PROGRESS 50TH ANNIVERSARY OF POWERED FLIGHT SECURITY

# planes

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# AIR INDUSTRY EXPANSION NEARS COMPLETION

## Industry Averages 26 Airplanes a Day In First 50 Years

The U.S. aircraft industry has produced more than 480,000 planes during its 50-year history, an average of 26 planes each day since the Wright Brothers flew the first powered airplane at Kitty Hawk, N. C., in 1903.

And, according to best available data, more than 27% of these almost half a million aircraft still are in existence. About two-thirds of the 27% are in active operation with world airlines, military forces and private operators.

***Peaks and Valleys***

Throughout the 50 years of plane production, however, output has been in fits and starts, with peaks of effort during war years and deep production cutbacks in peacetime.

Aircraft construction during the first years of the century was confined almost entirely to various backyards scattered over the country. But early in World War I, the potentialities of the airplane as a military weapon were realized and the first large-scale production got underway. Rate of plane output crept from 11 planes in 1911 to 411 in 1916, then spurted to 2,148 during America's first year in World War I and to 14,020 in 1918.

***World War II Record***

With the Armistice came a drop in production. Output nose-dived to 780 units in 1919 and increased slightly through the years until World War II when in 1944, the peak production year, more than 96,000 military planes rolled off U.S. assembly lines.

Lack of a long-range minimum aircraft procurement policy, how-

(See INDUSTRY, page 2)

### New Jet Engines Give More Power Per Dollar

The powerful new jet engines that give America's fighting planes their tremendous combat speeds are among the most complex items in the nation's arsenal of defense—yet measured by performance, they're produced at bargain prices.

Based on a typical engine with afterburner, cost per horsepower is only $2.56—an astoundingly low figure when compared with the average cost per horsepower of a diesel engine ($50), an electric motor ($50), or a typical outboard motor ($35).

## Utility Airplane Operators Organize New Nation-Wide Air Taxi Service

The tired old expression, "Call me a taxi!," has been given new life and a new meaning by the utility airplane.

Some 82 operators of lightplanes have banded together to form the National Air Taxi Conference, and are carving a niche in aviation by systematically carrying passengers from the nation's main air hubs to neighboring towns that do not have scheduled air service.

And they are doing it at competitive rates.

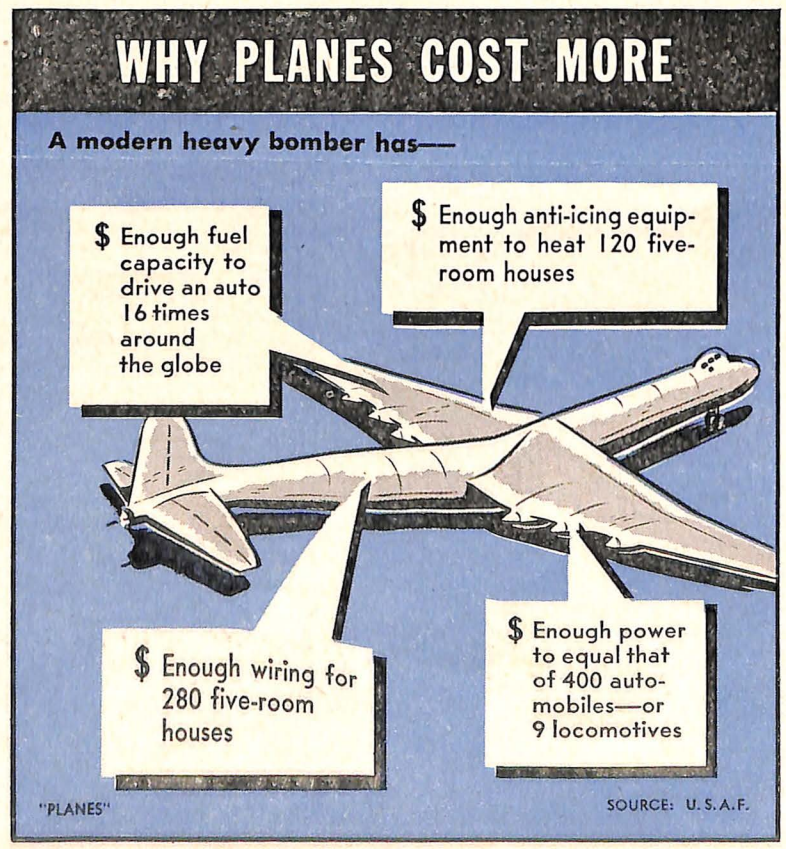
As an example, one of the large aircraft manufacturers is located 71 miles from the nearest city with major transcontinental airline facilities. To get from the airport to this plant costs a passenger $40 by airport cab and takes two and a half hours. By train the cost is $4.84—but the fastest rail service takes four hours and 50 minutes.

