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# planes

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## CIVIL HELICOPTER USE SLOWED BY OLD LAWS

### New Materials Sought To Solve The Heat Barrier

The competition between world powers for absolute air superiority has greatly magnified the urgency of overcoming the effects of the "heat barrier" which confronts America's aircraft builders today. This is caused by air friction at extreme speeds, which lowers the efficiency of ordinary aircraft materials.

Searing heat that melts all known metals (and even would cause diamonds to vaporize at ten times the speed of sound!) is the greatest problem facing the American scientists and engineers.

The so-called "sonic barrier," once believed to be an impenetrable wall which precluded men and machines from traveling faster than sound, proved to be relatively harmless and of little concern, once penetrated.

In thermal heating, however, there is no diminishing point so long as objects are confined to the earth's atmosphere. And as speeds become greater the problem increases proportionately. As long as flight is restricted to the atmospheric layer, more speed will result in more heat.

A great concentration of effort by the aircraft industry, the military and basic research organizations is required if the United States is to find the solution to new materials and to cooling of aircraft and equipment.

An American research aircraft has already flown at more than Mach 2, twice the speed of sound, but aluminum, steel and titanium, the (See AVIATION, page 3)

### U.S. Engine Costs Are Dropping

The American-built aircraft engines which power U. S. planes faster, farther and higher than man has ever flown before are mechanical giants when it comes to producing horsepower.

Yet they weigh but a fraction of a pound per horsepower produced, compared to pounds per horsepower of the engines of just a few years ago.

As an example, the engines which powered the 400 m.p.h. fighters of World War II produced only two (See U. S. ENGINE, page 4)

**MASSIVE RETALIATION**

**ONE Modern U. S. Bomber = ALL Combat Planes in World War II**

**One modern U.S. bomber, with a crew of only three, can carry more destructive power in one mission than the combined air forces of all combatants could carry in World War II.**

The terrible destructiveness of modern American air-nuclear power is the greatest assurance this country has against attack by aggressor nations.

'PLANES' Aircraft Industries Association

### Business Aircraft Well Equipped; Ready For Any Emergency Need

With the number of utility planes in the fleet having increased more than 400 per cent in just eight years, America's business aircraft form a strong secondary line of defense in total U. S. Air power.

This fleet of business airplanes, which are operated by some 6,000 different business enterprises, numbers approximately 12,000 today. In 1946 the total listed was about 2,500.

In their normal, peacetime roles, these planes are saving many dollars an hour for U. S. businessmen. Of the 12,000 in active operation carrying busy executives and emergency supplies to all parts of the country and to many overseas points, 2,475 are multi-engine. This is 1,025 more multi-engine planes than are operated by the scheduled airlines in both domestic and international operations.

And it has been estimated that within the next decade some 15,000 businesses will be profitably operating a fleet numbering between 40,000 and 50,000 planes.

Many of the planes in the present fleet are as well equipped as the scheduled airline aircraft in so far as instrumentation, aids to navigation, communications equipment and safety devices are concerned.

Their pilots and ground personnel outnumber those employed by the airlines. These are highly skilled men. The National Business Aircraft Association, an association of executive plane operators, reports that all of its member pilots are required to hold commercial pilot certificates with single engine, multi-engine and instrument ratings where

(See BUSINESS, page 3)

### NASAO Urges Old Statutes Be Revamped

Written especially for PLANES

By Claude B. Friday  
Director, Bureau of Aviation,  
N. Y. State Dep't. of Commerce  
President, National Association  
of State Aviation Officials

State and Federal agencies must modernize existing laws and regulations hampering the uniquely useful advantages of helicopter transportation if the best interests of the air traveling public are to be served.

Most state regulations and restrictions governing aircraft use were written in pre-helicopter days and designed basically to fit the needs of fixed-wing aircraft. But today, with air transportation a positive necessity in the national economy, the full utility of the helicopter remains limited by outdated regulations.

