50th Anniversary of Powered Flight — Progress — Security

planes

Vol. 9, No. 2, Feb. 1953 — OFFICIAL PUBLICATION OF THE AIA AIRCRAFT INDUSTRIES ASSOCIATION

'RESEARCH IS KEY TO AIR POWER'—FLOBERG

Airlines Assume Lead Over Ships In Ocean Travel

More international travelers get a look at America's skyline from 10,000 feet in the air than see it from the decks of the world's passenger ocean liners.

In the short 25 years since Clarence Chamberlin piloted the first passenger-carrying aircraft across the Atlantic, the airline industry has forged strongly ahead of sea travel as the leading carrier of transoceanic passengers.

Beat Ships By 300,000

And the bulk of all international air trade, originating or terminating in the United States is carried by the 234-plane overseas air fleet of U.S. flag lines.

Last year, according to the U.S. Customs Bureau, more than 1,300,000 passengers arrived at or departed from U.S. airports on international trips via commercial airlines. This reflects an increase of almost 150,000 over the previous year—*and is over 300,000 more than were carried by the steamship lines.*

Lion's Share on U.S. Lines

U.S. international airlines accommodated the lion's share of trans-Atlantic trade by transporting over 400,000 persons to and from Europe. Africa and points beyond. They carried over 500,000—more than the entire 1950 population of the city of New Orleans—between the U.S. and neighboring Central and South American countries, more than doubling the number flying under the flags of other nations.

The tremendous amount of time saved in getting to destinations for play or work is emphasized by statistics compiled by the Air Transport Association, the national trade association of the scheduled airlines. The average passenger, using planes

(See AIRLINES, page 2)

Dollars and Hours Saved By Jet Assembly 'Train'

A block-long "train" of jet plane assemblies, moved by a tiny pushmobile tractor on a regular schedule, speeds aircraft output and cuts production costs at a major U.S. aircraft plant. Formerly, it took four men four hours to move jigs from one work station to another. Today, the tractor does the job in three minutes.

PLANE PRODUCTION TIMETABLE

Investment of millions of manhours and millions of dollars is required before a single plane can be procured in a new aircraft plant. Initial costs during lengthy tooling-up period are written off during production run—when volume output reduces unit costs.

'PLANES' — SOURCE: Typical Manufacturer

Forecast of $3.3 Billion Payroll Made for Aircraft Industry in '53

Workers in U.S. aircraft plants will be paid a record $3.3 billion in 1953, with the total industry payroll equalling that of the peak employment year of World War II, according to preliminary estimates of the Aircraft Industries Association.

By year's end, some 800,000 Americans will be directly engaged in building aircraft. High wage levels now prevailing throughout the industry will push the annual payroll to a point equalling that of 1943, when average employment rocketed to more than 1,250,000 under the impetus of all-out wartime production requirements. The above figures do not include employees of thousands of aircraft industry subcontractors and suppliers.

Factor in Higher Costs

With approximately 50 per cent of the industry's total sales dollar going into payrolls, the $3.3 billion in wages constitute a major factor in the higher cost of today's military aircraft.

The gradual rise in average wages in the aircraft industry began before World War II, and has accelerated in recent years. Average hourly wages today, for example, are $1.96 compared with 84 cents in 1941. Weekly pay has jumped from an average of $39.80 to $84.50 during the same period. This increase of 112 per cent in wages compares with a climb of 81 per cent in the national cost of living index.

'Fringe' Benefits Rise

In addition to actual wages, the aircraft worker today receives a number of so-called fringe benefits, the majority of which have come into being since World War II. These benefits, which in many cases are paid entirely by the employer, include such items as insurance, sick leave, holiday pay, vacation pay, and —in many cases—pension plans. At one company, the cost of fringe benefits paid in addition to wages is 19 cents for every hour worked by the employee.

Employment in the aircraft and parts industry in June, 1950, when the Korean War began, was approximately 215,000 persons.

Time And Money Vital To Keep Air Superiority

Written Especially for PLANES

By

John F. Floberg

Assistant Secretary of the Navy for Air

Weapons of *quality* available in *quantity*, which are essential to a high degree of preparedness, provide the tools necessary to achieve military victory in event of war.