On the other hand, this passenger can take an air taxi and be at the plant in 30 minutes for $30. And, as with the cab, additional passengers share the fare proportionately.

This new slant in saving travel time and dollars is the out-growth of the combined efforts of the National Aviation Trades Association and the Air Traffic Conference of America. NATS was established less than two years ago, but business is snowballing. Through cooperation with major airlines, which place air taxi brochures in the seat packs of their airliners and also handle reservations on both ends of the flight, more people everyday are becoming aware of this additional air service.

Based on a projection of figures submitted in annual reports for 1952 by 17 of the member-operators, the air taxi business for the past year grossed well over $650,000 in passenger revenues plus an additional $67,500 in freight charges. These figures represent an approximate 12,500 air taxi trips and in excess of 4.5 million revenue passenger miles.

This is getting to be big business and—according to the taxi operators' headquarters in Washington, D. C.—it is just the beginning.




## Consistent Policy On Air Production Would Slash Costs

By

**DeWitt C. Ramsey**
**(Adm., USN, Ret.)**
**President, Aircraft Industries Association**

The United States aircraft industry today virtually has completed its scheduled expansion under the limited emergency program established by the Government following outbreak of the Korean War.

Ramsey

Aircraft plants throughout the nation, supported by some 61,000 subcontractors and suppliers, are producing military planes at the rate of about 1,000 each month. Problems involved in the re-creation of materials and components pipelines, manufacturing and engineering teams, facilities and tools resources have, to a large extent, been eliminated or are well on their way to solution.

***Rebuilding Potential***

The American people during these past three years have had the burden not only of financing large-scale production of aircraft, but of rebuilding an industry potential which was destroyed by precipitous demobilization and lack of orders following World War II.

It is not generally known that the aircraft industry—while broadening its base over the past three years—has produced *almost twice the airframe pounds* as it did in the comparable period of the World War II build-up. From 1939, when European orders gave American manufacturers a start on expansion of the aircraft industry, through 1941, U.S. plane manufacturers built 27,647 military aircraft weighing an average of about 4,000 pounds each. From 1950 through 1952, production has been approximately 16,800 military planes with an average airframe weight of about 12,000 pounds.

This recent three-year output is equal in airframe weight to more than 50,000 early-vintage World War II aircraft.

(See CONSISTENT, page 4)

# PLANES

*Planes* is published by the Aircraft Industries Association of America, Inc., the national trade association of the manufacturers of military, transport, and personal aircraft, helicopters, flying missiles and their accessories, instruments and components.

The purpose of *Planes* is to:

Foster a better public understanding of Air Power and the requirements essential to preservation of American leadership in the air;

Illustrate and explain the special problems of the aircraft industry and its vital role in our national security.

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## The Unlearned Lesson

It is the history of all science that great inventions have been made with a view to commercial markets, but it is equally true that all the way from the wheel to electronics the military has helped shape their development in the struggle for superiority in arms.

In aviation's early days, when no one regarded the airplane as a means of transportation, the military considered aircraft an excellent observation platform, mobile and controllable. The Army and Navy infused lifeblood into a young and anemic industry.

World War I established the airplane as a potent weapon of offense and defense, but the blow that struck the aircraft industry after the war set a pattern that has been followed ever since. All contracts were cancelled immediately after the Armistice. Automobile companies, which had received the lion's share of production contracts, went back to building automobiles. The aircraft industry itself was almost ruined. Most of the old companies either went out of business, reorganized, or merged to escape oblivion.

