



# planes

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## U.S. AIRLINE PASSENGER GROWTH BOOMING

### PAYOFF IN PAYLOAD

Powered by four turboprop engines developing a total of 24,000 horsepower, a new military transport being produced by a U. S. manufacturer carries a 100,000 pound payload. Its fuel load alone is more than eight times the weight of a transport the same company manufactured 30 years ago. This tremendous advance in air transport capability typifies the continuous and successful efforts of the U. S. aircraft industry to maintain American air supremacy in peace and war.

### Outlook for 1960: 60 Million

By Milton W. Arnold, Vice President  
Operations & Engineering  
Air Transport Association

Last year, more than 41 million passengers flew on U. S. commercial airlines—more than twice as many as travelled by air in 1950. At the present rate of increase, it has been conservatively estimated that this number will grow to upwards of 60 million in 1960.

There is little doubt in the minds of American businessmen that the potential growth of domestic and international air travel is tremendous. Last year, for example, nearly 70 per cent of all persons entering or departing the United States travelled by air. By 1960 this figure, also, is expected to show considerable increase.

Some of the most astute financiers in the country are betting hundreds of millions of dollars on these facts. The airlines of the United States are buying 446 luxurious new turbojet and turboprop airliners in reliance upon the growing acceptance by the public that travel aboard U. S.-built aircraft is not only the fastest way, but also the safest and *most economical* way.

Today, domestic airline fares average about 5.3 cents a mile, an increase of less than 4 per cent since 1938, although retail prices generally since that time have soared more than 105 per cent. In terms of 1938 dollars, air fares have been cut fifty per cent. International air fares are now 21 per cent *lower* than in 1938.

With the advent of the huge turbojet airliners, which will enter airline service in 1959, the dimensions of an entirely new era of air travel will be at hand. The jet's speed combined with its passenger capacity makes this possible. One of the new jet airliners which one United States aircraft company will deliver will have a maximum weight of approximately 290,000 pounds and cruise at speeds from 550 to 600 miles per hour. Its full payload range, with normal fuel reserves, will be more than 5,000 miles. It will carry up to 146 passengers.

If this one new airliner, which will cost the airline operator in excess of \$5 million, is used for only 450 trips a year, it would be able to haul 60,000 passengers across the  
(See AIR CARRIERS, Page 7)

### Electronic Testing Unit Cuts 20-Hour Operation to Less Than One Hour

The nose of the modern airplane is its nerve center. It carries a vast system of electronic gear necessary to keep the aircraft flying and evading inclement weather—and, in the case of combat planes, intercepting the enemy.

To be sure that these mechanical brains are properly linked and able to perform their many duties, the aircraft industry has devised a special testing unit, believed to be the largest of its kind, to inspect the intricate electronic systems of high performance aircraft.

The equipment, an answer to a trouble shooter's dream, is contained in a cabinet 65 inches high, 45 inches wide and 24 inches deep. It houses more than 6,500 electrical connections, over 1,600 terminal posts, through which the wiring harness connects to the tester six miles of wire, and a control panel containing 78 manually rotated selector switches. Most important, the test unit will detect inter-circuit leakage, continuity, grounds, discontinuity, and reversal, and in all but the most complicated combination of conditions will indicate just where the trouble is.

With ten circuits on each switch, the tester can examine 780 complete combinations of wiring circuits. The test for inter-circuit leakage is perhaps the most amazing. While it would require more than 570 separate manual tests to check all of the possibilities for inter-circuit leakage in one big, new long-range interceptor, the tester does it with only the rotation of the 78 switches.

The circuit tester cuts a 20-hour manual testing operation to less than one hour, and makes, in the bargain, a much more thorough test. With this new apparatus, production of many of our great new planes is proportionately speeded. The time saved can be translated into another kind of saving too—the taxpayer's dollar.

### New Aircraft Systems Beating the Heat

Science and the aircraft industry are rapidly learning ways to overcome the so-called thermal barrier.