We can lose any war if we are caught unprepared and lack either weapon quality or quantity. We must have both.

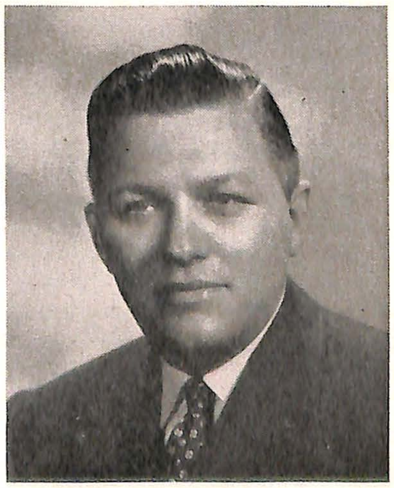
Unfortunately, the layman's interpretation of defense preparedness, representing superficial appraisal, often places emphasis on quantity rather than quality. Neither is subordinate, and I believe it is imperative that each be considered in its proper perspective.

Adequate Support Needed

Weapon research must be adequately supported through the recognition of its great importance to national defense, with emphasis on its requirements for scientific talent, facilities and natural resources. The sum of all these means adequate financial support. Recognition must also be given to the time phasing of weapon development in order to foster orderly and efficient research. Chronologically, weapon *quality* must precede weapon *quantity*.

The potential of a modern fast

(See FLOBERG, page 3)



JOHN F. FLOBERG

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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Yesterday's Decisions-- Today's Air Power

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

Within the next 10 months, the U.S. aircraft industry is scheduled to reach its peak production and employment under the limited emergency program. Even today, aircraft plants throughout the country are building more planes per month than ever before except under conditions of full-out mobilization.

This production achievement, it is pertinent to note, is due only in small part to the strenuous efforts now underway in the aircraft industry and the armed services. The level of military plane production this year—or at any given time—has its genesis in decisions made two to five years earlier. Assembly lines for modern aircraft extend back through industrial corridors of time that cannot be materially shortened by frantic effort in time of crisis.

Our experience since outbreak of the Korean conflict underscores this truth with unmistakable emphasis. In fiscal 1951, the Congress—impelled by the urgency of the international situation—gave the military services authority to make heavy purchases of military aircraft. On this authority, the armed forces ordered quantities of planes—and the immense task of organizing our industrial machine for increased production got underway.

But the lessons of World War I and World War II soon came back to haunt the nation's planners. Money appropriated in 1951 could not produce planes in 1951—or even in 1952. No amount of money, materials, effort or talent could repeal the immutable law of lead-time. Planes that had not been put into production in 1947 and 1948 could not be delivered in 1951.

Consequently, the large aircraft procurement appropriations in the post-Korean years gave the services the right to sign contracts and letters-of-intent for future aircraft deliveries.

