several are already understood to be interested in its possibilities.

► More Economical—In present jet engines more than half of the air that passes from the compressor through the combustion chambers is not burned but is used to reduce the temperatures of the burning gases to limits that the engine's structural members will withstand. NACA researchers say it is more economical to use some of this extra air to cool the turbine parts. That will make it possible to burn additional quantities of the air in the combustion chambers, thus increasing gas temperatures and thrust of the engine. Or the cooling advantage presumably could be used in employing less critical and low temperature materials for the blades.

A demonstration of the effectiveness of the tube-filled blades at the NACA Lewis Laboratory showed that the temperature of uncooled blades dropped from 1,400 deg. to 1,100 deg. when only 1% of the air was bled for cooling and the blade temperature dropped successively to 875 deg. and to 775 deg. as the cooling air flow was increased first to 3% and then to 5%, although the gas temperature remained at 1,400 deg.

NACA scientists expressed great faith in the future of ceramel (combination of ceramics and metals) as a blade material replacing present strategic materials. On a strategic index of materials, ceramel is only two-tenths as critical as the alloys currently used. Moreover the life of the ceramel blade is approximately three times that of the current alloy blades.

► New Type Mounting—The blades are formed by cold press and sintering and hot pressing has also been used experimentally.

With the advent of the ceramel blade, NACA expects to see eventual obsolescence of the familiar fir-tree blade mount, which has not worked well for the ceramel blades. A new type of mounting has been devised which uses four metal pins to hold the blade in place in the wheel.

## Two Strikes End

• Issues still unsolved, but Truman appeal honored.

• CIO seeks car bargaining practices in air industry.

Executive board of United Auto Workers-CIO in special session at Washington last week authorized striking UAW locals at Douglas Aircraft Co. and Wright Aeronautical Corp. plants to call off their strikes, in response to President Truman's appeal, relayed by Wage Stabilization Board. The locals were expected to comply with the national board's authorization and the strikes were expected to end last week.

However the union executive board declined a third WSB request to end a strike at ten Borg-Warner divisions. Instead it offered to work out a special arrangement with defense agencies for resuming production on any item critically needed for defense production.

► Critical of Truman—UAW-CIO President Walter P. Reuther asserted that the union balked on the Borg-Warner request because only 15% of B-W production is defense items; the other 85% he said is civilian production, mostly auto parts. Reuther criticized President Truman's referral of the Borg-Warner strike to WSB and asserted the union should have been consulted before the referral.

Meanwhile at Pratt & Whitney Aircraft's Southington, Conn. engine plant 1,900 striking members of the International Association of Machinists-AFL had returned to work after a four-week strike while negotiations continued over an unlimited arbitration clause which the union had insisted on.

Background on the three strikes acted on by WSB and the UAW executive board is this:

• Douglas Aircraft—Production of C-124 Globemaster II has been halted since Sept. 5 by 10,000 striking employees at Long Beach. The Globemaster, used to evacuate 127 wounded out of Korea in one flight, is the largest transport in production for the Air Force. Issues: wages, improvement factor, union shop, automatic progression. United Aircraft Welders (Independent) also struck over wages at Long Beach, Santa Monica and El Segundo plants.

• Wright Aeronautical—Production of new Sapphire J-65 jet engine halted Sept. 26 by almost 10,000 employees at Wood-Ridge and Garfield, N. J., plants. Issues: wages and welfare demands.

• Borg-Warner Corp.—Production of fuel pumps and other aircraft engine parts halted on Oct. 10 by strikes of

7,000 employees in 10 divisions. Issue: UAW-CIO demand for bargaining corporation-wide instead of in individual divisions.

WSB also was considering a fourth UAW-CIO dispute which Truman sent to the board before a strike began over wage demands. It involves 13 brass and copper fabricating plants, employing 30,000.

► Cars and Planes—Behind UAW-CIO's demands is a drive to impose on the aircraft industry most of the bargaining practices of the automobile industry. These include: bargaining with a corporation with regard to all of its plants as well as cost-of-living escalator, annual productivity increases, pensions and other welfare clauses.

John W. Livingston, UAW-CIO vice president and head of the Union's aircraft department, is a labor member of WSB. He considers himself disqualified to sit only on the Douglas case because he personally participated in bargaining negotiations. He was not certain whether he would sit on the board in the other UAW-CIO cases.

## Dean Says Tactical A-Weapons Are Here

New U. S. atomic weapons can cancel out on the battlefield the numerical advantage of the enemy, Gordon Dean, Atomic Energy Commission chairman recently stated.

No longer is the atomic warfare potential confined to intercontinental strategic bomber strikes at the industrial heart of an enemy country, Dean said in an address at San Francisco. Yet he does not believe the use of tactical atomic weapons on a battlefield would provoke an enemy atomic attack on U. S. cities, because of fear of reprisal from U. S. strategic bombers on enemy cities.

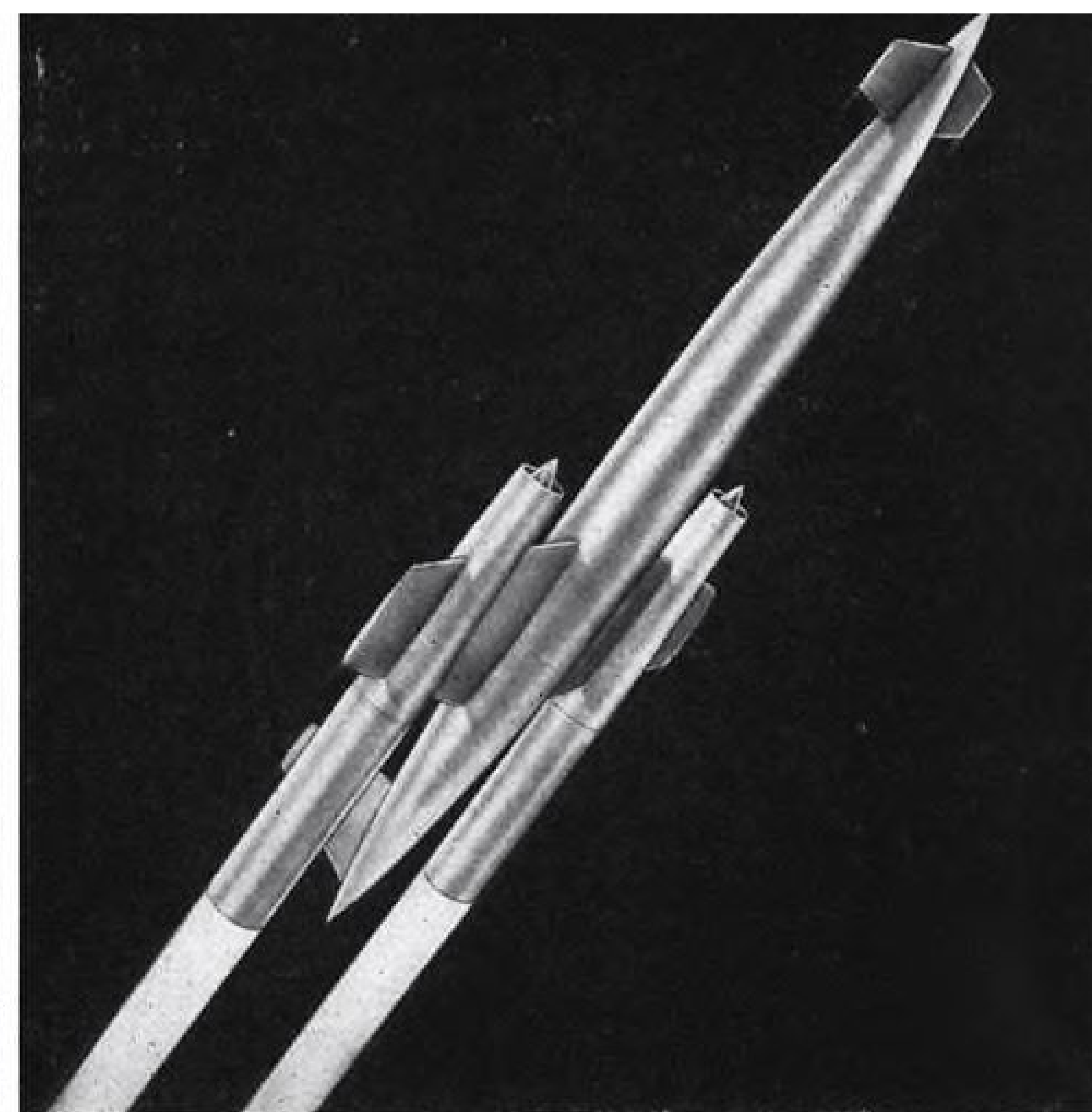
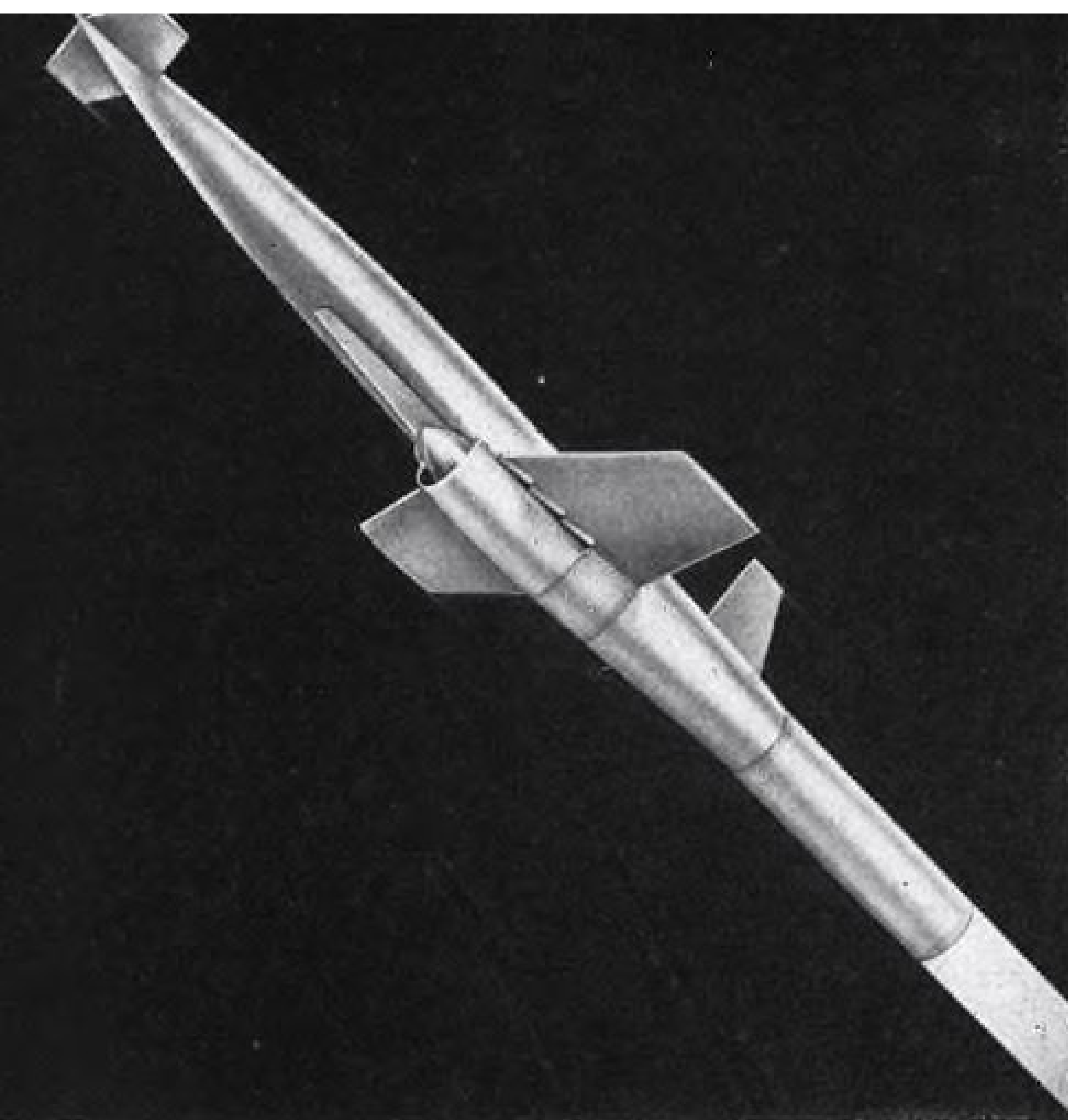
"We are now entering an era where the quantities of atomic weapons available to us will be so great and the types so varied that we may utilize them in many ways heretofore not possible," Dean said.

Besides the actual atomic bombs, these new weapons include the development of experimental atomic-powered planes and submarines. Consolidated Vultee is currently building the airframe for the first atomic-powered plant at Ft. Worth, to be powered by an atomic engine under development by General Electric at Lockland, Ohio.

## Complete F-51 Job

Grand Central Aircraft delivered to USAF the last of 200 F-51s being reconditioned and overhauled under a program which was begun 16 months ago.





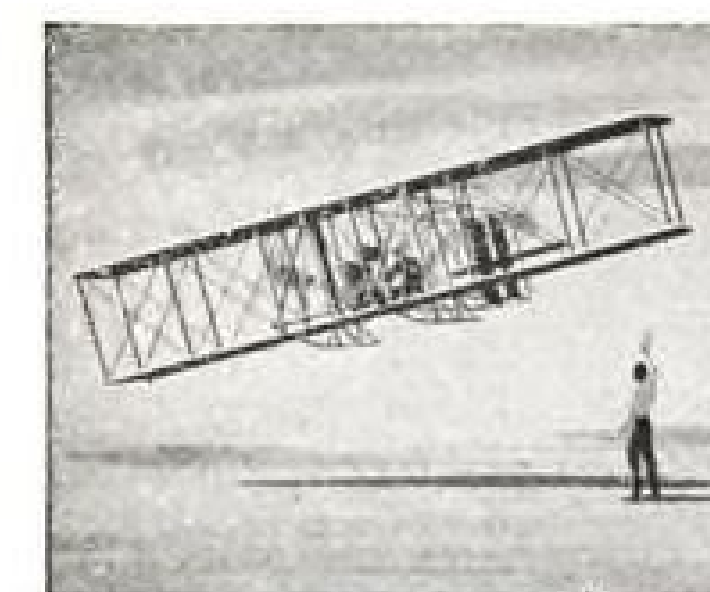
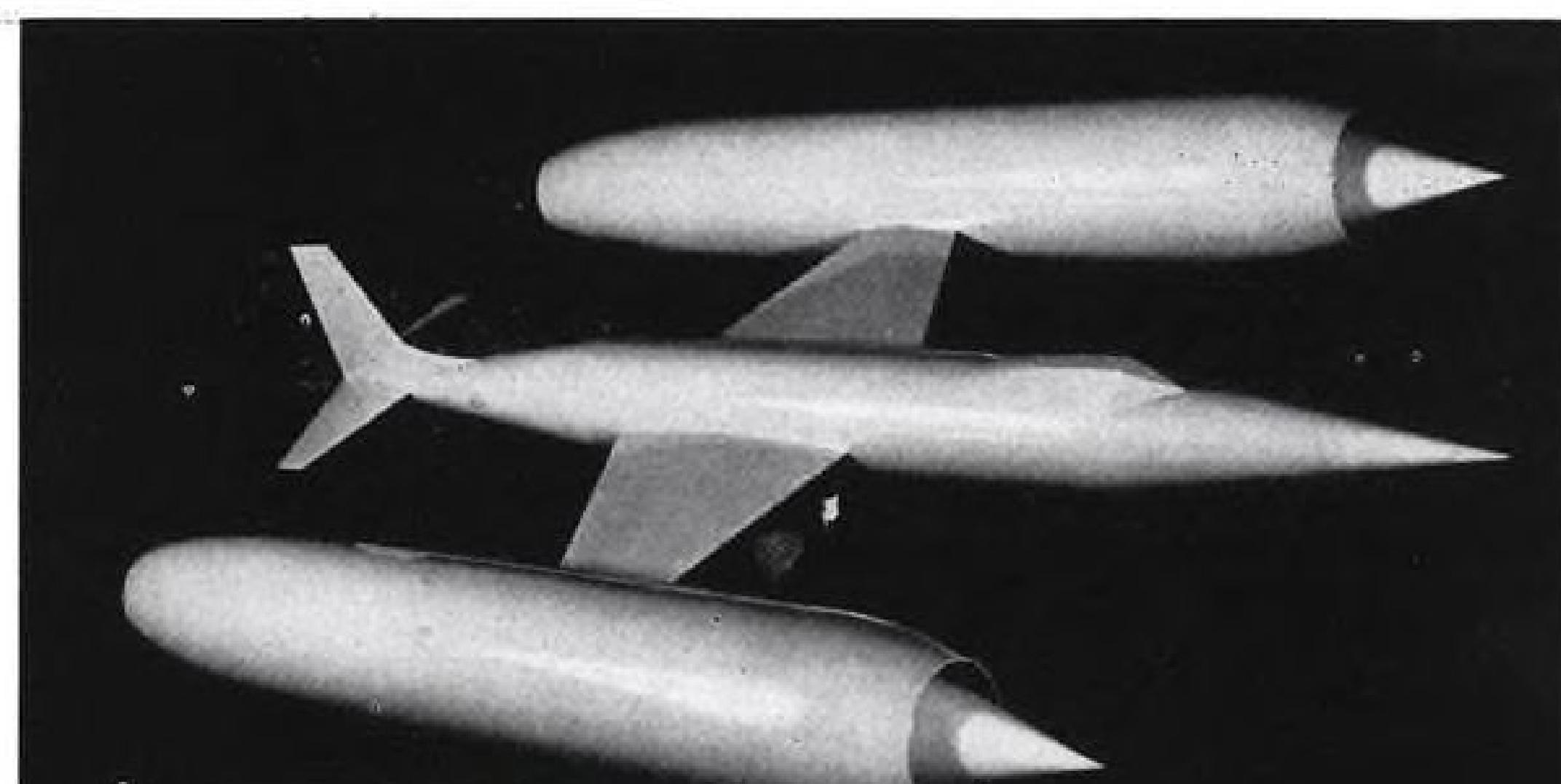
**RAMJET-POWERED** missile model has adjustable air scoop with boundary layer bleed for low-energy air on fuselage bottom. Other model has . . . **TWIN RAMJETS** mounted on wing, a configuration used for research on most efficient nacelle location. Both missiles have canard-type horizontal controls.

## NACA Designs for Super-Speed Missiles



**GOOD** design for hypothetical 1,350 mph. plane, prepared at NACA's Flight Propulsion Laboratory (left) relies on afterburner to double basic engine thrust, allowing small nacelles. But this . . .

**BAD** design, with unaugmented jet engines sufficiently powerful to give same speed (right) would require huge nacelles. Report on other NACA research at the Lewis Lab is on p. 16.



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ALTITUDE.....60,000 Ft. Plus  
WEIGHT COMPLETE SYSTEM.....6.5 lbs. Average

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## AERONAUTICAL ENGINEERING

### Space Flight Talk Gets Down-to-Earth

• Scientists at London agree it's time to start translating theories into practice.

• And they also think it can be done fairly soon—by a civilian organization.

The world's civilian scientists are taking the theory of space travel and applying it to schemes that seem capable of realization relatively soon—perhaps in the next 10 years.

This trend from fancy to fact is now defining astronautical aims within closer limits—near-to-earth satellite orbits for a beginning, and basically practical design thinking to promote early accomplishment.

Significant ideas on the establishment of earth satellites were developed in technical talks and a symposium at the recent Second International Congress

#### Special Report

Because of the growing interest in and approaching realization of space travel, AVIATION WEEK requested the British Interplanetary Society's council member J. Humphries to furnish on-the-spot coverage at the recent Second International Congress on Astronautics. Here is his analysis of the event and some of the highlights of the technical discussions.

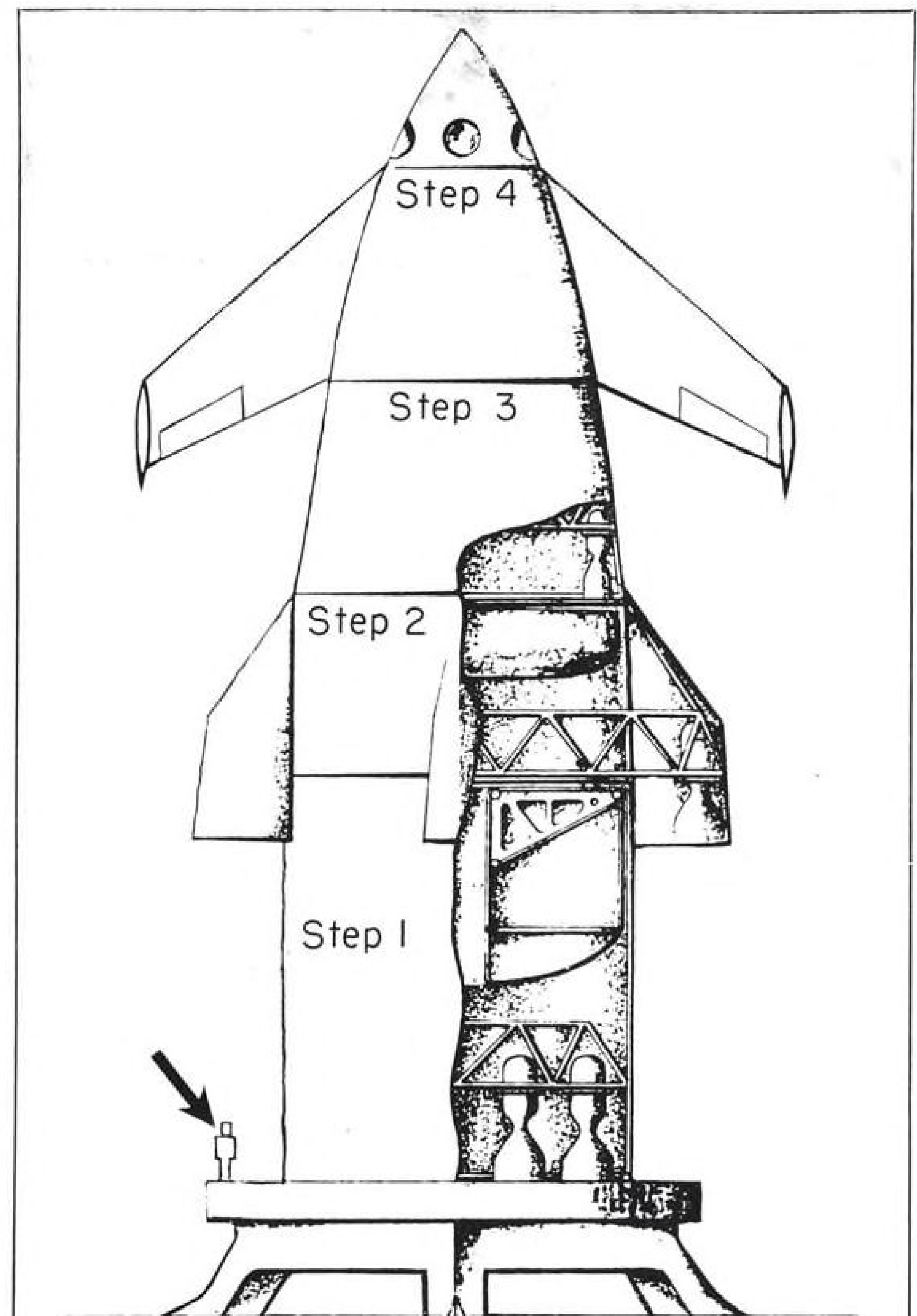
of Astronautics, in London, which was sponsored by the British Interplanetary Society.

The growing importance of these developments, which not so long ago would have been considered in the realm of science-fiction, was further emphasized by the formation of the International Astronautical Federation, the aim of which is to promote the achievement of space flight.

The new federation, which will have headquarters in Switzerland, is the first of its kind. It was effected at a meeting at the Congress of more than 50 delegates of space-flight organizations representing 13 countries—England, the U.S., Canada, France, Denmark, Holland, Sweden, Switzerland, Austria, Italy, Germany, Argentina, and Spain.

Discussions at the Congress covered these highlights:

• Instrument-carrying vehicles.



Data for Four-Step Freight Rocket

	At Takeoff	Three Steps	Two Steps	Final Step
Payload	234	66.1	18.4	3.5
Empty weight	110	33.0	8.65	5.5
Propellant weight	527	134.9	39.05	9.5
Gross weight	871	234	66.1	18.5
Thrust	1,800	400	100	5

HOEPPNER'S SPACE FREIGHTER, as proposed at the London meeting, would be 115 ft. long (note comparison with height of man), with four stages. Stages one and two would fire together, gases from stage two exhausting around stage one.





U. S. DELEGATES to astronautics congress: (l to r) American Rocket Society's F. C. Durant and A. G. Haley, and Pacific Rocket Society's E. V. Sawyer.

- Freighter scheme for space "platform" supply.
- Return flight techniques.
- Nuclear energy application.
- Military and civilian efforts as affecting the overall program.

## 1. Instrument Carrier

It is now generally agreed that an earth-satellite vehicle placed in a stable orbit at some distance outside the earth's atmosphere could perform a large number of functions. This utility, together with various aspects of satellite-vehicle design and operation were discussed in detail in the 17 papers comprising the technical sessions.

One of the first applications is likely to be a small instrument-carrying vehicle in a close orbit—at about 500 mi. altitude.

► **Three Step Rocket**—BIS's K. W. Gatland, A. M. Kunesch and A. E. Dixon in their paper, "Minimum Satellite Vehicles," advanced the possibility of putting a 484-lb. payload of instruments and telemetry equipment into such an orbit. They concluded that it could be done with a three-step rocket using liquid oxygen-hydrazine, and weighing 91 metric tons (metric ton equals 2,204 lb.).

Construction contemplated would be no further advanced than that of the Martin Viking, and the low overall weight would be obtained by casting off the propellant tanks of the first step as they are used—before the complete step is jettisoned.

## 2. Freighter Scheme

As techniques progress, an orbital space-station will be required for research, for example, as an astronomical observatory, and as a refueling base for true interplanetary spaceships. Construction of this outer "platform" would necessitate the use of freight rockets capable of toting the station materials into the orbit. These freight rockets were considered by various speakers.

► **Four Step Rocket**—Ing. H. Hoepfner of Germany's Gesellschaft für Wel-

traumforschung, described a four-step rocket capable of carrying a load of 3.5 metric tons into an orbit at an altitude of 1035 mi., the orbital period being 2 hr. at this height.

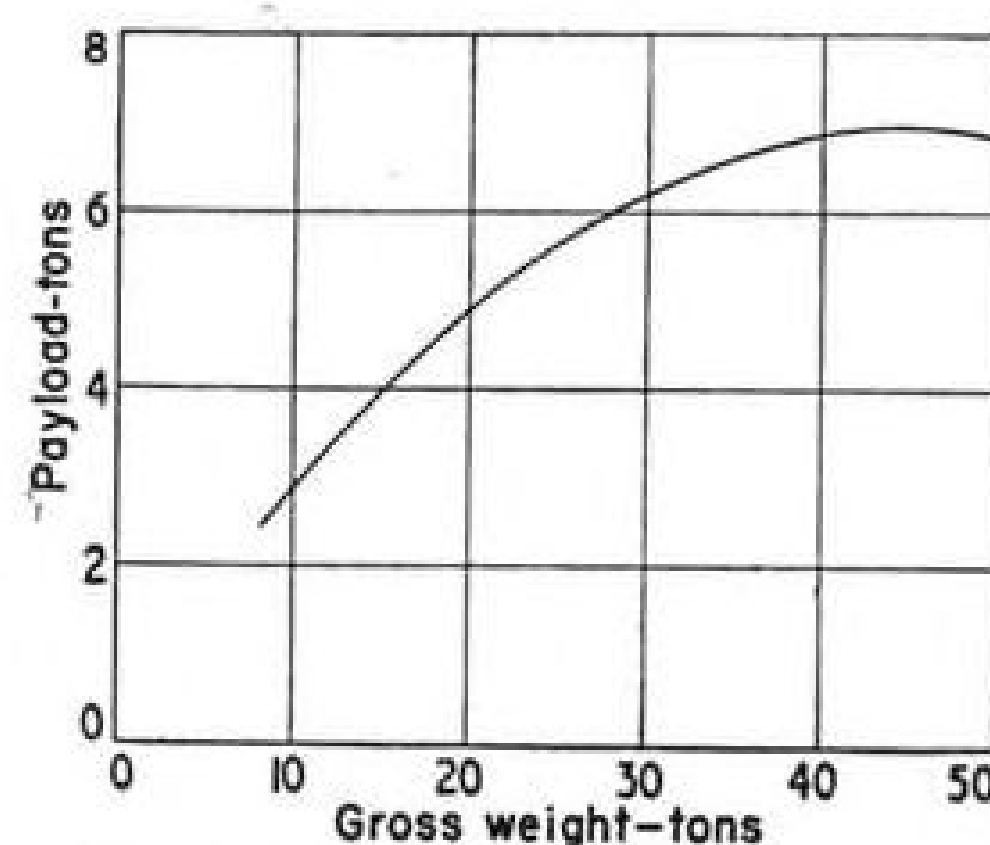
Gross weight of the complete configuration would be 871 metric tons, its overall length 115 ft., and maximum diameter 36 ft.

Propellant mixture would be nitric acid-hydrazine, assumed to have a specific thrust of 300 lb./lb./sec. The first two stages are intended to be recovered by parachute, the third discarded, and the last to remain in the orbit, although a version also was described which is fitted with wings for gliding back to a piloted landing on earth. A brief summary of the relevant data is given in the accompanying table.

## 3. Return Technique

Greatest problem in the glider return technique from artificial satellites appears to be the aerodynamic heating. This was dealt with in detail by BIS's T. R. F. Nonweiler. He proposes an all-wing delta-type glider using a double wedge section with the maximum thickness well back.

Such a configuration would require a very low wing loading—about 6.15 lb./sq. ft. to keep the maximum skin temperature within manageable limits. Assuming a maximum allowable temperature of 1300C., which would occur



PAYLOAD as function of glider size (wing loading 6 lb./sq./ft.).

on the lower wing surface near the leading edge, then a 5-ton payload could be glided down in a craft with a gross weight of 20 tons (long tons).

► **The Limit**—There would appear to be a limit to the permissible payload. This is at a gross weight of 40 tons and payload of 7 tons. Above this figure the payload decreases with increasing gross weight.

It was pointed out that as the high temperature zone was localized it might be possible to raise the local allowable temperature by means of a ceramic insert. Even a small increase in temperature would have an appreciable effect on the maximum allowable size of glider.

## 4. Nuclear Power

Still further in the future is the use of nuclear energy for spaceship propulsion. But even here, artificial satellites may play an essential part. Prof. Lyman Spitzer, BIS member, who also is in charge of Princeton University Observatory, proposed what may prove to be the most economical method of using nuclear energy for such a project.

A ship moving from a satellite orbit around the earth to a satellite orbit around the moon or another planet would require only a small acceleration and could therefore use a small thrust over a very long period.

An electrically accelerated ion beam could be used to achieve an ion ejection velocity of 62 mi./sec. without the use of very high temperatures in the propellant gases. Gases obtained from planetary atmospheres could be used for the propellant. The consumption would be very small, consequently low mass ratios could be used.

## 5. Civilian Effort

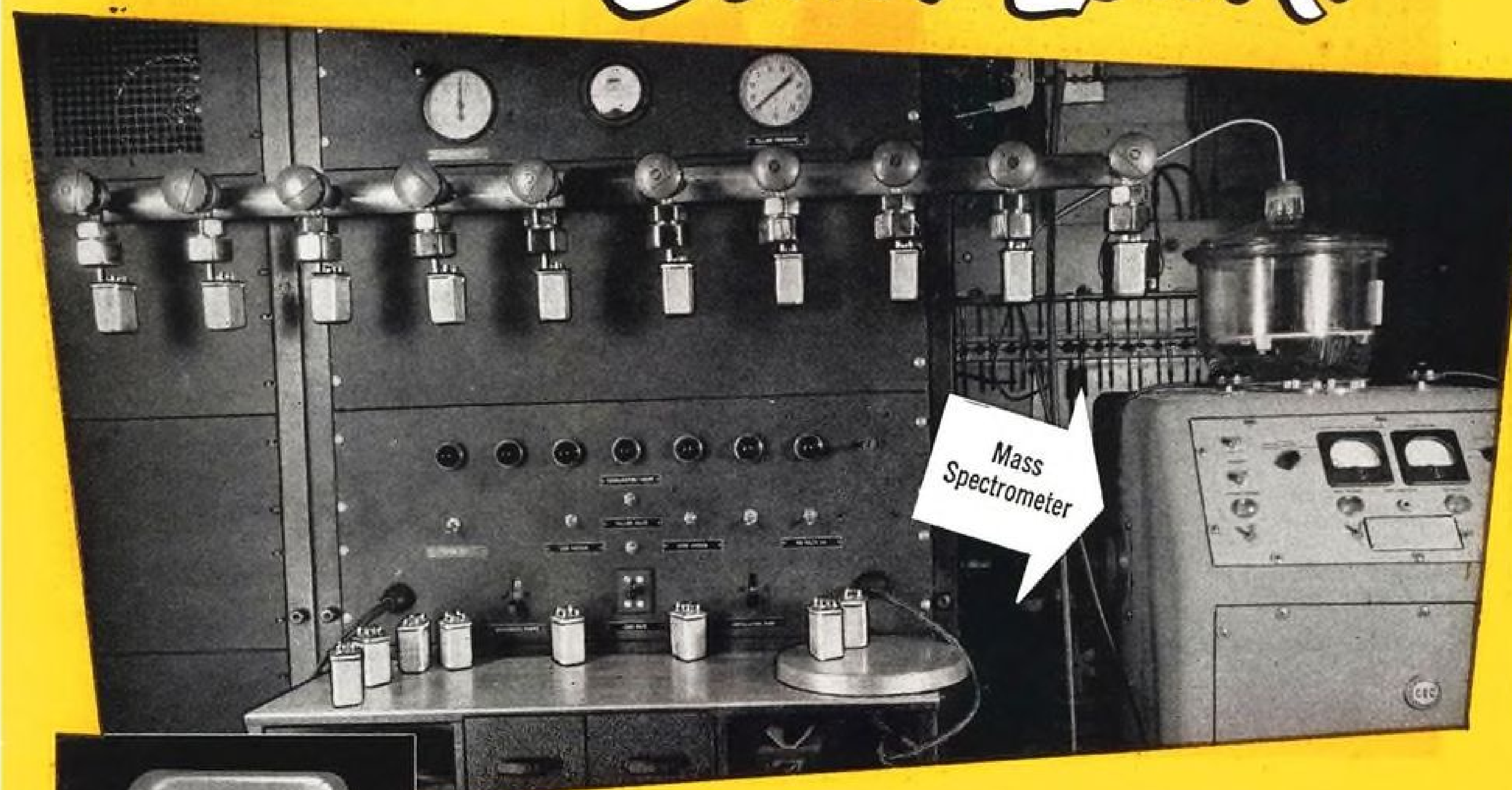
In an interview with the AVIATION WEEK's representative Dr. Eugen Sänger, famed rocket pioneer and authority on flight at extreme altitudes, voiced the opinion that the requirements for military long-range rockets and artificial satellites were on divergent lines. For most military purposes, the available comparatively low-performance propellants would suffice, hence only a small percentage of military effort was likely to be put into developing high-performance propellants such as liquid fluorine-liquid hydrogen and liquid fluorine-hydrazine.