In recognition of this deficiency, the National Association of State Aviation Officials has adopted a policy specifically aimed at the revision of many existing regulations:

"By reason of special performance characteristics which give the helicopter a utility not possessed by any other vehicle, the various States should review their laws and regulations with a view toward removing, where necessary, language which unnecessarily limits or restricts the operation of helicopters and rotary-wing aircraft; particularly with respect to airport planning, the establishment of public and private heliports, visibility limitations, minimum altitudes of flight, airport traffic patterns, and other matters where the differences between helicopters and fixed wing airplanes justify different regulatory treatment."

A survey conducted for the Helicopter Council of the Aircraft Industries Association has already blazed the way for action in carrying out policy to eliminate needless obstacles in the highly promising development of civil helicopter air transport. NASAO members have been urged to present their recommendations to eliminate obstacles to helicopter transportation to their state legislatures, most of which are in session this year.

The survey, which concentrated upon State Statutes, shows that as

(See CIVIL, 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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## Manpower Paradox

By DeWitt C. Ramsey (Adm., USN, Ret.)

President, Aircraft Industries Association

A serious paradox is complicating the crisis created by the shortage of scientific manpower, particularly in the aircraft industry.

This nation is bending every effort to foster the interests of young people to follow careers in science and engineering. We are pouring them into a fountain of learning for the national survival but many local draft boards are seining them out and handing them rifles instead of slide rules for their trouble.

According to a survey of the Scientific Manpower Commission, this nation is at an all-time low with respect to graduate students who are starting careers in science and engineering. Despite this appalling fact, there has been a sharp tightening up of the draft policy affecting engineers in both college and in-plant training.

The entire problem is of such grave importance that President Eisenhower directed the establishment of a cabinet committee on the training of scientists and engineers. The Committee includes the Secretaries of Commerce, of Labor, and of Health, Education and Welfare, the Assistant Secretary of Defense for Manpower, and the Directors of the Atomic Energy Commission, of The National Science Foundation and the Office of Defense Mobilization.

Modern aerial weapons have become so complex that the number of engineering manhours required for their design and production has increased five fold in the past few years. That complexity embraces virtually every physical science known to man. Conversely, in the years since the outbreak of war in Korea the number of graduate scientific and technical personnel available to the industry has dwindled alarmingly.

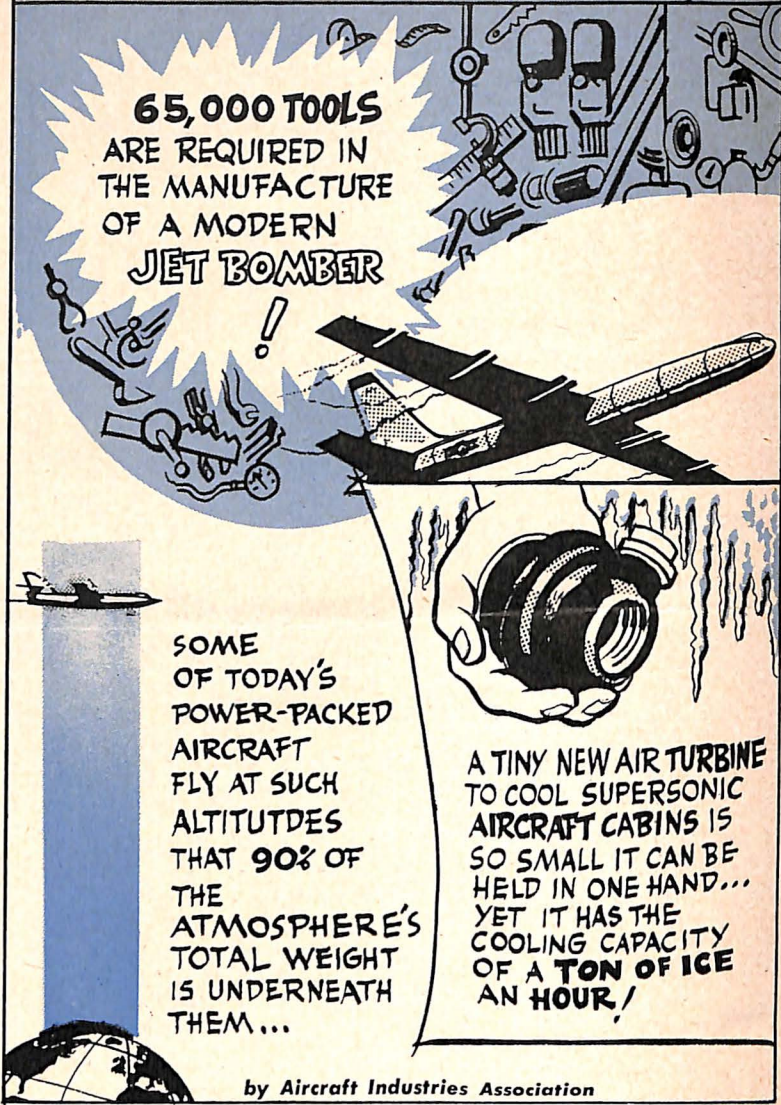
This critical shortage continues to grow. The number of engineers entering industry in 1954 has been less than one-half the number required. In the face of this gravity, the rate of induction by Selective Service of engineering personnel has shown a marked increase during the past year. Figures published by Selective Service disclose that in the past year the number of occupationally deferred registrants, excluding agricultural, has been reduced 35 per cent.