One major aircraft systems manufacturer has developed electronic vacuum tubes, capacitors, transformers, printed circuit boards and electric motors, which are operating experimentally at temperatures ranging from 900 to 1,500 degrees Fahrenheit—nearly three times as hot as the greatest heat that can be generated in the conventional household gas or electric kitchen oven.

The thermal barrier, nicknamed thusly by the aircraft industry, is caused by aircraft flying so fast that air passing over the surfaces of the plane causes the metal skin of the aircraft to generate terrific heat.

So far, these devices are just being operated in controlled laboratory tests, but it is indicative of the great effort put forth by all segments of the aircraft industry to keep United States air power supreme.

### 'Bossy' is Still Boss In Determining Wind Direction for Pilots

The wind sock and other highly developed wind indicators have met their match in the cow, according to the California Aeronautics Commission. In its "Hints to Pilots," the Commission noted that cows always point their tails toward the wind.

"Just remember to land facing the cows," the Commission suggested, "and you are into the wind. When cows point in several directions, there is little or no wind."

The Commission failed to give landing instructions for use at airports in urban areas, where the cattle population is scarce or nonexistent.

### Curved Speed Course Adds 67 feet

Commander R. W. "Duke" Windsor, winner of this year's Thompson Trophy for setting a national speed record of 1015.428 miles per hour over a 15.1 kilometer course in a Navy shipboard interceptor fighter, actually flew approximately 67 feet further than the surveyed ground distance, scientists estimated.

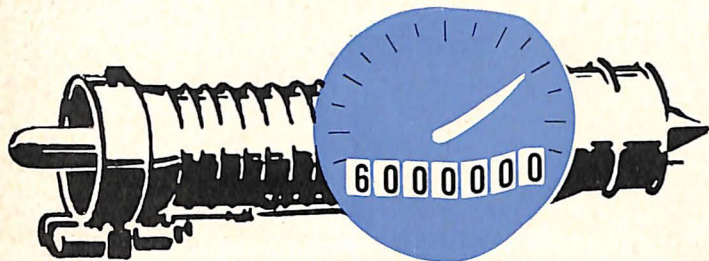
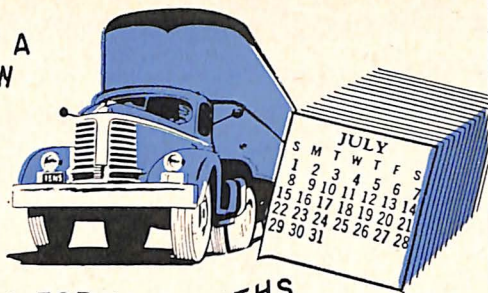
Windsor flew a curved course, rather than a flat straight line, in order to follow the curvature of the earth to maintain constant altitude at 40,000 feet. This added about 67 feet to the measured ground distance of 15.1 kilometers, and made the new official national speed record even more impressive.

The record was established near China Lake, California, August 21, 1956.

"PLANES"

## Plane Views

WING TANKS OF A LUXURIOUS NEW U.S. AIRLINER HOLD **9,600** GALLONS OF FUEL—ENOUGH TO SUPPLY A **40,000 POUND** TRAILER TRUCK FOR 14 MONTHS



U.S. MILITARY JET ENGINES OF ONE TYPE ARE FLOWN **6 MILLION MILES DAILY**—EQUIVALENT TO AN AIRLINE OPERATING 360 FOUR-ENGINE TRANSPORTS



CREWS OF A U.S. JET TRANSPORT, NOW IN PRODUCTION, WILL OPERATE **26** SEPARATE RADIO SYSTEMS FOR PASSENGER SAFETY AND CONVENIENCE

'PLANES'

## SAC 'Shack' Is Confirmed Electronically Without Single Bomb Being Dropped

New mobile radar control systems developed by the aircraft industry can track the flight of mammoth Strategic Air Command bombers in bombing and navigation training over the U. S. and Canada, and are able to determine the accuracy of any strategic bomber crew without a single bomb being dropped.

