



# planes

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## New Methods Reduce Costs Of Airplanes

Aircraft and engine manufacturers of the U. S. have developed new and improved manufacturing techniques which will mean the saving of many millions of dollars on a national basis in the accelerated production program for national defense.

The result of continuous planning, research and experiment during the postwar years and since the step-up of production following the Korean outbreak, these new techniques besides bringing substantial savings in the cost of today's complex airplanes also accomplish: (1) sharp reductions in the time required for manufacture of many parts and components; (2) marked savings in materials; (3) less dependence in some cases on critical hard-to-get materials; (4) increased ability to speed up production to peak rates quickly if emergency conditions should require it.

### Typical Examples

The time and cost-saving techniques involve specially developed tools and processes, better planning procedures, and better utilization of plant space and worker skills.

Some typical examples from reports made by aircraft companies in various sections of the country include:

One leading builder of bombers and transports has developed a new air driven tool for counter-sinking holes in heavy gauge sheet metal which reduces time required for this work by 80% and man-hour costs by 90%. The tool countersinks a half-inch hole in 30 seconds, where formerly three and one-half minutes were required. The wing of one bomber takes some 15,000 close-tolerance holes of this type.

Another factory devised two fast new methods of drilling holes in a bomber's compression ribs. One reduces drilling time from 26 hours to one hour and five minutes; the other reduces the number of tools used from 35 to seven.

### 75% Cost Saving

In another case new machining and stretch press methods were developed for the production of cam tracks, vital parts of a jet-powered bomber. Twelve of the parts now can be made in the same length of time required to make three by the former method.

A revolutionary method of forming and drawing sheet metal parts, now used in several aircraft plants, saves from 50% to 75% in costs compared to conventional aircraft plant tooling requirements for this type of work. One exam-

(See "New Methods" Page 3)

## FIRST EMPHASIS IN AIR PROGRAM IS ON EXPANSION OF FACILITIES

## Plane Production Now On Schedule

Written for "Planes" by

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

It is accepted by military strategists that in event of war an enemy's first objective would be swift aerial destruction of our centers of population and production. It is the responsibility, therefore, of America's air power to be ready for any emergency—ready for sustained defense and sustained attack. We must have adequate resources to provide equipment for both



Ramsey

until the enemy is brought to a decisive standstill.

To fulfill these obligations from an industrial standpoint, we have two very definite objectives: First, an adequate number of first line planes coming off the production line at all times to give us strong air arms in being and to avoid crippling obsolescence. Second, to build up the capacity for aircraft production at a high rate of speed, capacity that can be called upon for instant expansion if it is needed.

### Less Vulnerable

The major emphasis at this time is placed upon the problem of expanding production facilities and we are continuing steadily to broaden the industrial production base, rather than concentrating on turning out all the airplanes we could possibly produce. Let me emphasize that. We are now building productive capacity rather than a tremendous number of airplanes which could become obsolescent before there is any requirement for their use.

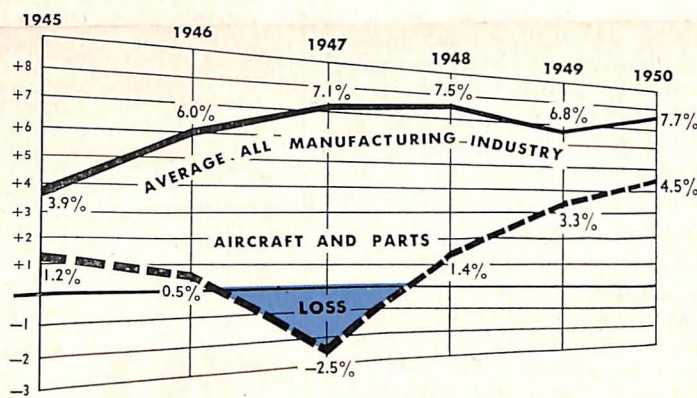
Plant expansion, tooling, materials, manpower training and a multitude of supply pipelines all must be developed in this base broadening procedure. If war comes, we intend to be ready for the long pull, as well as the quick retaliation.

Broadening of the base also is accomplishing the purpose of making the nation's aircraft production capacity relatively less vulnerable to aerial attack.