The following years saw heart-breaking competition from Government surplus aircraft dumped on the market; the struggle to develop new commercial aircraft; the shaky start of the airlines in the 20's; the boom following the Lindbergh flight; the remarkable growth of the airlines in the teeth of the depression; and the war clouds that gathered in the 30's.

During this inter-war period, there was no long-range program of military purchases, or even development. When war flamed in Europe in 1939, the U. S. had good designs—but little production potential. Fortunately, America's desperate allies had placed orders with U.S. manufacturers, setting the wheels of expansion in motion. When President Roosevelt later declared a state of emergency, the industry was gearing for an expansion which reached its peak in 1944 with an output of 96,318 planes.

But history repeated itself after World War II. Contracts again were cancelled wholesale. Production dropped from soaring heights, and the industry again was rocked back on its heels, with little business of any kind and with insufficient profits retained to absorb the shock.

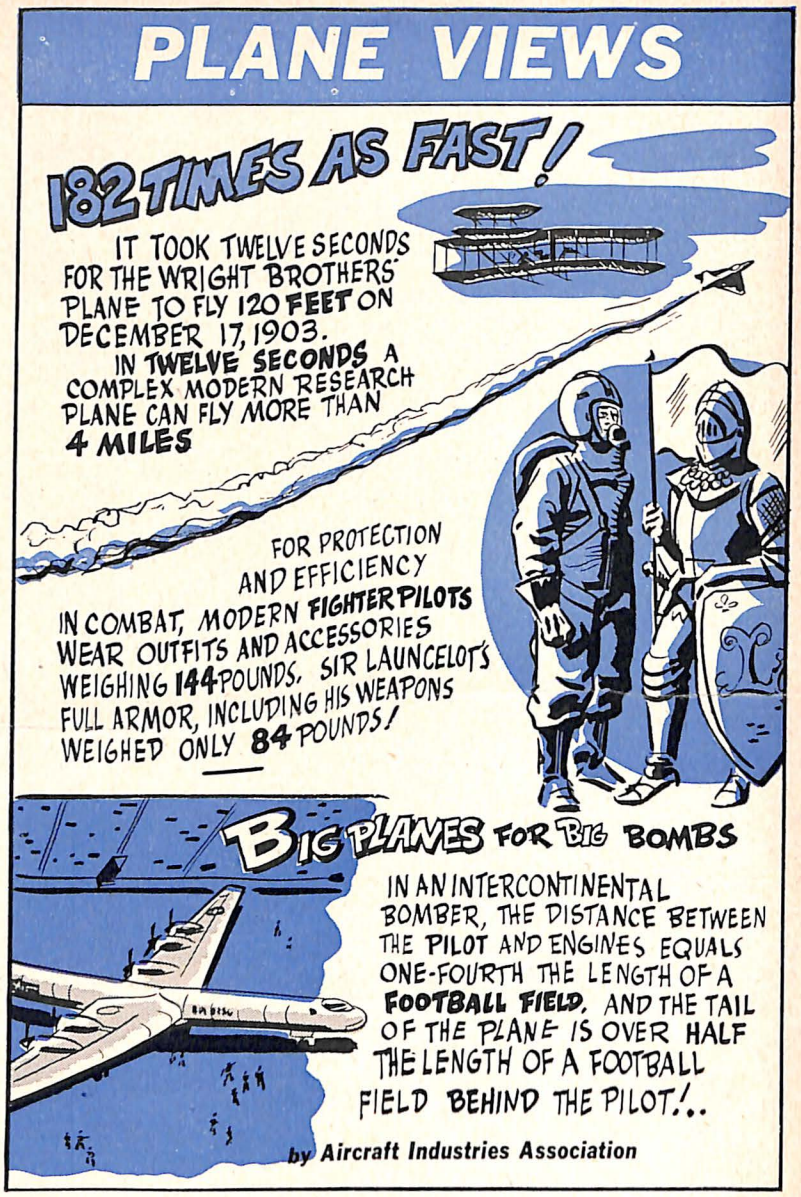
Then came the alarm of the late 40's, as Russia's aims became evident; the campaign for a 70-group Air Force and commensurate Navy strength; the recommendations of the President's Air Policy Commission and the Congressional Aviation Policy Board for long-range planning; the subsequent increase in appropriations for air strength; and the impounding of funds by Executive Order in 1948.