Also, such propellants are nearly always extremely difficult to handle and some of them might remain very expensive, two further points against their use by the military.

► **Job for Civilians**—Sänger considered that the best way of producing an instrument-carrying satellite vehicle, assuming favorable economic conditions, would be to set up a civilian institute for that purpose, rather than rely on military research.

Broadly speaking, this would be devoted to research on basic problems arising in the development of an artificial satellite and the practical applica-

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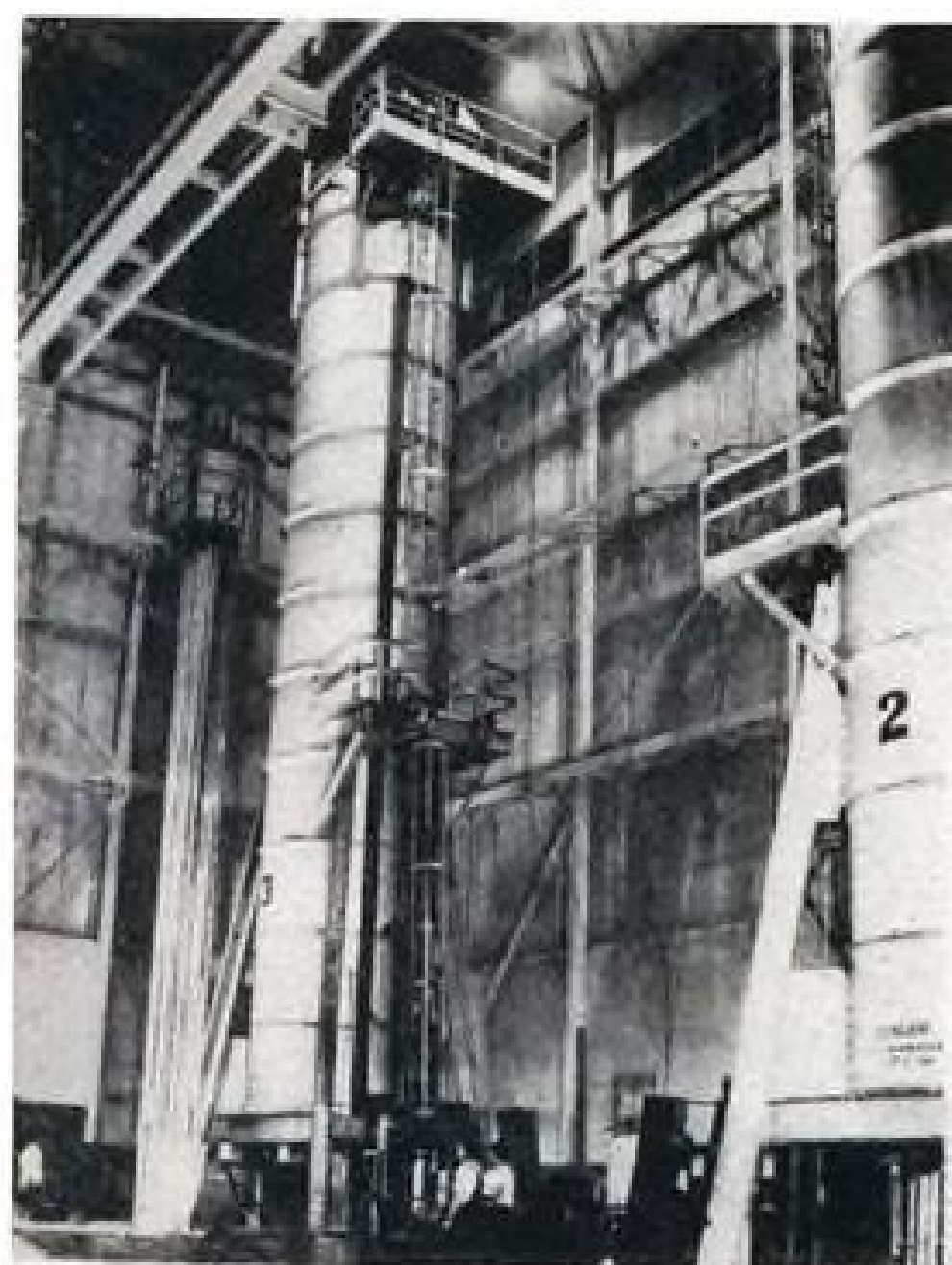
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tions of these studies. One of the main items would be the development of high-performance propellants and the incident basic work, particularly on heat transfer.

Assuming that an institute of approximately the same size and with the same facilities as Peenemunde (where V-2 was developed) were available, it should be possible to develop an instrument-carrying satellite vehicle in 10-12 years.

Sänger is president of the new Federation. In collaboration with Dr. Irene Bretz, he was responsible for the work on Germany's round-the-world rocket bomber program. Although this project was never completed, much work was done on the 100-ton-thrust rocket motor at the Trauen research station, where Sänger was in charge.

Other key personnel in the Federation are vice-presidents Andrew G. Haley of the American Rocket Society and Dr. G. Loeser of the Gesellschaft für Weltraumforschung.



### New Heat-Treat Unit Installed by Harvey

A new vertical heat-treat unit for high-strength extruded materials has been installed by Harvey Aluminum Co., Los Angeles.

This is the third in the company's battery of furnaces specially designed for positioning materials vertically to get higher heat-treat properties and reduction of twist and bow reported involved in some of the older, horizontal processing.

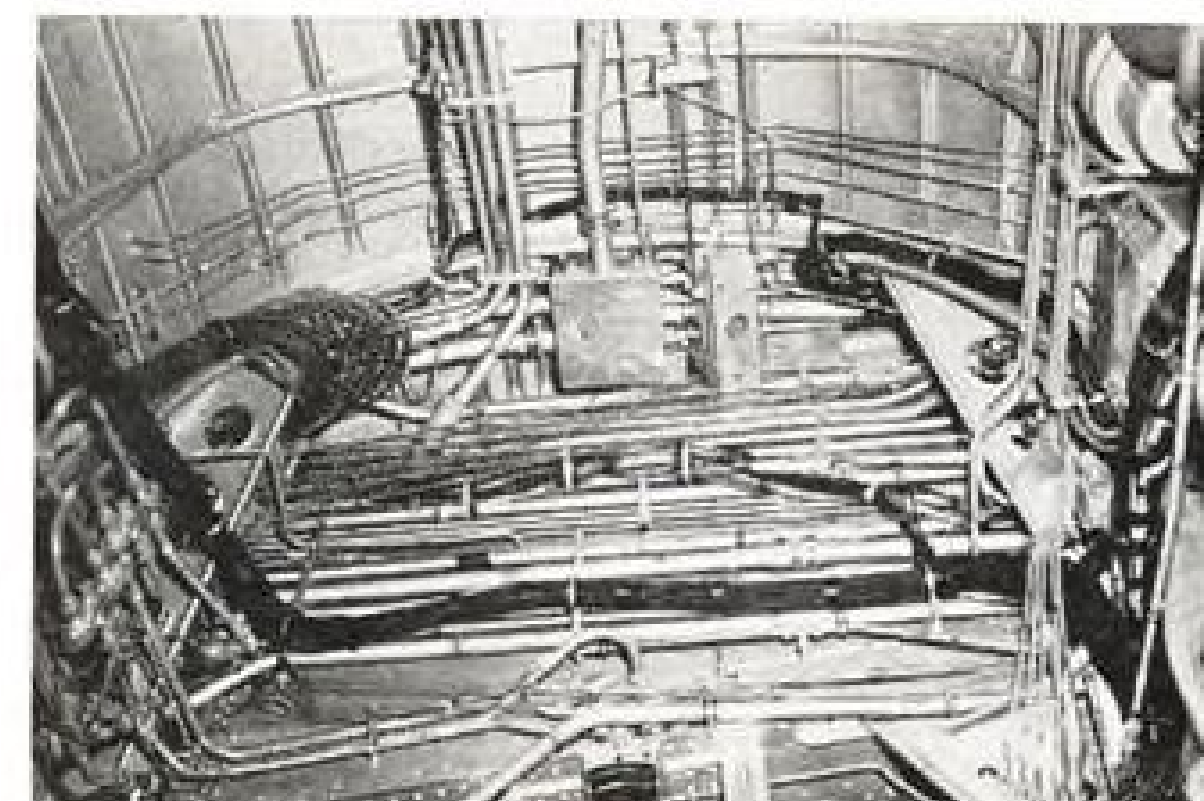
The vertical furnace can heat-treat extrusions more than 45 ft. long and weighing up to 3,000 lb. Electrical heating elements are electronically controlled.

Material is carried on a head holder which lowers into a water well some seven stories deep, then is hoisted into the cylindrical heat-treater. After treatment, the material is lowered into the well for quenching.



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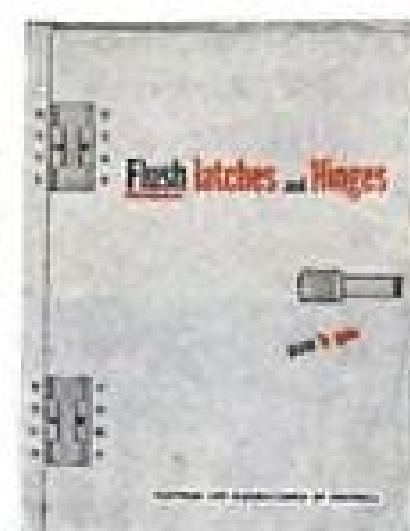
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### The Well Tempered Aircraft—II

## Engineering a Good Design

• First strive for simplicity, although complexity may be the easiest path; next, adaptability.

• The users' needs come first. There's no substitute for good flying qualities and maximum utilization.

Under the title "The Well Tempered Aircraft," Arthur E. Raymond, vice president-engineering, Douglas Aircraft Co., delivered the 39th Wilbur Wright Memorial Lecture before the Royal Aeronautical Society in London Sept. 10. Because it is the most thorough approach to the problems of constructing today's aircraft made by a recognized authority in recent months, AVIATION WEEK is publishing the major portion of Mr. Raymond's paper in installments, including copies of the original drawings. The first appeared Oct. 15 and discussed in detail "Proper Environment" and "Good Initial Choice," the first two of Mr. Raymond's eight fundamental elements essential to production.

### 3. Detail Design

Two aircraft designed to the same specification may differ widely in size, cost, and weight simply because of relative quality of detail design. In fact, much of the progress being made in the art consists in learning how to design a small, efficient aircraft to do the job previously done by a large complicated one. Not only does this hold true of the aircraft as a whole; it is also true of its components, down to the smallest parts.

It is not always appreciated that a pound saving in weight empty may be compounded into ten or more pounds saving in gross weight on modern designs.

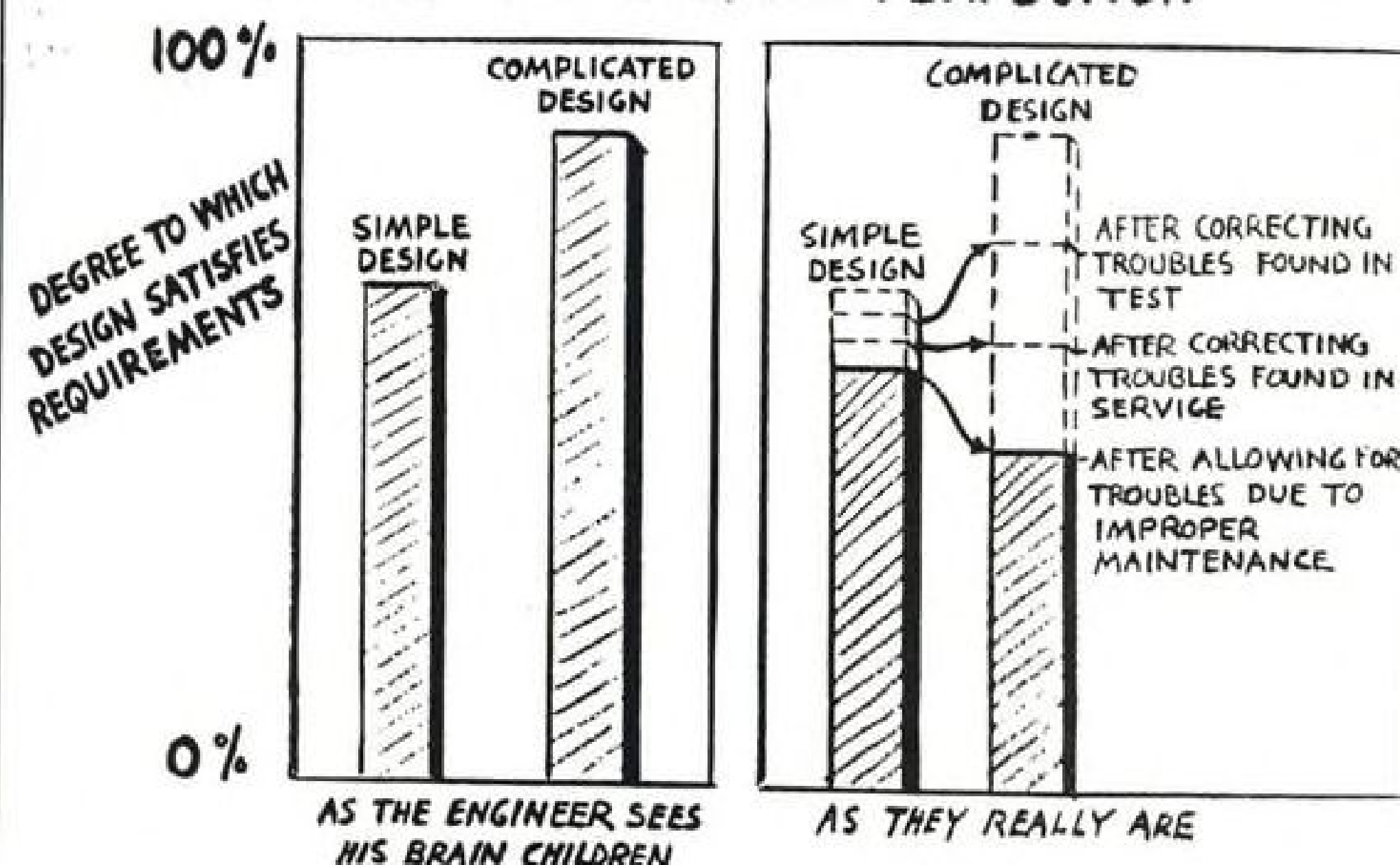
Quality, weight saving, and simplicity are all closely related. The simplest design that fulfills all desired characteristics is likely to be the lightest, with best

performance, and the most dependable and reliable in its operation.

► **Simplicity Best**—In comparing a complicated design with a simple one, engineers often tend to compare them with both designs fully developed and working perfectly, just as the designer intended. In such a comparison the more complicated design often looks better. Unfortunately, all the intangibles act against the complicated design and in favor of the simple one. Some of the intangibles are:

• **Design time.** Aircraft designs are not made in ivory towers; the design of each component must be scheduled, often far in advance of the time that the degree of complexity is known. Thus the complex design rarely gets as much time, in proportion to its needs, as the simple one. Very often the complex design can only be carried to the point where it barely works, and then must

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Both alloys show improved strength and hardness at sub-zero temperatures. And both alloys provide moderate strength at temperatures to 900°F.

"K"® Monel and "KR"® Monel are similar in composition and properties. "KR" Monel has better machinability and is recommended for parts requiring intricate machining.

The principal engineering characteristics of these alloys are:

**Tensile Properties:** "K" Monel in the fully age-hardened condition has a minimum yield strength (0.2% offset) of 100,000 psi and a tensile strength of over 140,000 psi, with minimum elongations (in 2 in.) of 15% and 20% for cold-drawn and hot-rolled materials respectively. "KR" Monel, age-hardened, has a minimum yield strength (0.2% offset) of 90,000 psi with minimum elongation of 20% (in 2 in.) for as-rolled material.

**Shear Strength:** The shear strength of "K" Monel, as determined with .050-in. x .250-in. specimens subjected to double shear, is (full hard, age-hardened) 98,450 psi maximum, with 0.04 in. deflection. The shear strength of "K" Monel rivets, fully age-hardened, is 89,200 psi with ultimate tensile strength of 147,000 psi.

**Spring Properties:** "K" Monel wire can be cold-drawn and age-hardened to develop 160,000 to 200,000 psi tensile strength. The torsional proportional limit of cold-drawn, age-hardened wire is about 40% of the ultimate tensile strength.

**Endurance Limit:** In rotating beam tests of polished speci-

mens at room temperature and 10,000 r.p.m., "K" Monel (cold-drawn, age-hardened) showed an endurance limit for 10<sup>8</sup> cycles of 41,000 to 59,000 psi.

**Magnetic Characteristics:** "K" and "KR" are non-magnetic under ordinary conditions and remain so at sub-zero temperatures.

**Working Characteristics:** Both "K" Monel and "KR" Monel may be hot-worked, forged, and cold-worked. "K" Monel may be readily machined in the annealed condition and may be considered commercially machinable at practical rates in other conditions with Brinell hardness of up to 275. "KR" Monel, because of higher carbon content and special thermal treatment, has better machinability than "K" Monel and is recommended for parts requiring more intricate machining. Because of greater hardness, both alloys will take a higher polish than Monel. Both may be joined by the usual welding, brazing, and soldering processes.

**Corrosion Resistance:** These alloys are highly resistant to attack by most commonly-encountered corrosives, including mineral and organic acids, alkalis, salts, potable and industrial waters, foods, organic compounds, and oxidizing atmospheres at normal and elevated temperatures.

**Forms Produced:** "K" Monel is supplied in most commonly-used mill forms—rods, hexagons, squares, flats, strip, sheet, seamless tubing, wire, welding materials—and in a variety of finishes and conditions. "KR" Monel is produced in rods, hexagons, squares, hot-rolled and cold-drawn.

**Applications:** Because these alloys retain their non-magnetic, corrosion-resistant, and high physical qualities at abnormal temperatures, they have been used to advantage in aviation instruments, roller chains for retractable landing gear, controls, springs and contact arms in electrical equipment, in stressed structural members and fastenings.

<b>"K" MONEL</b> Effect of temperature on physical properties (Age-hardened condition)						
Test Temperature °F.	Yield Strength (0.20% offset) psi.	Tensile Strength psi.	Elongation in 2 in. per cent	Creep Strength (0.10% in 10,000 hr.) psi.	Hardness (Brinell)	Impact (Charpy) ft.-lb.
-300	160,200	202,000	27	...	...	...
-110	134,600	171,550	17.3	...	36 (Rock. C)	27
Room	111,000	160,000	23.5	...	331	27
200	108,000	150,000	23.5	...	...	...
400	103,000	149,000	24	...	...	...
600	105,000	146,000	23	...	...	...
750	...	...	...	67,000	...	...
800	105,000	124,000	8.5	48,000	302	...
1000	92,000	95,000	3	8,500	255	...
1100	...	...	...	...	229	...
1200	80,000	80,000	1.5	...	...	...
1400	30,000	45,000	8	...	...	...

### FURTHER DATA AVAILABLE

A 23-page reference manual, *Engineering Properties of "K" Monel and "KR" Monel*, contains all essential engineering information on these alloys. It is available, free, for your files.

For help on specific metal problems involving corrosion, high temperatures, or fatigue, write directly to Inco's Technical Service, outlining your problems.

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be frozen, under pressure from the schedule, while the simple design, with time to spare, can be refined. Thus, those components which are simple tend to be more highly developed and free of service difficulties than those which are complex . . .

► **Maintenance.** When a design is so simple that its method or operation can be grasped by a mechanic, it stands a good chance of being properly maintained; while a design beyond the mechanic's understanding, in spite of maintenance manuals, placards, training courses, will rarely be as well maintained.

► **Problem in Psychology.** Carry-over of learning from previous designs is a major aid in reducing troubles in service. A design developed from a previous design, if the basic principles are still correct in the new application, is usually better than a completely new one.

It takes engineers a few hard knocks to make them realize this; some never do.

An engineer likes to take pride in a new and original design; he gets more satisfaction from this than from improving an existing one. It is a problem in psychology to get designers to take pride in the reliability and trouble-free operation of their product, rather than in the originality of their concept. On the other hand, using an old design in new conditions, to which it is basically unsuited, can be equally as bad.

► **Refinement of Design.** When refinement of design is carried on with the idea of making it meet requirements more exactly, it often results in more complication, higher cost, and in general, a poorer overall design. This is the disease referred to as "perfectionism."

Where refinement takes the form of conscious simplification, more often than not the result is a real improvement . . . But even simplification, carried on too long, results in the basic concept falling behind the state of the art.

Complication is sometimes the path of least resistance for the designer. It is either the result of lack of knowledge or lack of adequate thought. The sim-

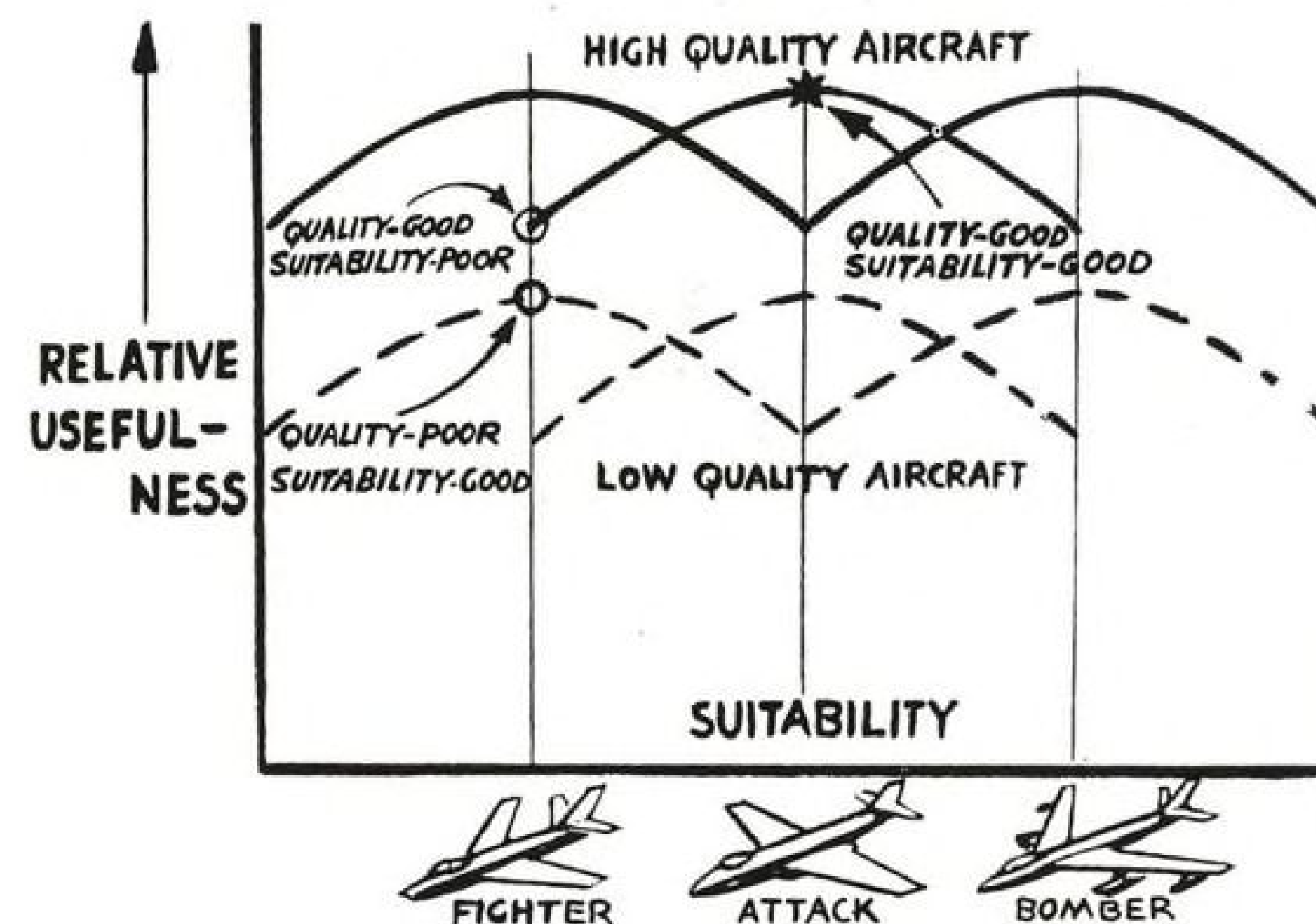
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### THE SUITABILITY-QUALITY CONCEPT



ple way of doing something is not usually the one that springs first to mind.

To achieve simplicity it is often necessary to make a succession of designs of detail parts and throw each one away in favor of a better solution.

► **Illusion of Economy.** Designing to a fixed budget rather than for a certain level of excellence may result in a spotty combination of good and bad elements. Designing to a fixed budget may be good if the budget is properly set. If it is too low the result is illusory; the cost of the original design is kept down but the costs of the subsequent development necessary to reach an acceptable level of perfection are higher.

There is such a thing as inherent simplicity. Certain aircraft configurations lead toward straightforward and simple solutions of detail problems. Other arrangements make one fight every step of the way.

It is often found also, as the design progresses, that small deviations from the initial requirements may make major simplification possible. Hence, the importance of keeping the door open to permit detail modification of the requirements for the general benefit of the whole.

► **Adaptability.** Another quality which carries through, all the way from the general arrangement of an aircraft to the detail design of its components, is its ability to absorb future technological improvement.

An aircraft designed for one particular type and model of engine in such a way that the replacement of that engine by another of somewhat different size and characteristics can only be accomplished by major structural altera-

tions, is in a highly vulnerable position it that engine fails to come through as anticipated.

Nor can it take advantage of successive future improvements in powerplants as they come along through the years.

If the design is to remain well-balanced through successive increases in power some thought must be initially given to adaptability to carry more payload or even different types of payload. For passenger transport aircraft, the nature of these future changes can be fairly well anticipated in advance; with military aircraft, life and usefulness may be greatly increased by the installation of items of military equipment which were not even dreamed of at the time of initial design.

Wing area, planform shape, and thickness ratio can be chosen for highest initial efficiency, or some leeway can be left for later growth. The same holds true for propeller diameter.

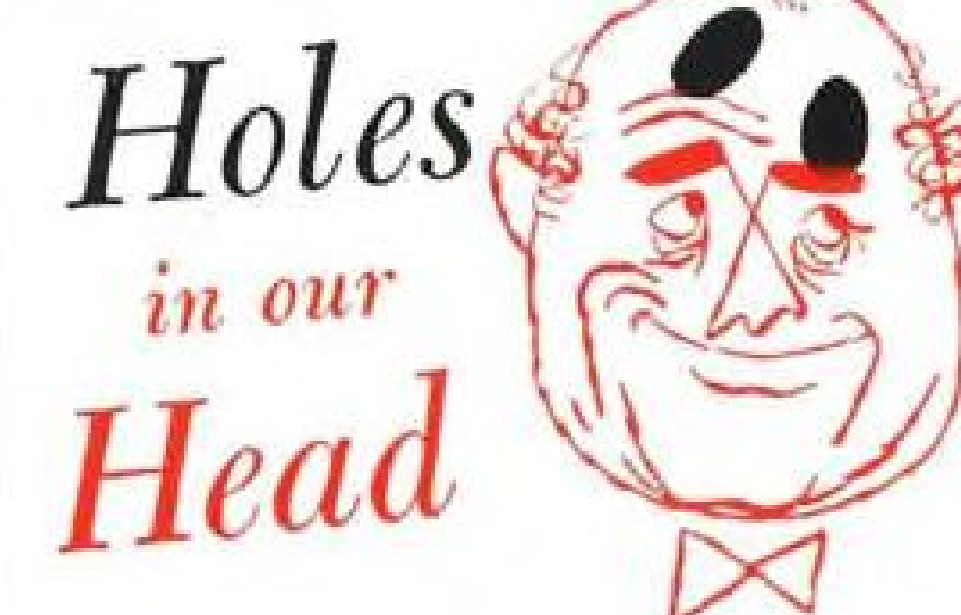
A long view is required to sacrifice immediate advantage for the benefit of longevity. A good aircraft may be in service for ten years or more and it is wise to keep its growth possibilities well in mind from the beginning.

► **Safety.** An aircraft in operation possesses both kinetic and potential energy. Not only is it moving rapidly; it is apt to be a long way up. Too rapid absorption of this energy spells danger.

Many new devices are placed on an aircraft in the hope and expectation that they will increase safety. Sometimes such devices end up by doing just the opposite.

If the failure of a safety device in service occurs more often than does the failure it is intended to protect against

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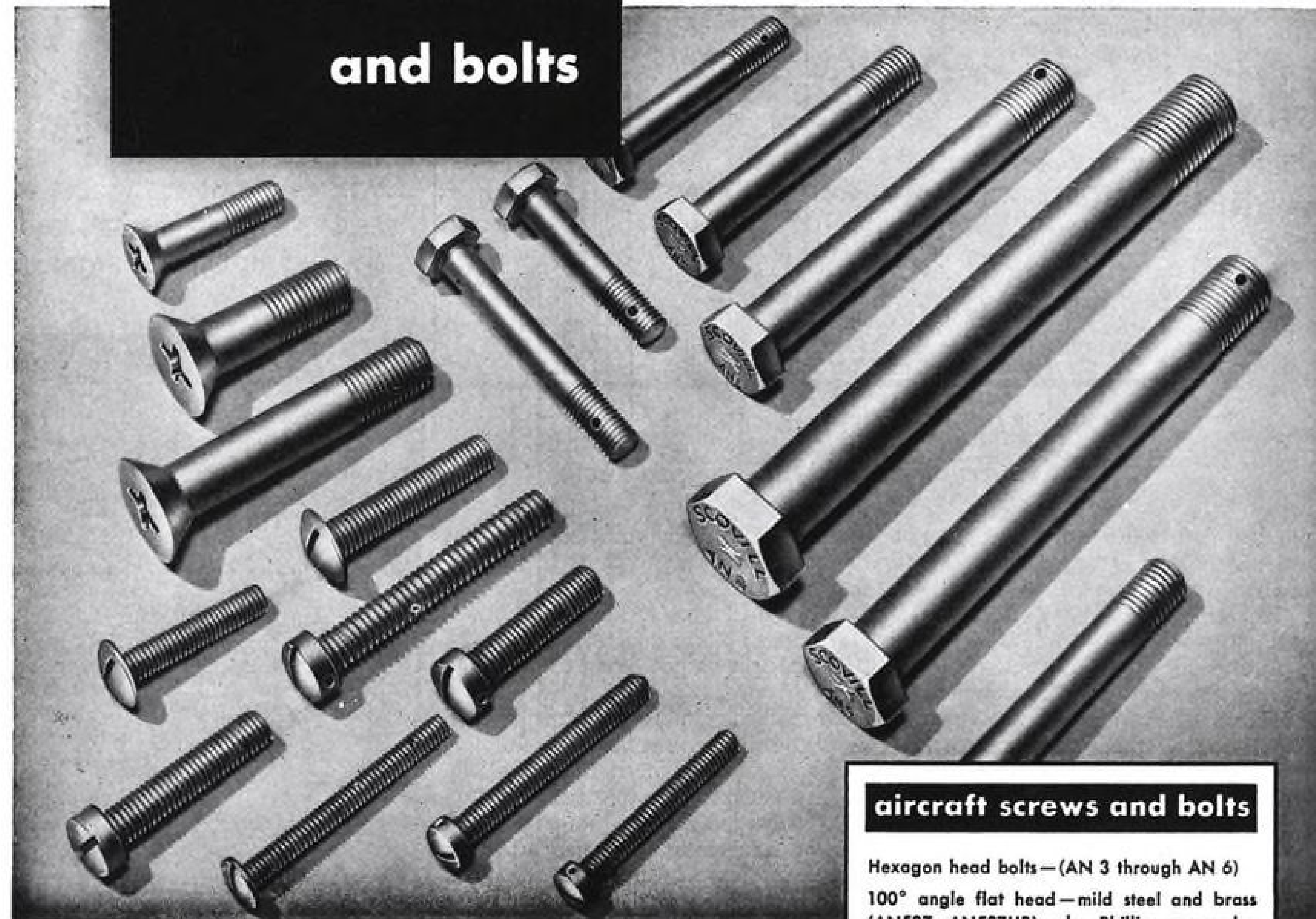
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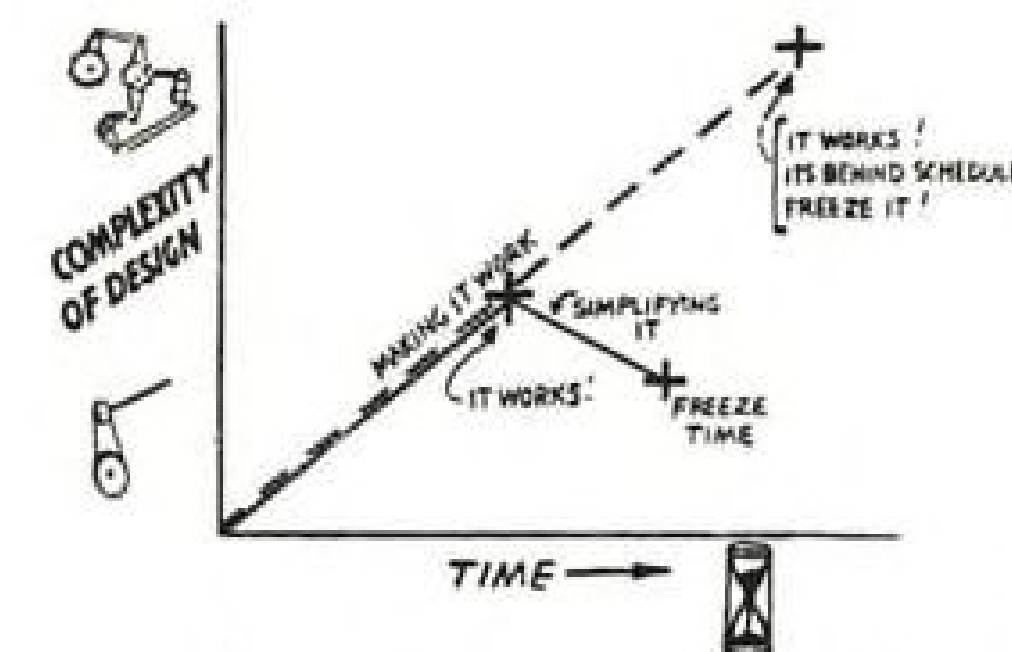
Hexagon head bolts—(AN 3 through AN 6)  
100° angle flat head—mild steel and brass (AN507, AN507UB); also Phillips recessed—cadmium plated—carbon steel (AN507), alloy steel (AN509)  
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Washer head screws—cadmium plated—alloy steel (AN525)  
Carbon steel machine screws—slotted or Phillips recessed—cadmium plated (AN500, AN501, AN505, AN510, AN515, AN520, AN526)  
Brass machine screws—slotted or Phillips recessed—plain or oxidized (AN500UB, AN501UB, AN505UB, AN510UB, AN515UB, AN520UB)  
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... it is certainly not a true safety device.