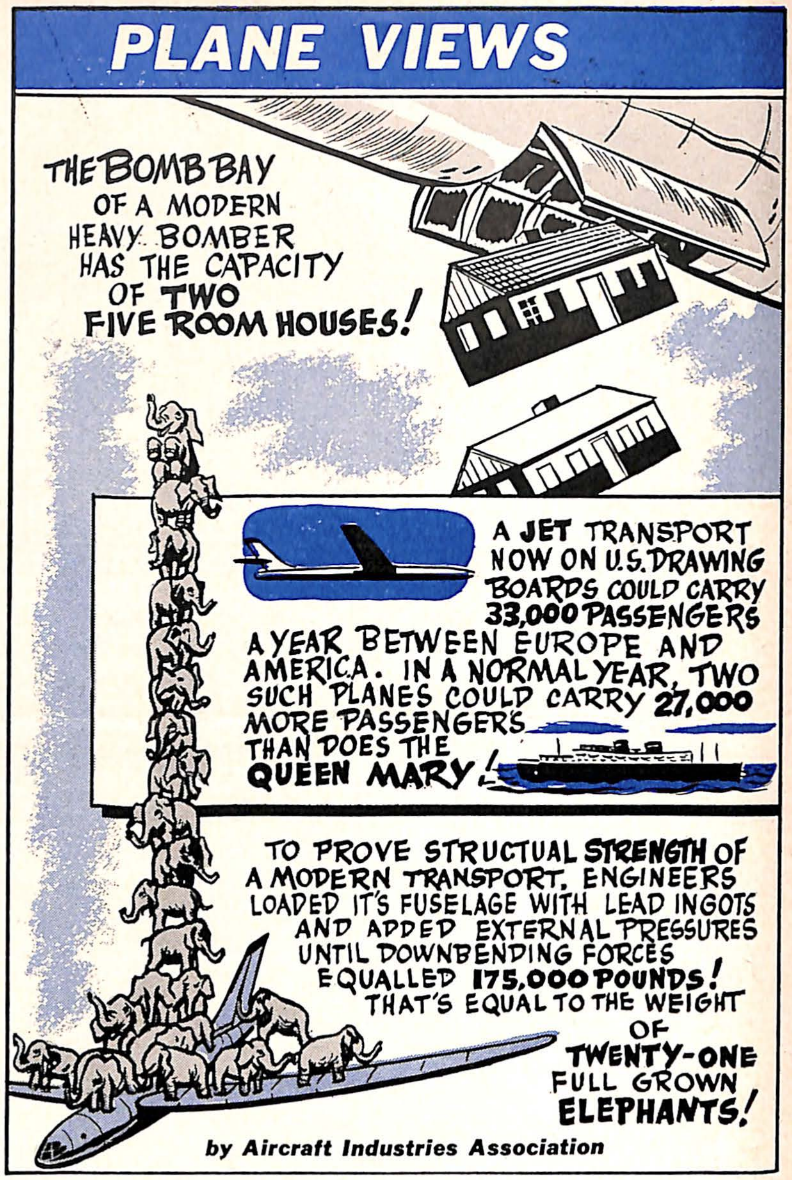
In the coming fiscal year, however, actual military *expenditures* for aircraft are expected—for the first time since Korea—to exceed obligations for future payments. It will be during the coming year that the action of Congress, in authorizing long-range programming for the defense build-up and in filling the industrial pipeline, will pay off in peak deliveries of the latest-model aircraft.

The production ingredients that go into these efficient new planes, now being delivered by the nation's aircraft plants, are in many cases materials and components ordered years ago, tools created and set up years ago, and engineering designs completed years ago. All these had to be brought together by well-trained specialists in plants which themselves had to be geared for production in a time-consuming process.

It is thus inescapable that our existing air power must always be the product of action taken in years past. No decisions made today can give America more air power *this year* than we long ago put into the production pipeline. Equally true, no magic wand exists to undo the production efforts of the past or to eliminate designs, materials, tools, manpower and facilities from this tightly-meshed pipeline without tremendous dislocation and serious impact upon future production potential.

Creation of modern air power is a gigantic and complex operation that, once having gained momentum, cannot be aborted without crushing damage and waste.

The searching examination given by Congress to each annual appropriations bill is made even more difficult by the fact that they must grant authority today for expenditures years in the future. Yet the nature of modern industrial production, with its increasingly long lead-time born of increasing complexity, imposes this heavy responsibility.



PLANE FACTS

- In 500 hours of flying on 47 simulated missions, one jet bomber recently covered mileage equivalent to nearly nine times around the world.
- Helicopters now operating in the New York area can move freight from Newark to Idlewild airports in 18 minutes, compared with four hours' transit time by truck.
- U.S. international airlines used 165,919,489 gallons of gas and 1,741,678 gallons of oil in transoceanic air travel during 1952.
- A newly-developed 10-ounce device will make 10-ton jet fighters easier to refuel—and safer to fly. The device, a tiny fuel-line coupling, weighs 80 per cent less than a standard fitting, yet gives greater safety against fuel leakage even at three times the pressure encountered in current jet fighters.
- Though U.S. jet aircraft are largely a postwar development, jet engines *built by a single U.S. manufacturer* already have flown more than 2.25 million hours (equal to more than 1.1 billion miles, assuming an average speed of 500 m.p.h.)—and are adding to that total at the rate of more than 100,000 hours per month.