Two years later, the war in Korea started—and with it perhaps the most dangerous threat to civilization in history. Since the beginning of fiscal 1951, some $40 billions of dollars for aircraft and related items have been appropriated as compared with a total of only $6 billions between 1945 and 1950.

It has become apparent, despite the lack of consistency in national air policy during the 50 years of aviation history, that there is great mutuality of contribution by the aircraft industry, commercial aviation and the military. The industry has developed better aircraft on its own. The airlines, in building their own business, have built an invaluable auxiliary of the military. The military, in turn, have contributed largely to aeronautical advancement. Most of the advances adopted by the military air services ultimately have been refined for use of civil aviation, which itself is one of the vital elements of air power. All components of aviation have become inseparably interrelated.

One lesson history has been unable to teach up to now, however, is the fact that there is no economy in cycles of complete neglect of air strength and then bursts of effort with the attendant compounding of costs.

Success of the widespread efforts to establish a national air policy, looking toward long-range air power, would not only make for future national security but would contribute greatly to the advance of *all* aviation.




## Industry Averages 26 Planes a Day In First 50 Years


(*Continued from page* 1)


ever, once again resulted in sharp cutbacks of plane production—and the immediate post-World War II years saw the industry build only 1,669 military planes in 1946 and 2,100 in 1947.

The month the Korean War began (June, 1950), some 215 military planes were produced in the United States. Today, the industry has largely completed a limited emergency expansion, and is building planes at the approximate rate of 12,000 military craft per year (still 2,000 less than were produced in 1918).

The planes produced today have vastly greater performance than their World War I predecessors. The largest Air Force operational bomber today, for example, has a maximum bomb load equalling that of more than 164 World War I bombers. And its maximum range is 44 times as great.

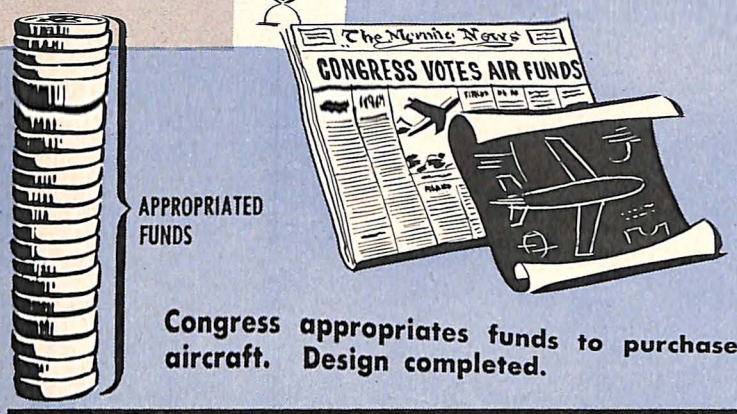
This same plane weighs more than 260 times as much as the 1,360-pound craft with a 25 h.p. engine and top speed of 40 m.p.h. which the Wright Brothers delivered to the Government in filling the first military order in 1908.

## PLANE FACTS

- At flight speeds of the latest fighters, it takes less than 20 minutes to fly from New York to Washington, D. C. Best airline time is 55 minutes.
- A recently-developed turbojet engine is two and one-half times as powerful as the *combined four engines* of a World War II heavy bomber—yet its weight is less than that of only one of the older bomber's engines and propellers.
- In seven months helicopters have flown over 1,000 patients to a single hospital ship off Korea.
- In flanges produced for a typical aircraft exhaust system, surfaces must be smooth to within 100 millionths of an inch average. (If 100 millionths of an inch were represented by the thickness of one dime, one inch would be 400 times as high as the Empire State Building.)
- A mammoth "three-story" military air transport, now in service, can carry 200 soldiers with equipment.
- A single jet medium bomber has 220 miles of wire and 1,000 vacuum tubes in its electronic system.