Aircraft deliveries, of course, have been accelerated and ex- (See "Aircraft Industry" Page 4)

## Aircraft Profits Continue Well Below Average for All Industry

(% PROFIT TO SALES)



"PLANES"

SOURCE: National City Bank of New York

## Nearly 61,000 U. S. Business Firms Participate in Aircraft Program

"Small business" in America is playing a big part in the production of aircraft for the defense program. Thousands of communities share in the business of building airplanes.

The aircraft industry has let more than 170,000 orders or contracts to approximately 60,850 subcontractors and suppliers who are turning out parts, components and materials from plants in 41 of the 48 states and the District of Columbia. This number will be increased substantially during the next six months as airplane production continues to expand.

These figures from a recent survey by the Aircraft Industries Association demonstrate that this industry has taken the initiative in bringing small businesses into defense production and thus broadening the industrial base to help meet possible major emergencies.

### 87% Small Business

Of the 60,850 subcontractors and suppliers, approximately 52,200 or 87% are small business firms employing 500 or fewer people.

The survey disclosed further that 50% of the dollar volume of orders received by aircraft manufacturers is spent by the industry with outside firms. Of this one-half, 60% now goes to the small business firms—and this percentage is gradually rising.

The wide distribution of the airplane dollar to U. S. business is indicated by the fact that more

than \$26,000,000,000 for procurement of aircraft for the U. S. military services and our allies has been appropriated or requested for the fiscal years 1951 and 1952.

From a percentage standpoint, the subcontracting programs of the aircraft industry are approaching World War II levels, though the subcontracting volume is comparatively low, since projected production rates for all military aircraft are no more than 15% of the peak World War II rate.

### Still Seek Subcontractors

The Aircraft Industries survey concluded with the statement that the industry is still seeking competent subcontractors and suggested that complete data on the potential subcontractors' plant, type of work, facilities, financial condition, manpower, etc., be sent in writing to the prime contractors in the industry.

The rapid expansion of the subcontracting base has been accomplished by the industry and the Department of Defense despite a virtual manufacturing revolution in the aircraft industry since World War II. Difficult problems have been created by the special techniques and methods required to produce modern high performance airplanes which are twice as big, twice as heavy and have twice the performance of their World War II counterparts. Thicker met- (See "Subcontracting" 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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ALL MATERIAL MAY BE REPRODUCED—MATS OF ALL CHARTS ARE AVAILABLE

## Tax Amortization and the Aircraft Industry

(Editorial)

Expansion of productive capacity today is one of the aircraft industry's most serious problems. That is why the Aircraft Industries Association has requested that rapid tax amortization be considered an item of cost for pricing purposes, and that the period of amortization be shortened in case the emergency should end in less than five years.

Under present legislation, Government contractors devoted to defense production are permitted to amortize, through tax deductions, all or a portion of the cost of expanding facilities in the five-year period, instead of the normal 20 years. If in the judgment of Defense Production Administration, there is a strong possibility that these facilities, or any portion of them, will not be needed for normal peacetime operations, certificates of necessity are issued providing for rapid amortization of the portion adjudged necessary only for defense. This does not mean, in any sense, that the Government provides the money with which plant and equipment are obtained. Private capital must still acquire these facilities. Tax amortization means simply a *postponement* of taxes until the plant and equipment are paid for.

No one knows, of course, how much steel will be needed after the emergency—or copper, or aluminum, or textiles, or nuts and bolts, or anything else. But the chances are fair for consumer industries that a considerable proportion of their facilities will be usable for peacetime production.

Not so the aircraft industry. It is historically true that very little of anything added to meet the expanded demands of a national emergency in this field of production is usable once the nation returns to a peacetime basis. Where other manufacturers reconvert to consumer goods, aircraft factories go on making airplanes, but at a tremendously reduced rate.

The infant aircraft industry expanded mightily to meet the demands of World War I, and then almost died when contracts were abruptly terminated in 1918. All four of the then major producing companies were reorganized under bankruptcy laws. After painful recovery, the industry performed a herculean task in World War II to become the largest industry the world has ever known. Between 1938 and 1943, floor space multiplied from 9.5 million square feet to 175.0 million square feet. Aircraft production, in airframe pounds, soared from approximately 7 million pounds in 1938 to the astronomical figure of 1.1 billion pounds in 1944.

But after the war, floor space dropped to 41 million square feet and airframe production plummeted to 29.5 million pounds. By 1950 floor space had climbed to 60 million square feet and airframe production to 37 million pounds. And once again we are on the up cycle as war clouds hover.