The only visible evidence of a U.S. bomber crew's ability to penetrate and destroy targets is inside mobile radar control vans, where the shadow movement of tiny "blips" across radarscope and the silent tracing of a thin red line by an electronic pen tell the story.

High overhead, almost daily, pilots say "Bombs away!" into microphones, and engines roar as the bombers speed away after completing their bomb runs. But below, there are no bomb blasts, and only occasionally the faint sounds of far-away jet engines are heard.

But inside the radar control van, the "blips" on the radarscope represent the course of the planes coming in toward the target which was picked up by the radar van's antenna, and

the electronic pen records the lightning computations of the computers on the plotting board.

Allowing for the type of simulated bomb, air speed, wind drift, and other factors, the scoring group knows exactly where the bomb should have hit the target and how the crew and the plane's performance should be rated. Computations completed for one mission by the "electronic brain" in the radar control system, the scoring group immediately gets set for the next bomber and crew.

If the "bomb drop" is exactly on target, the crew is credited with a "shack" or hit. If the simulated bomb falls within a city block of the target, the contestant gets into the scoring column, but if his drop missed by a wider margin, his run is disqualified and his crew is ineligible for credit for that run. They seldom miss, for Strategic Air Command is a strict adherent to accuracy — or else!

The Air Force uses these mobile radar control systems, developed by the aircraft industry, to guide missiles and airplanes as well as to score various types of bombing missions.

## 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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## Keystone of Superiority

There is nothing new about the efforts of this nation to discourage aggression. In fact, and in policy, the national attitude has always been to preserve the peace.

There has been a new factor added, however, into the art of war which makes the preservation of the peace more difficult and the art of war infinitely more deadly. This most significant factor is man's ability to control the transformation of matter into energy.

Unlocking this new door of science has made available atomic weapons probably a million times more potent than chemically compounded explosives. This fact, coupled with the very rapid advances in the aeronautical and electronic sciences, has created a revolution in warfare.

There is little doubt that in productive capacity or in scientific and technical resources the United States is a rich nation. This nation's aircraft industry could, if need be, produce more planes, engines, missiles and their associated electronics than the entire communist coalition. But the day is long past, our government and military leaders know, that sheer quantities of planes and men can preserve the peace, turn the tide of battle, or win a major conflict.

In terms of air power, the military services have just about reached the numerical strength that our national leaders have deemed the minimum compatible with adequate defense. So today, and for the foreseeable future, quality and readiness stand out as critical twin objectives of the aircraft industry and the military.

In this regard the relationship between the government and the aircraft industry is one of striking significance. Rising as it has in but a few short years, and based almost entirely upon technological developments, United States air power could not have developed as it has but for the close and mutually dependent relationship between science, the aircraft industry and the government.

The creation and production of advanced aircraft, aircraft engines, missiles, systems and components, required to maintain American aerial supremacy today, is a task of great complexity requiring the finest minds the country possesses. More than that, because of its nature it is a long process, requires careful planning and determined administration. It also requires wholehearted cooperation among scientists and engineers, industry and government. It is a process for which the American free enterprise system, on which the aircraft industry was founded, is peculiarly well suited.

In air power, the margin between victory and defeat can be a few miles per hour in aircraft speed, engine dependability, a slight difference in missile guidance reliability, or perhaps a better electronic fire control. In warfare there is no room for the second best in equipment, however slight the margin might be, and the United States aircraft industry is determined to devote all its energies to insuring that the quality of American air power is superior in all respects to that of any potential aggressor.

The keystone of superiority is quality. The hundreds of thousands of skilled workers, the thousands of scientists and engineers, and the management teams of the United States aircraft industry are devoted to a single purpose: American aerial superiority.

of the average taxpayer in the aircraft industry. Aircraft today cost tremendous sums of money. They take millions of engineering hours to create; they take years to design and develop; they require multi-million dollar installations for research and testing; they need mammoth machine tools for production. They are, in fact, among the most complex products ever built by man.