Airlines Lead Ships For Foreign Travel

(*Continued from page 1*)

flying the American flag, traveled 1,430 miles on his international trips but spent an average of just 6 hours' time in actual travel. Those passengers who flew on America's airlines operating across the Atlantic averaged flights of 2,362 miles each way and spent just 18 hours and 40 minutes in travel for the round trip.

This time saving enabled many business men to transact on-the-spot negotiations which would be impossible otherwise and opened new playgrounds to vacationers who never before could afford the time away from work.

The impact of these overseas travelers was probably felt most at the port of New York where 28,600 airplane arrivals and departures were clocked during the year. Already one of the world's busiest air terminals, these flights arrived or departed at New York 75 times each day for an average of over three planes every hour.

Although the present Korean war hampers speculation, the forecast for the number of transoceanic passengers in 1953 continues in an upward swing. The prediction is that in the neighborhood of 1,900,000 passengers will choose the airways for overseas trips this year.

'DON'T DISCOUNT FOE'S RESEARCH'—FLOBERG

(*Continued from page* 1)

carrier task force provides striking examples of both weapon quality and quantity, representing the result of continuous research and development.

One of these, mobility of bases, represents a product of weapon quality. Translated into aircraft carriers and aircraft in sufficient quantity, this mobility permits control of the seas through the advantage of concentration of superior power over any sea area.

Long Lead Time

History of carrier aircraft development over the past 15 years shows that an average of three to five years is required to develop a basic design using available scientific knowledge. As design complexity increases, this time span of aircraft growth approaches even longer periods. Dependence upon supporting research areas previously unexplored may also increase design time. Although prototype flights indicate a successful design, service evaluation may reveal deficiencies requiring another one or two years before quantity production begins. Part of this period may coincide with the production lead-time; although in the final analysis, it may be said that approximately five to seven years are required after design inception before an aircraft can be expected to be operational in service use. A number of fighter aircraft are known to have taken in excess of seven years to reach production stages.

World War II Experience

Historical examples of the time required to develop an aircraft may be illustrated by certain carrier aircraft which contributed so greatly to the air warfare of World War II.

Speaking in terms of Navy fighter aircraft only, two examples are furnished by the F6F and F4U series. Both designs were essentially completed prior to December, 1941. Both models were produced in quantity throughout the major portion of the war period. Even under accelerating military build-up of the 1939-1941 period, these models required almost two years between inception and first flight. Added to the design and development period for both aircraft was another 18 months to two years before operationally ready service models were available in quantity even with all the acceleration that wartime conditions made possible. If these aircraft designs had not been available for mass production at the crucial time, their tremendous contribution would not have been realized; many victorious naval and land battles might not have been possible or their outcome would have hung in the balance instead of inflicting overwhelming defeat on our enemies.

Fighter aircraft which are operational today in the fleet have grown from basic designs which were initiated prior to or immediately succeeding the end of World War II. These aircraft, because of their advanced performance and consequent great design complexity (and also because of the absence of accelerated wartime conditions following the war) required 2½ to 3 years between inception and first flight. To bring current operating models to production quantity stage required another 2½ to 3 years.

Development Takes Years

If war begins tomorrow, aircraft utilized throughout the war period would be comprised of those currently in production or those approaching production. In other words, immediately upon initiation of hostilities by an aggressor it would not only be essential but necessary for our survival to freeze designs immediately and launch into all-out production of those designs. Since we do not know when a potential enemy will choose to strike, we cannot afford to make a premature decision to freeze designs and impose the danger of producing ourselves into a state of obsolete defenselessness if the enemy chooses to bide his time. We are aware that our potential enemy is producing weapons at a fast rate. We also know that he has neither ceased nor curtailed his research and development toward improving the quality of his weapons. It would be foolhardy to underestimate his research potential or to assume that he has frozen his designs. Indications are that he has not. We must also assume that he has available scientific talent which approaches an equivalence of that which is available to us and the rest of the free world.