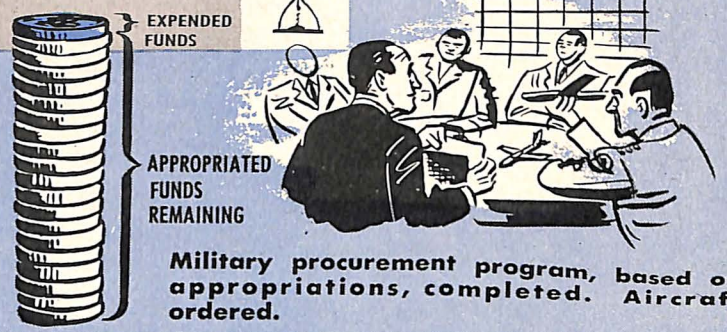
# IT TAKES TIME TO BUY MILITARY PLANES

**JANUARY 1951**



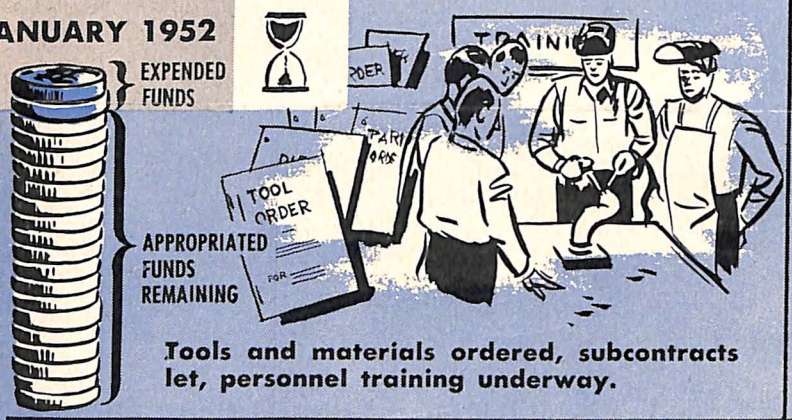

Congress appropriates funds to purchase aircraft. Design completed.

**JUNE 1951**



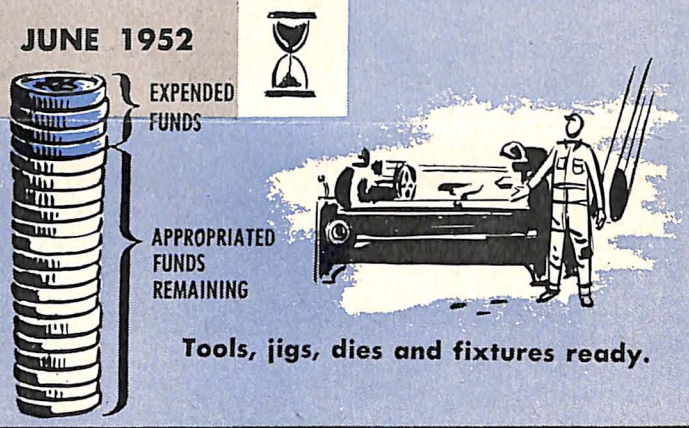

Military procurement program, based on appropriations, completed. Aircraft ordered.

**JANUARY 1952**



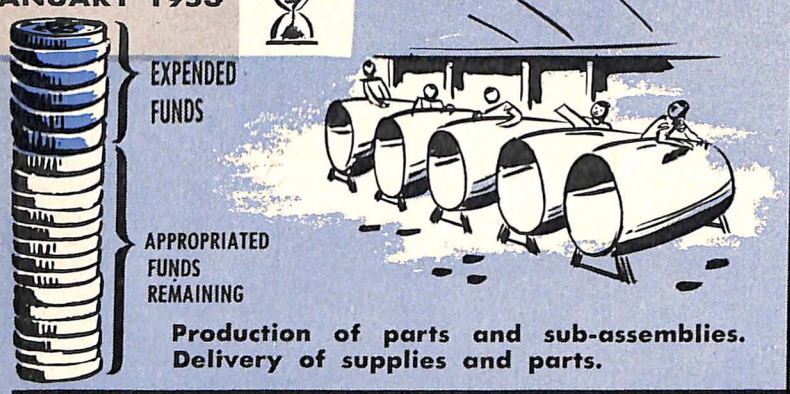

Tools and materials ordered, subcontracts let, personnel training underway.