More than any other private industry, aircraft manufacture is devoted to the fulfillment of military requirements. Even in peacetime years, 75% to 80% of its output is military. In all-out war, it is 100%. Presently, it is 95%. As military demands go, so goes the industry, and commercial demands can never take up the slack.

More than any other private industry, also, aircraft manufacture is sensitive and subject to change. Where most industries use standard tooling, the aircraft industry's tooling and equipment are of a special character. Change orders to meet the new combat challenge of an enemy can render much equipment useless practically overnight. Contract terminations can turn nearly everything to scrap. New planes require elaborate research and development and testing facilities—facilities which are useless long before a normal write-off period, and in many

## PLANE VIEWS

### AERIAL SNOWPLOW

FOLLOWING A BLIZZARD,  
A CROP DUSTING  
PLANE SPRAYED  
CRYSTALLIZED SALT  
ON AN OHIO HIGHWAY,  
CAUSING SNOW AND ICE TO  
THAW IMMEDIATELY

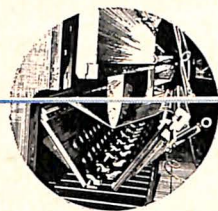
POWER  
IN THE AIR



A U.S. JET, 600 MPH MEDIUM  
BOMBER'S POWER IS EQUIVA-  
LENT TO THE FORCE NEEDED  
TO DRIVE A 25,000 TON  
BATTLESHIP.

HIGH WIRE...  
AND LONG

THE SAME JET BOMBER CONTAINS  
36½ MILES OF ELECTRIC WIRE...  
NEARLY 1,800 TIMES THE LENGTH  
OF THE PLANE.



FAST WAY TO BUILD FAST FIGHTERS  
SPECIAL PRESS DEvised BY ONE AIRCRAFT FIRM CUTS  
PRODUCTION TIME ON SINGLE OPERATION FOR WING  
LEADING EDGES FROM 8 HOURS TO 2 MINUTES.

BY AIRCRAFT INDUSTRIES ASSOCIATION OF AMERICA

cases before even a five-year amortization period expires. Aircraft manufacturing facilities have little use in other types of manufacture.

The rest of the story is partially told in the little chart on Page 1 of this issue. To amortize facilities cost, there must be profits, and the industry's profit history is a poor one, compared with the average of other industry. Moreover, if the emergency should end before the stipulated five years, loss of capital heavily invested in plants and equipment suddenly to be rendered almost worthless could be catastrophic to an industry whose health is admitted to be vital to the national safety.

It is for these reasons that the industry has asked that its tax amortization be admitted as an item of cost for pricing, and that the amortization period be shortened in the event the emergency should end in less than five years.

## Facts and Figures

A modern scheduled airline plane recently hauled from Philadelphia to Los Angeles the heaviest single piece of machinery ever carried by air—a 32½-foot, 11-ton tie rod for an extrusion press.

A major U. S. aircraft firm has perfected an electronic analogue computer which solves motion problems and can do in a week the work normally requiring a year with a desk calculator. With it many engineering problems can be solved before a plane is actually built, thus saving costly trial and error tests. At least four other aircraft firms will install the computers in their engineering departments.

## Flying Safe for Cardiac Patients, Studies Prove

A common belief that flying is dangerous for people with any kind of heart trouble has been disproved in studies made by Dr. Robert L. Levy of the Columbia University College of Physicians and Surgeons. In a report to the American Medical Association's annual convention June 13, Dr. Levy said that commercial airliners do not fly high enough to cause heart strain except in patients with very serious conditions.

"Flying for the vast majority of cardiac patients may be undertaken without undue risk," he said.

The steel shortage recently caused one of the principal makers of aircraft spark plugs to close down its plant for nearly a month.

# How Quantity Production of Airplanes Saves Money in Preparedness Program

The economies effected through quantity production of aircraft and allied equipment for the Air Force have offset to a large extent the 20% to 25% average increase in material, labor and other costs, according to a formal report of the Senate Appropriations Committee. Because of the quantity production involved, it was unnecessary for the Air Force to earmark special funds in the Fourth Supplemental Appropriation Bill to compensate for increased costs, the committee noted.

The dollar value of Air Force procurement has increased over 200% in the last year.