It is thus most essential that the United States lead the free world in setting an example toward achieving the best in quality and efficiency in weapon design. Aircraft which are in the initial design stage today will be available in production quantity at some time between 1957 and 1959. We must continue these designs to completion and simultaneously produce sufficient aircraft of the best available designs to meet our minimum current inventory and partial mobilization requirements.

Partial Mobilization

It does not seem necessary to assume that our present program build-up of partial mobilization leaves us in a defenseless position if an enemy decides to strike in the immediate future. It would be a serious situation but not a fatal one. Lacking the ability to make a prognosis as to the imminence of general war, the wisest approach appears to be the continuation of the present program of partial mobilization. This program should be interpreted to mean partial mobilization only with respect to production base or weapon quantity. Since there is no acceptable compromise with weapon quality, a mobilization program of any degree must include mobilization of weapon research and development to the greatest extent possible.

Process Must Be Endless

It has been alleged that military leaders are hampering production because they have refused to freeze weapon designs and are condoning endless research and development. Research and development is an endless proposition because of the inherent nature of the human scientific mind which progressively strives to reach higher degrees of performance and efficiency in weapon designs, keeping abreast of scientific trends. As weapons pass from design to production stages, design engineers must immediately conceive and lay out still better weapons. Weapons research must be prosecuted systematically and continually —not by "opening the valve" after its need is foreseen.

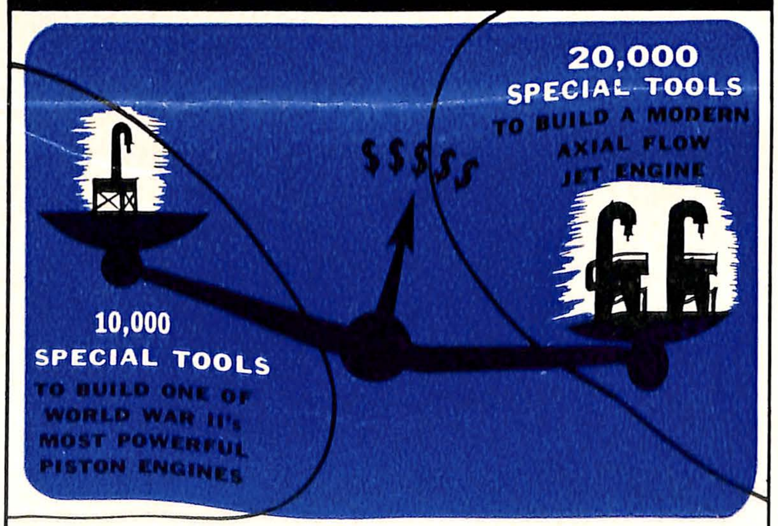
How Much for Quality?

In the fiscal years 1951 through 1953, defense budgets allocated an average of 3% of total appropriations for research and development or for weapon quality. During the same three-year period, an average of 46% of the total defense budget has been applied directly to quantity procurement of weapons. This percentage applied to weapon procurement is exclusive of the substantial indirect industry mobilization costs.

Such a comparison shows that the cost of weapon quality represents a relatively small percentage of total defense expenditures.

The customer is often admonished that "You don't get something for nothing." So he must also understand that there are few short cuts in effective research. In terms of national security this means that our weapon *quality* tomorrow will be just as good as our research and development today—but no better.

MORE TOOLS FOR BETTER PLANES



More time and money are required to build a powerful new jet engine for today's supersonic fighting planes. Typical of design, development and production problems faced by manufacturers is the vast increase in number of special tools needed to build jet engines—as compared with the most powerful World War II piston engines.

'PLANES' SOURCE: Typical Engine Manufacturer

Plane Power Rises Over 4,000 Times During Half Century

Military fighter pilots, with some of the latest engine designs, will have more than 4,000 times as much horsepower as did the Wright Brothers on their historic first powered flight at Kitty Hawk, N. C., in 1903.

The first 50 years of powered flight, celebrated nationally throughout 1953, have seen horsepower rise steadily up to the end of World War II, when the jet engine's advent brought incredible upsurges in aircraft power potential.