**JUNE 1952**



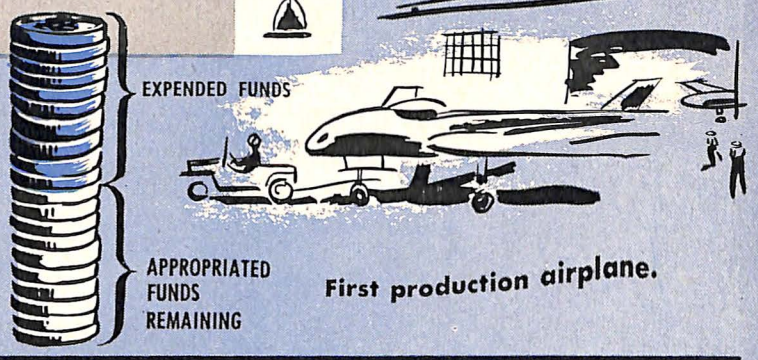

Tools, jigs, dies and fixtures ready.

**JANUARY 1953**



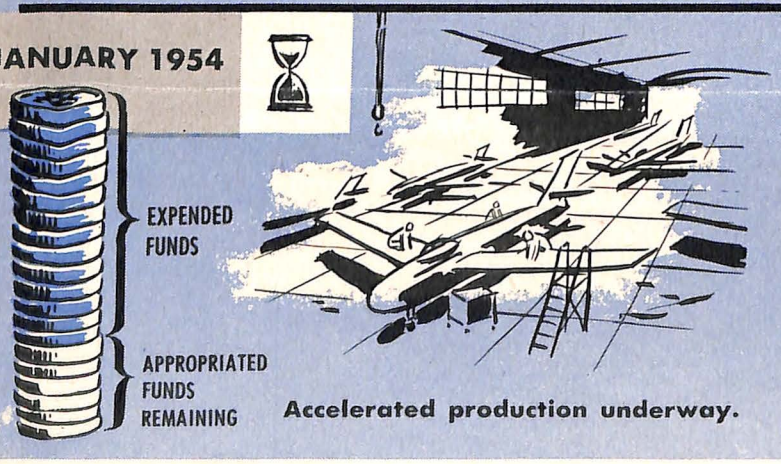

Production of parts and sub-assemblies. Delivery of supplies and parts.

**JUNE 1953**



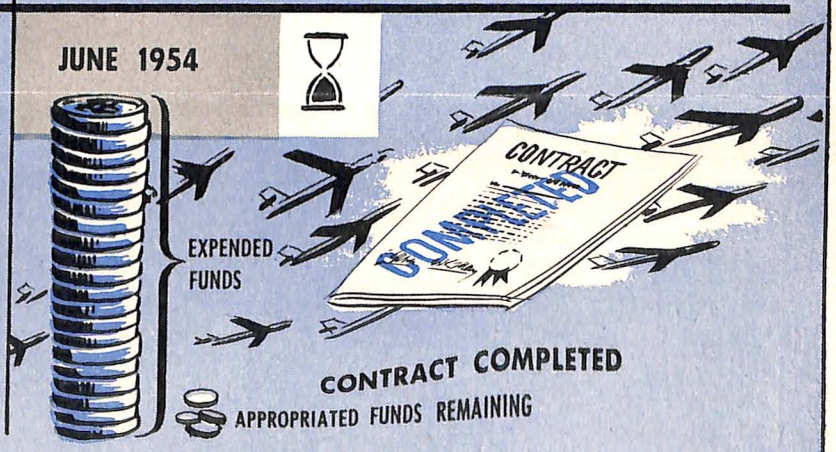

First production airplane.