The aircraft industry is in full agreement with the need for the Universal Military Training and Service Act in this age of peril. It adheres to the intent of Congress in setting down the purpose of the act that service in the armed forces "should be shared generally, in accordance with a system of selection which is fair and just, and which is consistent with the national economy." . . . "that adequate provision for national security requires maximum effort in the fields of scientific research and development, and the fullest possible utilization of the nation's technological, scientific, and other critical manpower resources."

As Donald A. Quarles, Assistant Secretary of Defense for Research and Development, wrote in a recent issue of *PLANES*, "The critical shortage of engineers and scientists in America is potentially a greater threat to our national security than are any weapons known to be in the arsenals of aggressor nations." Our local draft boards must take heed of this plight of industry and of the national security. This is especially necessary during this distressful period of low production of engineering graduates, when the United States is in a critical race with totalitarian powers for qualitative superiority in air power. Our scientific manpower, irreplaceable talents, must be utilized in their most highly skilled capacities.

Future security of the United States, probably that of all the free world, will depend upon the success of the efforts currently being made by the young scientists and engineers who are now engaging in research and development and upon the wisdom of our leaders in this period.

## PLANE VIEWS



65,000 TOOLS  
ARE REQUIRED IN  
THE MANUFACTURE  
OF A MODERN  
JET BOMBER

SOME  
OF TODAY'S  
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A TINY NEW AIR TURBINE  
TO COOL SUPERSONIC  
AIRCRAFT CABINS IS  
SO SMALL IT CAN BE  
HELD IN ONE HAND...  
YET IT HAS THE  
COOLING CAPACITY  
OF A TON OF ICE  
AN HOUR!

by Aircraft Industries Association

## USAF Is World's Biggest Business

The United States Air Force, buying more than a million separate items a year, continues to be the biggest business in the world.

By July, 1956, the Air Force will have bought more than \$25 billion dollars worth of aircraft of all types and related equipment since the outbreak of war in Korea in June, 1950. During the next 18 month period alone, the Air Force will take delivery on approximately \$10 billion dollars worth of supplies and equipment.

Best example of the tremendous Air Force purchasing program needed to maintain U. S. air supremacy is that USAF, during a recent seven month period, made 524,864 contracts to buy \$2,557,598,000 worth of items. These products ranged from tiny screws, costing a fraction of a cent a piece, to giant aircraft costing several million dollars each.