Similarly, systems backed up by other systems which will presumably be used if the first system fails, in turn backed up by other systems, and so on, simply tend to multiply the insecurity.

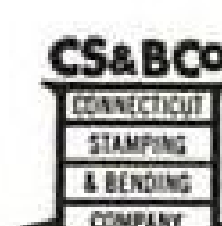
The constant shoring up of a poorly conceived design with crutches here and props there, rather than ... throwing the whole thing out and replacing it with a properly designed component, is a penny-wise and pound-foolish policy.

► **Style**—The aeronautical profession is beset by stylists and faddists. For a few years an attempt is made to operate everything electrically; then hydraulics becomes the rage; then a reversion to mechanical controls. At the present time there seems to be too much subservience to the god of electronics. Experience of all these things shows that they all have their troubles and they all have their place; the one that will do the best job should be chosen, not

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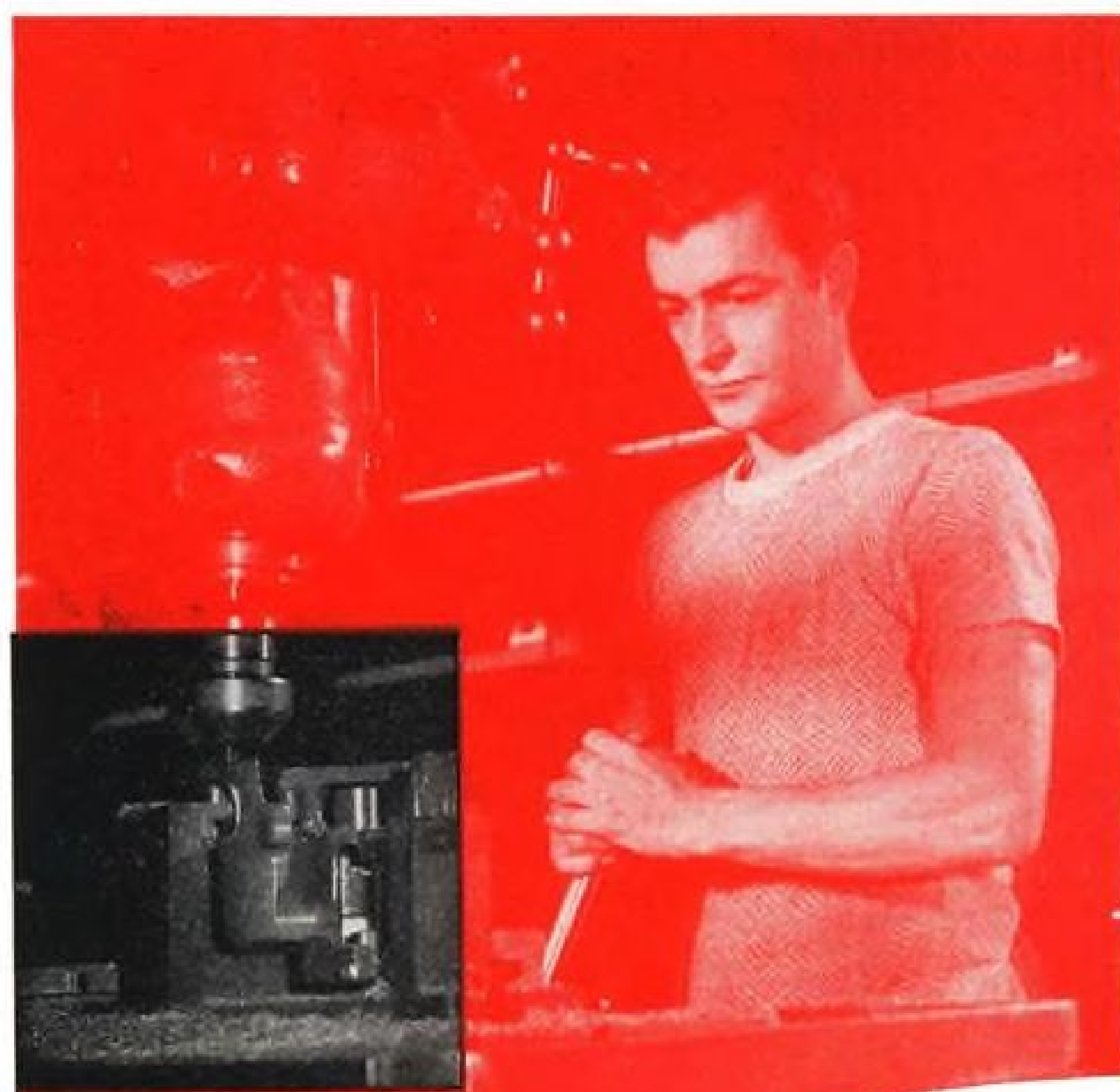
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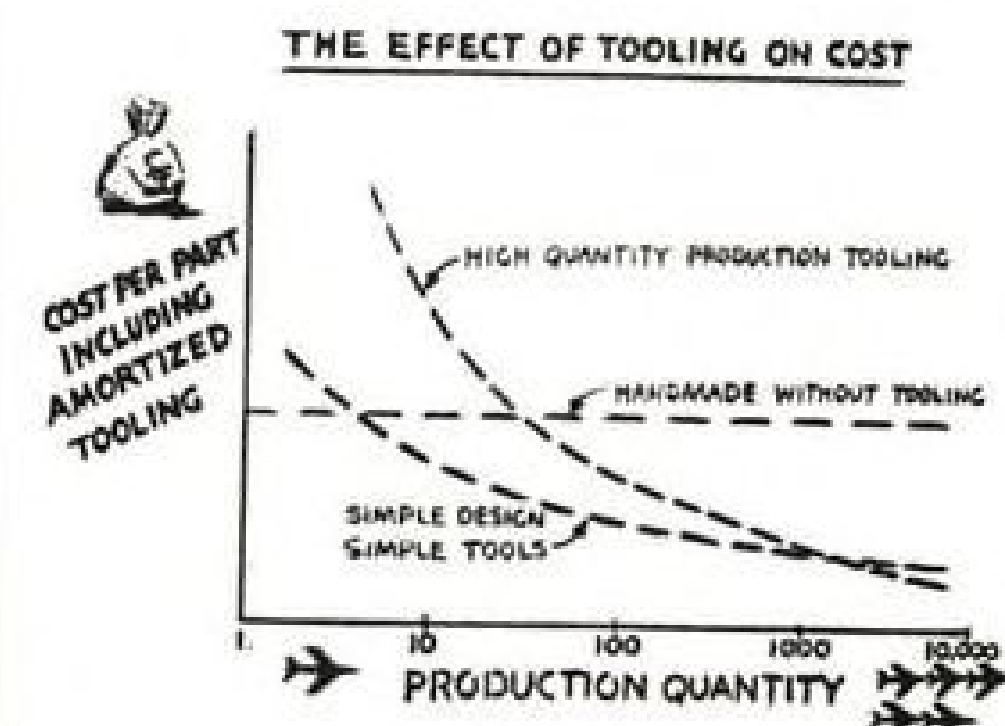
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the one which is familiar or personally preferable.

Proper functioning is more important than style or appearance, and the designer who attempts to force his brainchild into a form which satisfies his aesthetic sense at the expense of its performance or flight characteristics has not done a good job. There is no need, as with cars, to maintain a distinctive appearance to identify the product.

There is comfort in the fact that a device which is truly functional usually looks right and very seldom will offend the sensibilities.

Premature enthusiasms and *a priori* conceptions must be rigidly put to one side if a well-tempered aircraft is to be achieved. All through the design phase, choices have to be made between various ways of doing things.

In the early stages these choices tend to affect the general arrangement and large items; later on they affect smaller parts. These choices must be based on the best information and analysis, with a minimum of snap decision or decisions influenced by emotion. The design must be progressively frozen as it goes along, neither too early nor too late. Too early is irresponsibility, too late is perfectionism.

► **Producibility**—Aircraft production at best is not high-volume production, and the type of tooling required, except for a few items such as standard bolts and nuts . . . is not high-production tooling.

Such tooling is far too inflexible to accommodate itself to the constant stream of changes which is an inevitable concomitant of aircraft development. This lesson was learned the hard way by the motor industry during the recent war, when it was pressed into the manufacture of aircraft.

There has been considerable progress since aircraft were made by hand with little or no tooling. The correct middle course is to provide comparatively simple tools which can be augmented or duplicated if production is stepped up, and which can be thrown away if the design is changed . . . The true producibility of a design, as that term should be used, is the degree of its adaptability to the use of this type of simple tooling.

► **Standardization**—Even the most conventional plane is far from being an



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assembly of standard parts, but standardization plays its part in good design.

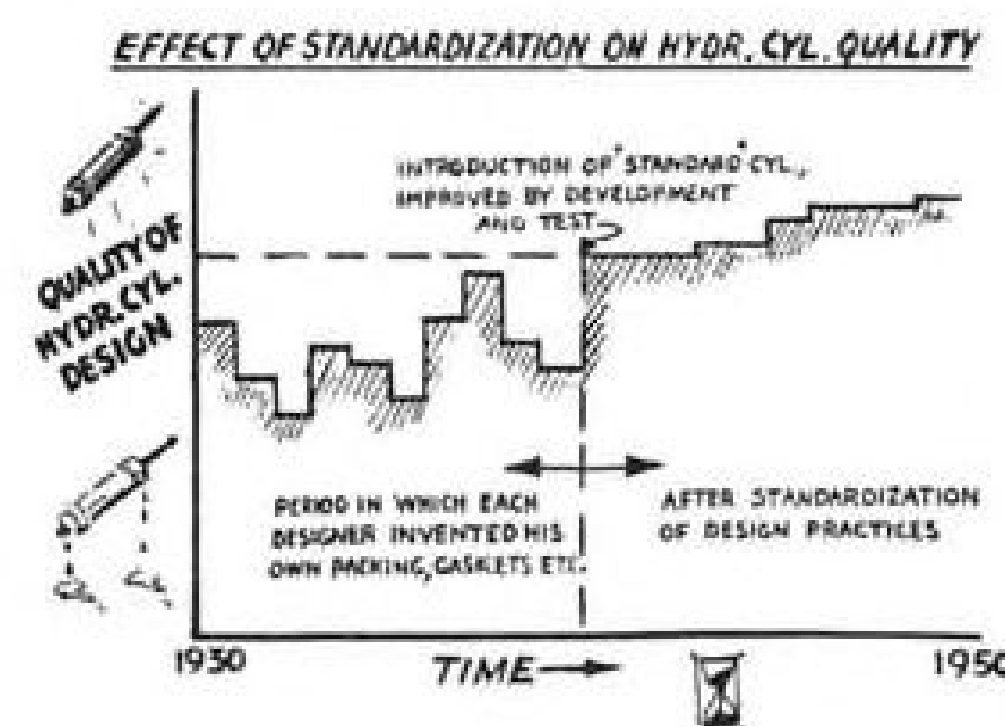
Good standards are those which result almost from necessity. They are developed because it is apparent to everyone that it would be highly inefficient not to develop them.

Standards which are imposed by edict or which have to be crammed down people's throats are almost always bad standards, with a stifling effect on progressive design. Standard practice, a broader type of standardization than standard parts, can be a most useful adjunct to design by ensuring the uniform utilization of best previous experience.

Engineering, tooling, and shop should keep close to each other, mentally and physically, during construction of the prototype. It is a team effort and must be carried through in that spirit.

#### 4. Development

► There should really be more than one prototype, not only because of the vulnerability of putting all the eggs in one basket, but also to shorten development time by running tests in parallel. In some instances, overall expense and time can be saved by having as many as ten or a dozen articles in flight test status concurrently. There are, in any



event, good reasons for having at least two.

► The Time Log—Experience shows that normally it takes at least as long to perfect a design after first flight as the time that has gone into it before first flight. For example, if it takes 15 months to design and build the first prototype, it will be at least 2½ years from the start of design until the aircraft is shaken down and ready for production deliveries.

A fairly conventional design or one with a high degree of carryover from previous experience may, upon occasion, be put into production before the first article has been tested, with reasonable assurance that the changes required will not be so drastic as to necessitate rebuilding.

But usually there has to be a gap between the completion of the development period and the start of production deliveries. In some cases this may have to be as long as the time it took to build the first article. This would mean, in the example chosen of a 15-month aircraft, that production deliveries might actually start somewhere between two and a half to nearly four years from the beginning of design.

Very seldom is full allowance made for this in laying out schedules. As a result, aircraft which are truly not seasoned are delivered to service squadrons and spend much time on the ground, or deliveries of fully developed aircraft come much later than optimistically predicted.

Flight test time is expensive, particularly on modern aircraft, and can be shortened by suitable preliminary re-

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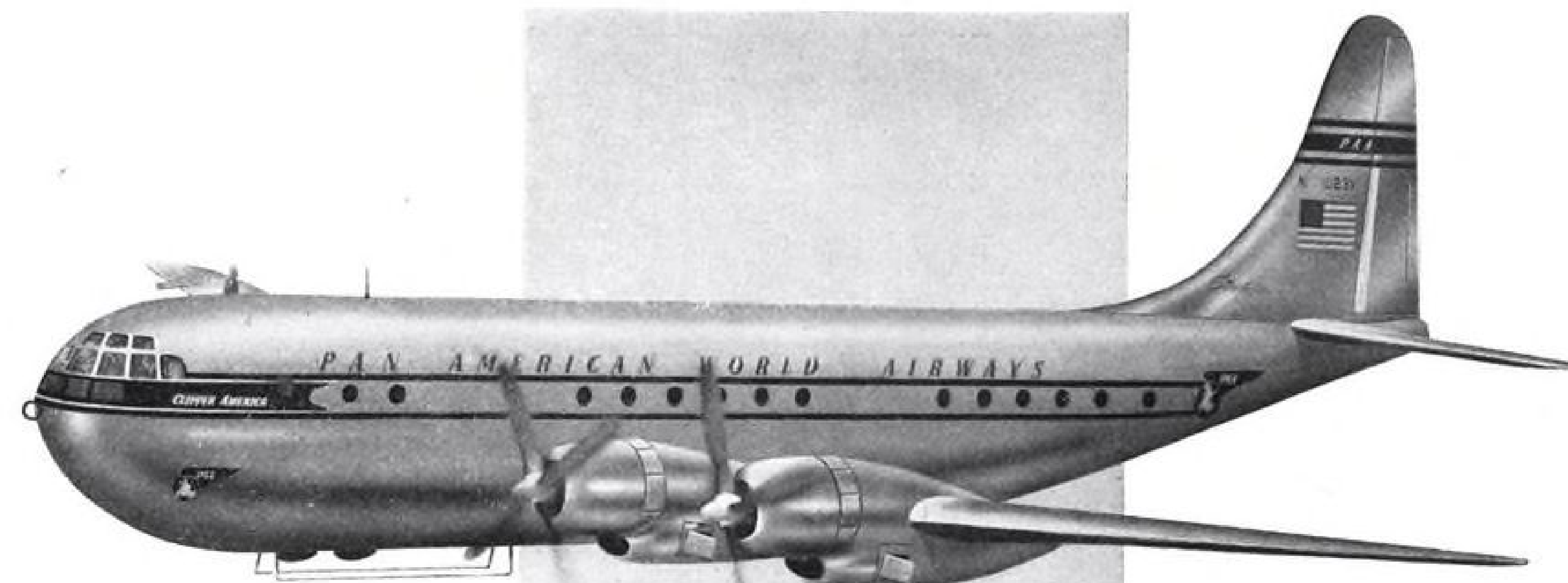
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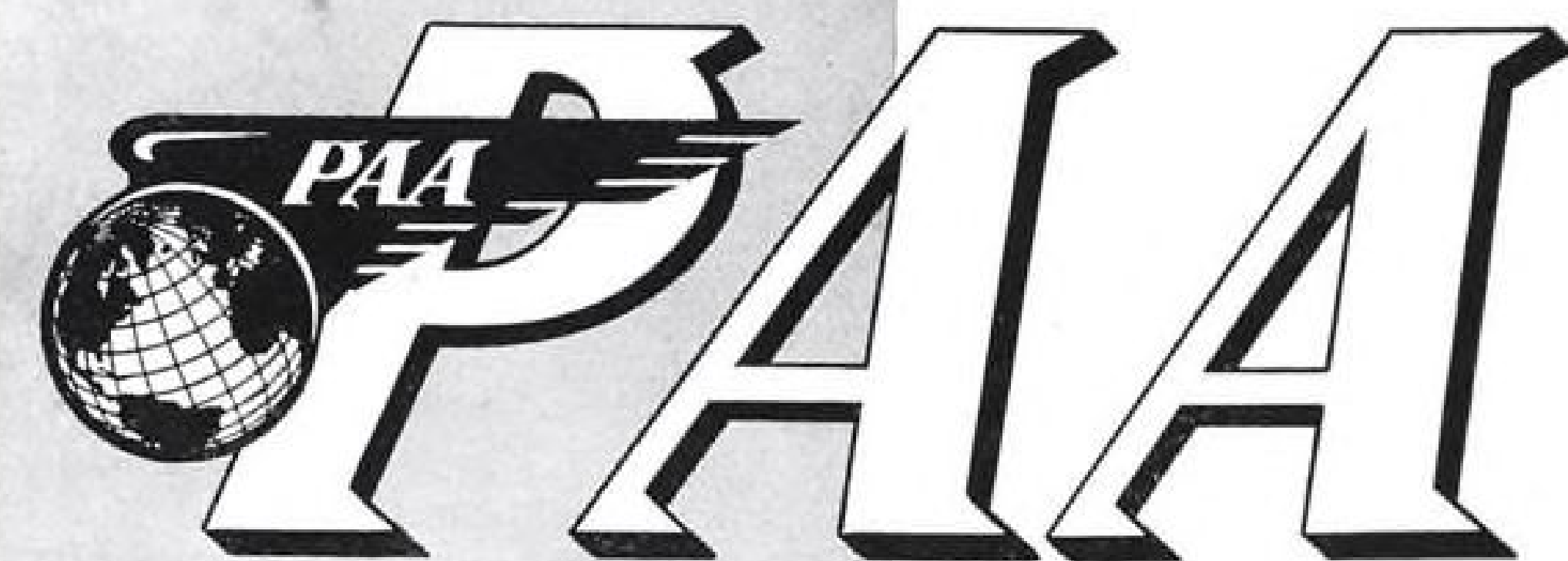
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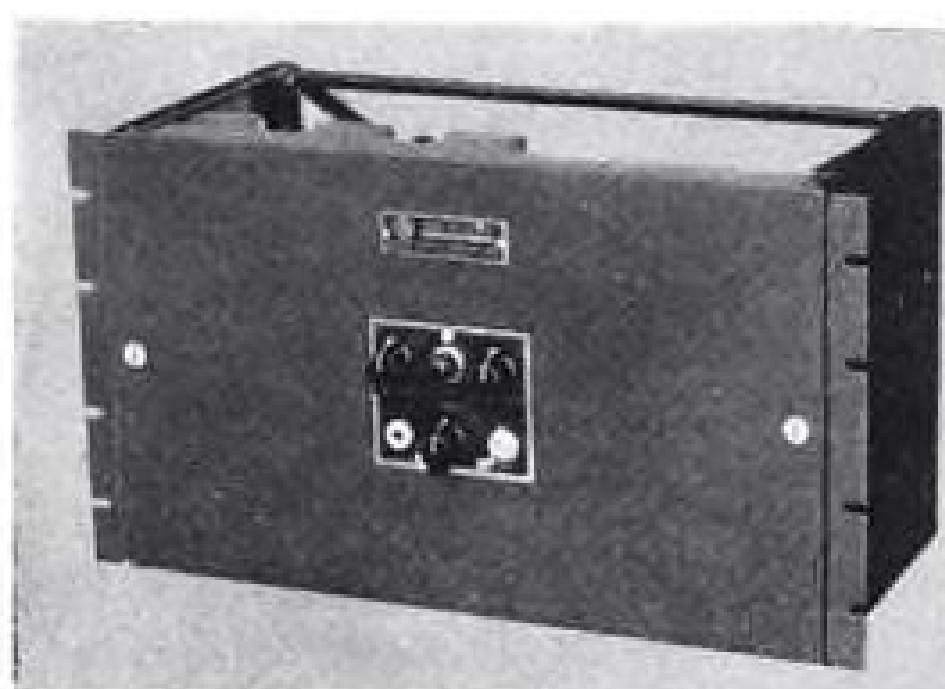
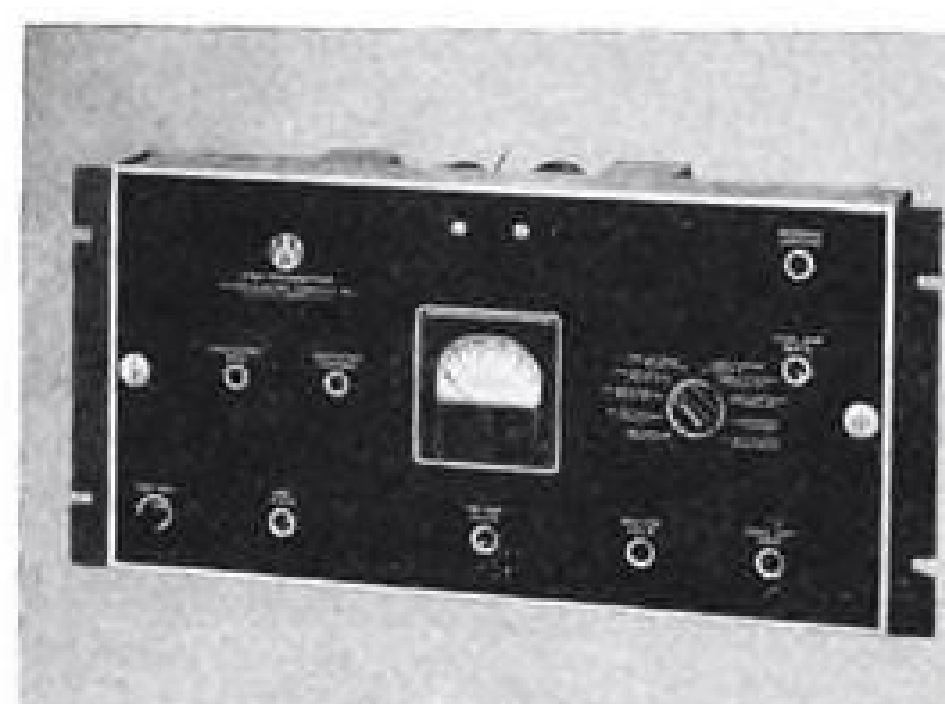
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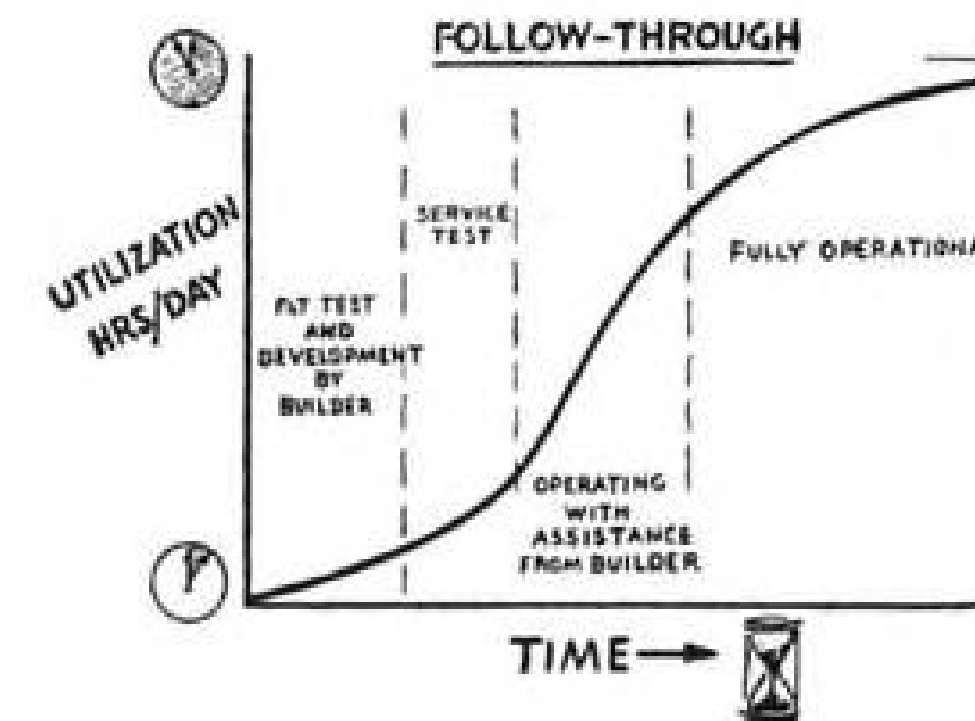
**Truce Team Airlift**—When the “cease-fire” talks began at Kaesong on July 10, United Nations envoys selected Sikorsky helicopters—the big new Air Force H-19 (S-55) and three smaller S-51’s—as the most expeditious means of travel to and from their advance camp at Munsan.

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whom would have died or would have been captured except for this unique instrument of rescue. In other military assignments, such as reconnaissance, liaison, and ferrying both personnel and materiel, they carried out important roles.

Sikorsky production lines are continuing to turn out S-55’s in quantity for the Army, Navy, Marine Corps and the Air Forces. Meanwhile creative engineering at Sikorsky is moving forward on such advanced projects as a “convertiplane” and a Marine Corps assault-type helicopter.

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search and ground or laboratory testing, including windtunnel testing.

► **Even Models Are Complex**—One of the difficulties of model testing, in recent years has been the time required to build models and test them. The high speed at which these models must be run in the tunnel, the resulting high forces upon them, and the nature of the information which must be obtained from them, have produced model construction so intricate and test programs so long that it has been difficult to get tunnel results early enough . . . to allow design modifications to be made while the drawings are fluid . . . The windtunnel tends to become a checking device rather than one for the collection of design information.

The tunnel tests may look questionable, but unless the curves are very definitely out of line, the temptation is to wait and see whether the aircraft exhibits these characteristics in flight, rather than to interrupt the design schedule and delay the project to make changes which may not be necessary.

If there were complete confidence in the validity of windtunnel tests this would not be so, but too often there is doubt as to the correlation between these tests and flight.

The result is that the flight tests merely confirm the fact that the wind-tunnel tests are right; the engineers congratulate each other that they knew it all the time, and the aircraft comes back into the shop for a major change.

Research and testing carried out for the purpose of determining design information or of anticipating trouble and eliminating it before it occurs, have this in common: they require a certain degree of pessimism. The optimist either thinks he already knows all the facts or does not expect to run into trouble. Both imagination and judgment of a high order (and a certain amount of pessimism) are required to gage the amount of research and testing necessary.

► **Flight Qualities**—Aircraft design is not a complete science and never will be, so flight tests and service experience are necessary in order to check what has been done on the drawing board and in the laboratory.

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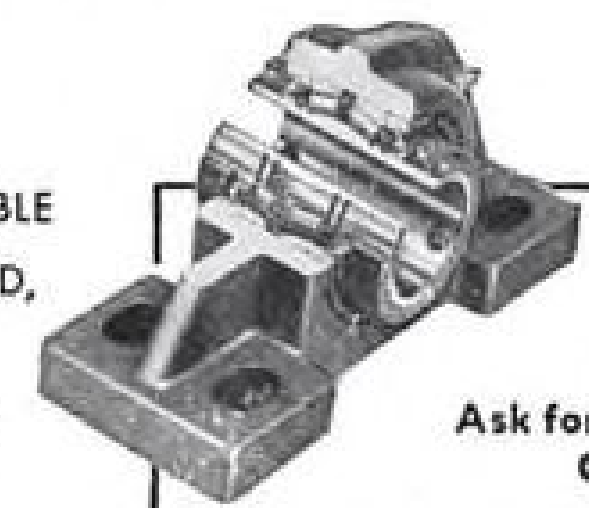
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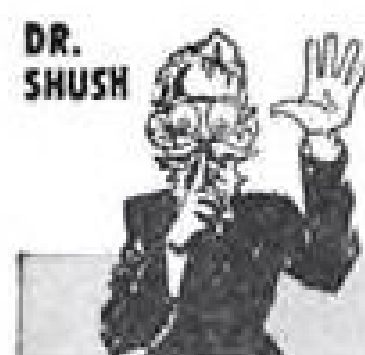
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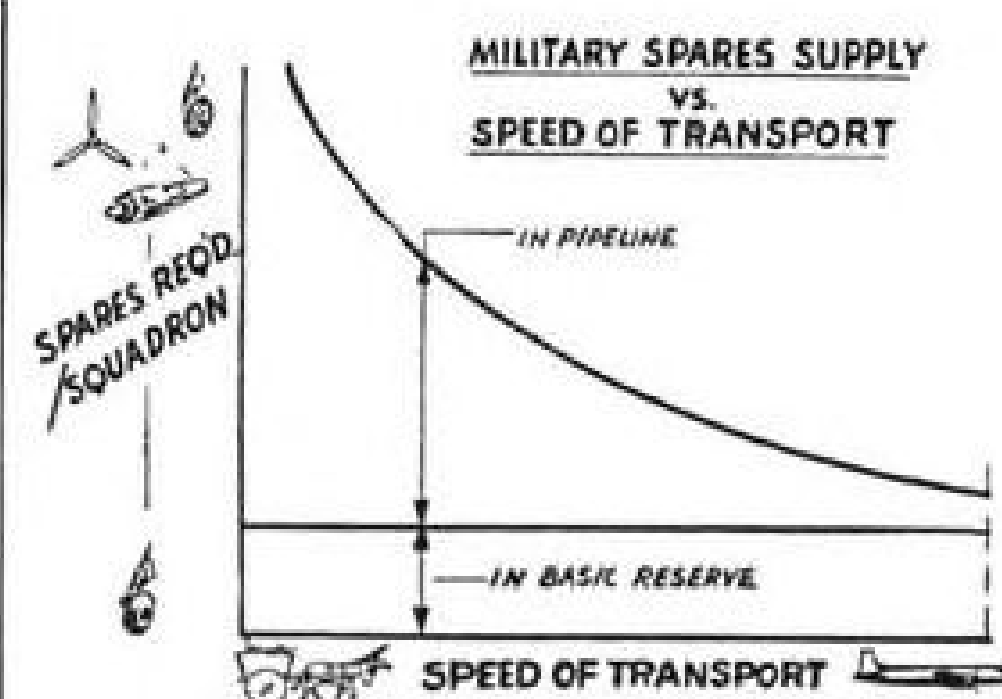
A Maxim Silencer quiets a jet during ground testing — location, Lockheed Aircraft Corp., Burbank, Cal.



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firmation of the way in which the aircraft operates as a whole in its medium. Here also enters, too often for the first time, the human equation in the form of the pilot and crew.

There is an increasing awareness of the fact that the experience and point of view of operating personnel should be intimately joined with that of the designer from the beginning.

Even if this has been done, it still remains true that the crew, and particularly the piloting personnel, can only evaluate the aircraft . . . by actually flying it.

The airplane is first of all a flying machine and there is no substitute for good flying qualities. Not only do they determine the ease with which it may be flown, its maneuverability, and its day-in, day-out performance; they are directly related to safety.

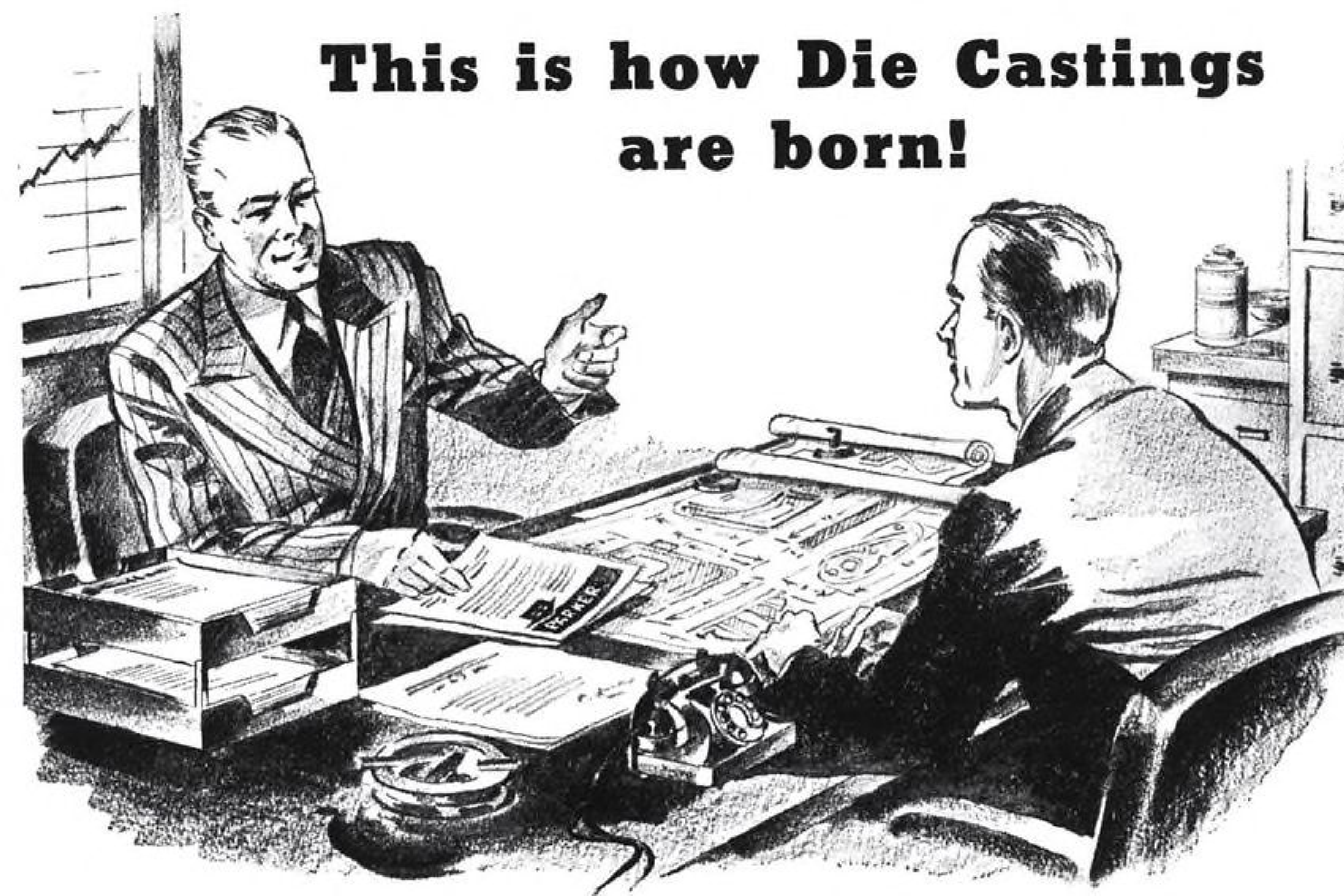
If the pilot is at ease when he is flying the aircraft, if he knows he will have control over it under all conceivable circumstances, he does not tire and he does the right thing under stress.