While the cost of this air power is understandably high, every American wants assurance that every cent appropriated by the Government for aircraft procurement buys the greatest possible amount of air defense. Certainly all Americans want to know that the system under which aircraft are procured is one that places a premium on efficiency and economy.

### Two Courses Were Open

UNDER the present system of aircraft procurement—a policy of buying aircraft from competing companies, each trying to out-do, out-invent, out-perform the other—the U. S. military services have placed reliance on philosophy which traditionally has stimulated American economic development and technological leadership.

Several months ago, before a Congressional subcommittee, Air Force Assistant Secretary Dudley C. Sharp talked about the nation's decision to rely upon a private, competitive industry for aircraft production.

"When the importance of air power was first recognized," he said, "the Government was faced with making a choice as to the most effective method of acquiring military aircraft.

"We had a requirement for an article which had no readily available sources. There were two possible courses of action open to us. One was to establish Government owned and operated plants, and the other was to rely on private industry.

"The decision which evolved was to rely primarily upon private industry for the design, development and production of aircraft."

Secretary Sharp declared that "experience has shown that the decision to procure from private industry was a wise one. This was demonstrated by the World War II contribution of the aircraft industry. It is also evident from the ability of the industry to date, to keep us ahead of the world qualitatively, in spite of the very serious postwar slump in production."

### An Industry Vying for Quality

THIS task of keeping America ahead in the air is one that has required vast research, design, engineering, production and management resources. In recent years the aircraft industry has had to grow at a rapid rate to meet the challenge. From several companies producing only hundreds of aircraft per year, the industry has expanded to become one of the country's most important manufacturing enterprises.

It is America's largest manufacturing employer, composed of thousands of competing companies. Its payroll today ranks number one among U.S. manufacturers.

A recent aviation directory lists 41 airframe manufacturers, ranging in size from our largest builders of military planes to small organizations producing experimental light-plane models. The same directory lists 25 companies that produce engines, 20 rotary wing aircraft and component manufacturers, 25 that manufacture missiles, 12 that make propellers, and approximately 2000 that manufacture and distribute aircraft equipment.

A survey by the Aircraft Industries Association shows that more than 50,000 U. S. companies are subcontractors or suppliers to this industry.

### Freedom to Explore and Improve

Each of these thousands of companies owes its existence to the ability to produce an essential product, at a reasonable cost, in competition with manufacturers of similar products. Only so long as product quality is high and

cost competitive can each company hope to stay in business.

This knowledge provides constant stimulus to the men charged with management responsibility in the aircraft industry. On this point, an executive of a major airframe company has pointed out that the vigor and energy that characterize the industry stem to a large extent from competition. And our competitive system of aircraft development is given strength and vitality, he asserts by the freedom which individual companies are given to explore and improvise.

One manufacturer recently described the way military procurement practices in the airframe industry rely on competition:

"... The competition is in many instances closely connected with design and mission requirements, as well as costs," he explained.

"After mission requirements have been established by the Government, engineering design proposals are requested from qualified contractors and such proposals are evaluated competitively from every aspect.

"At the same time, cost proposals are obtained, which are likewise considered from a competitive standpoint.

"A competition must be decided with due consideration of all factors, including excellence of design, demonstrated production ability (including both quality and schedule attainment), and costs. For any different competition, different weights may be assigned to each of the above factors, depending upon the urgency of the procurement and mission requirements."