Cost increases for other military departments, in some of which volume orders are on a smaller scale, caused the Senate committee concern.

It estimated total lost purchasing power in all 1951 appropriations for the Navy Department at \$1 billion dollars. Based upon averages of the current estimated costs of various types of equipment in significant categories, the committee said, the purchasing power lost to the Navy by inflation represents, roughly, any one of the following: five large aircraft carriers; 2,500 fighter aircraft; 40 destroyers; 60 submarines. The Navy had to ask for \$52,000,000 additional in the Fourth Supplemental to cover increased cost of aircraft under construction.

Costs are up for airframes, research and development and initial tooling outlay, but otherwise unit price of Air Force equipment "remains at the same level in general as that existing last June before the outbreak of the Korean War," the committee reported.

In contrast it cited the following increases on certain types of equipment bought by the Quartermaster Service: one type of switchboard up from \$994 to \$4,802, or 383%; a special-type radio set up from \$4,597 to \$20,185, an increase of 339.2%; sound-ranging sets up from \$4,959 to \$15,000, or 202%; power units up from \$333 to \$748, or 124%.

## NEW METHODS

(Continued from Page one)

ple: producing a particular saddle for tubing on a big bomber would require eight different stages on a drop hammer. Using the new method, the same work is done in one operation, saving 30% in material and cutting time for the job from 19 minutes to one-fourth minute.

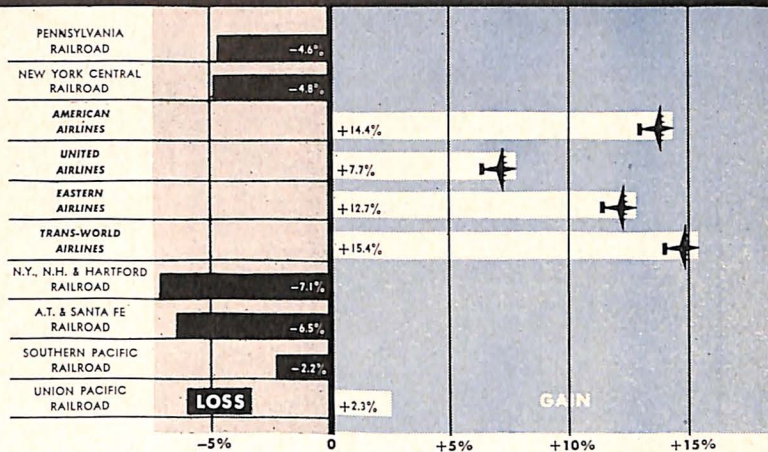
One firm has announced that its newly developed hot extrusion process for mass production of propeller blades will have the same effect on productive capacity as tripling the company's plant space. In addition it makes great savings in material. Using the ordinary process of steel blade fabrication, a typical blade requires 750 pounds of high quality alloy steel as compared with 400 pounds for the hot extrusion process. The three month flow time for fabricated blade tubes compares with about 15 minutes with the hot extrusion method.

### Production Speeded

Several factories are now using a new method of jig alignment in the difficult process of "tooling up" where extreme accuracy is necessary. It is an optical alignment system built into the jigs themselves which replaces the customary and less accurate transit-and-level alignment procedures long used. It is estimated that 30% in tool-fabrication cost is gained from the use of optics. With transit-and-level positioning, for example, manufacture of a bomber aileron jig would require 5,520 man hours of work, including the necessary making of a master gauge. With the use of optics, manufacture of the same aileron jig requires only 3,506 man-hours and no master gauge is needed.

One firm has announced the successful fabrication, on an experimental basis, of a forge-tapered aluminum wing spar which replaces about 50 parts formerly required. This eliminates many riveting operations and the unified structure has little possi-

## OF TOP 10 PASSENGER CARRIERS 4 LEADING AIRLINES GAIN 5 LEADING RAILROADS DECLINE



CARRIERS READ TOP TO BOTTOM IN ORDER OF PASSENGER REVENUE VOLUME "PLANES"  
SOURCE: "Railway Age" and CAB Form 41

bility of joint fatigue. In addition, it results in a 50-pound reduction in weight of a fighter plane.

Through use of a highly efficient method of metal forming developed in the past few years by one aircraft firm and made available to all others, formed sheet metal parts now can be produced at savings as high as 50%. In addition to speeding rate of production, parts produced by this method are held to close dimensional tolerances usually obtained only by expensive tooling.