During World War I, in the second decade after the first Wright flight, fighter pilots were flying aircraft with 400 horsepower engines.

By the end of World War II, they could have 4,000 horsepower at their command, compared with the Wright Brothers' 12 horsepower.

Then came the biggest revolution in power in aviation's revolutionary history. The jet engine brought vast increases in propulsive force — and today, with some of the latest engine designs, the pilots of the nation's newest aircraft will have available some 50,000 horsepower.

'Heat Wall' Looms As Next Obstacle Blocking Man's Domination of Skies

With the "sonic wall" conquered, engineers of America's aircraft industry are leveling an all-out assault on the latest obstacle to man's domination of the skies—the "heat barrier."

Just above where today's planes fly and just beyond present aircraft speeds are problems which threaten amazing advances in the science of flight. Tests have shown that at some speeds and altitudes today's planes have materials that would fuse and pull away — and the pilot inside would roast like beef on a spit.

Face Staggering Temperatures

The temperature range which newer and faster planes must face is staggering. The coldest weather ever recorded in the United States was the minus 66° registered at Yellowstone Park in 1933 while the highest was marked up at Death Valley 20 years earlier when the thermometer bounded up to 134°.

Yet, just 40,000 feet above the earth 65° below zero is a normal day. Even at sea level, the temperature of a jet doing 750 miles per hour increases by 100° merely from the friction of the air passing by.

And at 40,000 feet, for example, air friction on a 1,300 m.p.h. plane would cause temperature rises of more than 200°. That's higher than the boiling point of water at that altitude.

Requires Costly Research

These known facts are producing new technical problems every day which aeronautical engineers must solve, in most instances after long and costly research and development. Jet fuels tend to boil and steam away in today's modern aircraft; hydraulic oils rapidly reach a critical temperature; aluminum loses 10% of its strength at 200° and then fails rapidly. The heat inside the pilot's cockpit becomes so intense that refrigerating systems must take the torrid air from the jet engines, cool it off and pump it into the plane's interior.

One such refrigerating unit—the size of a man's hand and weighing but five pounds—has a cooling capacity equivalent to that of 45 home refrigerators.

To combat these varying elements, research engineers of the airframe and engine manufacturers, the Government and private agencies are conducting a relentless drive to find new metals and alloys and to develop equipment cooling systems which will withstand aerodynamic heating.

Aluminum, the old standby of the aircraft industry, and the new plastics may soon have to take a back seat and make way for the discoveries of a dawning high-speed age.

HOT ITEMS

One jet engine generates enough heat to warm 1,372 five-room houses.

Temperatures up to 2,800° are needed to obtain fusion in welding stainless steel for aircraft.

Refrigerating units in a typical jet plane must be able to take a searing 600° blast of air from the engine and deliver it to destination in a split second, at 20°.

Tolerances of metal parts used in building a late-model jet bomber are so close that the entire factory must be kept at a constant temperature. Otherwise, slight expansion and contraction of metal parts would prevent perfect fits.

Plastic aircraft cockpit hoods begin to lose their shape at a speed of 800 m.p.h. at sea level.

In flight testing a new jet plane, temperature records had to be taken from 96 points on the plane at the rate of one per second.

Hot sandwiches of aluminum, copper and plastic—built into the wings and tails of some modern jets—are solving icing problems. These metal and plastic sandwiches, electrically heated, are replacing rubber anti-ice equipment.