A West Coast airframe producer, on this same subject, pointed out why this kind of competition is good both for the industry and for the taxpayer:

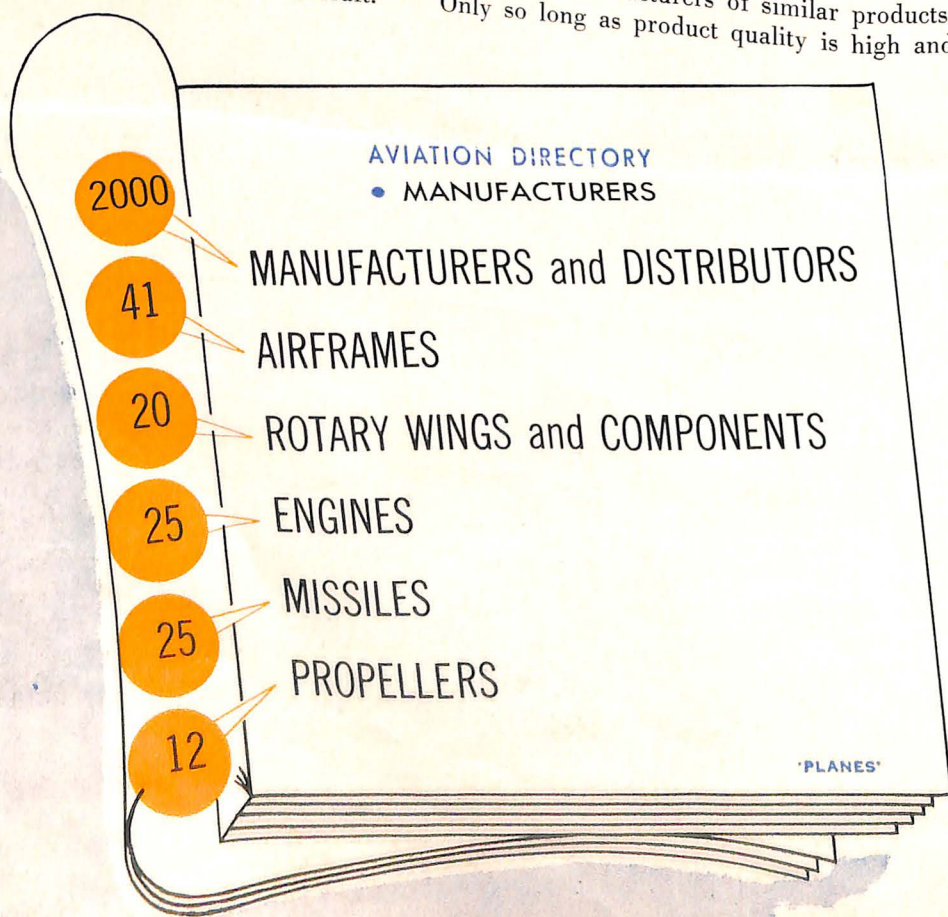
"The existing military defense program is not enough to keep all these (airframe) facilities operating at economically favorable levels.

"The result is spirited competition. We favor spirited competition. We feel that the Government does not owe anyone a living, and we are willing to take our chances on the quality of our accomplishments. We feel that competition keeps us, as well as our competitors, on our toes and continuously seeking means of accomplishing more for less."

### Net Result: Air Superiority

THE jet bomber that today is the backbone of the Strategic Air Command's medium bomber wings was designed in competition with two other companies which had designed medium jet bombers. Our country's newest intercontinental jet bomber was designed in competition with another heavy jet, conceived by another company. This competitive spirit prevails throughout the industry's operations. Atomic planes are being developed—with two major airframe companies vying to out-do each other, and with two engine companies seeking to better each other's performance.

In the intercontinental ballistic missile field, contractors have been determined by what is called "selective competition." Two contractors have been designated in each sub-system area, with several contractors working in the guidance area. This enables simultaneous de-



velopment of two operational missiles, each using entirely different technical approaches.

More important, of course: It means that the American taxpayer is certain of getting not only the most, but the best, for his air power dollar.

The net result of such competition: Americans can be confident that the air weapons finally procured are the best that the combined brains of American industry can devise and produce. This is true because the sum total of U. S. air power is able to draw on thousands of companies, with tens of thousands of engineers and scientists, vying with each other in design, development, production, subcontracting and supplying.