### Little Switches

Some of the precision snap-action switches used in the electronic equipment aboard today's combat aircraft are so small that 258 of them weigh only one pound.

## PLANE FACTS

- So exacting are military requirements for airborne electronic equipment that a major west coast electronics manufacturer has just completed installation of a special test chamber that permits testing of electronic gear at temperatures ranging from minus 100 degrees fahrenheit to plus 450 F., and at simulated altitudes of from 120,000 ft. to a point lower than the lowest point on the surface of the earth.

- New cars aren't the only vehicles with devices to squirt water on their windshields. One of the latest Navy shipboard reconnaissance fighters has a number of little squirters which spray water on the glass protecting its five cameras. The water washes off dust and debris picked up during takeoffs and landings.

- The hydraulic system on a modern jet bomber is made up of more than 200 precision-made valves and other components and can deliver 25 horsepower. The system operates the plane's steering, brakes, bomb bay doors and flight control surfaces. Thus, the pilot of a 100-ton bomber can maneuver his plane on the ground as easily as a motorist can drive an auto equipped with power-steering.



## Aviation Faces Many Problems In Heat Barrier

(Continued from page 1)

metals most widely used in today's aircraft, all melt at speeds under Mach 8. At speeds much lower than this, metals creep, expand and contract, causing fatal buckling of the structures and pulling away of the aircraft's skin.

New materials must be developed to protect American airmen and their aircraft before much greater speeds become a reality. Scientists are working today to develop newer metal alloys, synthetic rubbers, ceramics, plastics and lubricants. Aiding these new materials must be new design techniques and innovations, some of which are now taking definite form and some of which are still in experimental stages.

The problems are many and momentous. Their solutions will be costly in time, money and manpower, but these solutions must be found if the United States is to produce the supersonic engines and aircraft which will be necessary to American air supremacy within the next few years.

## U. S. Airlines Up 15% in Ton Miles

America's scheduled commercial airlines offer more air lift capacity than the rest of the world's air carriers combined.

Flying approximately 195,000 route miles in domestic and international operations, the airlines recorded another record-breaking year in 1954. They flew nearly 2.5 billion revenue ton miles, up 15.3 per cent over 1953 and more than double the ton-miles flown in 1949.

Estimated figures for the 12-month period show that total revenue passenger miles were (1) up 11.56 per cent for the trunk lines; (2) up 15.90 per cent for the local service carriers; and (3) up 9.43 per cent for the international carriers.

### Rail Travel Drops

These airlines, operating 1,450 fast and safe American-built transports, grossed a total revenue of approximately \$1.25 billion, close to 8 per cent more than they grossed during 1953.

The carriers also registered a 12 per cent gain in domestic inter-city passengers carried, while other modes of transportation again took a dip. In 1954 the airlines carried 28.3 per cent of all inter-city passengers, compared to just 12.4 per cent in 1950. Meanwhile, rail coach and pullman travel dropped off 7 per cent and inter-city bus travel lost 7.5 per cent during the corresponding four years.

With inexpensive coach service accounting for nearly one-third of the passenger miles flown during the year, a total of 34 million passen-

## Air Quotes

"A vital element in providing the free world with adequate military strength is mobilization readiness. Not only must there be adequate forces trained and ready, but these must be supported with adequate reserves of equipment and raw materials



built upon a strong industrial base. These reserve forces—personnel, plant, stockpile—must be immediately available. The destructive and paralyzing nature of a nuclear war will never again permit a leisurely mobilization as in World Wars I and II when it took us 18 months to mobilize. Nevertheless, we must be as well prepared for a long conventional war as we are for a short and devastating atomic war. As long as we maintain the superiority of the free world's qualitative and quantitative industrial strength over any potential enemy, that enemy must pause before engaging in aggression."—Charles S. Thomas, Secretary of the Navy, December 14, 1954.

gers chose air transportation and were flown more than 20 billion passenger miles.