Flying Radar Stations

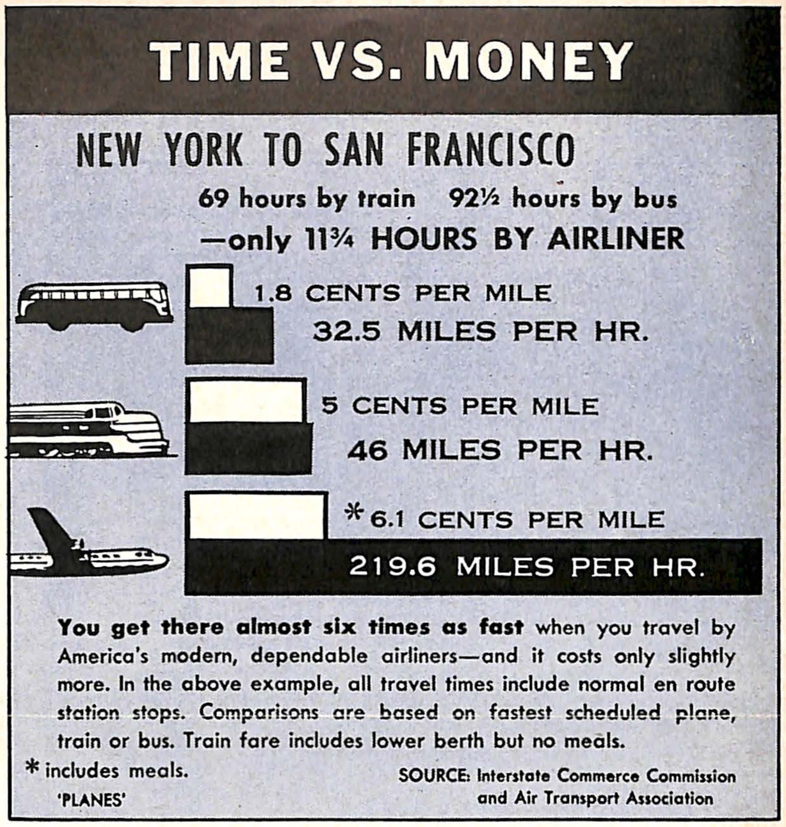
The flying radar station in one late-model all-weather jet fighter has 495 tubes and 6,400 coils, condensors and resistors. It enables the pilot to locate enemy aircraft in the dead of night, following which an electronic finger pulls the trigger and fires rockets automatically when the enemy plane is in range.

NAEC, AIA Begin Joint Air Education Program

A continuing program — designed to create better understanding in the nation's schools of the historical, economic, social, political and military aspects of aviation—has been announced jointly by the National Aviation Education Council and the Aircraft Industries Association.

Unique feature of the program is that it will be undertaken by working groups of teachers of the various school grades and, ultimately, of college level.

First effects to be felt in the schools, according to Dr. Leslie A. Bryan, president of NAEC, will probably be in the first year in the elementary grades, with some material developed for the secondary grades. In ensuing years, the studies will give increasing emphasis to secondary grade and college levels.



Aircraft Yearbook Says Companies In 41 States Build U. S. Air Power

During 1953, thousands of manufacturers and suppliers in 41 states will be engaged in building American air power, it is revealed in the 34th annual edition of The Aircraft Year Book, published this month.

The Year Book, standard reference work of U.S. aviation, is an official publication of the Aircraft Industries Association.

Nation-Wide Effort

The editors point out that more than 46 companies in 17 states are building aircraft, engines or airframes—and that thousands of additional companies throughout the nation are producing accessories, component parts and materials for these manufacturers and the military services.

One of the most extensive chronologies of aviation events and historic aircraft ever published is contained in the current edition, which is dedicated to the 50th Anniversary of Flight, being celebrated this year.

Highlights of Book

Among highlights of this year's book are a review of late developments in the aircraft industry, the airlines and the armed forces; descriptions, photographs and three-view drawings of more than 300 American airplanes; thumbnail biographies of 1,200 present-day aviation personalities; a complete bibliography of aviation books published during the past year; all current official aviation records; and comprehensive data on outstanding technical developments in the design, manufacturing and research fields.

The Year Book, priced at $6, may be obtained from The Lincoln Press, Inc., by using the accompanying coupon.

Air Quotes

"We cannot have a sound military establishment and adequate national security if the Army, Navy and Air Force are to be princes today and paupers tomorrow. Hasty and excessive demobilization, as well as hasty mobilization, greatly increases costs, unnecessarily disrupts our economy, and generally tends to increase the demands of the military services, which have experienced again and again the painful process of feast and famine. A steady defense position is vital to our national security and essential to our position of leadership in the free world This is the lesson that recent history has taught us, and we may disregard it only at our peril."—*Semiannual Report of the Secretary of Defense, January 1 to June 30, 1952.*

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