**JANUARY 1954**




Accelerated production underway.

**JUNE 1954**




It takes about four years for the military services to spend aircraft procurement funds appropriated by Congress. After appropriations are made and military programs established, the time interval between signing of a contract and delivery of the first production aircraft averages more than two years. During this time, relatively small payments are made as work progresses on the aircraft contract. The rate of payments increases when accelerated production gets underway. Time—as shown in the symbolic chart above—is an inflexible factor in building and buying today's complex, high-performance aircraft.

'PLANES'

SOURCE: Defense Department and AIA

# Mounting Shortage of New Engineers Plagues Industry

Unprecedented numbers of engineers are working today to design, develop and produce the high-performance warplanes needed for America's fighting forces—but there still aren't enough engineers to meet the demand.

As the military forces have called upon the U.S. aircraft manufacturing industry for planes that fly higher, farther and faster — with constantly increasing dependability and firepower — the need for engineers has skyrocketed.

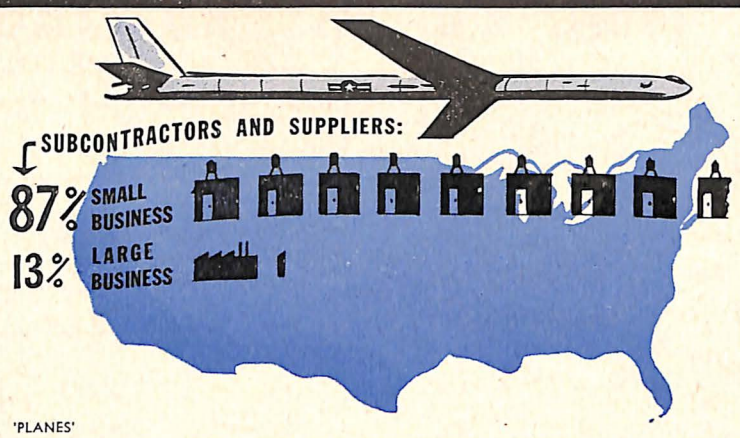
Today, between 50 and 60 thousand engineers are at work in airframe, engine and components plants throughout the nation. In addition, uncounted thousands of engineers are at work in plants of the more than 61,000 subcontractors and suppliers of the industry.

To fill this growing need, plus that of the rest of American industry, it has been estimated that a minimum of 30,000 engineers should be graduated from U.S. schools each year. Expected graduation this year will be about 10,000 below that minimum goal.

As a result, shortage of experienced engineers has become one of the aircraft industry's most serious manpower problems. These shortages are magnified as it becomes necessary to build the heavier and more complex planes required in an atomic and supersonic era. A typical modern fighter, for example, requires 27 times as many engineering hours as its World War II counterpart.

Broad-scale efforts are underway by the aircraft industry to meet production requirements despite the critical shortages. Among the extensive programs are (1) intensive recruiting activities, (2) job simplification projects, (3) training activities, and (4) subcontracting of work ordinarily done in home plants.

## BIG JOB FOR SMALL BUSINESS




**Between five and six thousand U. S. companies furnish the approximately 60,000 items of parts, materials and operating supplies stocked by a typical airframe manufacturer. An estimated 87% of these suppliers are small business.**

SOURCE: Typical Aircraft Manufacturer

# Consistent Policy On Air Production Seen as Key to Defense Economies

(*Continued from page* 1)

Even more important, these heavier planes are capable of performance unapproached during World War II. Since that war, speeds of our fastest aircraft have increased 300 per cent, altitudes have doubled, and firepower has increased nearly 10 times.

### *Expansion Near Completion*

Vast expenditures of money and effort have been necessary to reach the present level of production from the contracted base of mid-1950. Some forty billions of dollars have been appropriated by Congress since Korea to buy the planes needed for the nation's security.

With the industry's expansion on the verge of completion, Government planners and the aircraft industry today are focusing their sights on the objective of maintaining adequate air forces in being, supplied with the most advanced aircraft, *produced at the lowest possible cost.* A major element in future production economy must necessarily be an efficient and going aircraft industry — the only sound base for emergency expansion. Maintenance of such production potential need not be as costly as in the past, provided aircraft procurement follows an orderly and consistent pattern permitting long-range planning.