The airlines report total revenues of approximately \$1.4 billion, although the domestic trunk lines reported that expenses climbed faster than revenues and that operating income will be less than in 1953.

## Business Fleet, Up 400 per cent, Forms Strong Secondary Defense

(Continued from page 1)

applicable. Many of them hold airline transport ratings and the majority have had thousands of hours of flight experience with either military or airline backgrounds. Many of them presently fly overseas routes.

These men and their larger planes are available on short notice to add to America's defense transportation should the need arise. Men, equipment and even casualties could quickly be transported to any designated place. High priority cargo and key defense officials could be moved hurriedly to any point needed.

But in addition to these big planes, the smaller, lightweight utility aircraft which make up the balance of the fleet form an equally important factor in the overall picture. Most of these planes are single engine and could also be pressed into immediate service. An initial emergency could possibly involve simultaneous atomic attacks on numerous centers in the United States. The need for doctors, nurses, medical equipment and other critical supplies would be immediate. These small planes could perform an unparalleled service due to their great numbers and their ability to land in small spaces, including streets and highways, where other avenues of communication have been destroyed.

The N.B.A.A. reports that a plan has already been worked out and coordinated between its members, the Defense Air Transportation Administration and the Federal Civil Defense Administration for use of the larger aircraft—those weighing 12,500 pounds and over.

This important segment of America's aviation, playing an extremely

important role in the economy of the nation today, will provide a vital link with the military air services and the airlines in the event of any national emergency.

## Ladies Day Every Day In Air Industry

It's "Ladies Day" every day in America's aircraft industry!

The girls who played such an important role during the manpower shortage created by World War II are back in full force helping manufacture the sleek, swift airplanes rolling off today's production lines.

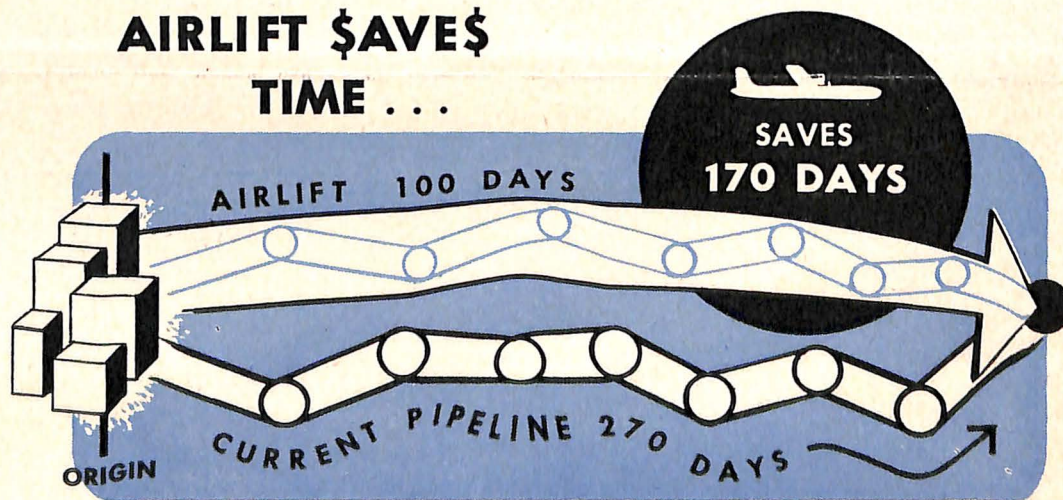
And they are not all sitting at desks and typewriters. In fact, the big majority of them have gone right back to their old jobs of driving rivets and wielding welding irons.

One of the larger aircraft manufacturers reports that, whereas just five years ago only 14 per cent of its workers were women, a run-down of today's roster shows that 24 per cent of the work force is comprised of man's better-half. And during this five-year period there has been a great increase in the total number of workers.