## Rocket Development Committee Organized By Aircraft Industry

The Aircraft Industries Association of America has organized a Rocket Technical Committee which is doing extensive work in developing and extending the uses of rocket power in modern military craft and missiles and for commercial application. Eight member companies of AIA engaged in rocket development work have named top experts to this committee and others are expected to be added in the near future.

The application of rocket power in aviation has progressed so rapidly during the past four years many of the outstanding engineers and physicists in the industry are working with rockets. The AIA technical committee now provides a medium to effectively assist in coordinating advances in rocket techniques and developments. In past years similar AIA technical committees have materially aided the piston engine and turbo-jet groups.

Since the problems of rocket propulsion are distinctly different from those of jet or other type power plants, the new committee will work directly with the military services on new design requirements, testing procedures, safety problems and the storage and handling of propellants. It is currently working on design and test criteria for propellant tanks.

As a major aid to both industry and the services, it also is working on joint revision of rocket engine procurement and technical specifications.

While rocket power currently has its greatest application in guided missiles, it also powers some of the experimental supersonic planes and is used for "rocket-assist takeoff" to get heavily loaded planes off short runways. RATO also is used for fast climb and for extra bursts of power in combat. Its development is expected to continue both for main propulsion and augmented thrust units. Most guided missiles get their power from rocket engines, both main and booster units. Developments are going forward with both liquid and solid fuels.

## Air Quotes

"Starting from a 40-odd group air force, the aircraft industry is unable until almost 1953 to do much of a job toward supplying the airplanes that we would lose in war against any major opposition.

"In my opinion, the U. S. Air Force is the single potential that has kept the balance of power in our favor. It is the one thing that has, up to date, kept the Russians from deciding to go to war.

"As the power of the Russian Air Force increases, and their stockpile of atomic weapons increases, the job of the U. S. Air Force becomes roughly doubled.

"Whereas today it is a deterrent to war, because of its ability to devastate the industrial potential of any great nation on the globe; tomorrow, if the Russian Air Force has the atomic bombs and the ability to deliver them, we have to have an Air Force that can take the attrition that would be necessary to destroy that air force, and destroy it promptly; and after that, have a sufficient air force left to destroy the manufacturing potential of Russia, and to do what we call policing action after that to insure that it was not rebuilt."—*Gen. Hoyt S. Vandenberg, Chief of Staff, U. S. Air Force, testifying on Capitol Hill May 28-29, 1951.*



Gen. Vandenberg

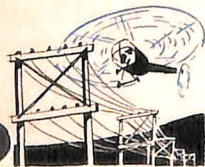
## PLANES QUIZ ✈️

Seventy per cent score on this quiz is excellent. Sixty per cent is good. Answers on Page 4.

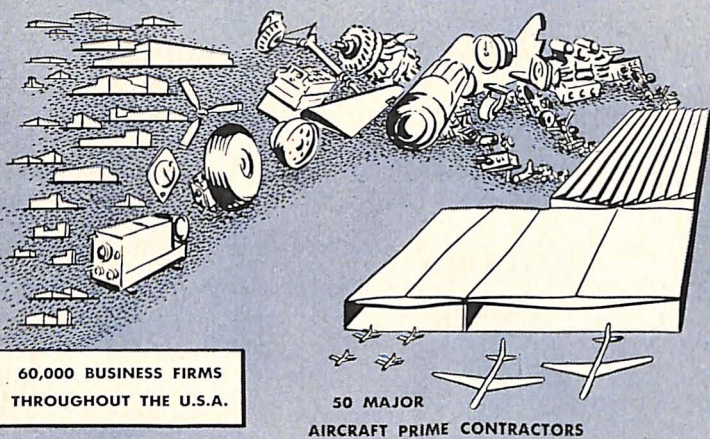
- In the U. S. the total number of airplanes now used regularly for agricultural purposes is now approximately (a) 2,000; (b) 3,500; (c) 5,000?
- Power lines can be patrolled by helicopter at half the cost of conventional ground patrol. True? False?
- The International Civil Aviation Organization is now composed of (a) 15 nations; (b) 31 nations; (c) 57 nations?
- Titanium, the rare hard metal used in jet aircraft engines, costs \$25.00 per pound. True? False?
- The first jet-powered bomber produced in the U. S. flew (a) three years ago; (b) five years ago; (c) eight years ago?
- U. S. domestic scheduled airlines set a world record for safety in 1950.