If he is nervous and apprehensive, or has to fight the controls in bad weather, his state of mind adds to the inherent difficulties. A good flying plane must be obtained first of all; the rest can be added later.

► **What You Learn**—Functional characteristics come next: Do the installations on board the aircraft operate properly under all service conditions? It is not easy to check this point, because cold and hot weather, ice and snow, humidity, etc., do not always turn up just when desired for test purposes.

With the great endurance and long range of many modern aircraft, and their standards of slow obsolescence, these functional characteristics have to be evaluated over long periods. As flying time accumulates, the type of test information being obtained gradually shifts from that which establishes how fast it will go, how high it will fly, its takeoff and landing distances, and whether the electrical, hydraulic, and air conditioning systems operate properly, to information as to which items have to be redesigned to lengthen life between overhauls or reduce the incidence of failure.

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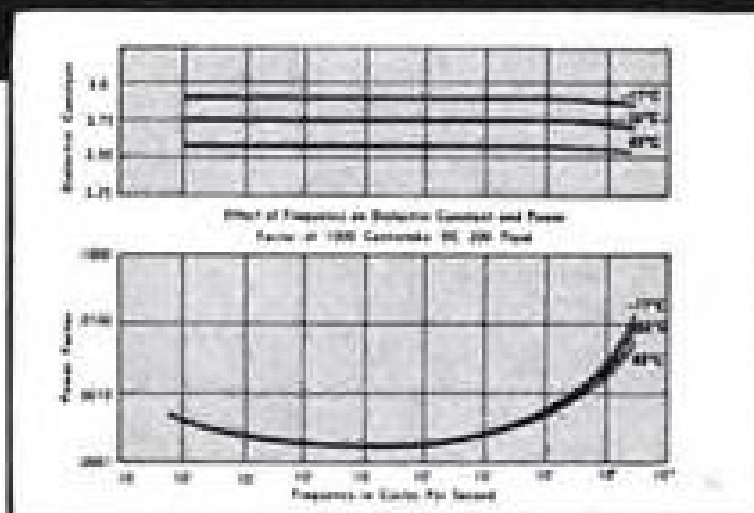


**DOW CORNING  
SILICONES**

## Heat-Stable, Moisture-Proof SILICONE DIELECTRIC MATERIALS are available in the following forms:

### LIQUID DIELECTRICS

DOW CORNING 200 FLUIDS are a series of clear, inert liquids, notable for their thermal stability and for their remarkably flat viscosity-temperature slopes. Available in viscosities from 0.65 to 1,000,000 centistokes. Pour points range from -123° to -47°F. and flash points range from 30° to 600°F. Low dissipation factors at elevated temperatures or at high frequencies, inertness to moisture, oxidation resistance and heat stability make Dow Corning 200 Fluids unique among liquid dielectrics.



As indicated by these curves, neither frequency nor temperature changes have any pronounced effect on the power factors or dielectric constants of Dow Corning 200 Fluids. Power factor and dielectric constant of 1000 cs. fluid at -17°, 23°, and 83° C. are plotted against frequencies ranging from 10 to 10<sup>10</sup> cycles per second.

### DIELECTRIC COMPOUND

DOW CORNING 4 COMPOUND is a nonmelting water-repellent dielectric paste which retains its grease-like consistency at temperatures from -70° to 400°F. It is highly resistant to oxidation and to deterioration caused by corona discharge. Power factor is less than 0.003 at frequencies up to 10,000 megacycles; volume resistivity is more than 10<sup>12</sup> ohm centimeters at temperatures up to 400°F.; dielectric strength is more than 500 volts per mil at a 10 mil gap. Dow Corning 4 meets all requirements of Specification AN-C-128a.



Dow Corning 4 packed in phonograph pick-up head cartridges increased crystal service life 20 times. The silicone compound prevents Rochelle Crystals from deteriorating due to absorbed moisture. It also acts as a viscous damping medium, thereby reducing excess vibration and enabling the head to handle a much higher frequency.

### ELECTRICAL INSULATING VARNISHES

DOW CORNING 996 VARNISH dries tack-free in not more than 3 hours at 150°C. Dielectric strength measured with 2 inch electrodes on 2 mil films baked for 16 hours at 150°C. is 1000-2000 volts/mil, dry, and 500-1500 volts/mil, wet. Heat flexibility is more than 100 hours at 250°C. Cured films have good resistance to dilute acids, concentrated hydrochloric acid, and dilute or concentrated alkalis.

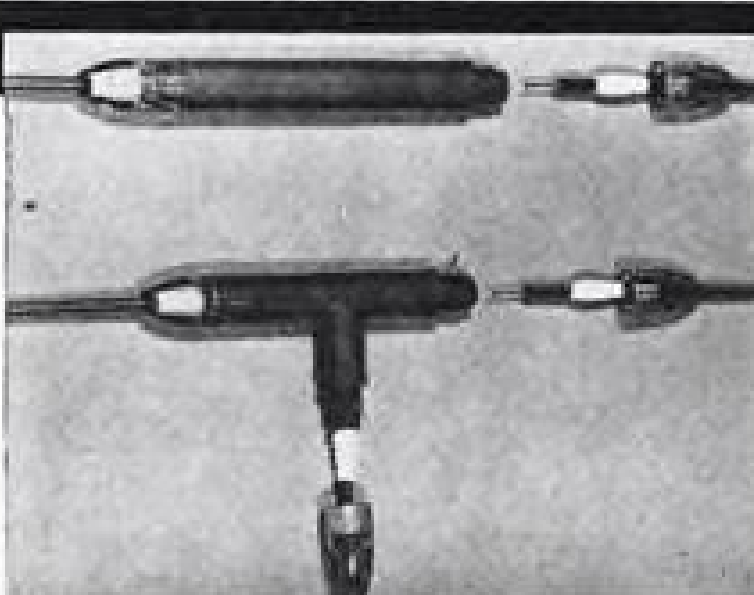


Flashover in high voltage television power supply coils can set ordinary organic varnish aflame. To eliminate this fire hazard, coils are impregnated with Dow Corning 996. Highly resistant to arcing, 996 provides positive protection against carbon tracking for the life of the entire set.

### SILASTIC\*, THE DOW CORNING SILICONE RUBBER

Silastic combines the remarkable heat stability and moisture resistance of resinous silicones with the physical properties of rubber, including resilience, shock and abrasion resistance, and resistance to both mechanical and electrical fatigue. Its dielectric properties show little change over a wide range of frequencies, even after aging at high temperatures. The surface resistivity of Silastic is high, and its thermal conductivity is about twice as great as that of either organic rubber or resinous insulating materials.

\*T.M. REG. U.S. PAT. OFF.



Completely eliminating taped connections on aircraft antennae, white Silastic seals reduce static and corona discharge by as much as 90%. They retain their resilience as well as their dielectric properties, excluding moisture and foreign matter after long exposure to the full range of ground and stratospheric temperatures.

### SILICONE-GLASS LAMINATES

DOW CORNING THERMOSETTING RESINS are used to bond inorganic fabrics and finely divided particles such as powdered metals or mica. Typical 1/8" silicone-glass laminates have a flexural strength of 22,000 to 45,000 psi; water absorption after 24 hours of 0.25 %; dielectric strength with continuous filament cloth of 250 volts/mil or more; power factor of 0.002 at 1 mc; loss factor of 0.007 at 1 mc; wet insulation resistance of more than 10<sup>12</sup> ohms; arc resistance of 300 seconds and a heat distortion value above 250°C.



For maximum dependability and long service life, silicone-glass terminal blocks and contactor bases are being used in late model automatic toasters. Tests prove that Dow Corning silicone resin bonded glass laminates are more rigid, more heat-stable, more resistant to moisture and easier to fabricate and assemble than conventional materials.

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flight testing merges into service testing.  
► **Aim of Development**—In a sense development never ends, for so long as the aircraft lasts, improvements will be made in it. What is aimed at in the development period as defined here is to get the aircraft into such shape that it can go into service and do its job, month-in and month-out and average not less than, say, five and perhaps as many as ten or more hours of flying time per day.

If it can do that, it is a well-tempered aircraft and justifies its existence. Every single item which goes to make up the machine as a whole has to come up to a certain standard of perfection to achieve this aim.

This can only be done by systematic development over a reasonably long period of time; it cannot be cut short and if not done early it will be done more painfully later.

### 5. Follow-Through

With the completion of the development phase the aircraft passes from the more-or-less direct control of its builder into the hands of the operator . . .

► **Liaison With Operator**—If specific training courses for key people from the prospective operator are set up in the manufacturer's plant some time before delivery of the first aircraft, these men can take the lead after delivery in carrying the familiarization program down through the ranks . . .

As service changes are made in delivered aircraft or as new aircraft of the same model with modifications go into service, the manufacturer must be prepared to give supplementary training to the operator. He must also assist in setting up refresher courses whenever it becomes apparent that troubles are being experienced because of insufficient or forgotten information.

There is always a tendency to criticize a new aircraft that is not fully understood. It may be much better than previous ones but, just because it is different, it will at first seem strange and uncomfortable.

An easy affection only comes after long familiarity and the period of be-

### Amazing Aircraft Finish

**Avex**

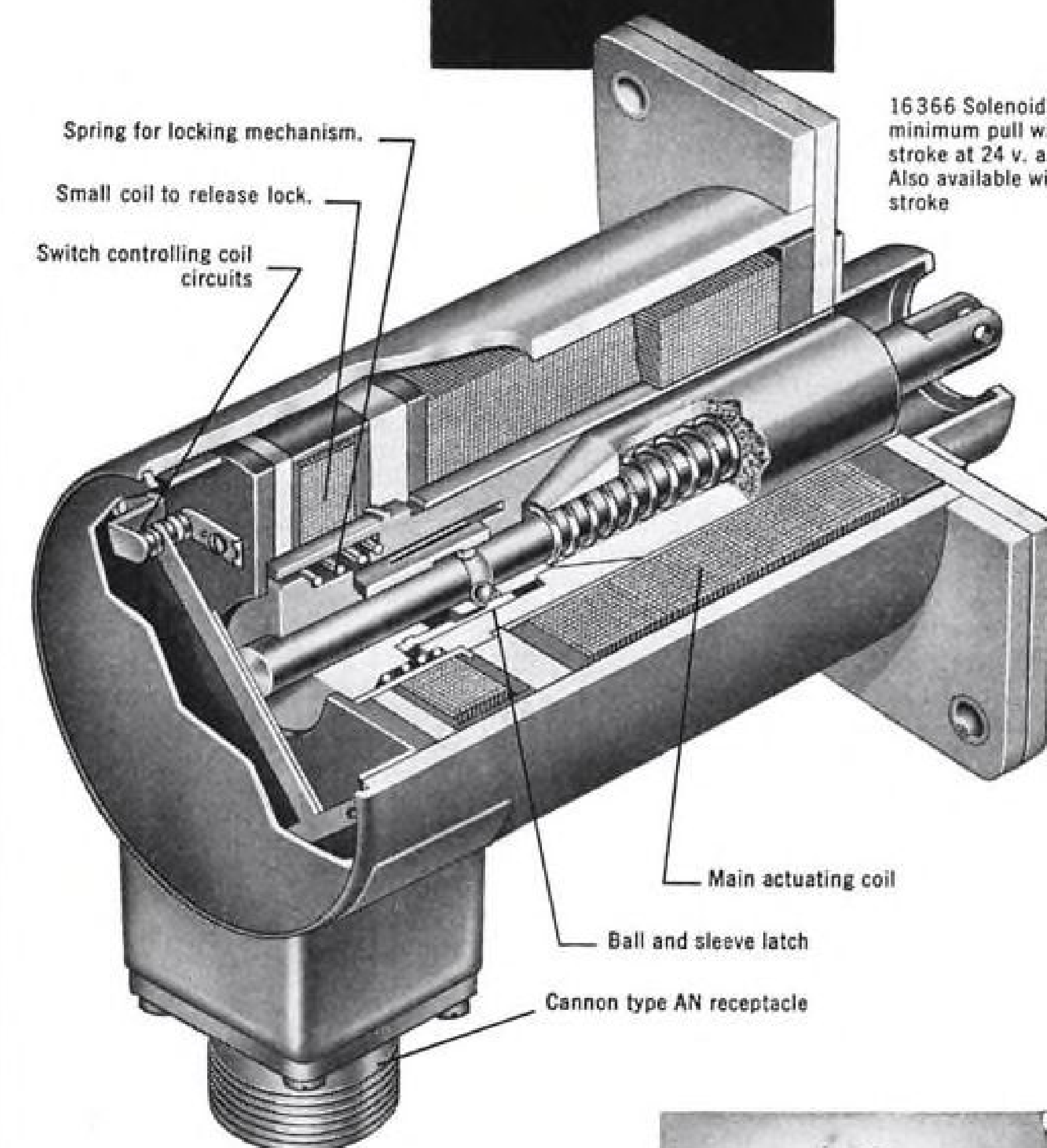
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**CHAMBERLAIN AVIATION, INC.**  
AKRON 9, OHIO

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—demand

**CANNON  
SOLENOIDS**



16366 Solenoid — 18.7 lb. minimum pull with 1/2" stroke at 24 v. at 170°F. Also available with 1-1/6" stroke

Here's a special purpose Cannon D.C. Solenoid, #16366 for aircraft. Design and safety conditions require that the armature lock in the actuated position for an indefinite time, without relying on a continuous flow of current.

The ingenious ball-and-sleeve latch locks the armature as the main coil circuit is broken through the built-in switch. When current is applied to the smaller coil, motion of the sleeve releases the main armature. Study of the drawing shows how a smooth-acting, positive lock is accomplished.

This is one of more than 60 different Cannon D.C. Solenoids built around 18 basic coils for either continuous or intermittent service. Write for Solenoid Bulletin free on request.

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#1154 an intermittent service solenoid, 12v, D.C.—10.5 amps.—stroke 9/32", weight 13 oz.

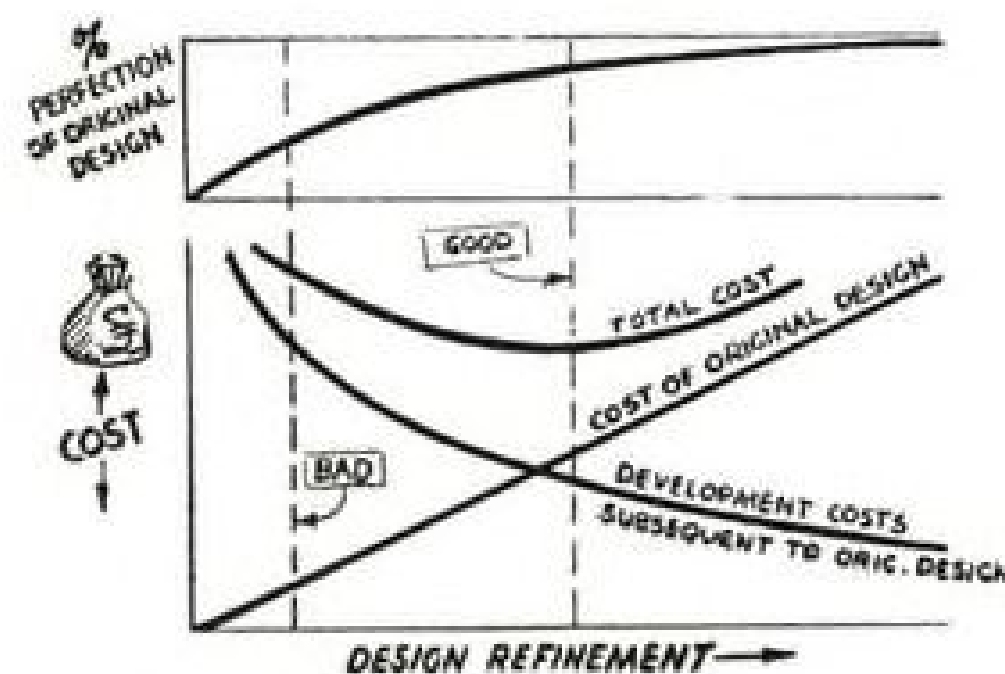


#4440 a continuous service solenoid, 24v, D.C.—3.6 amp. (starting) .42 amp. (holding)—stroke 3/8" weight 16 oz.



#11790 a continuous service solenoid, 24v, D.C.—3.6 amp. (starting) .42 amp. (holding)—stroke 3/8" weight 15.5 oz.





coming acquainted with something new can be very awkward if a well-thought out and organized program is not put into effect to bridge it over.

► **Facilities**—In addition to knowing how to maintain and service the aircraft, the operator must have adequate and proper facilities. Here also, he can be assisted by joint planning well before delivery, so that the facilities are ready when they are needed.

Some of these facilities will be common to all or several types of aircraft which the operator uses. Others will be special to a particular one. For example, servicing stands, handling equipment and loading equipment often have to be specially designed and built. Sometimes the operator may do this.

But more often these auxiliary pieces of equipment can best be developed by the aircraft builder with the advice and assistance of the operator, and can be delivered with the aircraft itself.

► **Spares**—Nobody knows ahead of time exactly what items, and how many of them, will be needed as spares. Nevertheless, working from statistics accumulated on other aircraft, a reasonable list can be made during the initial design phase and these items can be manufactured with the early production aircraft.

The nature of military operations makes the problem of spares particularly difficult, but different services and different countries vary in the efficiency with which they cope with it. It should not be necessary to rob one aircraft to supply deficiencies in others, but such cannibal practice was often the only way to keep aircraft flying during the recent war.

Spares for military aircraft are often badly handled. Large surpluses and acute shortages go hand-in-hand and things are seldom where they are needed, when they are needed.

Military spares supply can be simplified by the use of air transport. Depots can be farther from the front and fewer in number and there can be more flexibility in the whole operation if time in transit is counted in hours instead of in days, weeks, and even months.

► **Service**—It is not enough to see that replacement parts are on hand when needed; changes must often be made in the design of parts to stop repeated troubles or lengthen service life . . .

There must be a methodical reporting system, by which the manufacturer is made aware of the troubles as they occur, in sufficient detail to enable him to diagnose the cause and work out a cure. There must be almost continuous personal contact by men in the field.

Extreme rapidity of handling the correction of troubles of a serious nature must be coupled with an overall system that overlooks nothing.

This service information has to travel both ways. The operator does not always need replacement parts, he needs instructions as to how to make his own correction on the spot, or he needs assurance that the correction he proposes to make is satisfactory. Also, the whole service record of a given aircraft has to be analyzed by the manufacturer's service organization and given to his designers so that they will have the benefit of knowing how their previous designs worked in practice when they design a new aircraft. Only in this way do they gain experience—and by going out into the field as often as they can.

► **Technical Aircraft**—Courses of instruction, personal contact and service bulletins supplement familiarity with the physical plane itself, and the technical data that has to be supplied with it. Operating manuals, maintenance and service manuals, selected drawings, structural and aerodynamic data all represent a tremendous effort on the part of the builder of the aircraft to ensure that its operator gets maximum utilization.

If there ever was a day when the manufacturer could build his product and forget about it, it is gone forever.

Hours per day must be kept constantly in mind. An aircraft is designed to fly; while it is on the ground it is no good to anybody. This is always the case with the civil operators; with the military services it is true in time of war and potentially true at all times. In times of peace the military services have to assure themselves by actual test that their personnel are trained for continuous operation and that their aircraft are capable of it.

In the development of the techniques that make this sort of operation possible, the services can be greatly assisted by the civil operators. Each gives much to the other. The civil operators would not have many of the devices they use had not the military services first developed them; nor would many of these devices ever have reached their present state of perfection had not the civil operators put them through months and years of almost continuous service.

And through all of this trial period the designer must remain alert to help, to learn, and to put the combined experience into practice.

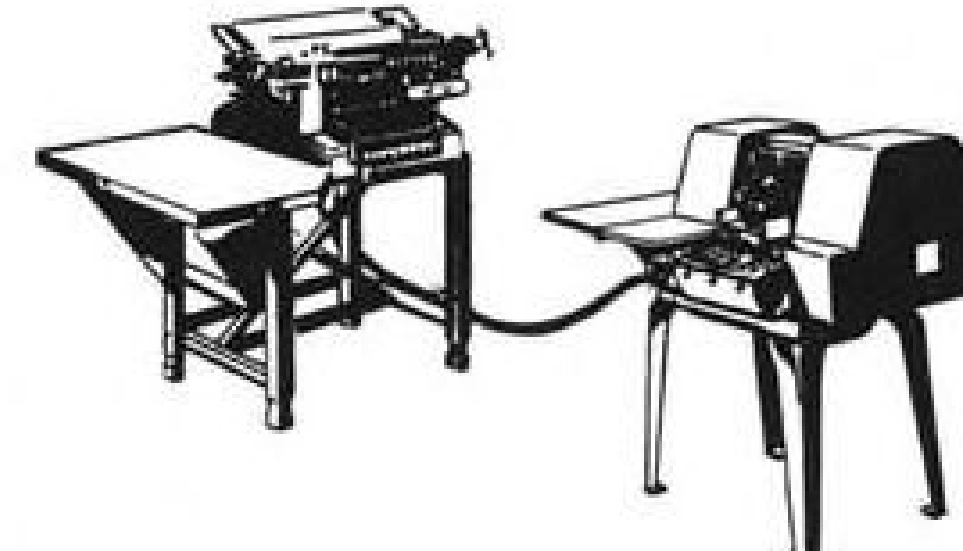
NEXT: Building an airplane for long and useful life.

# How to lick your payroll problems . . .

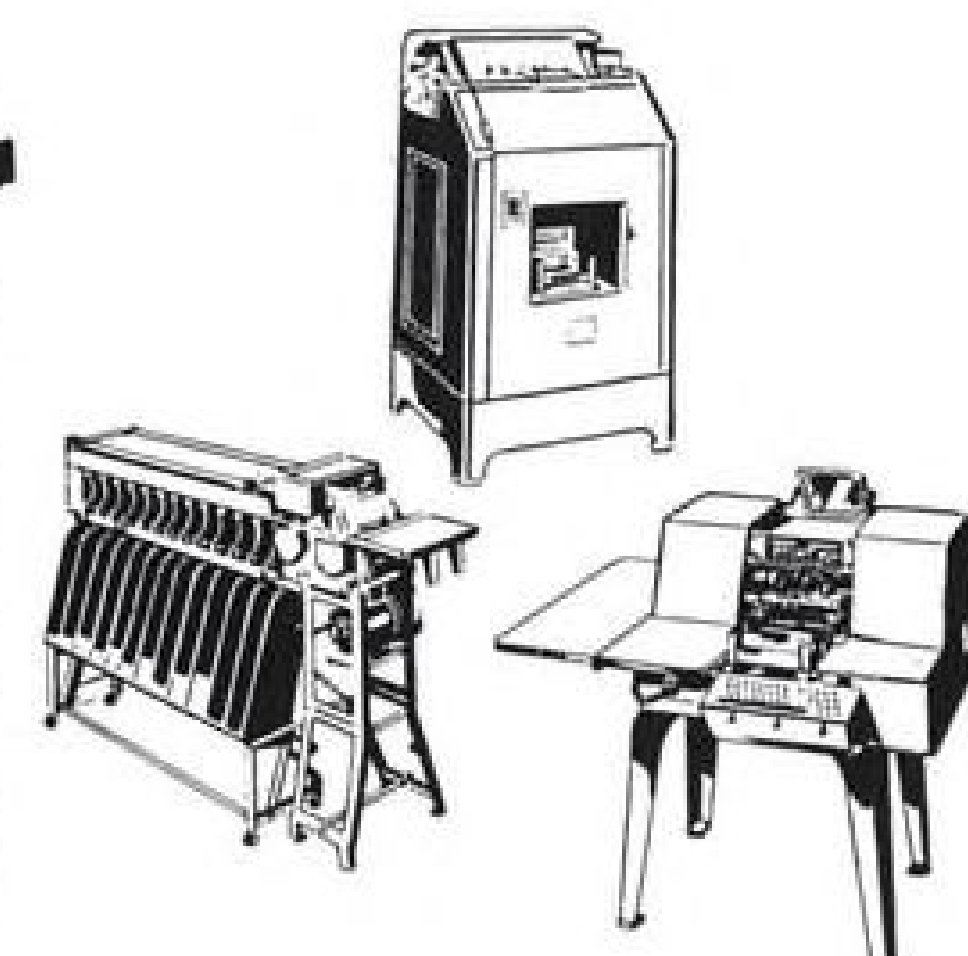
Which method is best for you?



BY ACCOUNTING MACHINE



BY SYNCHRO-MATIC



BY PUNCHED CARDS ALONE

For your type and size of payroll?

This is often the most economical method for getting out payrolls with speed and accuracy. It helps reduce those peak loads which disrupt your office routine.

May be used for all types and sizes of payroll, with or without the Synchro-Matic hook-up for punched-card reports.

When payroll does not require full-time use of machine, it may be used for other accounting jobs in between payrolls.

When payroll is very large, the machine may be equipped for continuous forms to give maximum speed.

**A.** All the advantages of accounting-machine method for payroll in a hurry.  
**B.** Also the advantages of punched-card method for payroll distributions, analyses and reports with speed and economy; especially helpful for centralized records from locally-written payrolls.

One keyboard operates two machines. The accounting machine is synchronized with a tabulating card punch. As payroll records are written on accounting machine, punched cards are produced as automatic by-product on synchronized punch.

This is a very profitable method:  
**A.** To get extensive cost analyses, detailed labor distributions, and basic data for budgeting by ratio of indirect to direct labor costs. (Punched cards used to rate, extend and summarize gross earnings; employee's jobs and rates may vary widely within pay period.)  
**B.** To get out a large salary payroll quickly. (The same punched card can be used over and over for each employee and a new card is required only for changes in salary or status.)

For the payroll records you need?

One line of writing gives you four completed and proved records:

1. A payroll register with column totals for all earnings, deductions and payments (plus an extra copy of the register if desired for use as branch or department payroll sheet).
2. Pay check (or envelope) with automatic net pay and amount protection.
3. An itemized statement to accompany pay check or envelope for employee's reference on earnings and deductions.
4. A chronological record of the employee's earnings, with to-date totals as desired for gross earnings, taxes withheld, bond deductions, etc.

- Records (1) to (3) are produced on the accounting machine, record (4) optionally from the punched cards, which are also used for fast machine tabulation of:
5. All reports on withholding taxes and social security deductions—federal, state and local.
  6. All deduction listings and reports for hospitalization, insurance, dues check-off, bond or stock purchases, and employee accounts receivable.
  7. Payroll distributions by location, budget account, etc.
  8. Personnel reports and analyses by average earnings, class and rate, location, seniority, age, sex, or other breakdown.

- Punched cards are used from the beginning; to calculate all earnings (regular, overtime, incentive, bonus, etc.); to summarize gross earnings for each employee; to produce records (1) to (8); and also to produce following records:
9. Actual (empirical) costs by item to compare with standard or estimated costs.
  10. Labor cost distribution (direct, indirect and burden) by work center, etc.
  11. Analysis of efficiency (time utilization) by employee and supervisory group.
  12. Reports on machine performance and the causes for low productivity.
  13. Reconciliation of the payroll bank account from punched-card paychecks.

For the maximum savings?

For a comparatively small investment, you can make tremendous savings of clerical time. No specially skilled personnel is required. Your present staff can quickly learn to operate the Remington Rand, easiest-to-use of all the accounting machines. Just one simple keyboard. Standard alphabet keys. Only ten numeral keys for all figure work.

For a slight extra cost, you get the advantages of two machine methods. Practically the same operating simplicity as with accounting machine alone. No attention required from operator for the automatic punching of cards. If you have no tabulating department, Remington Rand can tabulate reports from your cards at low cost, saving you additional investment.

The punched-card machines can be rented, purchased outright, or acquired by Remington Rand Use-Purchase Plan which offers an easy way to save on your long-term investment. An efficient tabulating department will multiply the results from human effort by many times, produce results not economical by other means, and repay all costs several times over.

For your needs we have no reason to recommend anything but the right machines and systems. We make them all

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# BRAIN WORK

*high in the heavens*



GUIDED MISSILES that become more accurate as they close the range on attacking enemy aircraft are being developed by the Fairchild Guided Missiles Division. Missile experience dating back into World War II has enabled Fairchild engineers to design a guidance system which "homes" on radar echoes reflected from attacking planes and cuts down the margin of error the closer the "bird" gets to its target.

Already flight-proved in Fairchild-built test missiles this guidance system is being refined and developed further to meet the requirements of our Armed Services. One of the most advanced guidance systems yet devised, it is another example of Fairchild's engineering ability, combining the practical and theoretical to meet the stringent technical demands of modern military science.

ENGINE AND AIRPLANE CORPORATION  
**FAIRCHILD**

*Guided Missiles Division*

FARMINGDALE, N. Y.

Fairchild Aircraft Division, Hagerstown, Md., Chicago, Ill.  
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A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

## Not, PLEASE, In the Name of Fairness

Our national Office of Economic Stabilization has adopted a policy of gearing wages to the cost of living. We are told that "escalator clauses," which provide that rates of pay shall be adjusted to take account of changes in the cost of living, will be generally approved.

If the adoption of this policy had been announced as a frank concession to political expediency, it would have been quite understandable. There may very well be votes, lots of them, in a policy which purports to protect the income of a large group against loss through the price inflation caused by the defense program.

A case might even have been made for a policy of approving escalator clauses on grounds of production expediency. The leaders of some three million organized workers now covered by such clauses have indicated that they would fight to the limit to keep them and thus maintain "real wages," that is, wages measured by their purchasing power. The leaders of other organized groups have indicated they would fight to get the

benefit of such clauses. Denial of them might mean serious strikes.

### Justified "in Fairness"

However, the policy of approving escalator clauses was not based on these relatively low grounds of expediency. It was justified on high moral grounds, on grounds of "fairness." In the words of the President's Council of Economic Advisers, "maintenance of real wages during inflation cannot in fairness be disallowed."

That proposition is false.

It would be truthful to say, "maintenance of real wages during inflation cannot in fairness be allowed."

The truth of the corrected proposition becomes evident immediately when you take a look at the basic nature of the inflationary problem created by defense mobilization.

We are devoting a large share of our national production to defense. The share is now scheduled to hit about 20% in 1952.

Since we are not able to increase our total production fast enough to meet defense needs



in addition to civilian needs, that means a cut in the supply of goods and services that is available for civilian consumption. But the money paid out for the production of defense materials is added to that which is available to buy civilian goods.

Thus, more money is put into the hands of the people to buy less goods. So prices go up. That is inflation.

If one group of people then is granted enough additional money to offset the price increases—and that is the purpose of an escalator clause—and thus can continue to buy as much as they have been buying right along, less goods will be left for other consumers who are not getting this advantage. That is palpably an unfair distribution of the sacrifices necessitated by defense mobilization. In fairness, therefore, maintenance of real wages in inflation cannot be allowed.

Organized workers were not the first, of course, to get the benefit of an automatic adjustment to take account of the increased cost of living. The farmers got theirs first. The price parity formula is, in essence, an escalator clause. The federal government underwrites increases in the prices of the things farmers sell in order to match increases in the prices of the things they buy.

### Crucifying the Helpless

As matters stand, two groups are without benefit of escalator clauses. One group is composed of manufacturing firms. While they have not been nearly as successful as the misleading reports of "record-breaking profits" suggest, they have been able to look after themselves fairly well—thus far.

But one group is completely without protection. It is that numerically large but politically unorganized mass of people—many of them old and relatively helpless—who are trying to live on pensions, annuities and other fixed incomes derived from their savings. They are at the end of the line when the increased costs of inflation are passed along. They have no one to whom they can pass the buck. They are being progressively pauperized by the continuing inflation caused by progressive boosting of costs and hence prices.

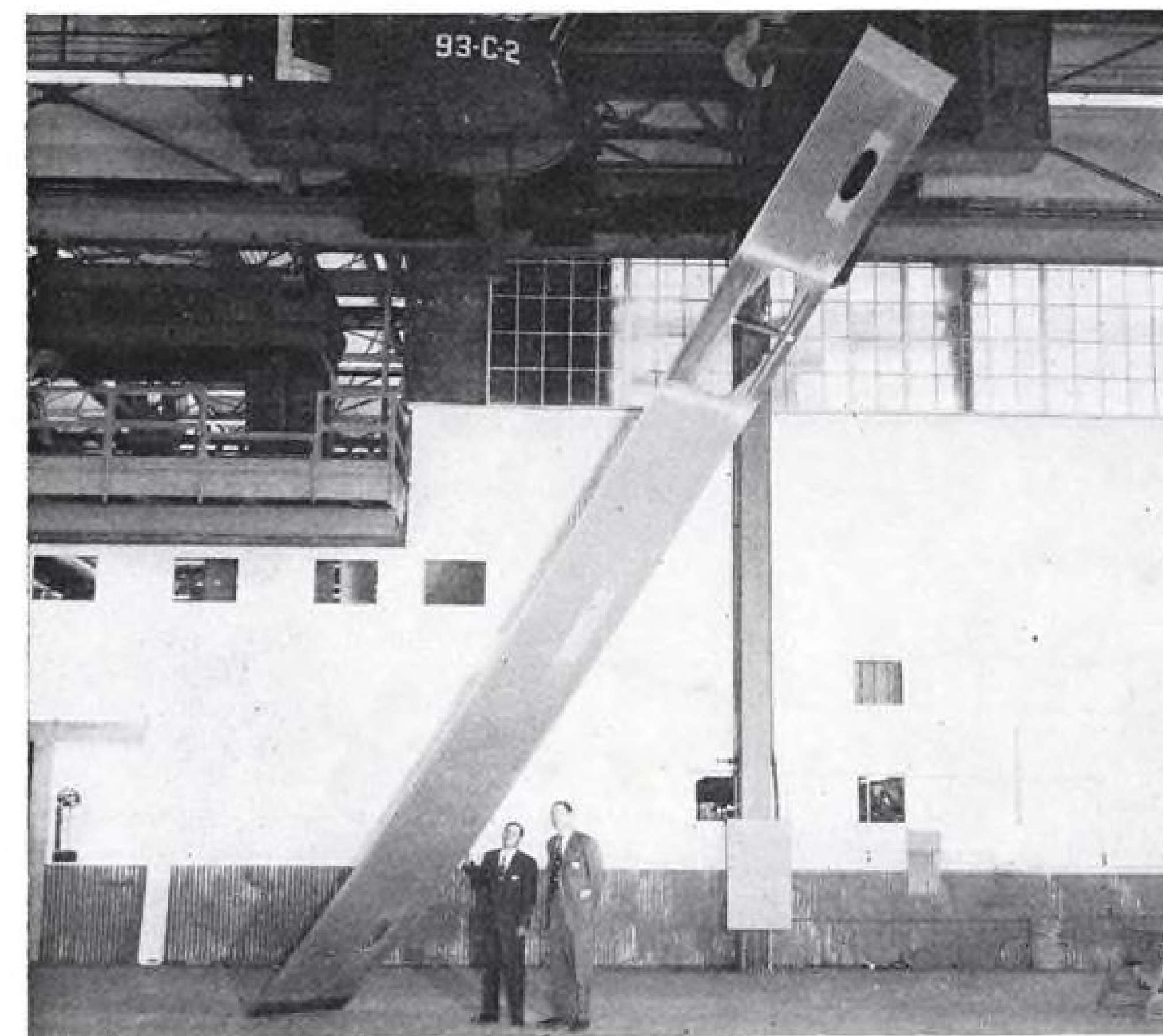
With the present line-up of pressure groups in Washington, protection for the principal victims of inflation—those who have saved for a rainy day only to find inflation has blown away the roof—is obviously an extremely difficult business. But to have even temporary insulation against inflation granted to powerful groups in the name of fairness should be offensive to the nostrils of a nation that presumes to assert the moral leadership of the Western World.