A Midwestern aircraft executive pointed

recently that the modern production line no longer begins at the drafting board. "It has been moved one step farther back," he commented. "It begins now with a search for basic knowledge—for information that is no longer available in the textbooks."

It has been said that there are just two types of combat planes today—the obsolescent and the experimental. The faster-than-sound aircraft, the guided missiles, the ocean-spanning bombers already are being superseded on the drawing boards by aerial weapons of even more awesome performance. Always there is the requirement for aircraft that will fly farther, faster, more dependably.

The aircraft industry's scientists and engineers now are thinking in terms of planes,

recognition of the need for cost-consciousness, for economy.

Assistant Secretary of the Navy Raymond H. Fogler has explained that "the greatest portion of the cost of aircraft and engines to the Government is made up of the contractor's costs. Hence it is essential that we provide him with incentives to reduce such costs by achieving maximum efficiency in the use of his labor, engineering talent and materials, by designing for low-cost manufacture and by arranging the facilities most effectively to achieve reduction in his manufacturing cost."

But he also pointed out:

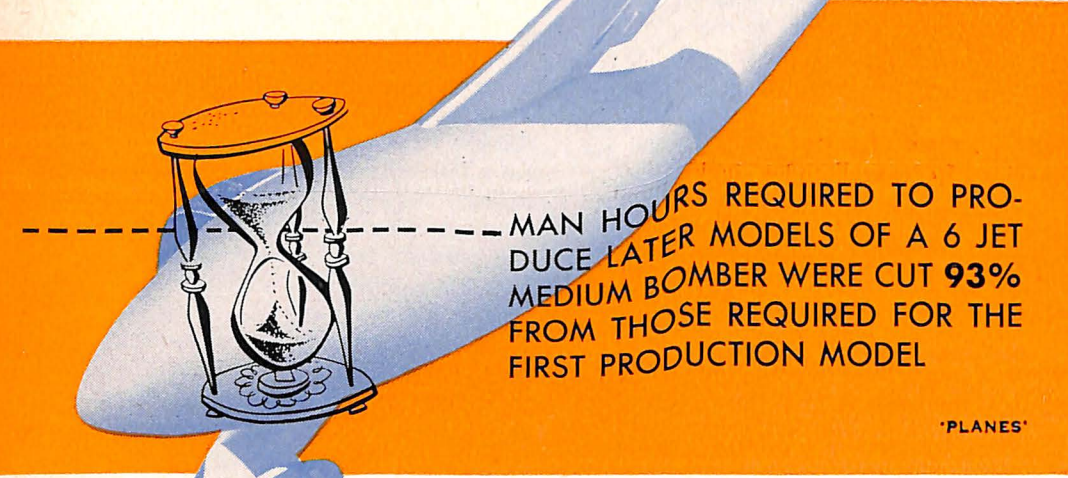
"The risks which individual firms face in producing military aircraft are substantial and numerous. In the field of military aircraft the industry has but one customer, and that a highly demanding one—the Department of Defense. A contractor who fails to produce a satisfactory military product is in serious jeopardy of losing his competitive position. . .

"For example, before a production model becomes obsolete, the manufacturer must develop and offer a new model to meet new requirements. If he cannot do this, and if his new model does not out-perform those of his competitors, he has little chance to continue in production."

The impetus of competition within the industry is thus a constant force acting upon individual manufacturers, impelling them to risk private capital, to direct resources into new channels, to increase the pace of activity. It has also placed a premium upon cost reduction.

### Stretching the Procurement Dollar

WHAT has this meant in dollars and cents to the taxpayer? Specific cases speak for themselves. Many of them are staggering. In the case of one company, it has meant that the Government saved \$160 million because the manufacturer was able to produce aircraft for less than they and the military authorities originally thought possible. In the case of another company, man-hours required to produce each airframe pound of a six-jet medium bomber were cut to only seven per cent of those required for the first production model.



out several months ago, however, that the aircraft industry does not compete like "shirt manufacturers, all producing approximately the same quality to the same delivery schedule, trying to obtain a Government order under an advertised bid. Theirs is primarily the competition of price only.