True? False?

- The speed attained by rockets currently being tested in the U. S. is up to (a) 1,500 mph; (b) 2,000 mph; (c) 3,000 mph?
- The operational life of jet engines (without overhaul) has been increased during the past two years (a) three-fold; (b) six-fold; (c) ten-fold?
- Swept-back wings of modern airplanes result in smoother flight and greater comfort for passengers. True? False?
- In the U. S. which category of planes put in the greatest number of hours in the air—(1) the airline planes; (2) lightplanes in local flying such as for instruction or pleasure; (3) planes flown for business use?



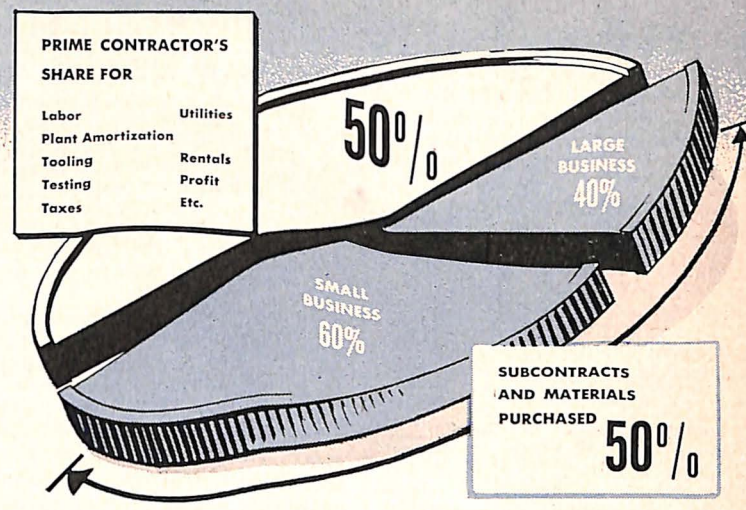
## 60,000 Subcontractors and Suppliers Now Serve The Aircraft Industry



"PLANES"

SOURCE: Aircraft Industries Association Survey

## SMALL BUSINESS GETS 60% OF AIRCRAFT SUBCONTRACTS



"PLANES"

SOURCE: Aircraft Industries Association Survey

### SUBCONTRACTING

(Continued from Page one)

al sheets, harder materials and closer tolerances are required. In addition, military airplanes must carry many more complex instruments and equipment such as radar, pressurization and control systems, and have tremendously greater fire power than the planes of six years ago. Thus, complex and expensive tools and extraordinary skills are necessary both for the plane builder and the subcontractor who produces parts and components.

#### Planning and Research

Joint Air Force-Navy-Industry mobilization studies initiated four years ago were directed at possible all-out mobilization. Although today's situation is far short of all-out war production, the planning and research have materially shortened the time required to locate and include outside production sources.

Some of the principal advantages of the subcontracting program cited by AIA:

1. Greater national security by developing a number of sources of production items, assuring continuance of production even if some were knocked out by enemy attack.

2. More economic stability by taking up the slack in industries facing cutbacks in civilian production.

3. Assurance that high volume production could begin almost immediately if necessary, as a result of spreading defense production know-how to more companies.

#### The Industry Goal

President Truman has established as the aircraft industry's goal the development of expanded capacity capable of producing 50,000 airplanes per year or approximately 4,200 per month. Charles E. Wilson, Director of Defense Mobilization, has called for a jet engine production capacity of 18,000 engines per month. These goals are expressed in terms of *capacity* and not *deliveries*. The actual delivery schedules, even at production peaks for both airplanes and engines, are substantially below these goals.

Subcontractors and small business firms are supplying a vital part of the proposed capacity.

### AIRCRAFT INDUSTRY BASE EXPANDING

(Continued from Page one)

panded since hostilities began in Korea. But, although the appropriations for both 1951 and 1952 exceed all previous years except 1942 and 1944, the actual rate of increase in aircraft production is less than 50% of the rate of increase made by the industry in World War II. Present programs do not call for expansion of actual production to the World War II rates, but rather the assurance of capacity to meet such rates if it becomes necessary.