Such long-range procurement, with the basic objective of security *with* economy, would allow more efficient manufacturing operations. It would equalize the extravagant peaks and valleys of the past, and assure firm goals in such fields as production, employment, inventories and finances. It would enable retention of the industry's teams of specialists which in the past have been scattered in recurrent contractions and re-created at great expense with each industry expansion.

### *Firm Orders*

With firm orders based on military requirements projected over a span of years, the industry would be able to retain volume production experience and to maintain tooling and planning for a reasonable level of emergency expansion. This would allow, too, a subcontractor force sufficient to assure a broad emergency production base for additional volume output of proved types of aircraft.

Accompanied by Government encouragement of profitable operations and by a competitive atmosphere in procurement, such a long-range program would pay off many-fold in lowered costs and constant air readiness.

### *Major Objective*

National self-interest argues against the profligacy attendant upon policy vascillations which, in the past, repeatedly have resulted in destruction of essential industries without achieving true economies. Certainly, an existing, healthy nucleus for emergency expansion — turning out aircraft at a peacetime volume assuring strength at greatest savings—should be one of our most important objectives.

# Turbojet Production Bottleneck Broken By Engine Builder

A bottleneck in the nation's defense production program is being broken by a new method of speeding output of stator blades for jet engines.

The method, devised by a major engine manufacturer, involves fabricating the blades instead of forging them, which is a relatively slow and expensive process.

Each jet engine has more than 1,000 of these stationary blades.

With the new fabricating process, savings in critical materials are estimated at 39 per cent because of a virtually chipless production which cuts waste.

In addition, cost of the blades will be reduced by approximately 55 per cent. Details of the fabrication process cannot be revealed because of security restrictions, but have been made available to other jet engine manufacturers.

Less production equipment is required for fabrication as compared with forging.

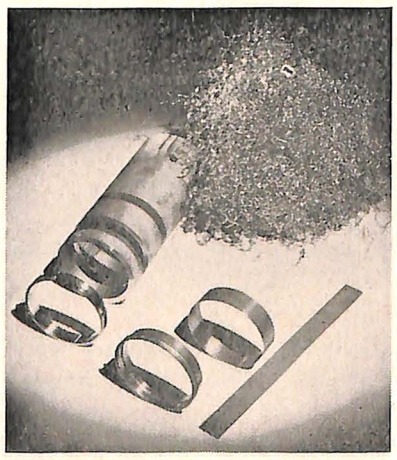
# New Technique in Building Single Part Cuts $1,000,000 from Cost of Jet Plane

An aircraft manufacturer's new technique for making one small airplane part has cut the over-all cost of producing new jet aircraft by an estimated million dollars.

The plane part, a stainless-steel end for hot-air ducts, is used in great quantities in a late-model all-weather Air Force interceptor.

Because they had to be fabricated to extremely close tolerances, the conventional way of manufacturing the parts was to machine them from heavy wall tubing stock.

In a continuing search for techniques to cut the cost of today's high performance aircraft, the manufacturer developed a new cam action press punch die to form the parts. This new method, used in lieu of machining, has resulted in a reduction in fabrication time from about three hours to less than five minutes.



**Finished parts (above) show savings with new method. Left, two pounds of scrap remain after part is machined. Right, completed part formed from strip stock with no loss of material.**

## Air Quotes

"The high cost of the present defense build-up is attributable to many causes—some economic, some military and some political. Inflation accounts for between 15 and 20 percent of the increase in dollar costs since June, 1950. The necessity of making up the time lost after World War II constitutes another important reason. Between 1945 and 1948 the full defense expenditures of the United States and Great Britain were cut by over 85 percent, while Soviet defense expenditures, including only those admitted in their published budget, were reduced from their peak wartime expenses by only 48 percent. During this period, the Soviet Union gained more than three years of intensive military production of new equipment."—*Semiannual Report of the Secretary of Defense, January 1 to June 30, 1952.*