**The only really fair way to handle inflation is to prevent it. But once it is under way, fairness demands that the burdens be as evenly distributed as practicable.**

An escalator clause—or a farm parity provision—is explicitly a device to enable the group favored by it to escape the burden of inflation. Whatever concessions we feel we must make to political pressures or production expediency, let us at least be honest enough not to invoke "fairness" as justification for so arbitrary a discrimination in the distribution of the defense burden.

**McGraw-Hill Publishing Co., Inc.**

## PRODUCTION



### Giant Wing Section in One Piece

Lockheed replaces 1,500 parts with one in forming 32-ft. Connie component on Giddings and Lewis' skin mill.

A sample of the mammoth-size airframe components that are just around the corner has been introduced by Lockheed Aircraft Corp.

It is an integrally stiffened wing piece measuring 32 ft. long by 4 ft. wide and represents the type that soon will be mass-produced on Lockheed's huge new Giddings & Lewis skin mill (AVIATION WEEK July 9, p. 40).

► **Pilot Piece**—This particular wing part, which was made for Lockheed as a pilot piece for a tooling check, was designed for the Super Constellation. It is reported to be the largest single piece of wing ever fabricated. Lockheed studies indicate that this type of fabrication will cut costs considerably.

The self-stiffened panel—a 323-lb. aluminum alloy strip—was cut from a 3,340-lb. slab and replaces complicated assemblies that normally would be composed of about 1,500 parts. More than 300 manhours of riveting are eliminated by the panel makeup.

Cost of this first piece is about \$7,000. But when the new skin mill gets rolling, machining expense is expected to be halved.

Lockheed reports that a structural strength increase was mandatory for the 374-mph. Super Connies with compound engines and for a faster speed if projects should come into the picture. Conventional methods of construction were prohibitive from a weight standpoint.

► **Six in Connie**—In the new fabrication for the wing sections, channels are cut down the length of the 1½-in.-thick slabs, leaving standing ribs almost 3/16 in. thick as stiffeners. The wings require six long panels (each wing has the 4-ft.-width attached on either side to narrower panels measuring from 1½ to 2 ft. wide) fitted between the main wing beams on the underside.

Smaller self-stiffened pieces, limited in size by milling machine capacity, have been used by Lockheed for some time on fighter wings and transport center sections. And with the company's improved machining facilities, the process will be used more extensively on both military and commercial aircraft.

The design philosophy introduced by integral stiffening—giving thinner and

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**TURBO-ENGINE HARNESS ASSEMBLIES** connect multiple thermocouples in parallel to one instrument lead. The equal resistance between any pair of thermocouple connections and main terminals permits checking temperatures of individual thermocouples or the average temperatures of the entire circuit.

**RECIPROCATING ENGINE HARNESSSES** are designed to check the temperature of each cylinder head thermocouple.

All Harnesses are designed and engineered to meet individual engine requirements.

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## Selector Switches

### FOR RESISTANCE THERMOMETERS AND THERMOCOUPLE THERMOMETERS

EACH SWITCH HAS "OFF" POSITION PLUS NUMBER OF POINTS LISTED.

Points	Size	Switch Part Numbers	
		Thermocouple Type	*3 Wire Resistance-Thermometer Type
2	2"	1152	36SR2
3	2"	1153	36SR3
4	2"	1154	36SR4
5	3"	1055	37SR5
6	3"	1056	37SR6
8	3"	1058	37SR8
9	3"	1059	37SR9
10	3"	10510	37SR10
12	3"	10512	37SR12
16	3"	10516	37SR16
18	3"	10518	37SR18
20	3"	10520	37SR20
24	4"	27524B2	38SR24
28	4"	27528B4	38SR28
40	4"	3852C	

\*Resistance thermometer switches are provided with a safety resistor on off position.

#### SPECIAL SWITCHES

No. 37S6C2, Four "4 Point and OFF" thermocouple switches combined in one 3" case.

No. 9S5, Single Pole, Four Point Instrument Switch in 1 1/4" round case.

No. 44S4, Six Pole, Double-throw Instrument Switch in 2 1/2" round case, one hole mounting, 1/2-32 threaded bushing.

DESIGNED FOR TEST WORK AS WELL AS FOR PERMANENT INSTALLATIONS. LEWIS SELECTOR SWITCHES ARE CONSTRUCTED WITH STURDY CONTACTS OF LOW RESISTANCE AND POSITIVE DETENT. THESE SWITCHES ARE SPLASHPROOF, DUSTPROOF AND ARE BUILT TO GIVE YEARS OF SERVICE.

4" SIZE

**THE LEWIS ENGINEERING CO.**  
NAUGATUCK, CONNECTICUT

Manufacturers of Complete Temperature Measuring Systems for Aircraft

stronger wings—is that there will be no need to substitute sweepback for the straight wing in the highspeed regime to delay compressibility effects, the straight configuration giving better handling qualities at low speed and better maneuverability at high altitudes and speeds (AVIATION WEEK June 25, p. 20). An example of this application is the thin, integrally stiffened, straight wing on Lockheed's F-94C which will support a dead load of 150 tons.

### Temco Moving

A move by Texas Engineering & Manufacturing Co. to transfer all of its extensive Douglas C-54 overhaul and conversion work from its Dallas, Tex., plant to a separate facility about 50 miles away at Majors Field, Greenville, is well under way.

By the end of the year, when the transfer is completed, Temco will be employing approximately 600 people at Greenville, with payrolls running over \$150,000 monthly. Current employment there is about 100. The new base is already overhauling all C-54 control surfaces and tail assembly units and is transferring outer wing panel overhaul production from Dallas. Next major step was to be shift of Temco's extensive instrument, propeller, radio, radar, hydraulic and accessory shops.

Since May, 1948, the company has overhauled and reconditioned approximately 500 C-54s for the USAF, in addition to working on a number of F-51 and F-47 fighters, conversion of C-54s into hospital planes and C-97s into command planes, and handled large quantities of work for foreign governments and various airlines.

The new Greenville installation is headed up by Herrol Bellomy, superintendent in charge.

### Cladmetal Patents New Bonding Process

A patent covering an improved method for producing clad metals, including Rosslyn Metals, which provides for continuously bonding chrome-nickel steel and copper, has been granted American Cladmetals Co., Carnegie, Pa.

The finished product is soft and devoid of "roll set," even when it is coiled cold. Also, the bonding operation is accomplished without materially reducing the thickness of the composite strip.

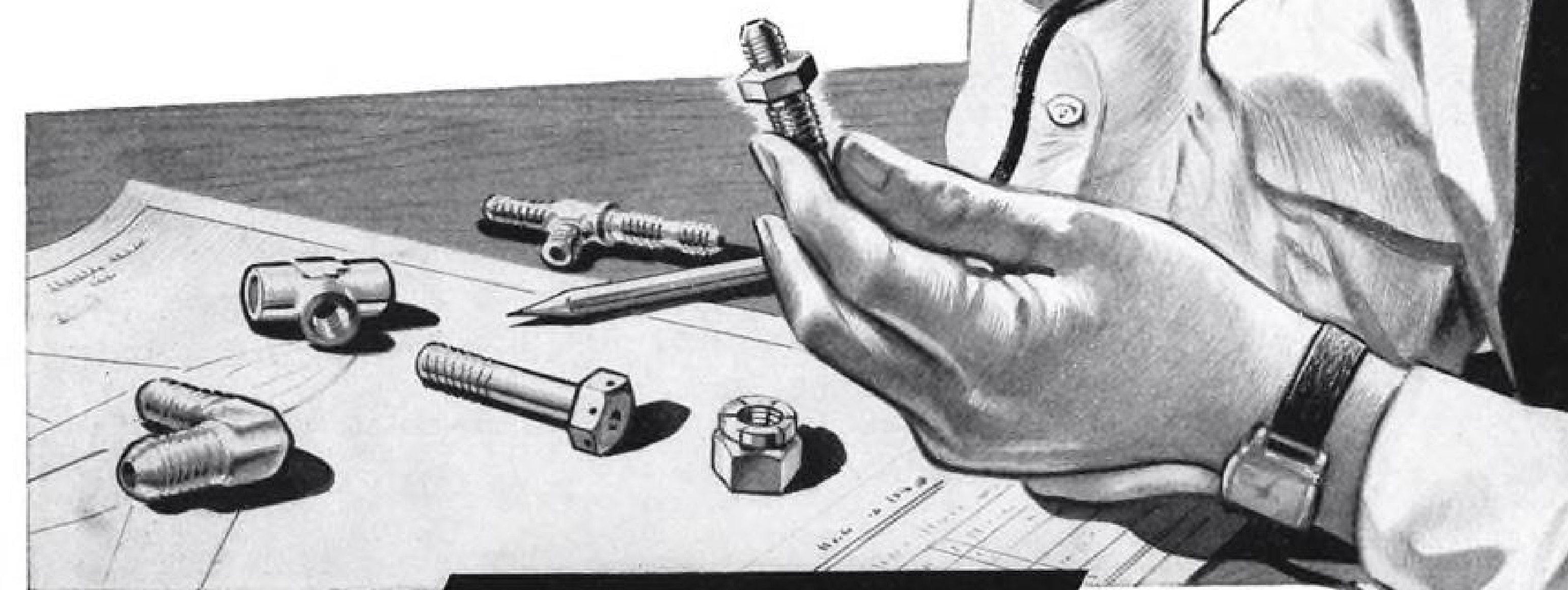
The new process is significant since Rosslyn Metal is proving itself in high temperature applications. Because the metal is said to conserve up to 30% of critical materials such as cobalt, nickel, chromium and columbium, it is finding favor also in general applica-

For Aircraft Hardware and Fittings

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*millions of moments*



**FROM DAYS TO MILLISECONDS**

Wars are won by the coordinated timing of innumerable motions, and the A. W. Haydon Company is proud of the part it has played in bringing timing to the necessary precision.

With experience gained in World War II, the A. W. Haydon Company is building new and improved timing devices that are "Preferred Where Performance is Paramount."



**The A. W. HAYDON COMPANY**  
222 NORTH ELM STREET  
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Design and Manufacture of Electrical Timing Devices

tions for stretching supplies of stainless steel.

## Republic Tackles Employee Shortage

Nine months ago, Republic Aviation Corp., faced with the critical shortage of aeronautical engineers, inaugurated a training program to fit engineers having little or no aviation experience into the company's expanding research and production programs.

Since then nearly 400 non-aeronautical engineers have successfully made the transition, 341 becoming drafting trainees, 2 thermodynamicists, 4 aerodynamicists, 2 flight test, 52 stress and 12 research men. Previously these men had held degrees in science, architecture, art and other fields.

Also paying dividends is Republic's new branch engineering office, opened last June in New York City, to bypass the commuting problem.

A shop training program for teaching unskilled workers in aircraft manufacturing procedures has processed over 1,600 employees. Two week's instruction was given in riveting, bench mechanics work and assembly. Eight-week courses in welding and jig building were also offered the trainees.

Republic training centers were set up at Farmingdale, Freeport, Huntington and Hempstead, L. I. The facilities were made available through cooperation of the New York State Department of Education and the local board of education in each of the four communities.

In addition to these new training centers, the Casey Jones School of Aeronautics opened a North Amityville facility near the Republic plant in August, which was to supplement its LaGuardia Field school in pre-employment training.

Republic presently employs more than 13,000 men and women on its large F-84 Thunderjet production program.

## General Paint Forms Aviation Department

A new Aeronautical Finishes department has been set up by General Paint Co., Los Angeles, which will develop and produce aircraft products exclusively. Products to be manufactured will include aircraft finishes, oil-base and nitrocellulose-base products and special developments such as vinyls, butyrates, silicones and methacrylates.

The company's other five paint plants will aid the new division. The department is being headed by Harold L. Acker, aircraft finish specialist and developer of aircraft zinc chromate primer.



In Aircraft Fan Design

Only **JOY**  
**AXIVANE®**  
**FANS**

Offer All These Advantages



### CAST-IN STRENGTH

The outer casing, stationary vanes, and the inner casing are a single casting to provide maximum resistance to shock, and to prevent strain under working conditions.

### LIGHT WEIGHT

These fans are not only compact in design, but are available in either aluminum or magnesium to reduce overall weight to a minimum.

### VANEAXIAL DESIGN

Stationary vanes provide an equal pressure and velocity distribution at all points across the fan outlet, thus producing an air flow pattern substantially free from turbulence.

### AERODYNAMIC ENGINEERING

Both the blades and stationary vanes of Joy blowers employ aerodynamically-efficient airfoil shapes, to insure the most favorable electric-to-air power ratio.

### PRECISION CONSTRUCTION

The squared-off blade-tips clear the casing by only a few thousandths of an inch to minimize tip loss, a common cause of fan inefficiency, and to reduce noise.

### COMPLETE LINE

Joy offers a wide selection of standard single or two-stage aircraft fans, as well as custom-designed types, for all ventilating, heating or cooling problems on military and commercial planes. Optional features include straight or flared inlets, beaded or flanged connections, radio noise-filters, anodization, and cooled motors where required.

### UNMATCHED EXPERIENCE

Joy is the world's largest manufacturer of vaneaxial fans and blowers. Fans for all purposes, ranging from 1/25 H.P. to 3000 H.P. and up, with fixed, adjustable, or controllable blade pitch, constitute the unequalled background of JOY engineering experience.

Write for Bulletin, or

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100 Years of Engineering Leadership

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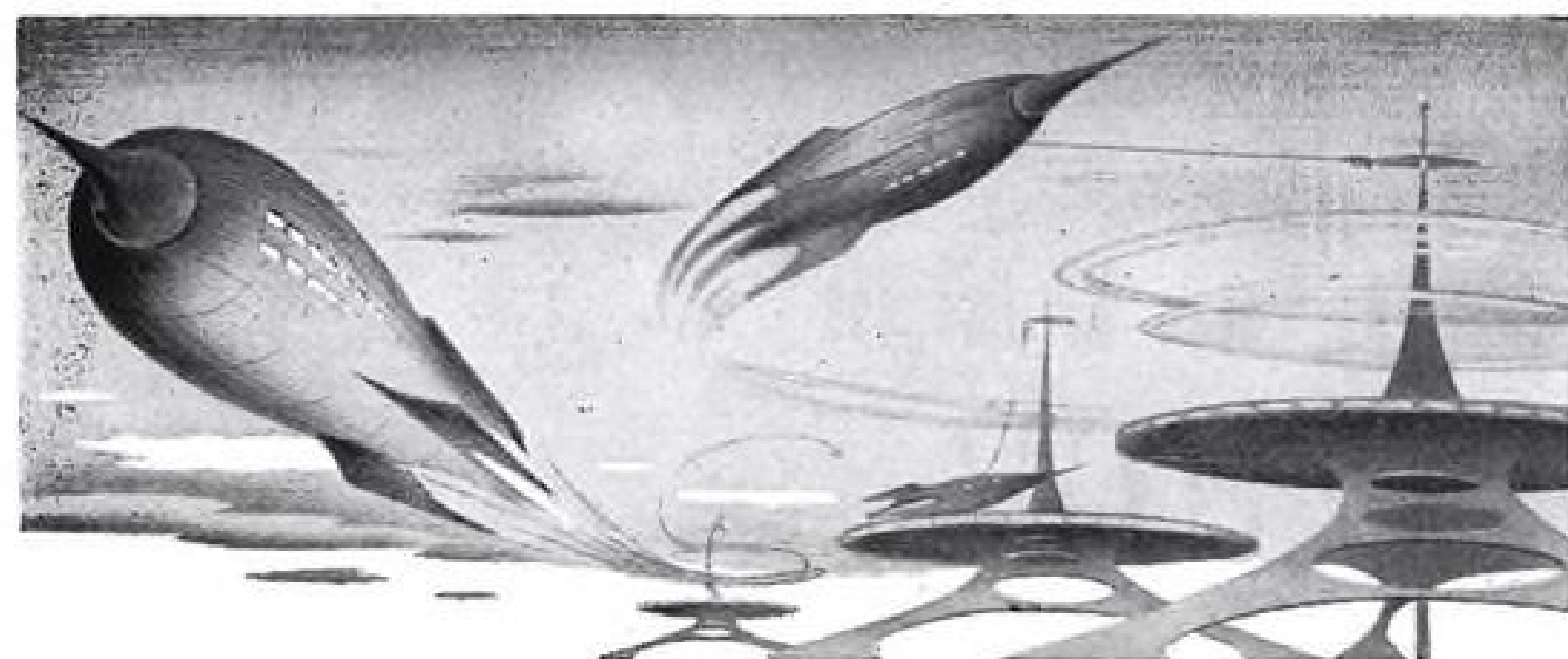
**SINCE 1940** Schuttig and Company has been designing and manufacturing electronic devices to meet exacting requirements of government agencies, manufacturers and airlines. As specialists in communications, remote control and navigational equipment, both ground and airborne, Schuttig has earned its reputation for *electronic precision*.

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## FRICTION-FREE TRANSFER OF ROTARY TO LINEAR MOTION with Saginaw Ball Bearing Screw Jack

- Permits faster operation, forward or reverse
- Requires less power
- Compact design • Light in weight
- Remarkably low maintenance • Practically unlimited in application

The Saginaw Ball Bearing Screw and Nut, up to 97% friction-free, and one of the most efficient means of transferring rotary into linear motion known today, is widely used in aircraft actuating devices. It is vastly superior in efficiency to the conventional Acme screw.

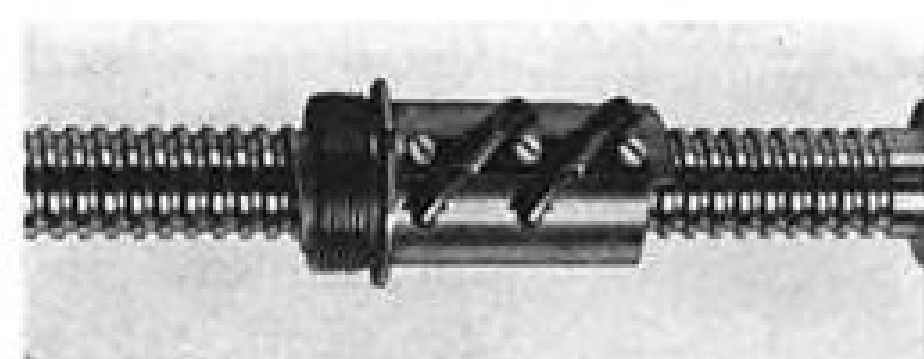
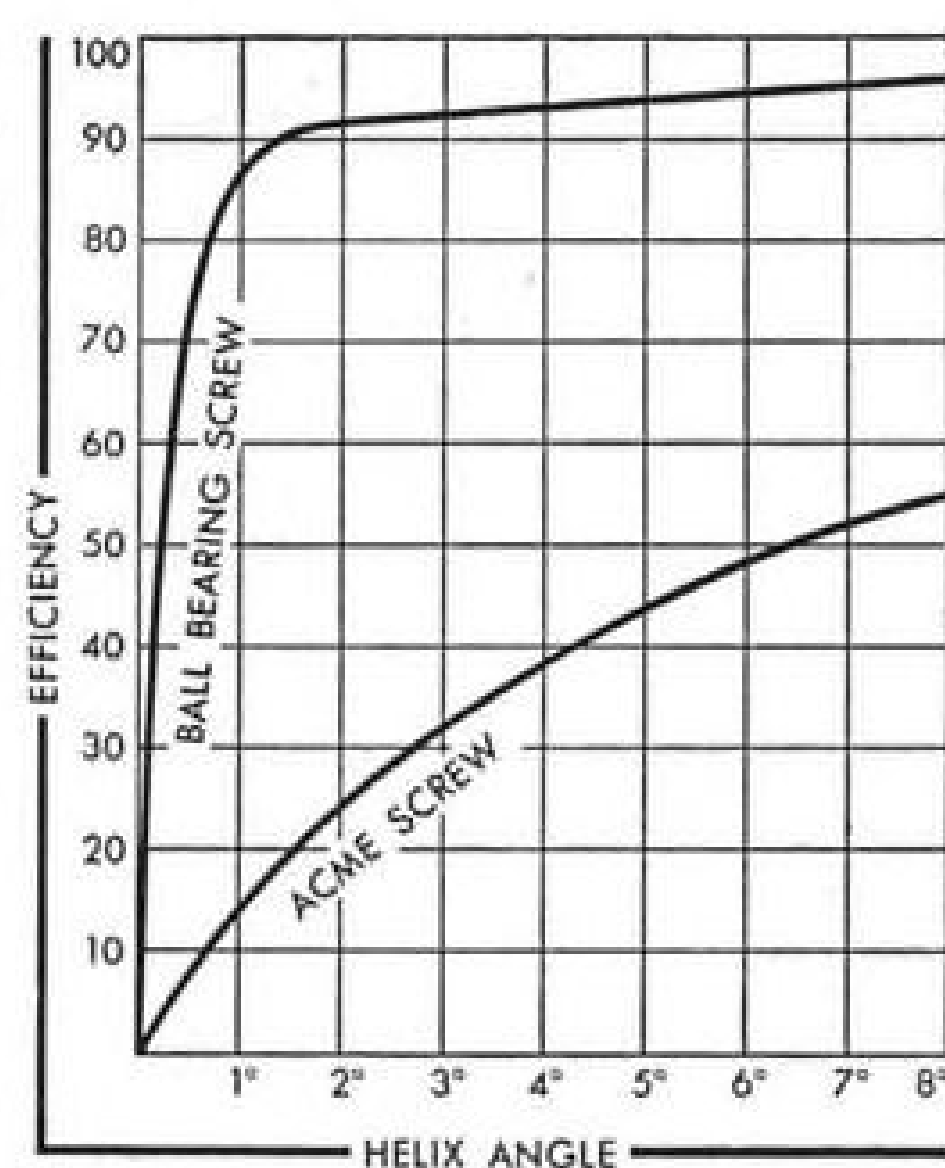
The Saginaw Ball Bearing Screw and Nut permits the use of lower horsepower motor drives in actuators, reducing over-all weight, gives faster operation with less heat generated, and allows rapid forward or reverse action with minimum friction. It is compact in design, light in weight—and requires very little maintenance.

### SAGINAW DESIGNS EACH APPLICATION TO SPECIAL ORDER

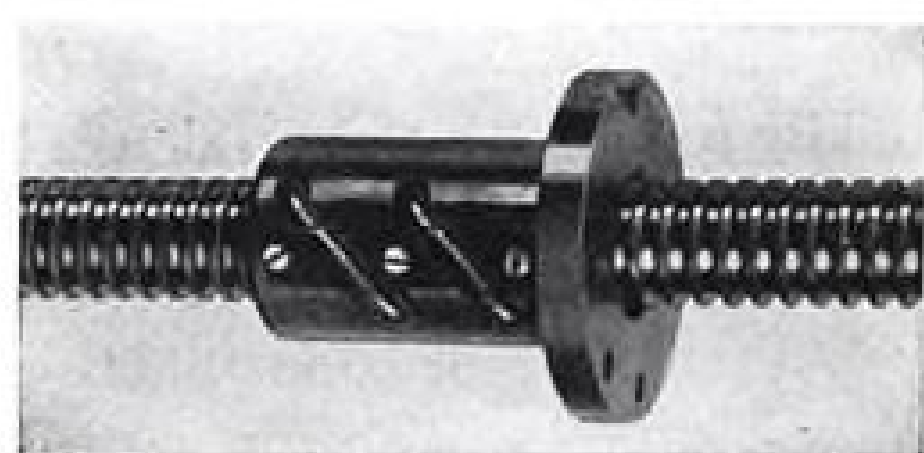
Aircraft applications of this actuator are many and varied. It operates satisfactorily under extremely high loads. Stroke and thrust are limited only by available power. Saginaw treats each application as an individual design, and is equipped to meet any desired production rate. Saginaw's engineering staff is one of the most highly trained and experienced in the entire field of manufacturing and its facilities are available to customers for assistance with their problems.

Write for Saginaw's new factual booklet on the ball bearing screw and nut principle.

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STEERING GEAR DIVISION  
General Motors Corporation, Saginaw, Michigan



Threaded-type nut. Two-circuit assembly.



Flange-type nut. Two-circuit assembly.

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## EXPANDING INDUSTRY

Westinghouse Electric, which has received numerous recent military contracts involving several hundred million dollars, has announced a \$296 million expansion program extending beyond 1953, including a new electronics equipment plant at Raritan Township, N. J., a small motor plant at Union City, Ind., electronic tube plants at Elmira and Bath, N. Y., an aircraft armament plant at Baltimore, Md., and a jet engine parts plant at Columbus, Ohio. New contracts include production of pylons for F-84 Thunderjets at Mansfield, Ohio, appliance division and navy orders for jet engines, including the Westinghouse J-40, at Philadelphia gas turbine division.

Solar Aircraft Company, San Diego, has dedicated its new Wakonda jet engine parts plant at Des Moines where it will manufacture hot end parts for latest jet engines. Building and machinery cost \$7 million and plant has 300,000 sq. ft. First job will be production of J-47 components for Packard.

McCulloch Motors Corp., Los Angeles, has purchased all outstanding stock of Rhodes Lewis Co., Culver City engineers and makers of aircraft components. This is the third major acquisition by McCulloch in the last six months, previous purchases being Del Riccio Plastic Products Corp. (now Pacific Optical Corp.) and Davis Precision Machine Co.

Norden Instruments, Inc., has started construction of a new million-dollar plant in Milford, Conn., to make fire control equipment for aircraft and ships. The plant will employ about 800 and is expected to be completed early next year.

Weatherhead Co., Cleveland, has received an order from Packard Motor Co., prime contractor on the General Electric J-47-GE-23, to build components of this engine.

Hughes Aircraft Co. has moved into its new 40,000 sq. ft. electronic feeder plant in Los Angeles Airport Industrial Tract. Company also has acquired three warehouses, two buildings for the accounting department and one for purchasing at the tract and now employs about 10,000.

AC Spark Plug Division of General Motors will add approximately 590,000 sq. ft. at its Dort Highway plant for production of special defense products,

including fire control systems for Sky-sweepers. Plant is scheduled for completion next year.

Glenn L. Martin Co. has purchased a 7,000-ton hydraulic press for low pressure, shallow, metal-forming by the Guerin process. Production space also will be expanded 1,550,000 sq. ft. at the Baltimore plant.

Beech Aircraft Corp., Wichita, is taking over a major portion of the former Liberal, Kan., Air Base for military production work of an undisclosed nature.

California Eastern Airways, Inc. has received two Air Force contracts for fabrication of classified electronics kits at the company's Oakland, Calif., manufacturing division.

Hiller Helicopters has established a division for research and development of helicopter jet engines at the Willow Road plant, Palo Alto, Calif.

Taylorcraft, Inc., Conway, Pa., has received additional contracts for parts from Glenn L. Martin Co. Company also has prime contract with Air Force to manufacture portable maintenance shelters.

Convair employment at its Fort Worth division now exceeds peak of World War II, having increased 14,000 during the past year on B-36 production program. Present total is just under 31,000. Company employs 19,000 at its two San Diego divisions.

Chance Vought Aircraft plans total employment of 11,000 at Dallas, Tex., by year's end, an increase of 3,000 over present total. Firm is producing F7U Cutlass jet fighters and F4U Corsairs for Navy and has subcontracts on B-47 and P2V.

Sterling Electric Motors, Inc., Los Angeles, has started construction on a million-dollar precision aircraft gears plant at Van Wert, Ohio, where it will employ 200. Completion is expected by end of year.

Northrop Aircraft, Inc. will construct and operate an Air Force production flight and installation center at Palmdale, Calif., airport, where F-89 Scorpion all-weather interceptors built at the company's Hawthorne, Calif., plant will be tested. Company also is adding 2 million sq. ft. at its production plant.

General Fireproofing Co., Youngstown, Ohio, will build a \$1.5-million addition for production of jet fighter and bomber parts. Company has parts contracts for F-84, B-47 and from Lockheed.

**Instantaneous POWER**

**WITH Cornelius PNEUMATIC SYSTEMS**

Aviation engineers look to Cornelius for Aircraft Pneumatic Systems. A valued recognition which has developed from many years of specialized work in this field.

To insure a satisfactory, trouble-free system specify Cornelius Pneumatic Equipment: Air-Compressors, Air Storage Bottles, Pressure Regulators, Pressure Switches, Pressure Relief Valves, Brake Valves, Check Valves.

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Pneumatics do it **FASTER** with **LESS** weight

*Pioneers in Pneumatic Systems for Aircraft*



## EQUIPMENT

# Card-Index Overhaul Cuts Braniff Cost

• 'How to do it' described in drawings, instructions.

• System permits precise allocation of men, parts.

Dallas—A recently instituted "Work Schedule" program which sets up in advance the exact pattern, tools and parts to overhaul an airplane, including instruction cards for the mechanics, is saving Braniff International Airways countless thousands of manhours maintaining its DC-3s and DC-4s. Plan will be applied to Braniff's DC-6s as soon as possible.

Here is an index of the real savings derived from this method of overhaul: manhours required for the first DC-3 8,000-hr. inspection under the new system were 4,696—a reduction of 1,096 from the 5,792 previously required. And this despite the many "bugs" which inevitably accompany the establishment of a new method plus the fact that the mechanics were unfamiliar with the operation of the "planned overhaul system."

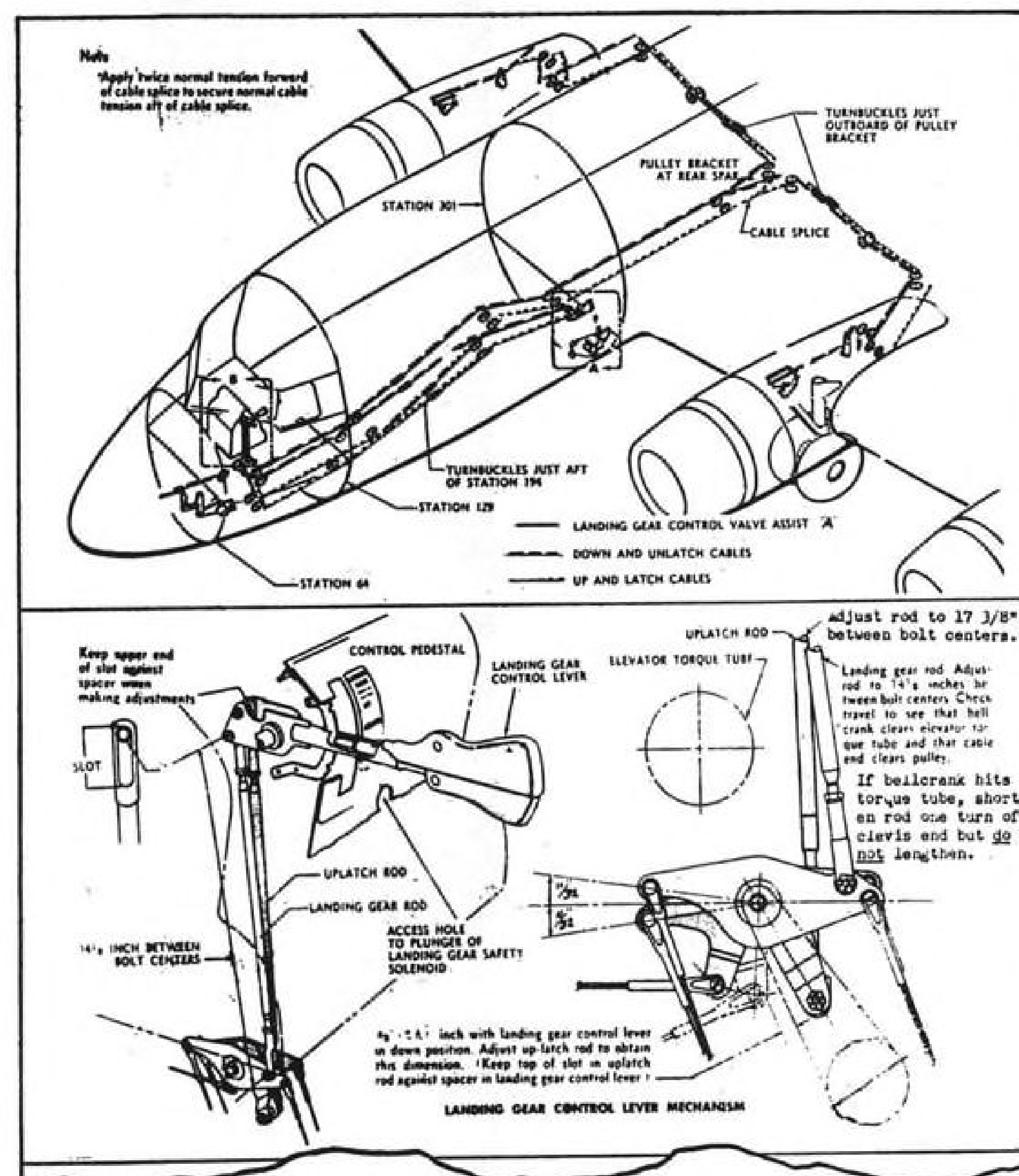
► **How To Do It**—Twin keys to the system are precise pre-planning to forecast accurately the work to be done on an aircraft, allocating manpower efficiently over the airframe to avoid congestion among mechanics, and the work card, the front of which tells a man what to do, the reverse how to do it. Braniff has given particular emphasis to the "how to do it" side of the card which includes explicit instructions on how to accomplish the job accompanied by detailed drawings showing the area of the ship where the job is to be performed.