The ladies are particularly adept at such things as wiring, which is increasingly important as more and more electronics are used, but they are equally efficient at drilling the 15,000 close-tolerance bolt holes which are sunk in the wings of one medium bomber.

## AIRBORNE ECONOMY

AIRLIFT SAVES TIME . . .



Air Force Secretary Harold Talbott says: "development of an airlift for supplies could cut the length of the Air Force supply line from 270 days to 100 days," thus increasing flexibility of operations and reducing the need for huge and costly inventories.

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Aircraft Industries Association



# Civil Helicopter Transportation Slowed By Outdated Regulations

(Continued from page 1)

of the end of 1953 every State had passed statutes dealing with the regulation of aviation. The large majority of the statutes, however, were passed before the advent of the helicopter.

The more serious problems facing the helicopter industry under these old statutes can be traced to two main sources: 1. not recognizing the



CLAUDE B. FRIDAY

unique operating characteristics of the helicopter; and, 2. failure to recognize the difference between the landing area requirements for fixed-wing aircraft and for helicopters.

## "Aircraft" Defined

By 1953 the statutes of every State, except one, defined the word "aircraft" broadly enough to include the helicopter. Four States do give separate recognition to the helicopter, but only in a very limited manner.

Of these regulations, the ones which are holding back the full usefulness of helicopter operations are fixed-wing rules governing altitude and visibility limitations, and approach zone requirements for landing and take-off. These regulations appear in statute form in some States but in the form of administrative regulations in most States. However, in almost all they now apply alike to the conventional fixed-wing aircraft and to the helicopter under broad definitions given to the word "aircraft."

## Few Provisions for Helicopters

Statutes in all of our States in 1953, according to the AIA survey, except two, defined the word "airport" or "landing field" broadly enough to include a helicopter-type landing area, and gave no separate recognition to the heliport. As a result, heliports are subject to existing "airport" regulations unless some special provision is made for them.

In some States helicopters classified as "aircraft" may be required to operate only from conventional "airports," unless provisions relieving them from existing regulations are written into the statutes or administrative regulations.

The survey showed, however, that many State statutes include provisions which are beneficial and which appropriately apply to both fixed wing and helicopter operations. For example, many statutes provide for assistance or financial aid in developing "airports," for the use of the power of eminent domain in constructing airports, or for the advancement of aviation in general.

Necessary action at the state level in preparing for this forthcoming helicopter development points up the value of an organization such as the NASAO. Prior to 1931 there was no central place or group through which the various State aviation representatives or officials could thus coordinate their planning, compare aviation development programs, provide mutual assistance or develop State laws, rules, regulations, and operational standards which would assure maximum uniformity in all States, exactly as is called for in this present helicopter review.

## NASAO Organized in 1931

When the NASAO was organized in 1931, it declared its purpose to be to "foster aviation as an industry, as a mode of transportation, and as an arm of the national defense; to join with the Federal Government and other groups in research, development, and advancement of aviation; to develop uniform laws and regulations; and to otherwise encourage cooperation and mutual aid among the several states." As a result, there is an active informed organization through which the States can act swiftly and effectively on local, national and international issues.

Through NASAO it is possible to continuously coordinate the views of the various States, develop and recommend uniform policies, procedures, legislation, etc. By acting collectively through their Association, the member States are often able to effect considerable savings of time and funds in completing projects and programs of regional or national interest.