#### No Time Advantage

Preparedness is costly and the taxpayers are entitled to know what they are getting for their tax dollar. It is important to realize that currently more than \$26 billion is allocated for production of airplanes, including the sums requested in the 1952 budget. This represents 40% of the total money scheduled for procurement of military weapons of all types for the military services. A substantial portion of this sum for the procurement of aircraft and related equipment is scheduled for facilities expansion.

In addition to government-provided funds for this purpose, many millions of dollars have been invested by the aircraft firms themselves in new tooling, new equipment, additional floor space, and in research.

Upon the preparations we are making now for adequate facilities and readied supply lines may depend the salvation of our own homes and families if all-out war erupts. No one doubts that if there is another global war the United States itself will be a primary target. Never again will we have the "time advantage" which favored America in previous world wars. Never again will there be a "leisurely" mobilization period, while other countries take the brunt of enemy attack.

#### Anticipating Problems

Therefore, in our production planning we are attempting to anticipate every problem. A major shortage in aircraft engine production was foreseen and in the early stages of facility expansion the Defense Establishment called in the automotive manufacturers who did such a splendid job in World War II. Several major new plants are tooling rapidly for engine production. The same sort of job is being done to meet critical

requirements for electronic equipment.

It must be remembered also that a long "lead and flow" time is required for aircraft production, which means that orders placed now and money obligated now by the government will not result in heavy deliveries until calendar 1953. Further, the new major subcontractors and licensees who are being added to the aircraft engine production program will require a year before their first production products can be delivered and will require at least 18 months before approaching high-volume production rates.

It is possible that even in the event of global war the 100,000 planes-a-year peak rate achieved in World War II may not be necessary because of the increased performance and destructiveness of the modern airplane when compared with its World War II counterpart. This increased performance accounts to a great extent for the higher unit costs of today's airplanes.

#### Industrial Know-How

The same type of engineering talent and management know-how which made U. S. plane production the world's biggest business during World War II is doing the necessary job today. They are doing it despite the technological complexities of the shift to jet-powered planes and despite the problems peculiar to a semi-war economy.

Most of our airplane plants are operating on a one-shift, 40-hour week basis except for bottleneck-breaking overtime. This policy has been adopted not only to broaden the industrial production base but to maintain, as far as possible, uniform working conditions for both civil and military production so that mass movements of labor to war plants will not result.

It is vital to our basic defense program that we recognize and solve quickly all problems—administrative, legislative or economic—which arise to threaten the orderly production and facilities expansion we are now achieving in this industry. Indeed, both government and industry, benefitting from past experience, are doing everything possible to anticipate these problems and eliminate avoidable obstacles.

### Answers to Planes Quiz

1. (c) Latest CAA survey shows nearly 5,000 planes used for various agricultural purposes and the number growing steadily.
2. True. Bonneville Power Administration reports helicopter line patrol costs \$1.35 a mile, compared to \$2.75 for ground patrol.
3. (c) Fifty-seven nations which operate more than 90% of the world's international civil air transportation.
4. True. Aircraft and allied industries are seeking ways to lower present \$25-a-pound cost of producing titanium.
5. (b) First jet bomber produced in the U. S. was flown in May, 1946, is still being used in tests.
6. True. They carried 17,420,859 revenue passengers in 1950 at an unequalled passenger fatality rate of only 1.1 per 100 million passenger-miles flown.
7. (c) Rockets being tested by NACA range from 1,000 to 3,000 mph and altitudes as high as 150,000 feet. Other types are being made and tested by the aircraft industry.
8. (c) Little more than a year ago 75 hours operation was the limit for one type jet engine; the same type has now operated over 700 hours and remained in excellent operating condition.
9. True. An outstanding engineer reports: "One of the characteristics of the swept wings is the load-relieving tendency of the wing tips. In rough air, wing flexibility is quite apparent." The wing tips "ride the bumps" while the cockpit rides smoothly.
10. (2) and (3). The last survey made by CAA for the year 1949 showed planes flown in business activity were used about 5½ million hours and those in local flying about the same. Domestic airline planes that year flew about 3½ million hours.

### Cargo Plane Hauls More Big Engines Than Boxcar

Eight huge aircraft engines, built on the East coast, are now being shipped at one time in an air cargo plane to the aircraft factory on the West coast. A railroad boxcar can carry only five of the engines, since they have to be encased in metal cans for the rougher surface transportation. The eight engines can be loaded or unloaded from the airfreighter in less than one hour.