Gene Norris, assistant to the director of maintenance and engineering, cited these advantages of the system as compared to the old "work sheet" method previously used.

• **Parts** required for each job are known in advance. They are drawn from stores and are placed in cribs immediately adjacent to the aircraft. Result: If parts are short, they may be procured in time for the plane's arrival in the shop, mechanics do not waste time chasing parts and lining up outside store rooms to get parts or materials to work with.

• **By** sorting the cards in proper sequence, a logical, coordinated series of jobs will be performed in correct order

BRANIFF INTERNATIONAL AIRWAYS AIRPLANE MAINTENANCE WORK CARD			
CARD	1705-04	OF 25	JOB
DATE	PLANE NO.	OPERATION	CODE
INSP.	MECH.	JOB TITLE	TIME
		1. Rig main landing gear up-latch.	
		2. Safety control cables.	
SEE BACK OF CARD			
CALL INSPECTOR TO CHECK RIGGING			
FROM CHIEF			
BY MECH. RYAN, JR.			

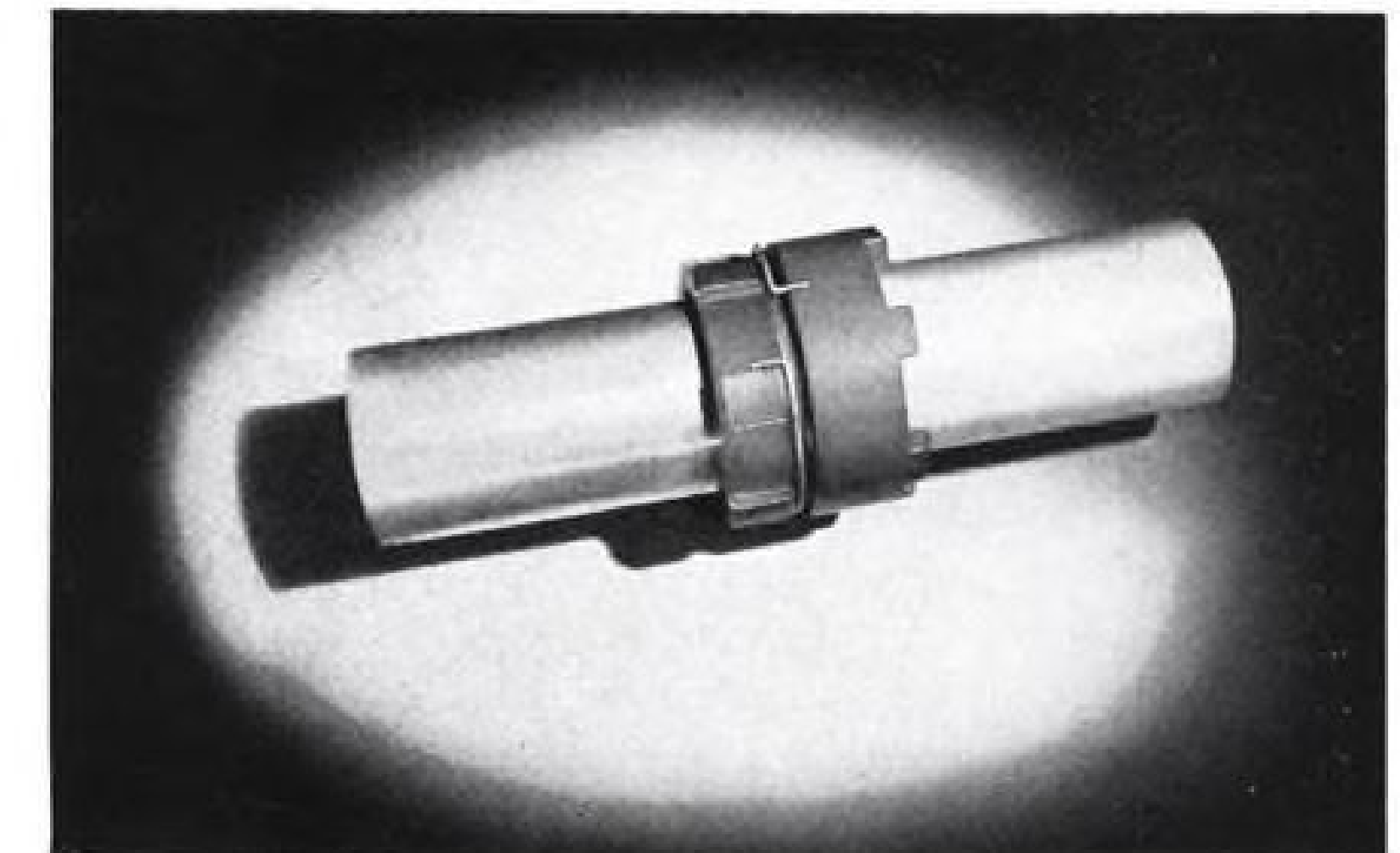


**In the Cards** Front of Braniff's work card (top) tells what to do. Back of card, part of which is shown (below) tells how.

IN THE AIR-IT'S  
*Convair*



ON THE *Convair*-BUILT  
U. S. NAVY XP5Y-1  
IT'S THE **FR**  
PIPE CONNECTOR\*



One of the latest additions to the proud CONVAIR family, the XP5Y-1, will help maintain the U. S. Navy's command over the seas.

It is natural that the builders of the CONVAIR XP5Y-1 have sought to incorporate

the best equipment available. We are proud that CONVAIR has decided to use FR Pipe Connectors throughout the aircraft.

The FR Pipe Connector is the product of over fifteen years' research and development in the pressure fueling field. Light in weight, yet rugged, the FR Pipe Connector has advantages not shared by any other pipe coupling method.

\*REG. U.S. PAT. OFF.



For further details, write to:

**FLIGHT REFUELING INC.**  
Specialists in Aircraft Fueling Systems and Equipment  
DANBURY, CONN. U.S.A.

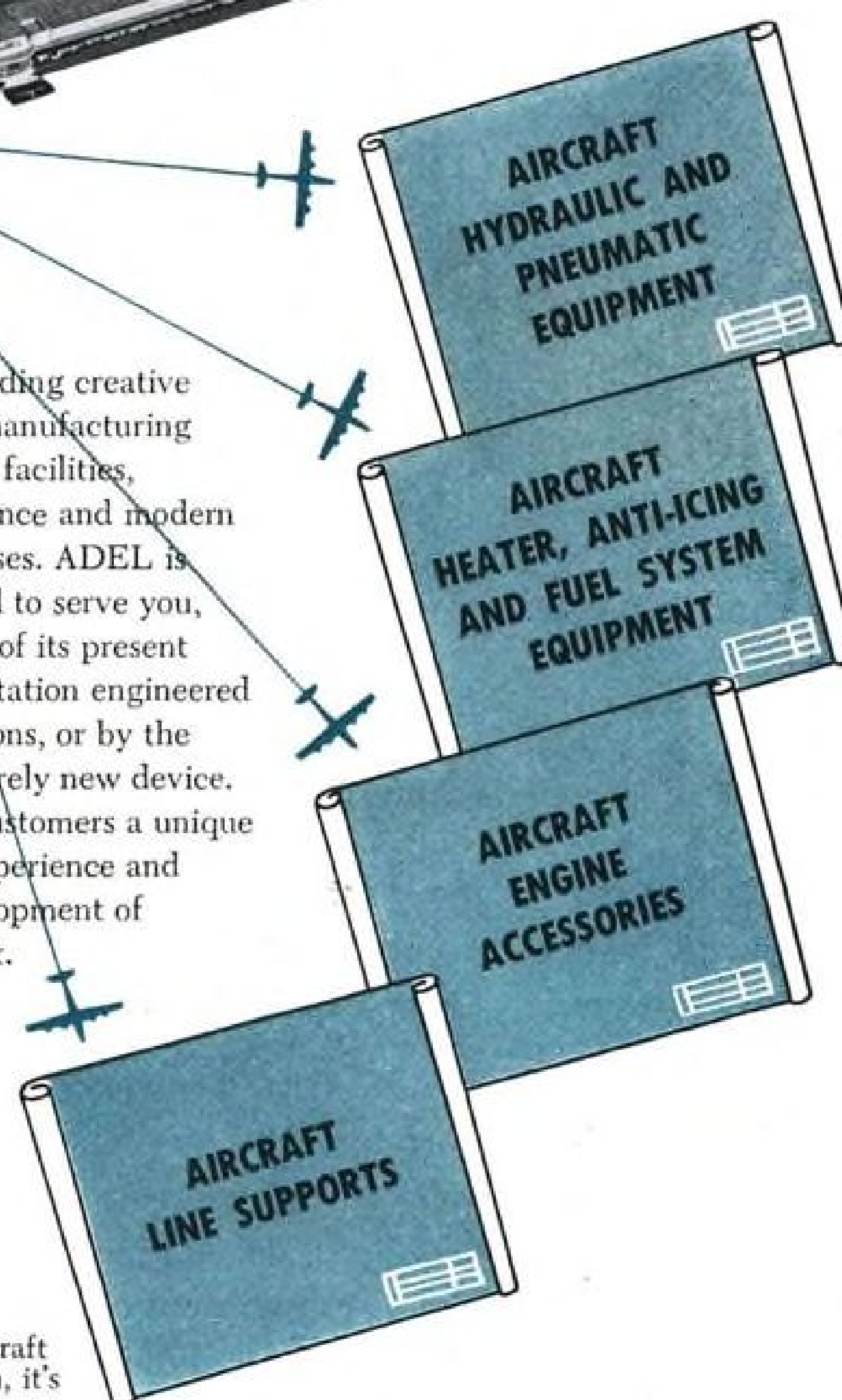
PRESSURE REFUELING - NOZZLES, ADAPTERS, TANK FILLING VALVES, PIPE CONNECTORS



# ADEL



Here is an outstanding creative engineering and manufacturing organization in its facilities, versatility, experience and modern production processes. ADEL is superbly equipped to serve you, whether with one of its present products, an adaptation engineered to your specifications, or by the creation of an entirely new device. ADEL offers its customers a unique combination of experience and facilities for development of aircraft equipment.



Whatever your aircraft equipment problem, it's a challenge to

ADEL DIVISION, GENERAL METALS CORPORATION  
10775 Van Owen Street, Burbank, California



THE WORLD OVER

Manufacturers of  
Aircraft Equipment

DIVISION OF GENERAL METALS CORPORATION • BURBANK, CALIF. • HUNTINGTON, W. VA.

CANADIAN REP.: RAILWAY & POWER ENGINEERING CORPORATION, LIMITED

without duplication and congestion on certain parts of the plane (such as the cockpit).

• Reduces to a minimum possibility of mechanics misinterpreting work to be performed. On the work cards is printed all the information required to do the work correctly showing permissible tolerances, torque values, rigging instructions etc. with appropriate diagrams and drawings. Secondary advantage is elimination of tedious and time-consuming task of looking up these data in the maintenance manual. It also simplifies the accounting department task of allocating accurately charges against an aircraft for the work done on it.

Each mechanic punches in and out on the card's detachable stub. When accumulated in sufficient quantities, these stubs will allow Braniff engineers to forecast with considerable accuracy how long individual items of work will take and so can staff up with the correct number of men for each visit.

With savings already realized on the DC-3s and -4s BNF is looking forward to even more substantial economies when the system is set up for the DC-6s, and eventually for the Convair 340s now on order.

Although not new to the airline industry, the system was worked out and tailored to Braniff's needs by Wm. Maxfield, director of maintenance and engineering, with the help of his assistant, Gene Norris. The plan was coordinated by L. N. Mason, assistant to the president.

► New at Braniff—G. C. Younie, BNF's Chief Maintenance Engineer, told AVIATION WEEK that all 340s now on order will have the Bendix Omni Mag (AVIATION WEEK Oct. 9, 1950, p. 44) aboard. The airline was very satisfied with the unit as a result of a one-year service test.

The 340s also will be wired to receive ignition analyzers, the airline not having decided which unit to buy. Younie said the thinking tended to the Scintilla.

Four of the company's older DC-6s have had their cabin supercharger drive systems converted to Skydrol. Indications are that moving parts life will be increased because of the fluid's improved lubricity. The three new DC-6s will be delivered with Skydrol in the cabin supercharger drive systems. The Convair 340s' cabin superchargers also will be Skydrol-equipped.

Braniff is bringing the landing weight of its existing fleet of DC-6s up to 78,000 lb. from 75,000. The three new ships will have a landing weight of 80,000 lb.

A tour of Braniff's engine overhaul shop revealed these developments:

• The cooling covers over the dyna-

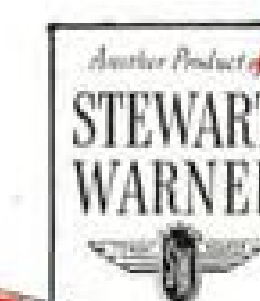
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in the Nation's Leading  
Aircraft*

# South Wind

*Aircraft Heating  
Thermal Anti-icing Equipment  
Inert Gas Generators*

Write Today for specific model information or experienced counsel on any phase of aircraft heating. Address inquiries to the South Wind Division, Stewart-Warner Corporation, Indianapolis 7, Indiana.

**South Wind**  
AIRCRAFT HEATING  
ENGINE PREHEATING  
THERMAL ANTI-ICING EQUIPMENT  
INERT GAS GENERATORS





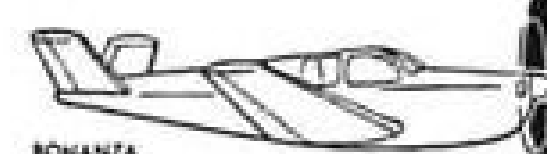
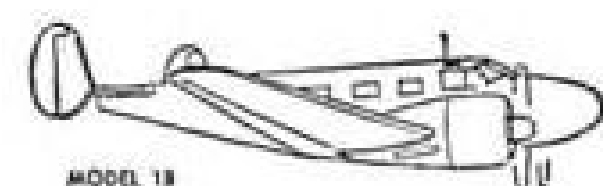


## HELPING AMERICA BUILD FASTER

To keep us better informed — newspaper-owned Beechcrafts

WHEN Beechcrafts go "on the staff" of a publisher, key men *really* get around. And the front page reflects it. News is covered better and faster. Public service missions are routine. This Model C35 Beechcraft Bonanza carries four big men plus photographic equipment, cruises at 175 mph. So *more* gets done when time in transit is slashed as much as 75%.

Today in every business, Beechcrafts are helping America build faster. With defense production up and consumer goods needed too, company-owned Beechcrafts perform a more valuable function than ever. Find out how a Beechcraft streamlines *your* business travel. Call your Beechcraft distributor. Or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.



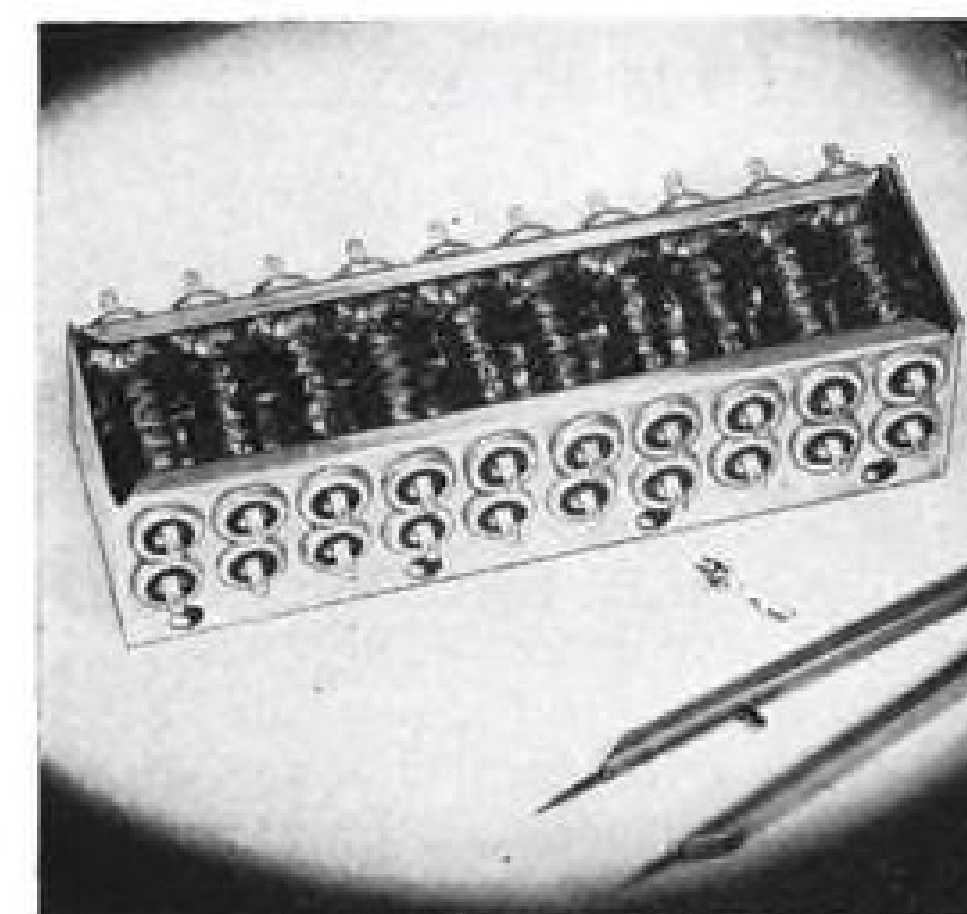
BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

focal engine mounts are now attached to the inner ring baffle with two bolts. Result is that the adjacent exhaust stacks have to be removed before the engine may be swung off the engine-bearer because of insufficient clearance to reach the bolts. Conversely, after overhaul, the engine must first be mounted on the engine-bearer, and cooling covers installed before the exhaust stacks may be fitted.

• Braniff mechanics are experimenting with substituting Dzus fasteners for the bolts. If this scheme works exhaust stacks may be left on the engine and the whole powerplant swung off or on the engine-bearer with stacks attached. Considerable manhour saving is anticipated because of the much greater ease of exhaust stack disassembly and re-assembly with the engine on an "A" frame instead of on the plane's mount.

• Removal of exhaust valve seats, guides and port liners has been facilitated by a clever modification of P&W tools supplied for the job. The tools, used after the cylinder has been heated, are suddenly cooled by blowing CO<sub>2</sub> through specially drilled ports. The rapid chilling of the exhaust components, and resultant shrinking makes them drop out of their seats with ease.

To accommodate its rapidly expanding equipment and maintenance program, Braniff recently doubled its hangar space at Love Field, Dallas. The airline, employing some 2,500 workers, now occupies 13 buildings, including four hangars, and spreads out over an area of approximately 60 acres.



FILTRON miniature 20-circuit filter.

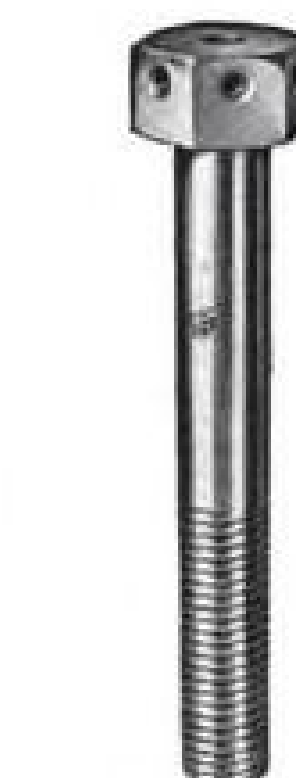
## Cuts Radio Noise

The art of radio interference suppression at levels currently required by the military is becoming a highly complicated and exacting job according to Leonard Milton, vice-president, in charge of engineering of Filtron, Inc., one of the country's largest filter manufacturers. Reasons requirements are getting so tough are:

• Growing number of electrical RF interference makers (motors, generators,

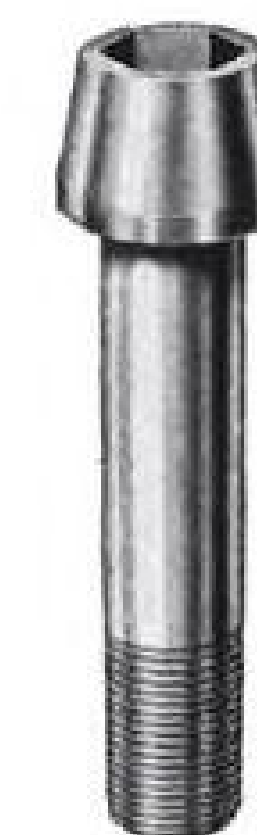
## HIGH-STRENGTH, CLOSE-TOLERANCE FASTENERS for the AVIATION INDUSTRY

UNBRAKO SOCKET SCREW PRODUCTS



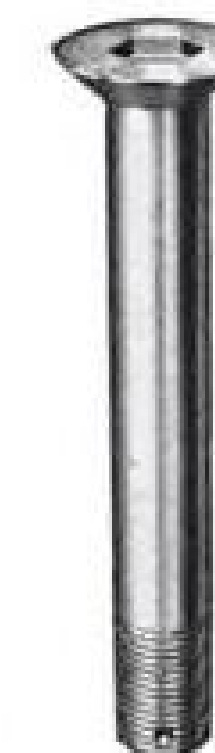
STANDARD "SIX-DIGIT" ENGINE BOLTS

all listed diameters — hex and internal wrenching types; AN specifications. Information on request. Address Dept. 678.



NAS INTERNAL WRENCHING AIRCRAFT BOLTS

latest NAS specs; threads fully formed by rolling after heat treatment; full range of sizes. Dept. 678.



NAS SHEAR BOLTS

close tolerance, high strength, flush-head type. Dept. 678.



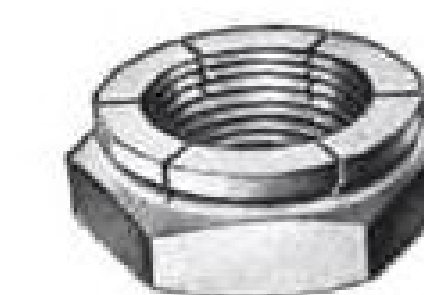
NAS INTERNAL WRENCHING LOCK-NUTS

superior safety nuts. Sizes from 1/4" to 1 1/2". Dept. 678.

Several decades' experience in the manufacture of fasteners for the most critical applications is your assurance of complete reliability in every SPS Aircraft Product.

The finest equipment, workmanship and "know-how" are lavished on these vital aircraft parts. This has resulted in widespread acceptance and approval by government and civilian agencies alike.

## FLEXLOC SELF-LOCKING NUTS



"FLEXLOC" THIN NUTS

less than regular height, yet conforms to accepted standards, since every thread, including locking threads, carries its share of load. Has all "regular" FLEXLOC features; saves height and weight; sizes #10 to 1". Dept. 51.



"FLEXLOC" EXTERNAL WRENCHING NUTS

incorporate famous FLEXLOC self-locking principle and one-piece, all metal construction. Latest NAS specs; sizes from 1/4" to 1 1/2" NF Thread Series; approved for temperatures to 550° F. Send for samples. Dept. 51.



"FLEXLOC" SELF LOCKING NUTS (REGULAR)

serve as both stop and lock-nuts. One-piece construction—resilient segments lock positively with uniform torque. Aircraft approval of sizes from #4 to 1" inclusive in steel, brass, aluminum. Since regular steel FLEXLOCs are approved for temperatures to 550° F., you need stock only one type locknut for this temperature range. Dept. 51.

For further information on products shown in this advertisement please address departments listed. Inquiries on other aircraft parts should be addressed to Department 678.

-SPS STANDARD PRESSED STEEL CO. JENKINTOWN 3, PENNSYLVANIA



*Does a flame-out mean bail-out?*



... Not Necessarily So! Especially if the engine is equipped with a dependable GLA ignition system. The Model ACD2-6 high energy condenser discharge system—specified for many of the latest air force aircraft—is typical of the many complete systems built by GLA. Their performance is uniform under varying conditions of operating environments.

We specialize in equipment which combines advanced electronic development with unique space and weight-saving design. Solving complex ignition problems and producing the equipment is our business—our Engineering Department invites your inquiry. May we hear from you?



**GENERAL LABORATORY ASSOCIATES INC.**  
NORWICH, NEW YORK

**GLA**

AIRCRAFT AND ELECTRONIC PRODUCTS

inverters, relays, alternators, etc.) being installed on modern military aircraft. All have to be filtered.

- Increasingly sensitive avionic receiving equipment requires more efficient filtering over wider ranges of frequencies. Existing frequency limits, Milton says, are 15 to 1000 megacycles.

- More stringent demands for smaller size, higher temperature and lighter weight units are compounding the filter designer's headache.

Milton told AVIATION WEEK that his firm could accomplish a 50-75 percent filter size reduction if called in during design stages of the unit to be filtered. The state of the art has advanced far beyond the early days of filtering when engineers "threw condensers across anything until it looked like Christmas tree ornamentation."

In the trim, modern Filtron plant, Flushing, N. Y., research is actively progressing in filtering to 1,000 mc. and beyond. At the same time, the firm offers a consulting service to manufacturers of equipment requiring filtering. Filtron will work with the engineers of these firms from the initial design stages to show them the most modern and advanced methods of mechanical bonding, shielding and filtering to reduce radio interference to irreducible minimums. Then, if necessary, custom-made filters will be provided for that particular piece of electrical equipment.

Filtron has, in its screen room labs, all of the approved testing equipment measuring up to 1,000 mc. as specified in the latest specs such as MIL-I-6181.

## PAA Increases Overhaul Force

Pan American World Airways has doubled the force of mechanics at its Brownsville, Tex., overhaul shops to handle a two-fold project.

The airline is under contract to the USAF to overhaul 1,200 Pratt & Whitney R-1830 engines for C-47s. PAA has also moved in the overhaul of its nine C-46 cargo carriers from Miami where maintenance was being done by a private firm.

## Amazing Aircraft Finish

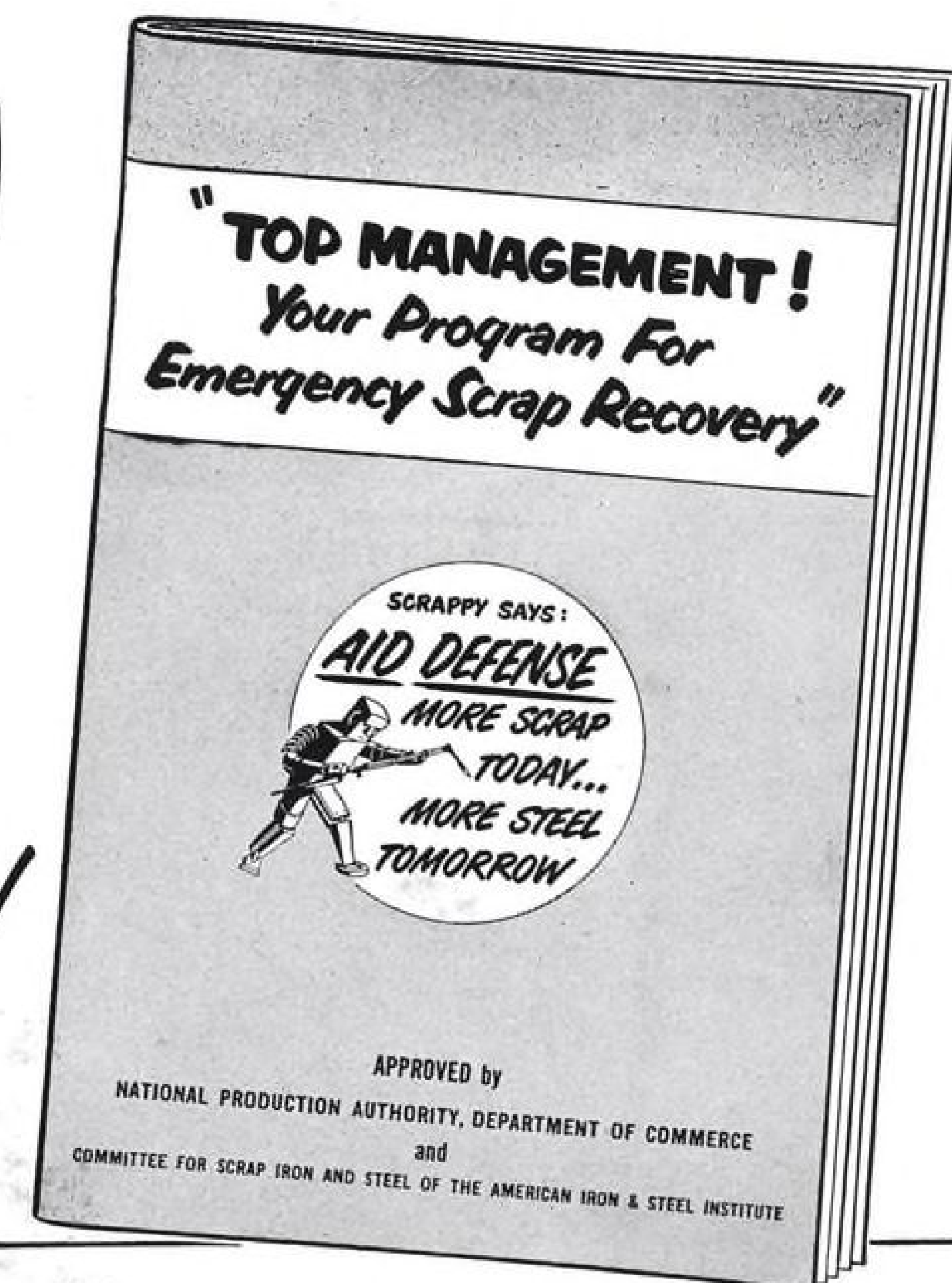
**Avex**

Sky-high in Quality!

CHAMBERLAIN AVIATION, INC.  
AKRON 9, OHIO

# What YOU can do... Must do

*to ease the critical iron and steel scrap problem*



It's a problem calling for the assistance of every thoughtful business man—now.

Unless the steel mills get more scrap... furnaces may have to be shut down.

Shut down—at a time when our armed forces need more and more equipment... when civilian demands for steel are greater than ever... when our economy is fighting desperately against inflation!

**You Can Help.** Yes... regardless of the business you're in... you're in the scrap business, too.

If you're in the steel-fabricating bus-

iness, you have extra *dormant* scrap to be added to your *production* scrap.

If you're in any other business, you surely have idle metal that will do you—and America—more good being fed into furnaces than cluttering up your premises.

**Write for Suggestions.** The booklet shown here tells how to set up a Scrap Salvage Program with least amount of effort and minimum interference with your regular operation. It tells where to look for scrap, what to do with it when you get it.

You are urged to send for the booklet

now. Use the coupon.

## FACTS ABOUT SCRAP SALVAGE

Steel production	1950 — 97,800,000 net tons
Estimated capacity	1952 — 119,500,000 net tons
Purchased	

scrap used*	1950 — 29,500,000 gross tons
Estimated purchased	
scrap requirement*	1952 — 36,200,000 gross tons

\*All consumers

Where will the extra tonnage come from? Mostly from your *dormant* metal—obsolete machines and structures, tools, jigs, fixtures, gears, wheels, chains, track.



*This advertisement is a contribution, in the national interest, by*

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Please send me a copy of the free booklet: "Top Management: Your Program for Emergency Scrap Recovery"

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# Mystik Tapes

...for Industry, for Defense



...Meet government specs... and your specs!

Here are just two of the many kinds of cloth tapes and paper masking tapes made by MYSTIK. They meet the toughest specifications demanded by the government—but they go beyond that. They're built to meet *your* needs... on the production line and for protective shipping. MYSTIK is *proved* under toughest conditions... MYSTIK Cloth Tapes supplied 65% of the total needs of industry and the armed forces during World War II. Write for full information and samples. Mystik Adhesive Products, 2643 N. Kildare, Chicago 39.

Mystik Cloth Tapes • Mystik Paper Masking Tapes • Mystik Protecto-Mask  
Mystik Dri-Pipe • Mystik Spra-Mask • Mystik Sand-blast

## NEW AVIATION PRODUCTS



### New Lightplane Plug

A new sparkplug, the Safr B-57, claimed to be a boon to the lightplane owner since it minimizes radio interference caused by ignition systems and saves him expense of a shielded system, has been announced by U.S. Quarry Tile Co.

The plug is said to be the result of five years' development and, according to the company, already has received CAA approval. The unit is reported to have an extremely wide range between pre-ignition and fouling because of high thermal conductivity of the insulator material used.

According to the firm, the plug has successfully completed a rigid 150-hr. ground endurance test, including 50 hr. at full throttle with temperatures in excess of those allowed in flight, 50 hr. at various cruising powers and a final 50 hr. at full throttle. The plug passed his test without cleaning or resetting of the gap, the firm reports.

U. S. Quarry Tile Co., 217 4th St., NE., Canton, Ohio.

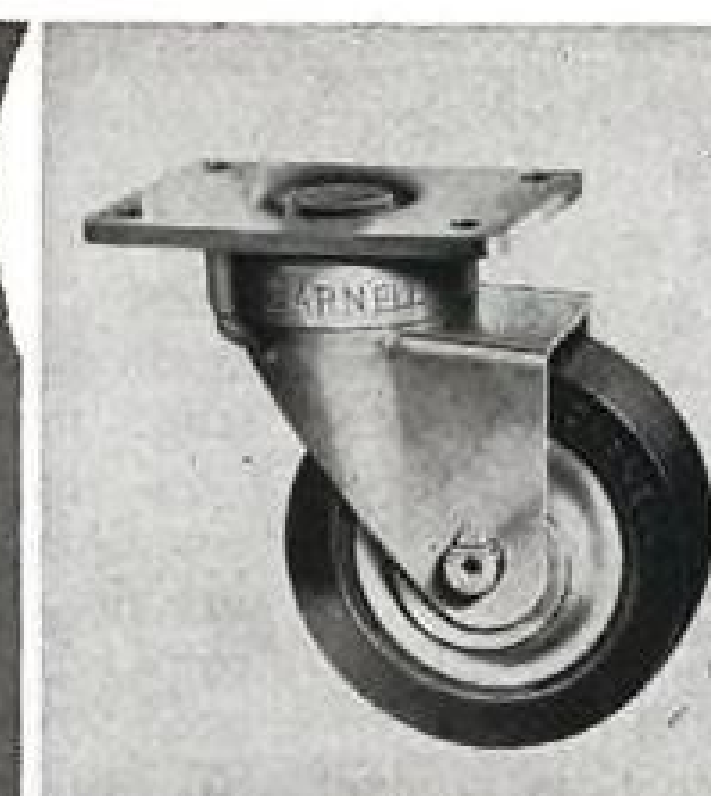


### Aircraft Actuators

A new series of lightweight, high torque electrical actuators for aircraft has been announced by Pacific Airmotive Corp.