## Safety Always First In Building Aircraft

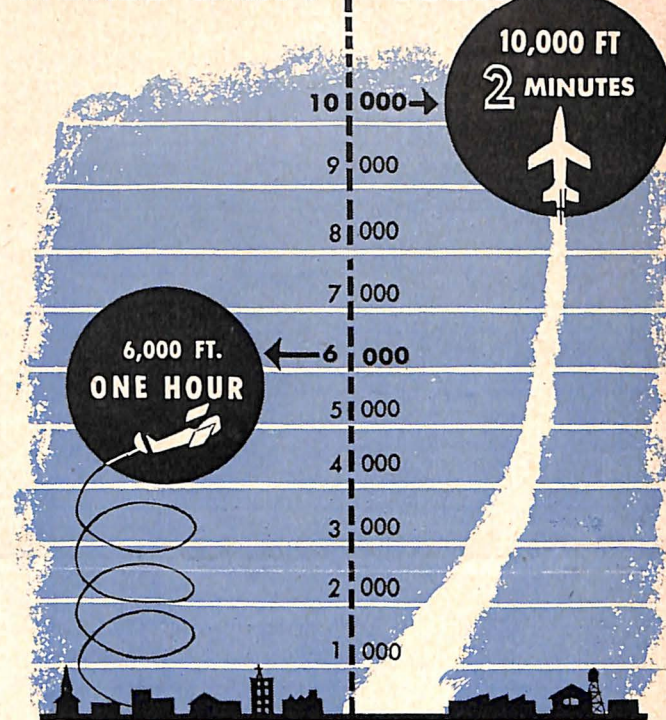
America's aircraft industry is one of the most safety-conscious industries in the world. Long before the swift new planes taxi out for their take-offs, safety is the by-word.

For instance, the plant of one large Eastern aircraft manufacturer is a community within itself. Here, 20,000 men and women go about their tasks daily and 197 drivers weave their trucks and tugs through traffic and down narrow aisles.

Each day this community is subject to the same traffic problems that plague many American cities. But last year the operators of this company's vehicles traveled over a million miles within the plant and their record at the end of the 12 months showed only 43 traffic mishaps—all of them minor.

## U.S. AIR POWER CLIMBS

WORLD WAR I | TODAY



It took fighter aircraft an hour to climb to 6,000 feet in World War I. Some of today's powerful jet fighters can reach 10,000 feet in less than two minutes . . . The increasingly efficient jet engines manufactured by America's aircraft industry are the products of years of research and development.

'PLANES'

Aircraft Industries Association

## U. S. Engine Costs Are Dropping As Horsepower Ratings Climb

(Continued from page 1)

thirds horsepower for every pound of engine-weight, while today's modern jet engines produce the equivalent of four horsepower for every pound that they weigh.

As the demand for faster planes to assure America's defense increases, the ratio of weight to horsepower becomes even more vital in the building of military airplanes. After an aircraft passes a speed of 500 m.p.h., tremendous increases in horsepower are required for each slight increase in speed. Planes that fly 600 m.p.h., when propelled by an engine producing 11,000 h.p., would need 67,000 h.p. to attain a speed of 1,000 m.p.h.

## 10,000 Times Kitty Hawk Power

But speed alone is not the only reason more horsepower must be developed by each engine. Today's planes, through necessity, are much heavier than their predecessors. The fuselages and components must be made of heavier materials which are capable of withstanding the searing temperatures bursting through jet engines, and the skin friction-heat created by a plane passing through air at speeds faster than sound.

The engines of one modern bomber generate 10,000 times the horse-

power produced by the first Wright plane. The weight of that plane when it first flew at Kitty Hawk was just 750 pounds, including the engine and pilot, compared to a gross weight of 400,000 pounds carried aloft on a recent flight of one of today's medium bombers.

## Jet Power Is Cheap

The research and engineering necessary in designing and building these modern engines requires the skill and imagination of thousands of scientists, engineers and specialists. It takes 87 different specialists and 8,954 different parts to build one of the engines which power some of the newer military aircraft.

Although the investment in dollars and manpower has been large in creating these jet engines, it has resulted in terrific dividends in developing this country's unmatched air strength of today.

Whereas the construction cost per horsepower is nearly \$17 in a reciprocating engine, the cost for the same power generated by a jet is only \$2.56.

In addition, the American aircraft industry has manufactured more single- and multi-engine jet planes than the rest of the Free World combined.