First of this new line, now in pro-

## DARNELL



• Save Money, Floors, Equipment and Time by using DARNELL Casters and Wheels... Always dependable, these low-cost floor protection products have been made to give you a long life of efficient, trouble-free service.

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duction, is an actuator weighing less than 1½ lb., having a maximum torque of 110 in. lb. at 2 rpm. The unit includes a radio noise filter meeting Specification MIL-6181. Dynamic braking relays also are included in the same envelope.

Pacific Airmotive Corp., 2940 N. Hollywood Way, Burbank 7, Calif.

### Plane, Field Tape

A self-bonding electrical insulation tape which can be used through a wide range of temperatures and is designed to meet stringent performance demands of the aviation industry, is being marketed by Bishop Mfg. Co.

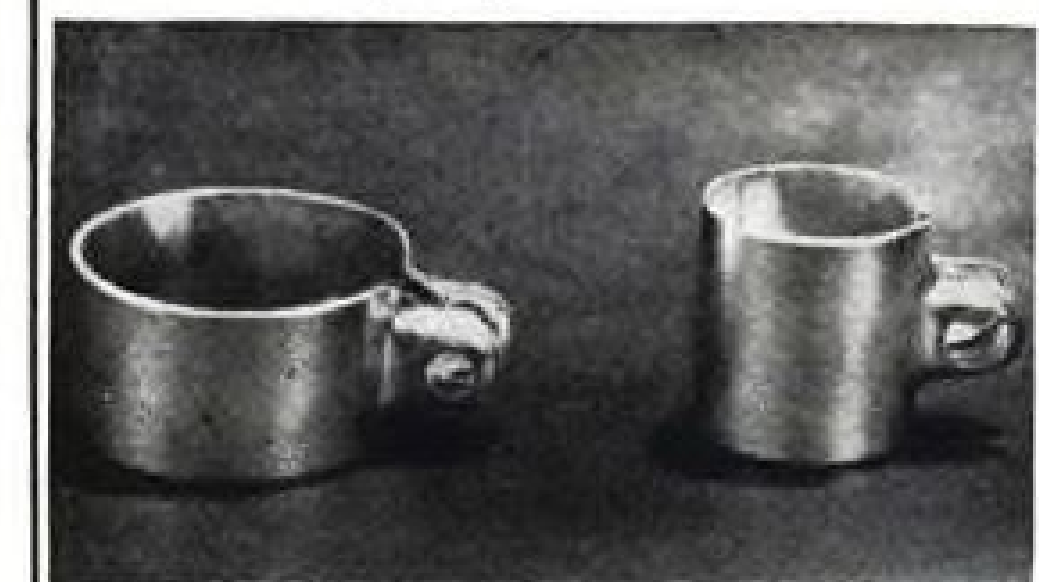
The product, Bi-Seal, Type 4, is a hydrocarbon formulation that is non-adhesive, yet extremely tenacious once applied. Instead of adhesive, Bi-Seal depends on its "memory." After being stretch-wrapped around a cable splice or component, the tape tends to contract to its normal length, creating powerful internal pressures that "fuse" it, in effect, into a tight, solid mass which cannot unwrap.

Bi-Seal makes a wrapped seal, following the contours of the most complex shaped component, says Bishop. It is strongly resistant to moisture and provides a high dielectric sheath over any type cable or wire insulation.

The versatile tape is said to be capable of performing a wide range of insulation tasks associated with aircraft and ground installations, from protecting parts exposed to corrosive salt spray or the humid atmospheres of the tropics to serving as electrical insulation on cable splices exposed to icing and frigid temperatures of the Arctic or high altitude.

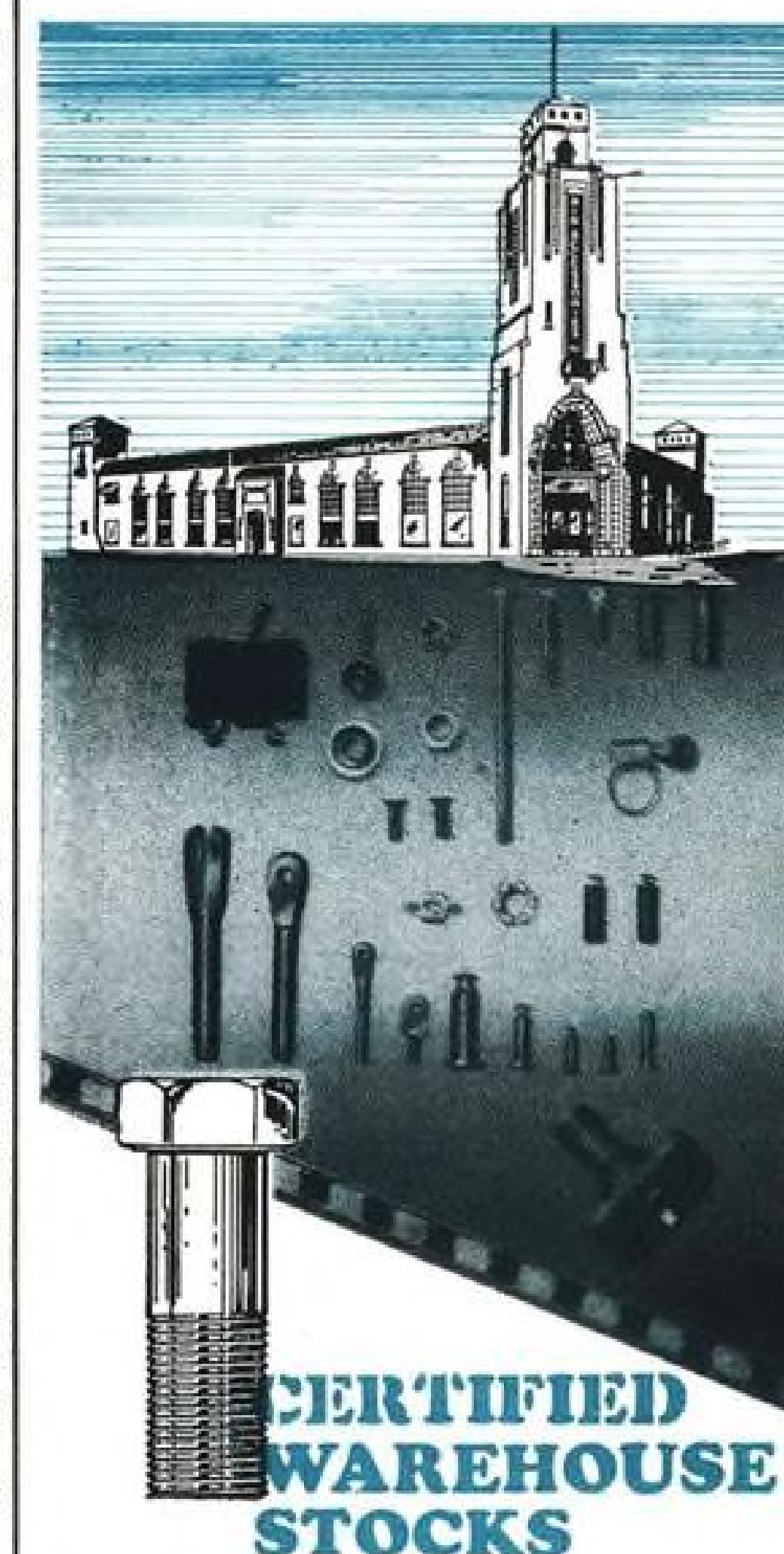
Bi-Seal is recommended by Bishop as a moisture barrier medium and as electrical insulation in applications involving field lighting equipment. It could be useful, for example, for field use in the Arctic where an emergency cable-splicing job might have to be performed outside in extremely low temperatures. The product can be used at temperatures down to -65F, according to the firm.

Bishop Mfg. Co., 10 Canfield Rd., Cedar Grove, N. J.



### Better AN 741 Clamps

Improved AN 741 standard aircraft tube clamps, types "A" and "B," exhibiting more uniform quality and designed to closer tolerances than parts of this type formerly produced, are re-



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AMC Supply has your aircraft needs in complete warehouse stocks. Rubber and plastic Products, Electrical Cable and Supplies, AN Specification Parts and Supplies, Dopes, Fabrics, and Many Other Aircraft Supplies.

In order to better serve you, AMC Supply now has complete facilities for the manufacture of hard-to-get, AN, NAS Bolts and Special Assemblies. Send us your requirements and drawings.

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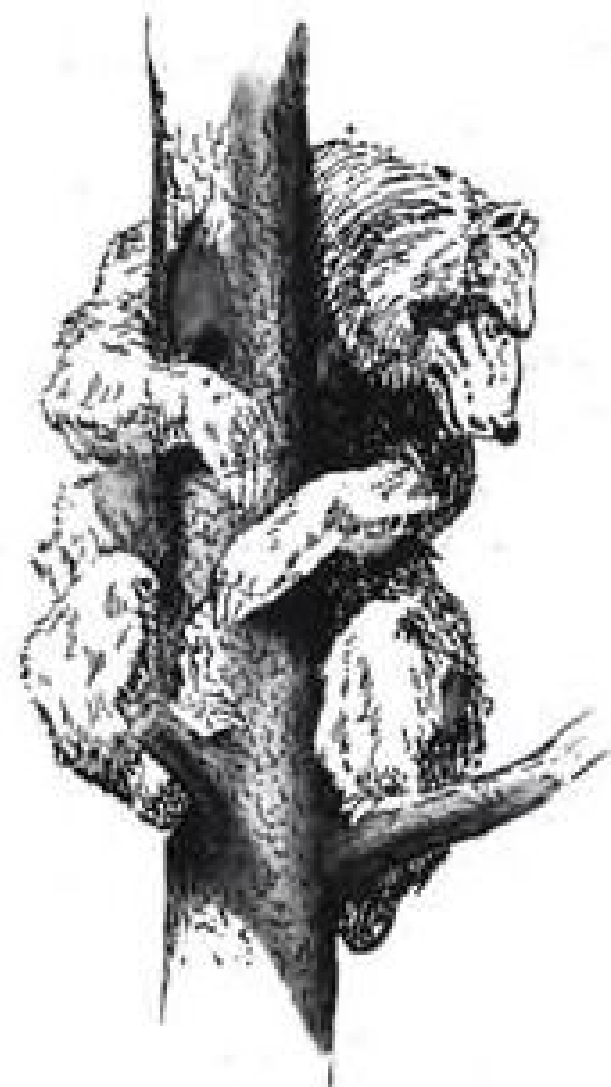
A DIVISION OF AIR ACCESSORIES, INC.

P. O. Box 1440B 1400 Henderson  
Fort Worth, Texas



# Up a Tree?

Not enough hours in your day? Here's a handy slide-chart to make your job simpler and save valuable time! This FREE chart instantly identifies A-N Nos. pertaining to stainless steel nuts, screws, bolts, rivets, cotter pins, washers; gives sizes, other data. Write for your FREE copy of Chart 51C TODAY!



## Anti-Corrosive

### AN STAINLESS STEEL FASTENING SELECTOR

In listing below, find AN number and note kind of fastening. Then, in proper window, set AN number and read data.

NUTS				SCREWS			
NUMBER	NOM. SIZE	THD. IN.	CAT. PAGE	NUMBER	NOM. SIZE	THD. IN.	CAT. PAGE
AN 310 C18	1-1/8"	12	22	AN 501 C1	#1	72	11

See other side for RIVETS, COTTER PINS, WASHERS

AN3 to AN20 Hexagon Head, Fine Thread, Class 3 Fit Aircraft Bolts with hole drilled in shank.  
 C—Corrosion Resisting Steel (Stainless Steel to Spec. AN-QQ-S-770, Condition QT, Class II, Type 431).  
 H—Indicates drilled hole in head of Bolt.  
 A—Indicates no drilled hole in shank of Bolt.  
 Last Dash No—Refer to drawing for length of Bolt

Number	Size	Thd./In.	Number	Size	Thd./In.	Number	Size	Thd./In.
AN3	10	32	AN7	7/16	20	AN14	7/8	14
AN4	1/4	28	AN8	1/2	20	AN16	1	14
AN5	5/16	24	AN9	9/16	18	AN18	1-1/8	12
AN6	3/8	24	AN10	5/8	18	AN20	1-1/4	12
			AN12	3/4	16			

AN310 Castellated Nuts, Fine Thread, Class 3 Fit  
 AN315 Hexagon Plain Nuts, Fine Thread, Class 3 Fit  
 AN316 Hexagon Double Chamfered, Double Countersunk Check Nuts, Fine Thread, Class 3 Fit  
 AN320 Hexagon Shear Nuts, Fine Thread, Class 3 Fit  
 AN340 Machine Screw Nuts, Coarse Thread, Class 2 Fit  
 AN345 Machine Screw Nuts, Fine Thread, Class 2 Fit  
 AN381 Corrosion Resisting Steel Cotter Pins to Spec FF-P-386a, Amendment 2, Type C (Type 302)  
 AN427 100° Flat Countersunk Head Rivets to Spec AN-W-24, Grade G, Condition A (Type 302 or Type 304 annealed), Coarse Thread, Class 2 Fit 5"

## Anti-Corrosive

### Metal Products Co., Inc.

#### Manufacturers of STAINLESS STEEL FASTENINGS

CASTLETON ON HUDSON, NEW YORK

ported available from Production Products Co.

The new clamps are designed to overcome difficulties previously encountered with parts of this type. According to the firm, quality of AN 741 clamps on the market during World War II was so inconsistent that many aircraft companies had to produce their own. The improved clamps are fabricated to even closer tolerances than required, says the company.

They are available in steel with zinc or cadmium plate, in heat-treated aluminum or work-hardened aluminum with anodized finish. Sizes range from 1/4 to 2 1/2 in. diameter, .050 in. thick in steel and .051 in. thick in aluminum alloy. The company reports it also is producing the PP561 clamp (same as Curtiss 561D or Consolidated S01001).

Production Products Co., Standard Products, Inc., 650 E. Gilbert, Wichita 11, Kan.

## ALSO ON THE MARKET

A metal cleaner, recently developed to perform three jobs in one operation is now on the market. Oakite Compound No. 33 performs this way: (1) removes oil, (2) eliminates rust, (3) conditions metal for good paint adhesion, according to the manufacturer, Oakite Products, Inc., 22 Thames Street, New York 6.

"Card-All" reference cards bound in convenient booklet carry wide range of information in tables and formulas constantly needed by engineers and draftsmen. Information desired can be found quickly through speedy color indexing system, says maker, General Design Co., 1200 Commercial Trust Bldg., Philadelphia 2.

Propeller blade hub grinder said to provide exceptional efficiency when grinding external surfaces of aircraft propeller blade hubs and ball raceways, is on the market. Trick is a workholding fixture on an anti-friction bearing work spindle that holds the blade in a vertical position so grinding may be performed in that position. This avoids errors brought about by deflection of the blade when ground horizontally, according to the manufacturer, Norton Co., Worcester, Mass.

New air hammer striking up to 6,000 blows per min. is available. Light in weight (about 2 lb.), unit features a patent 3-point ball-bearing chuck to lock tools in working position eliminating hazard of tool ejection. Tool operates at 120 psi. and mounts control to regulate striking speed or power. Made by Pneumatic Tool division, Salisbury Corp., 1161 E. Florence Ave., Los Angeles 1.

## NOW... A COMPLETE LINE OF CYLINDRICAL ACCUMULATORS TO SPECIFICATION MIL-A-5498

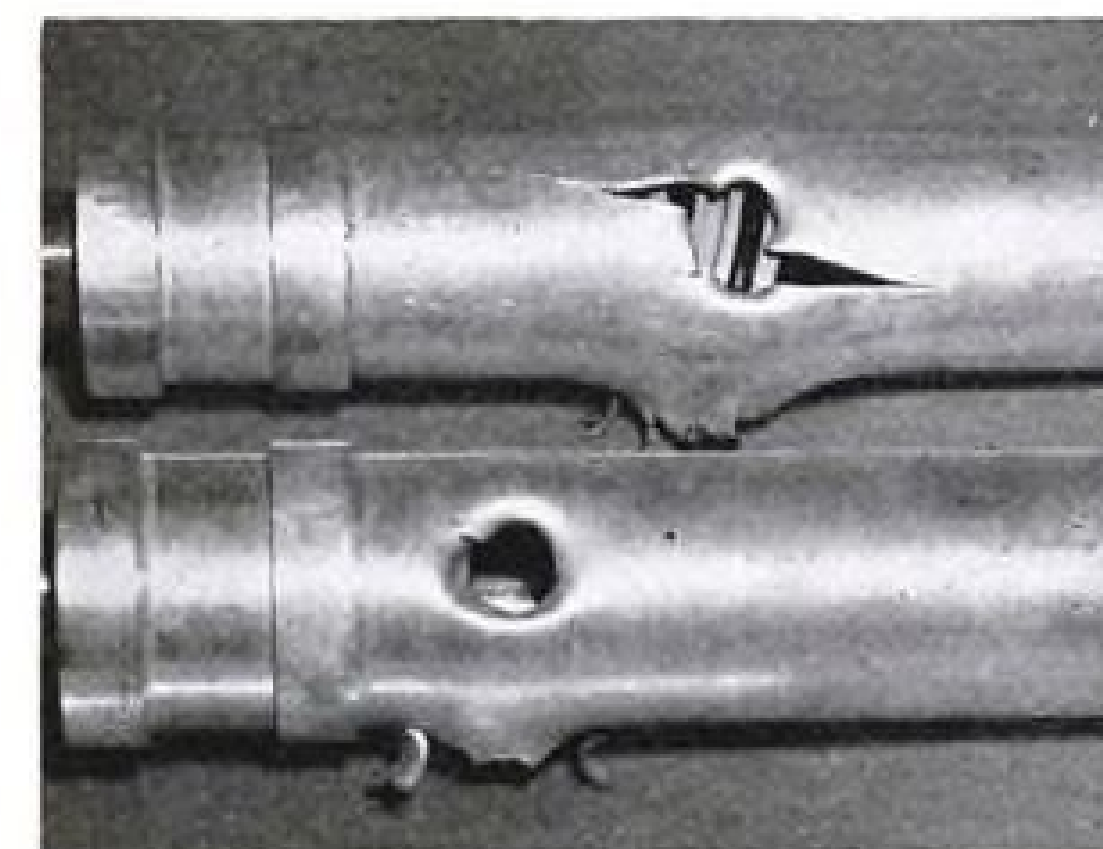


Cylindrical accumulators designed to the latest proposed AN Envelope and which meet requirements of Specification MIL-A-5498, including winterization and ability to withstand gunfire, are now available from Bendix-Pacific, largest producer of aircraft accumulators.

At the suggestion of both the Air Force and the Bureau of Aeronautics, Bendix-Pacific has developed these accumulators, weighing approximately the same as the Bendix-Pacific spherical accumulators. With several models of cylindrical accumulators already in volume production Bendix-Pacific is now gearing for mass production of all sizes.

Listed below are the numbers which Bendix-Pacific has assigned to accumulators meeting the proposed envelope arrived at the April meeting of the SAE A-6 Hydraulic Committee. Other light weight models are also available.

Assembly No.	Air Capacity
551050-3	25 cu. in.
551050-1	50 cu. in. (small dia.)
551200-5	50 cu. in. (med. dia.)
551200-3	100 cu. in.
551200-1	200 cu. in. (med. dia.)
552200-1	200 cu. in. (large dia.)
552200-3	400 cu. in.



The ability of Bendix-Pacific cylindrical accumulators to withstand gunfire is evidenced by this untouched photo. Fifty calibre incendiary ammunition was used.

Write for complete data and specifications.

## Pacific Division

### Bendix Aviation Corporation

NORTH HOLLYWOOD, CALIF.

East Coast Office: 475 Fifth Ave., New York 17 • Export Division: Bendix International, 72 Fifth Ave., New York 11 • Canadian Distrib.: Aviation Electric, Ltd., Montreal



## AIR TRANSPORT

# TAL Builds Hedge Against Nonsked Ban

● CAB gets harder and harder to please, so Transocean looks for new revenue on the ground or in the air.

● But flying is still the business the company loves the best and feels it knows the best.

San Francisco—In the mountains east of Fresno, Calif., a \$700,000 stretch of county road is under construction; on Okinawa a salesman just sold a new Dodge; there's a new exclusive gift shop in Rockefeller Center.

Doesn't sound much like an airline's operations, but when the profits from these are added they'll show up in the financial statement of Transocean Air Lines.

These three activities are just samples of Transocean's diversification. There are many more non-flying divisions and subsidiaries of the parent firm.

► **Largest Ever**—No, TAL hasn't gone out of the flying business. In fact, it's in it more than ever, with 111 airplanes in the air today—largest number ever operated by the airline. And, if the seven C-54s now in the Korean airlift were excused tomorrow, they'd be engaged in profitable flights some place in the world within a week.

The fact that Transocean has spread is the result of the leadership of a former United Air Lines pilot—dynamic TAL president Orvis Nelson. Not that Nelson wanted or wants to get out of the air—it's the business he loves and the one he feels his men know best. But shortly after formation of the company in 1946, he saw dark clouds. The possibility that continued frowning on TAL's world-wide contract carrier activities by the CAB might put the company out of business was very real, and a look at a future when all construction workers, DPs, etc., were through being flown from one part of the globe to another was discouraging. Nelson wanted to hold his boys together even if it meant getting into new fields of business.

► **Anything Anywhere**—While diversification has been brewing, TAL has continued to fly anybody and anything any place in the world. Nelson's original dream, presented to the nine original investors in 1945 during a layover on a Pacific island while they were flying for ATC, has continued to come true.

Masses of men and material have been flown about the earth. Besides the

Korean airlift, TAL planes are flying in Alaska for the Navy; scheduled flights among the Jap mandated islands are maintained; non-scheduled flights between Oakland and Honolulu and trans-continental coaches are making money; pilgrims from the Near and Far East are being flown to Mecca; supplies from Asmara in East Africa are going air freight to Arabia for the Arabian American Oil Co. TAL is also getting its share of the day-to-day charter flights.

Some of TAL's earth-bound endeavors are quite natural off-shoots. Its desire to maintain a high standard of flight crew proficiency, for instance, led to the establishment of a flying school. Lack of adequate automobile servicing facilities at busy Oakland airport has resulted in the establishment by TAL of a super gas station.

Their use of Wake Island as a base led to their present operation of a small city—from the light and water systems to the pool hall. A print shop in Oakland set up to print sundry forms used by the company also solicits business in adjacent communities. Then there's the barber shop. "Any way to make an honest dollar," says Nelson.

► **Other Irons**—Transocean Engineering Co., the construction subsidiary that has bid and built several bridges in the California highway network and now is on the Fresno road job, is the result of a deal with the Chinese government plus some left-over engineering know-how from TAL's operation of the Arcata landing aids experiments.

SeaBee construction equipment left on Wake was given to the Chinese. Nelson bartered for it and brought the works to the U.S. by barge. After reconditioning it, he was in business.

In setting up the Talchem division not long ago, TAL took on the international distributorship of the Jackson Chemical Supply Co., Los Angeles. The line consists mainly of industrial cleaning compounds which Nelson found used in TAL's own maintenance shop. Monthly sales have increased each month since Talchem inception last April.



NELSON: "Anything for an honest dollar."

When the Oakland Airport restaurant franchise ran out last year, Nelson decided he could do a better job feeding the public than had been done. Today an ultra-modern eatery has a regional reputation. It's run by an Irish girl imported by TAL from a hostelry at Shannon airport.

Talca Motors, a subsidiary on Okinawa, grew from the fact that a TAL station manager didn't have enough to do between flights. Military and other personnel on the island were in a car-buying mood so a Dodge and De Soto distributorship was set up.

Of Transocean's present 3,400 employees about 1,800 work for Aemco, meaning Aircraft Engineering & Maintenance Co. This subsidiary was set up as an overhaul base and now is working chiefly on Air Force C-54s, most of which come out of the Korean airlift. It did a similar job on planes from the Berlin shuttle.

► **Gift Shop**—But the newest TAL activity to get into full swing is the international trading company, an example of which is the Rockefeller Center gift shop. Dealing in imported merchandise only, it will not only sell retail, but will take wholesale orders. Similar stories will be established by Transocean in other major cities.

Vital part of the operation is the setting up by Nelson of offices in many foreign countries. Not only will these offices buy products in the countries in which they are located, but they will also make arrangements for purchase of anything in the U.S. for governments or private firms. An example of

such activity is \$200,000 worth of pre-fab housing now being delivered abroad. These offices will also act as full-fledged travel agencies. Naturally they'll be on the lookout for any aviation business that might come along.

Typical of Nelson's solid planning is his hiring for his trade organization recently 15 graduates of Lt. Gen. Barton K. Yount's American Institute of Foreign Trade. The school was established at Thunderbird Field, Phoenix, shortly after the last war.

► **Money Makers**—None of TAL's enterprises is necessarily based on air transportation. Each must stand on its own feet, and apparently does, since each is making money. Of course, expediency is the rule. If a Transocean plane should be coming from Honolulu with cargo space available, a case of fresh pineapple for the restaurant might be tossed aboard, but otherwise each operation uses the most economic transportation.

That Nelson has managed smartly is witnessed by the fact that a just-released financial statement reveals the company is still making a substantial net profit. All activities are grossing about \$2 million per month at the present time.

So, with a weather eye on the CAB, Nelson and Transocean can relax, knowing there'll always be a company nucleus to "earn an honest dollar."

## TCA Plane Orders In

Trans-Canada Airlines has ordered five Lockheed Super Constellations and three North Star DC-4Ms at total cost of \$9.5 million.

The five Super Connies are scheduled for delivery in late 1953, at cost of \$1.5 million each including spares. TCA is buying the three North Stars from Canadian Pacific Airlines at \$2/3 million each including spares. They will go into TCA service early next year.

Trans-Canada plans to put the Super Connies on its overseas routes to Europe. They will cut presently scheduled Montreal-London nonstop flight time by four hours to about 10½ hours. TCA has ordered its Super Connies with the 3350-hp. Wright R-3360 compound engine.

## Avianca, Lansa Join

(McGraw-Hill World News)

Bogota—Avianca has taken over another important Colombian carrier, Lansa, thus making the carrier second only to Pan American Airways as regards mileage in the Western Hemisphere, and fifth in the world. The new carrier has increased its capitalization by over three million pesos.

Avianca has also picked up two cargo planes from the Colombian cargo carrier Sociedad Aeronautica de Medellin (SAM), one of its debtors.

## CAA to Revise Air Safety Office

Move aimed to give airline operations more service, also provide for their more rigid inspection.

Civil Aeronautics Administration is reorganizing its Office of Aviation Safety to give more direct service to airline operations and more rigid inspection of them. The CAA is implementing this 3-year-old plan, partly because of a prod from the Senate Appropriations Committee, partly because of governmental pressure for CAA to do more to help airlines improve operating safety.

Fatal accident rate of the scheduled domestic airlines the first three quarters of this year comes to double last year or the year before. Passenger fatality rate per hundred million passenger miles is about 2.2; in 1950 it was 1.1 and in 1949 it was 1.3. But if CAA, CAB and the airlines together can crack down and prevent any more fatal accidents the rest of this year, the final 1951 rate will come out only about 1.3 or 1.4—about the same as 1949 and almost as good as 1950.

► **The Plan**—Under the new reorganization plan transport operations, maintenance, pilot, mechanic and medical problems will all come under one CAA office in each region and at the home CAA office in Washington. Airlines have had to deal with separate CAA offices on separate phases of operations.

And CAA will appoint an overall safety director in each region—in effect, a sort of second-in-command regional administrator, with top command in all matters pertaining to safety.

Transport operations will be an entirely separate office from general aviation, meaning all flying except by common air carriers. This specialization of transport operations recognizes the growing difference in size and complexity of transport operations compared with other flying.

Target date for formal switch-over to an independent safety operations office, with transport and general aviation operations separated, is Feb. 3 next year.

CAA Safety Director E. S. Hensley will interview candidates to fill 29 new or re-designated jobs—eight in Washington and three in each of the seven CAA regions. Hensley is slated to remain in his present post, presumably with greater centralization of safety authority in Washington.

A selection board, including Deputy Administrator Fred B. Lee and several regional administrators will help Hensley make the 29 personnel selections.

► **Why Reorganize?**—CAA has been talking about re-shuffling or streamlining its safety administration for the last three years, but rapid turnover in the top administrator spot kept the plan

back. Also, some regional administrators didn't like the idea of CAA's creating safety czars under them. But then the Senate Appropriations Committee last summer let it be known the CAA had better get the long-stagnated plan underway—regionally as well as in the home office. And, Senate said, any regional administrator who opposed the plan could be dealt with accordingly. This directive came through in August.

CAA announced the plan six weeks later.

It is considered a "reorganization on functional instead of subject lines." Instead of aircraft, airmen, maintenance, etc., it is to be safety of operations, on the one hand, and aircraft engineering, on the other, with personnel and other matters handled according to how they fall in these categories.

► **Safety Drive**—Aside from announcing the administrative reshuffle, CAA is pushing an airline safety drive. The chief emphasis will be on "cockpit discipline" and intensified personnel training.

CAA Safety Director Hensley says several factors had allowed slackening of airline personnel habits this year, resulting in the recent tragic retrogression in safety. Practically all airlines have re-doubled safety training and discipline efforts lately, he says. And CAA is cracking down in its six-month pilot instrument flight checks, requiring pilots to pass every detailed requirement; when pilot gets a "down check" on any detail now, CAA makes him practice a few days and come back for a re-check.

Hensley sees three major causes for the 1951 decline of airline personnel safety supervision and discipline.

• **Capacity operation** of the airlines. Extra sections and charters and over-scheduling have kept everyone going at peak, with not enough time to pick up loose ends.

• **Personnel shortage.** Peak operations combined with military draft have cut down experience level of personnel.

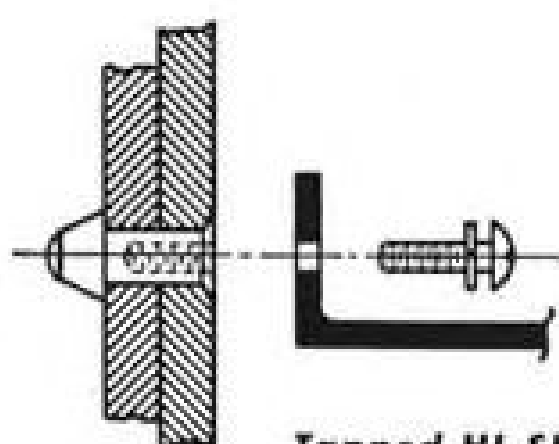
• **Extra duties** for management and pilots attending mobilization—airlift contract operations; mobilization planning; and parts scarcities.

More effort and care by every human being connected with safety—airline and government—are the answer, Hensley says. He largely discounts the argument of many pilots and operations people that much more money should be spent on removing booby traps from cockpit layout and equipment. Personnel training and discipline rate the most increase in spending, he says.

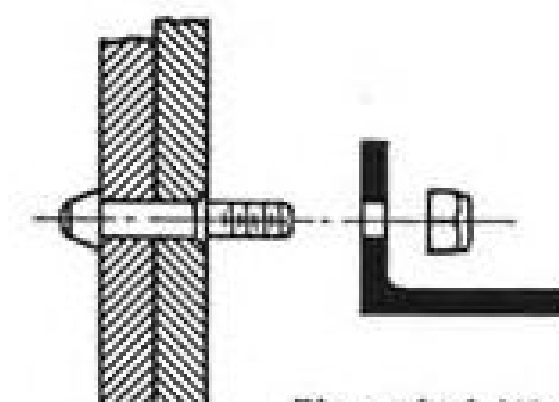


REGULAR *hi-shears* save weight, time and space when fastening structure

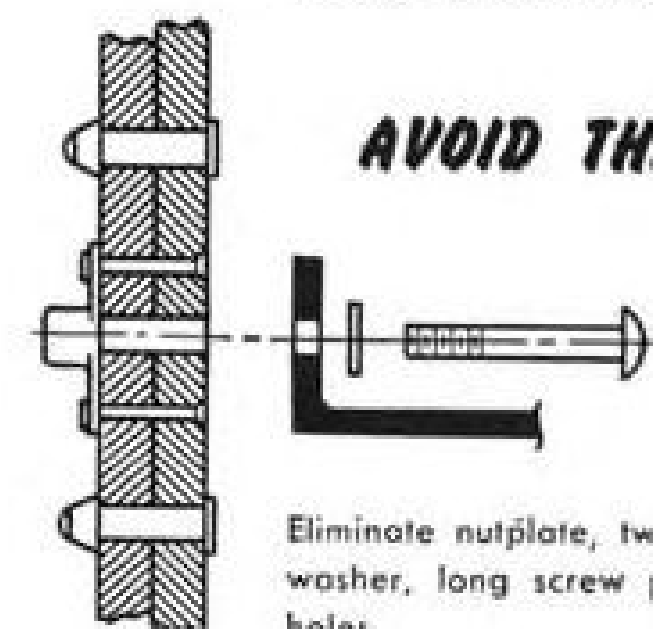
SPECIAL *hi-shears* fasten primary structure and provide attach means for removable elements



**Tapped HI-SHEAR** secures primary structure. Screw and lockwasher secure detachable element (screw completes shear cross-section). Works in flat or contoured structure.



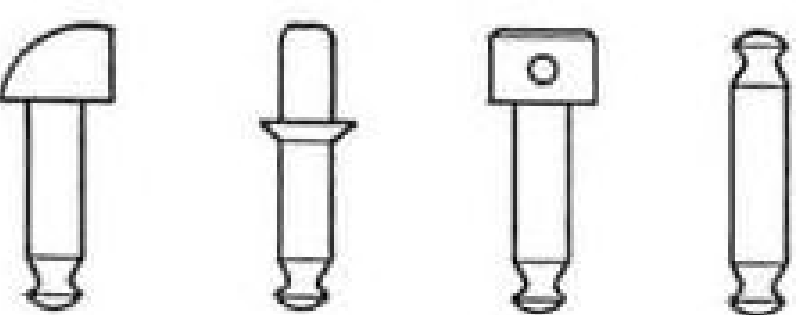
**Threaded HI-SHEAR stud**, plus self-locking nut, provides single attachment. Multiple attachments permitted when structure is sufficiently flat.



**AVOID THIS!**

Eliminate nutplate, two rivets, washer, long screw plus two holes.

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Cam . . . smooth stud . . . cross-drilled head . . . Hi-Shear dowel pin . . . these special Hi-Shears have saved weight, time, space and parts! Your problem may require a new approach. Send a sketch . . . we will supply price and samples.

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THE *hi-shear* RIVET TOOL CO.  
8924 BELLANCA AVENUE  
LOS ANGELES, CALIF.

## UAL Management Reshuffle Continues

United Air Lines has announced another management change to promote smoother operations and maintenance. Irving E. (Gus) Sommermeyer moves up to become general manager of flight operations, reporting to new Flight Operations Vice President D. R. Petty (AVIATION WEEK Oct. 8, p. 69).

Sommermeyer is a 15,000-hour pilot. He is known as a strong advocate of rigid pilot training and flying by the book. Since 1947 he has been assistant flight manager at Chicago.

Future assignment of Walter Addams, former general manager of flight operations is not yet announced.

Other United Air Lines management changes have so far taken the shape of assignment of responsibility to one vice president each, for flight operations, engineering and maintenance, and ground service. Petty was elevated to take the flight operations burden off J. A. Herlihy, whose title changed from vice president-operations to vice president-engineering and maintenance. Flight operations center is in Denver. The engineering and maintenance center is at San Francisco.

Petty and Sommermeyer now take over flight operations. So far, their staff includes: flight training center, C. A. Frieburg; weather, Henry Harrison; dispatch, Burt Lott; communications, J. R. Cunningham.

About the same time that United decided to split its flight operations responsibility from engineering, the United pilots' Master Executive Council of Air Line Pilots Assn. did the same with its pilot committee organization. It split its Engineering and

Air Safety Committee (and regional subcommittees) into one MEC Engineering Committee and one MEC Air Safety Committee. It did the same with local subcommittees.

Pilots assert that their committees were formerly bypassed by United management. They now ask that management consult them on matters of pilot interest.

## Colonial, AAA Mail Pay Cuts Ordered

The Civil Aeronautics Board has slashed mail pay of Colonial Airlines; slightly reduced that of All-American Airways; and slightly increased that of Wiggins Airways.

Colonial's annual mail pay starting Apr. 1 this year is estimated at \$872,000—about \$400,000 under last year's.

CAB says its cutback on mail pay to Colonial results from three main factors:

- Improved nonmail revenue outlook and present performance;
- Reduced depreciation charges on equipment;
- Lower costs anticipated under "honest, economical and efficient management."

CAB has also ordered Colonial to refund to the government more than \$230,000 back mail pay received for operations Apr. 15, 1946, to Apr. 1 of this year. Total pay fixed for Colonial for that period now is \$5,120,319—compared with \$7,721,000 asked by Colonial. CAB says it is paying \$2.6 million less than Colonial said it deserved because the Board finds Colonial's costs were inflated by "improper management." Colonial is under new management now.

Says the Board: "If the carrier had

conducted its operations during the five-year period in an honest, economical and efficient manner, as required by the Civil Aeronautics Act, its mail pay requirements should have been in the amount allowed by the Board rather than that claimed by the carrier."

• **All-American.** All-American Airways' mail rate starting next year is reduced to give an estimated \$1.5 million annually, compared with a present rate for 1951 of about \$1,650,000.

• **Wiggins Airways—CAB** estimates Wiggins will need \$233,715 in mail pay for the nine months from July 1 of this year to Mar. 31 of next year and about \$274,130 annually thereafter. Wiggins is also getting \$70,000 in back mail pay increase.

## Egypt Releases Eight C-47s

(McGraw-Hill World News)

Cairo—Eight Douglas C-47 Dakotas have been sold to a Canadian civil aviation firm by Egyptian authorities following a ruling by the government that the planes were no longer considered essential military material. The Ministry of Defense bans re-shipment of goods which may be vital to national defense.

Two of the planes have left for Canada and the remainder are expected to follow shortly. They were originally obtained as war surplus from the British and reconditioned by Misr-Air.

## 30-Day Stay Given To Heacock Nonsked

Civil Aeronautics Board has given a 30-day stay of execution on its order revoking operating authority of nonsked Air Transport Associates, Inc.—the Seattle-Alaska carrier of Amos Heacock. CAB will study his 230-page petition for reconsideration of the CAB death edict to his airline last month for flying "too frequently and regularly" in 1949 and 1950.

Included in the exhibits filed in his motion for reconsideration, Heacock presented letters of protest from over 900 residents of Anchorage and Fairbanks, Alaska. Protest of most is that this nonsked brings 75% of the airborne perishable foods into Northern Alaska, and its demise would adversely affect welfare and business of the territory.

## British Plane Test

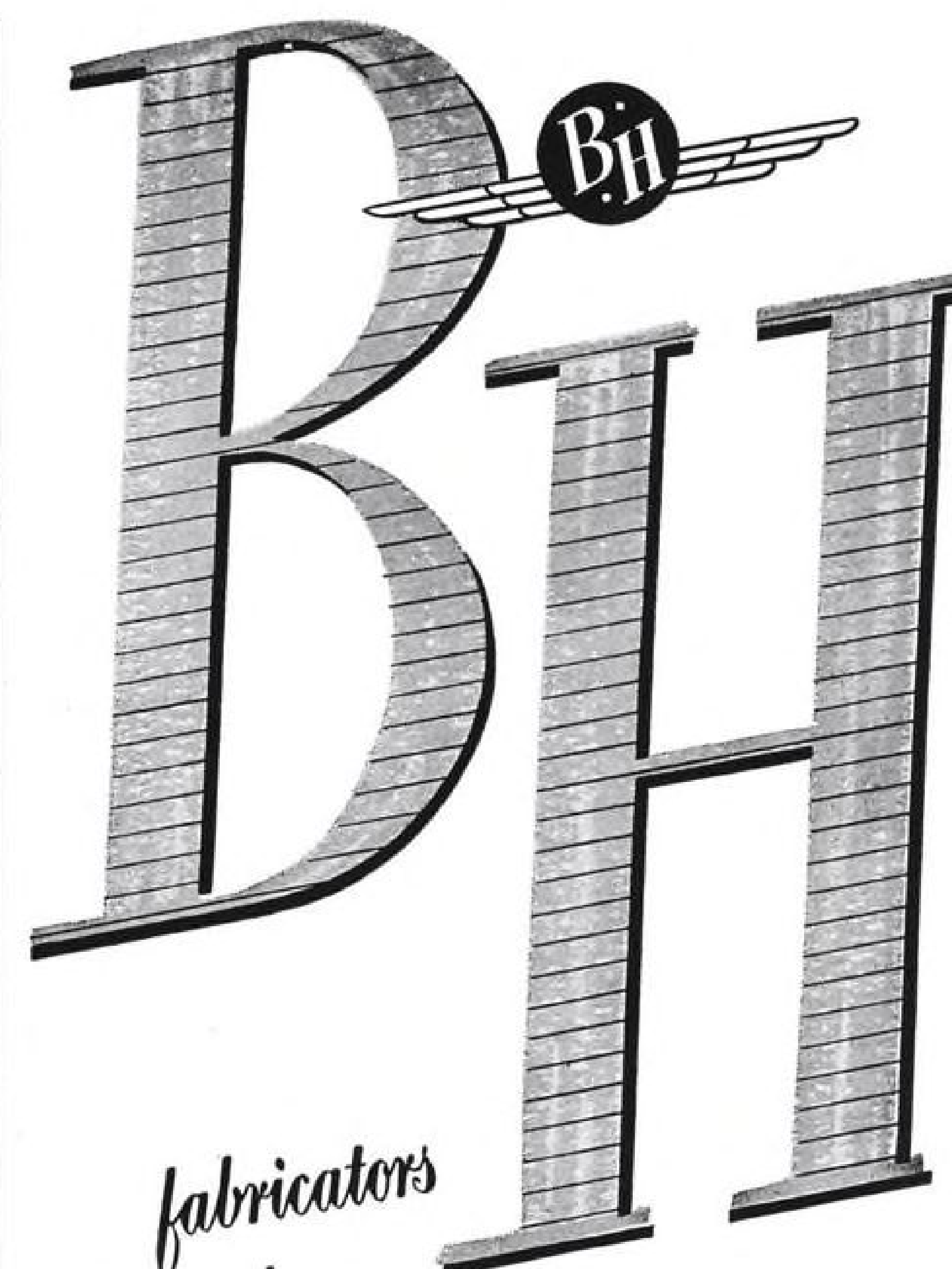
British Army will test Auster B4, lightplane "flying boxcar" in maneuvers on Salisbury Plain. Craft can be used as four-seat observation plane, ambulance, supply-drop plane or freighter.



COUPLE OF SLICK DC-6As

With the delivery of its second Douglas DC-6A this month, Slick Airways has stepped up its coast-to-coast all-freight service to a daily schedule. The new planes, first of six on order, are reported the first spe-

cifically designed to carry commercial air freight. Each has a capacity payload of 30,000 lb. Pressurized cabins allow operation at altitudes of 20,000 feet at speeds in excess of 300 mph.



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## SHORTLINES

► Aerovias "Q," Cuban airline, has CAB and Presidential permission to fly passengers, mail and cargo between Havana and West Palm Beach for two years. Winter traffic is about double summer's. Direct Havana-West Palm Beach service would expand traffic between the two points and compete little with anyone else.

► Air Coach Transport Assn. has placed full-page ads with Washington newspapers outlining CAB nonsked regulation history and criticizing CAB for revoking the letter of registration of ACTA president Amos Heacock's Seattle-Alaska nonsked airline—Air Transport Associates, Inc. While re-instating several other nonskeds it had planned to put out of business, CAB brought enforcement action against Heacock on grounds he flew too often to Alaska with foods, freight and passengers.

► Braniff International Airways now has a full staff in Miami—newly authorized Braniff gateway to South America. Service is now five flights a week. . . . Company boasts "the fastest airline service between the U. S. and Sao Paulo, Brazil, the largest industrial city in Latin America."

► British Overseas Airways Corp. plans to fly Stratocruisers on the New York-Nassau run starting next month, three times a week. Constellations have been making it. . . . BOAC showed a \$28,000 net profit in August, second month's profit in its history. July was the first, with \$341,600 net reported. Loss in August a year ago was \$1,058,400.

► Capital Airlines' debt at Sept. 30 was \$3,026,500 of debentures. This marks a reduction of \$11,599,000 in debt in 33 months. At Dec. 31, 1948, the company owed \$4 million to banks, \$9,850,000 of debentures, and \$775,688 arrears on debenture payment and sinking fund schedules.

► Eastern Air Lines reports final details are settled with Braniff and Mid-Continent on two interchange through-flight services: Miami-Denver via EAL-Braniff interchange at Memphis; and Miami-Kansas City via EAL-MCA interchange at St. Louis. Service will begin as soon as "technical alignment on flight equipment can be worked out," Eastern says.

► European-American Airlines is currently a "paper" airline; it will come

alive flying DC-4s if its application for a trans-Atlantic air freight certificate, now consolidated in the North Atlantic Certificate renewal case, receives favorable CAB and/or Presidential consideration. Head man of the company is Albert E. Dickens, Washington, D. C. CAB decision and perhaps Presidential decision are expected by July 4, 1952, date of expiration of PanAm and TWA route certificates.

► Hertz Driv-ur-Self has extended its credit card system to Canada, Hawaii, Mexico and the United Kingdom.

► Mid-Continent Airlines plans to occupy its new hangar, service shops and office building at Twin Cities by Dec. 1. All structural steel work is done. July 20 storm damage set schedules back five weeks.

► National Airlines has asked CAB for route extension from New York to Boston. . . . Has also asked CAB to lower its compensatory mail rate from 53 cents a ton mile to 45 cents (same as Big Four) next year when National gets its DC-6Bs. These will lower the airline's costs, National says. National also figures the lower mail rate will raise its mail volume.

► Navy Fleet Logistics Air Wing Atlantic-Continental division has flown 60 million passenger miles in a year without any kind of accident.

► Northwest Airlines says it will start Stratocruiser service, Seattle-Anchorage, Nov. 1, making total of 21 trips a week including nine DC-4 trips added this month. Daily cargo lift capacity will be 20,000 lb. each way daily. CAB suspension of nonsked Air Transport Associates caused cargo pile-up and intensified cargo service demand at Seattle for flight capacity to Alaska. . . . NWA has CAB examiner's recommendation for all-cargo service on Route No. 3, Twin Cities to New York and to Portland and Seattle, with restrictions on service to many intermediate cities.

► Sabena Belgian Airlines is using two Sikorsky S-51 copters to fight insects in the Belgian Congo. The copters were bought in England, where Westland Aircraft built them under license. Two more are on order for delivery this year.

► Slick Airways has opened full cargo facilities for servicing Baltimore from Friendship Airport. Slick says Baltimore service will be integrated with its C-46 service and its new DC-6A service.

► United Air Lines flew a record 186,377,000 revenue passenger miles in September—26% over a year ago.

## ENGINEERS

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for  
**LONG-RANGE MILITARY  
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Engineering Personnel Office  
SECTION 3

**NORTH AMERICAN  
AVIATION, INC.**

Los Angeles International Airport  
Los Angeles 45, Calif.  
or  
Columbus 16, Ohio

## AVIATION CALENDAR

Oct. 22-24—National Electronics Conference & Exhibition, Edgewater Beach Hotel, Chicago, Ill.

Oct. 24-25—1951 annual convention of the National Assn. of State Aviation Officials, Arizona Inn, Tucson, Ariz.

Oct. 29-30—Air Industry & Transport Assn. of Canada, annual general meeting, Seignior Club, Montebello, Quebec.

Oct. 29-31—National transportation meeting of Society of Automotive Engineers, Hotel Knickerbocker, Chicago.

Oct. 30-Nov. 16—Fifth Air Transportation Institute conducted by The American University, Washington, D. C.

Oct. 31-Nov. 1—Society of Automotive Engineers, fuels and lubricants meeting, Drake Hotel, Chicago.

Nov. 7—Annual Wings Club Dinner, Waldorf-Astoria, New York.

Nov. 8-9—Seventh annual national conference on industrial hydraulics, sponsored by the graduate school of Illinois School of Technology and Armour Research Foundation, Sherman Hotel, Chicago.

Nov. 16—Annual business meeting of the American Rocket Society, 29 W. 39 St., N. Y. 18, N. Y.

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

Nov. 30-Dec. 5—Meeting of the American Society of Mechanical Engineers, Chalfonte Haddon Hall, Atlantic City, N. J. For information write: Ernest Hartfort, 39 W. 39 St., N. Y. 18, N. Y.

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

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

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

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

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

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

### PICTURE CREDITS

9—(Goliath) Combine; (Vickers) Eastern Publishers Service; (Convair) Convair; (Martin) Glenn L. Martin; (Lockheed) Lockheed; 12—Acme; 13—(top) Wide World; (bottom) Acme; 18—NACA.



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P-2257, Aviation Week  
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P-2250, Aviation Week  
1111 Wilshire Boulevard,  
Los Angeles 17, California

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P-2214, Aviation Week  
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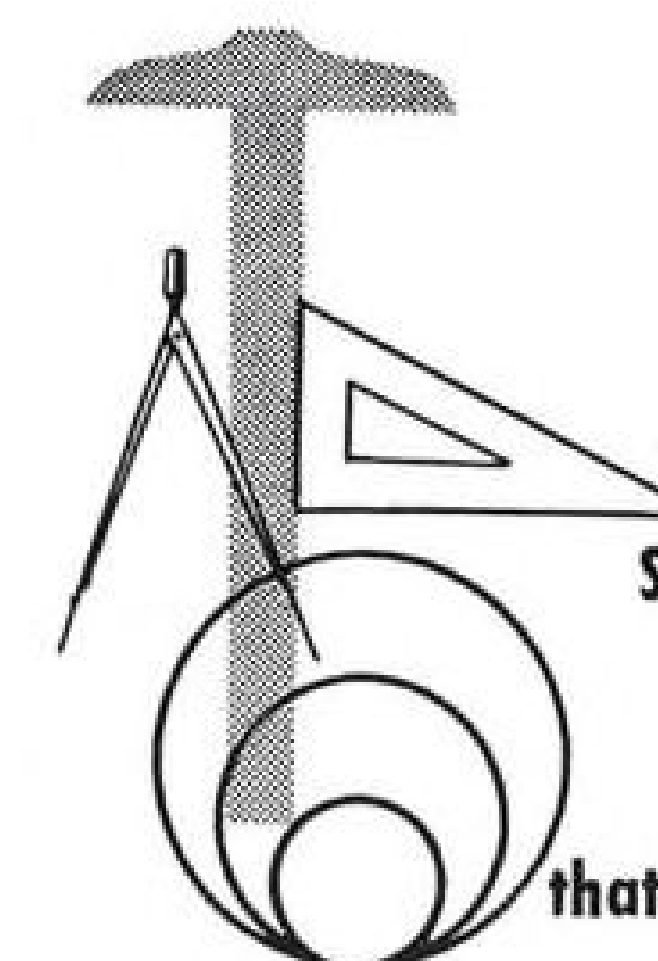
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## LETTERS

### Goodyear's Airfoam

We note Sept. 10, page 49, an item with respect to newly designed seats for use in DC-6Bs, in which "Airfoam" cushioning is used.

"Airfoam" is our trade mark with respect to foamed rubber products, and we shall therefore greatly appreciate it if, in the future, you will capitalize same so that our exclusive rights in this very valuable trade mark may not be jeopardized.

W. L. BAKELAR, Patent Attorney  
Goodyear Tire & Rubber Co.  
Akron 16.

### Pilots' Insurance

I read with interest the items on page 58 of your Sept. 3 issue and your comments regarding the Connecticut General Life Insurance Co. of Hartford.

The Franklin Life Insurance Co. of Springfield, Ill., which was founded in 1884 and has more than one billion of life insurance in force, is the first and, so far, the only life insurance company that issues standard life insurance to airline pilots without an extra rate.

We have more than fifteen millions of insurance in force on this group and have found our mortality experience better than average.

At the present time we have salary allotment franchises with only five airlines, including Pan American World Airways, Braniff Airways and Panagra, but are making plans to extend this coverage to all of the domestic airlines in the United States.

On our salary allotment franchises with these airlines, we not only issue standard coverage to the flight personnel, but in addition to the convenience of premium payments by way of salary deductions, there is an additional saving of approximately 6% to the policy holder.

V. D. WRIGHT  
Franklin Life Insurance Co.  
The Wright Agency  
158 Valencia Ave.  
Coral Gables, Fla.

### More on H-2

I am somewhat surprised at the reaction which my comments, in connection with the article on Hollingshead H-2, have aroused. I had not intended to criticize the fluid itself, but rather the flat statement that it "will not burn." We have had considerable experience in the field of synthetic hydraulic fluids, and we have learned to use the term "non-flammable" or statements such as "will not burn" with caution. We feel that the term "non-flammable type" or "less-flammable type" is less misleading and more nearly descriptive.

We quite agree with Mr. Scholz that the determination of the degree of flammability of non-petroleum type hydraulic fluids should not be based on any one single test, such as the Cleveland Open Cup. This is

well illustrated by the present commercial specification (AMS-3150, issued May, 1948) and the military specification (MIL-F-7100). These specifications require that flammability be examined by several different methods. In the Hot Manifold flammability test, conducted according to AMS-3150, ignition was obtained at 1160F and continuous burning at 1380F with H-2. As another example, the autogenous ignition temperature for H-2 was found to be 805F. Certainly H-2 is a non-flammable type hydraulic fluid, but not one that "will not burn."

The CAA Flammability Reference Scale, which is used to prove the non-flammability of H-2, is only one of many tests. As yet it is not used as a test method in any military or commercial specifications. It is interesting to note that, in the CAA Technical Development Report No. 142, one scheme of rating would show aviation gasoline to be less flammable than tricresyl phosphate—which latter fluid has been used as a fire retardant for over thirty years. In our opinion this method does nothing more than rate efficiency of hexachlor butadiene as a fire retardant in a number of different fluids.

We feel that it is misleading to call any fluid "non-flammable" or to say that it "will not burn" unless it has been shown that it will not burn or ignite under any conditions.

J. KENNETH CRAVER, Manager  
Resin Materials & Functional Fluids  
Development Department  
Organic Chemicals division  
Monsanto Chemical Co.  
St. Louis 4.

### Alodine

Scott Reiniger deserves congratulations for his excellent opus (on Alodine) Aug. 30 . . . and I have also received a letter from Chance Vought expressing equal enthusiasm. . . .

NORMAN P. GENTIEU  
Technical Editorial Dept.  
American Chemical Paint Co.  
Ambler, Pa.

### From ALPA

In your Sept. 10 edition you have a story of the "New Push Given All-Weather Plans." Mr. Sayen and the Engineering Department have asked that I have 500 reprints of this made. I hope this will meet with your approval.

JAY M. SHRECK  
Publicity and Public Relations Dept.  
Air Line Pilots Assn.  
3145 W. 63rd St.  
Chicago, 29.

Let me add my thanks to you for your objective reporting of the ALPA reorganization and removal of Behncke from office. It appears to me that reports such as yours will do a great deal toward "educating" airline management that working with the ALPA

can now benefit both parties. Most of us who have been working closely with the Association realize that this has not been true in the past.

There are many pilots in the Los Angeles area who have not read your fine series of articles on ALPA's reorganization, and I wonder if you have tear-sheets or reprints available that we could use locally to put into our bulletin books and on the bulletin boards. We would be very grateful if you could send us any number up to 5 or 6.

Thanks again for your fine work. We hope that we can live up to and even perhaps exceed the standards of good unionism as you have outlined in your stories.

LEON WOLLARD, Councilman, UAL  
1553 W. 52nd St.  
Los Angeles 62.

(ALPA has reprinted the entire series of four articles and expects to distribute it to all members.—Ed.)

### Nonskeds' Airlift

Thanks for the editorial, "Organize or Hang?" I am having it reproduced and sent to all nonsked carriers.

We had Lee Moore's article on our military traffic program reproduced in pamphlet form. We distributed about 20,000 copies of this through our members and many others went to our regional directors and military traffic representatives. The program is going great guns. They tell me they could load many more planes if more were available.

Last week-end Air Coach Transport Assn. began transporting its first loads of vets returning from Korea. We called it "Operation Homelift" and about 700 men were moved to airports near their homes from San Francisco Port of Embarkation at Camp Stoneman. A similar movement has been arranged for this coming week-end from Seattle.

ERIC SMITH  
Public Relations Consultant  
Suite 316, Bond Bldg.  
1404 New York Ave., N.W.  
Washington 5, D. C.

### Gritty But Good

Acc Robson's piece in AVIATION WEEK, "Toward Automatic Message Transmission," was read with much interest. I think you did a fine job of making a gritty subject plain and interesting. This sort of reporting is certainly worthwhile in this cockeyed flying business.

S. P. SAINT, Director  
Air Navigation Traffic Control Div.  
Air Transport Assn. of America  
1107 Sixteenth Street, N.W.  
Washington 6, D. C.

### From Cal Central

We thank you for the clear, concise reporting on our airline in AVIATION WEEK. Bucking the national and international operators as we are, it is sometimes difficult to obtain an unbiased press.

A. H. KEENER,  
Advertising-Public Relations Manager  
California Central Airlines  
Lockheed Air Terminal  
Burbank, Calif.

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First in Controls





## EDITORIAL

### Those 'Fantastic' Weapons

Another epidemic of speculation about wonder weapons is sweeping the country since President Truman aroused hope that perhaps science and industry have devised a panacea for ending war quickly.

He said it this way, in a speech in San Francisco Sept. 4 before a Democratic Party conclave: "It is fantastic what can happen with the use of the new weapons that are now under construction in this country, not only the one which we all fear the most, but there are some weapons which are fantastic in their operation. I hope we will never have to use them."

There are fantastic weapons on paper, including such dreams as artificial satellites revolving around the earth. These, at some undetermined future date, might possibly serve as platforms for weapons that, by remote control, could spray disaster on parts of the earth. This apparently was in the mind of one Washington spokesman who referred mysteriously to "conquering the atmosphere." But such a satellite is far away. It is not—as Mr. Truman said—"under construction."

What about missiles? This field offers the most popular area of speculation that followed in the wake of the President's remark.

Undeniably, progress has been made and is still being made, but there is nothing now in missile production that justifies the description, "fantastic."

It sounds like history repeating itself. There was a similar wave of missile speculation in 1950. An editorial here July 31 of that year sounds familiar:

"It's time for another warning on missiles. The public is being dangerously misled by the continuing dribble of government press releases on various and isolated missile firings, velocity figures and impressive heights. The general public impression from this publicity barrage seems to be that pushbutton warfare is around the corner." At that time we urged someone to bring order out of the chaos.

Shortly afterward, the eminent K. T. Keller was appointed a sort of referee or coordinator for all of the government agencies' various, unorganized guided missile programs. Keller has done a signal job and will soon leave his post, considering his assignment completed. When he was named, this government had already spent \$100 million on missiles, yet not one production model of any type was then on a factory line.

In July, 1950, we pointed out that we still did not have any intercontinental missile weapon. This is still true. We did not have any long-range rockets—nothing even in the 1,500-mile class. This is still true.

In 1950 we did not have in being any service-tested or service-adopted missiles of any type or range. Here we apparently have made progress of some kind.

But we still do not have a single missile defense unit set up anywhere in this country ready to bang away at invaders. Whatever is in construction of the Matador type—which is merely a jet-propelled airplane with swept-back wings and no pilot—certainly does not stand up to Mr. Truman's label of "fantastic."

All of this is fact. It is not criticism of those who are working diligently in this vital field. Actually, irresponsible public talk exaggerating the work of these men in the missile endeavors is exceedingly unfair to this hard-working and loyal group. But they know best of all: there are no fantastic weapons "in production." The rest of the citizens should understand that, too.

### Doing the Impossible, Quicker

It is no new idea that this fabulous aviation business has a reputation for doing the impossible. Aircraft manufacturing gets most of the acclaim. It deserves plenty. But the airlines are doing a lot of the "impossible," too—things that would have been done sooner, however, if it hadn't been for an earlier generation of obstructionists.

It was only a few years ago that CAB heard it sagely said that a fourth transcontinental airline would never pay, that equipment interchange on the airlines was and always would be impractical and impossible, that stall warning indicators could not be made workable, that airlines were ordained by Providence to carry only the champagne trade and that air fares must inevitably march upward with the cost of everything else, that the industry must never agree or support subsidy separation, that the helicopter would always be inherently complicated and of little practical use, that air freight was trivial and always would be.

There are just as many old-fogey ideas being propelled aimlessly about today as there were in 1931 or 1941.

Airline people who have been worrying studiously about perhaps hundreds of passengers "diverted" from full-fare services to air coach ought really to be plotting like sharpsters to win thousands or millions more from buses, trains and motor cars to any class of air transport and how to get millions who don't now travel at all into the mood of flying somewhere because it's easy, cheap and safe.

Airline people are still dawdling around, five years after the end of a radar war, trying to find the perfect and ultimate answer to all-weather collision and navigation gadgets, when they ought to be getting some kind of radar scope on every transport plane at the earliest possible minute. Government people who are timidly worrying about our international relations, fearing to "offend" some of the other members of our world brotherhood, ought instead to be clearing the way for those who have the desire to start low-rate, frequent international air coach services so we can really do a job of improving our world brotherhood with stimulated trade exchange.

CAB people who have been so absorbed in fending off politicians and pressures from rival applicants for new helicopter mail services ought to reverse their binoculars and see how the aviation business would really look if it were magnified clearly for anyone with vision.

Too many of the misfits who control some of the destinies of aviation don't have the vision or the will to look ahead at aviation as it could appear, magnified clearly, if they would but do their jobs. No wonder the impossible takes a little longer! —Robert H. Wood



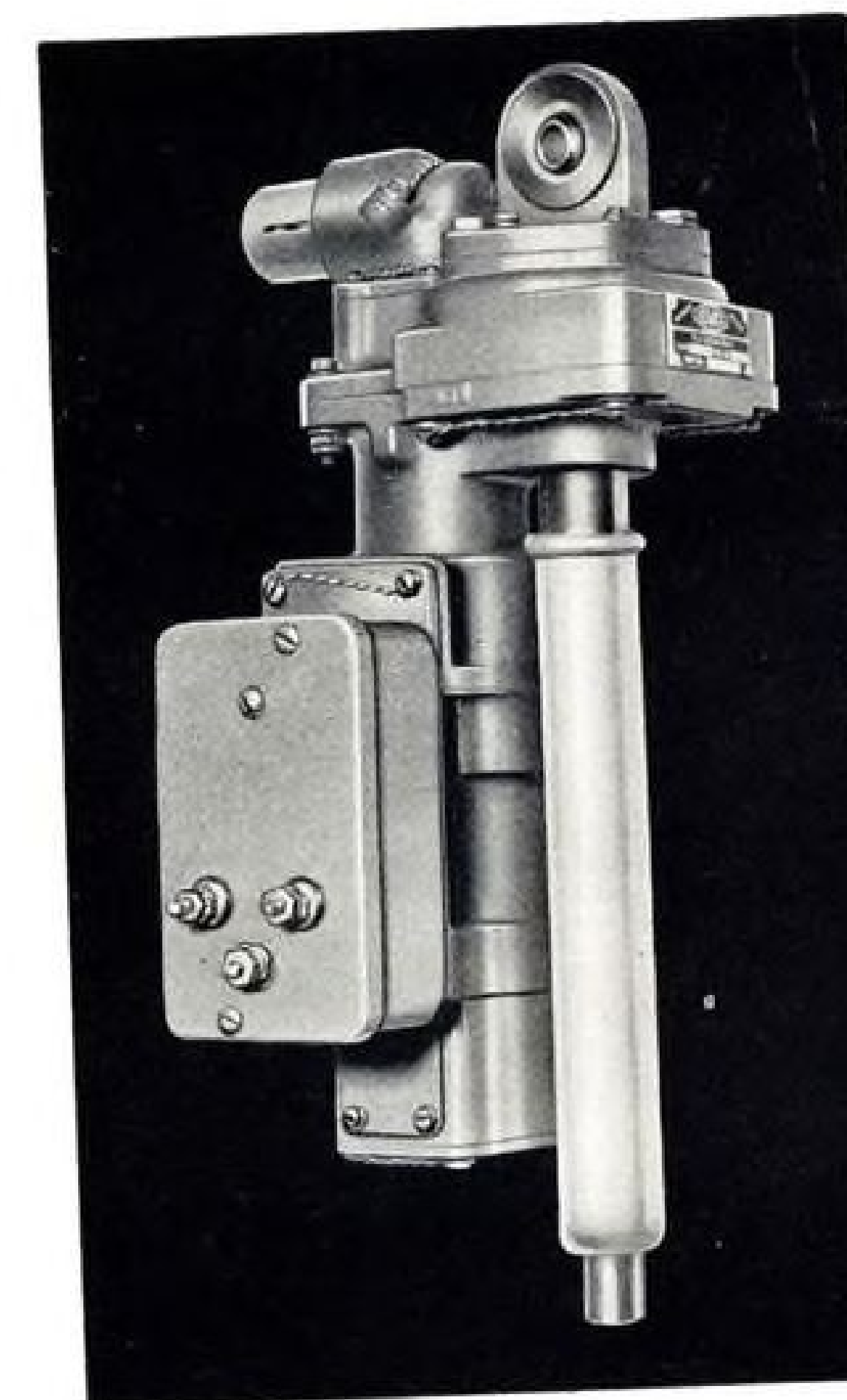
## technical bulletin

### Featherweight Linear Actuator for Jet Wing Flaps

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Two actuators are interconnected by flex shafting. A single brake operated by either motor provides quick and accurate positioning for

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Non-jamming end stops

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Weight—8 lbs., 3 ounces

Planes fly faster, range farther. Today's impossible is practical tomorrow. EEMCO design and production contribute to building electrical actuators thought impossible just yesterday.

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## Allison Powers FIRST FLIGHT of First Turbo-Prop Transport

The first U.S. turbine transport is now a reality and is under test. It was made possible through the private enterprise and initiative of the Allison Division of General Motors. First flight was completed December 29, 1950 with an Allison-owned Convair Turbo-Liner equipped with two Allison "301" Turbo-Prop engines.

This investment in the future of Turbo-Prop power is the result of Allison determination to speed the development of turbine transports in this country. The Allison "301" Turbo-Prop engines, developed under sponsorship of the U.S. Navy, are the most advanced Turbo-Prop engines in the U.S. today. They lead the world in high power for their low weight. They will make possible smoother, more economical transports to carry increased loads of passengers and freight.

Allison will prove these advantages in an extended flight test program on the Turbo-Liner. The results—to be made available to the military services, aircraft manufacturers and commercial air lines—will prove the safe and dependable operation of Turbo-Prop power.

Thus the United States will continue its world leadership in transport aircraft.

**Allison**  
DIVISION OF GENERAL MOTORS, INDIANAPOLIS, INDIANA  
Builders of the famous J35 Centrifugal Flow and J35 Axial Flow Turbo-Jets. Now Serving the Military Everywhere.

# Allison Turbo-Prop Engines Power 3 New Cargo Planes—

### ★ The Lockheed XC-130

### ★ The Douglas R6D

### ★ The Lockheed R70

While testing continues with the first U.S. Turbine Transport—the Allison Turbo-Liner, built by Convair—military contracts have been awarded for the installation of Allison Turbo-Prop engines in three additional types of transport aircraft.

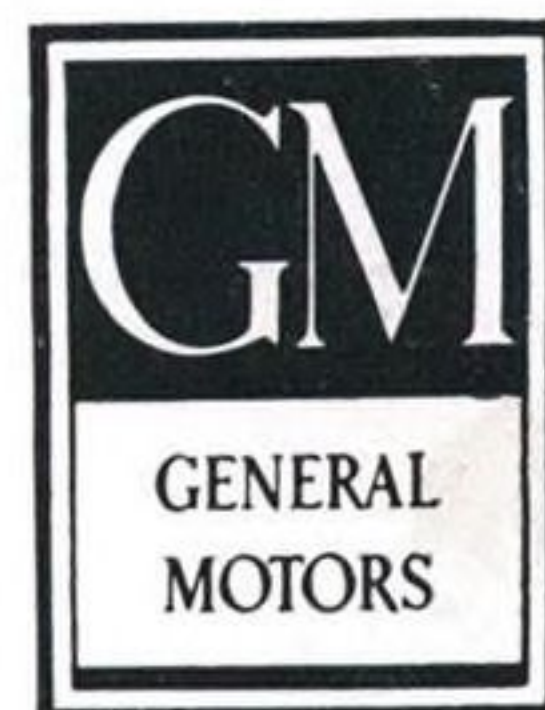
★ The Lockheed XC-130—a U.S.A.F. four-engine medium cargo plane—is the first military transport ever designed originally around Turbo-Prop power. It won U.S.A.F. design competition over five other makes and the selection of Allison engines

represents another first for Allison in the development of turbine transports in this country.

★ The new Navy-sponsored R6D is a modified configuration of the world-famous Douglas DC6A Liftmaster.

★ The Navy R70 is the new turbine version of the Lockheed Super Constellation.

Allison Turbo-Prop engines were selected for all three aircraft because they develop more power with less than half the weight of present engines in this power class.



**Allison**  
DIVISION OF GENERAL MOTORS, INDIANAPOLIS, INDIANA

Builders of J35 Axial,  
J33 Centrifugal Flow  
Turbo-Jet Engines and  
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