"Ours, on the other hand, is the competition of creativeness, quality, ability to produce, speed of delivery and price." And he added: "Generally it is all-or-nothing competition. If you lose, you lose big."

In practice, how has this system worked? With federal expenditures for aircraft, guided missiles, and related equipment estimated in excess of \$8 billion in the current fiscal year, how well has competition provided a built-in safeguard that the best air defenses are created at the lowest possible cost?

### U. S. Technological Leadership

THERE is no better proof of the efficiency and effectiveness of competitive procurement than the industry's record over the past few years.

Shortly after returning to the United States from an unprecedented trip to the Soviet Union in June, Air Force Chief of Staff, Gen. Nathan F. Twining, assessed the comparative quality of U. S. and Soviet aircraft in these terms:

Despite "undeniable strides," he said, "they have not outdistanced us. Nothing is superior to the best U. S. aircraft in comparable categories."

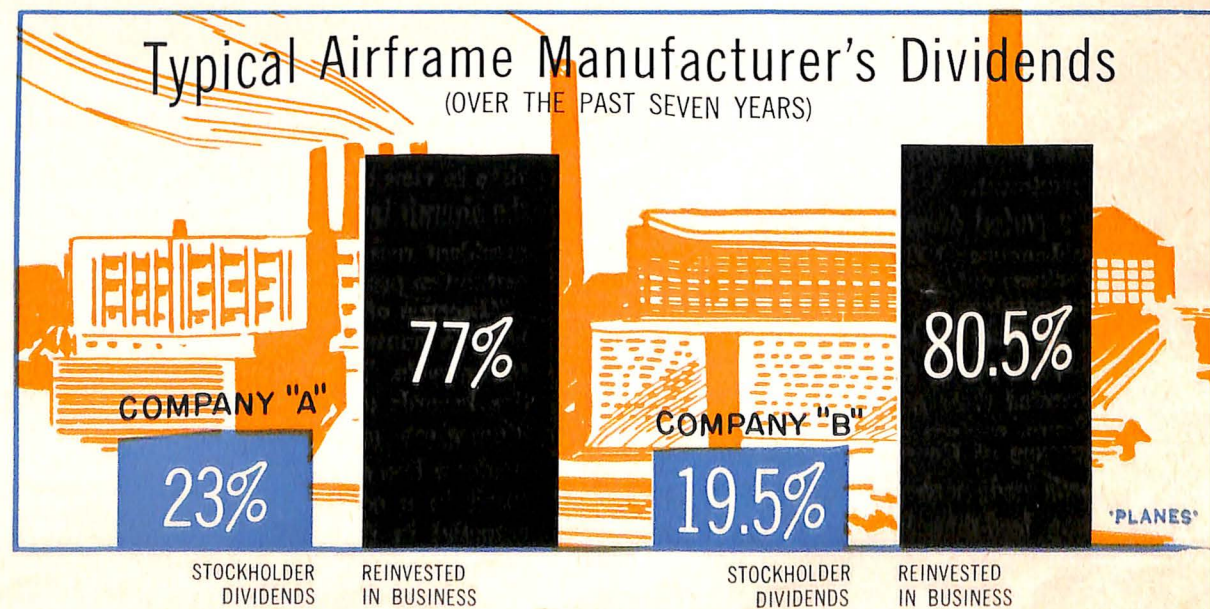
Today's challenges are, however, greater than ever before. An aircraft executive said

powerplants and components that will enable men to fly four and five times the speed of sound. They are searching out the secrets of the stratosphere, developing earth satellites, designing missiles that can cross oceans and continents with undeviating accuracy.

Today's facts have, in truth, become more startling than yesterday's fiction. They are overshadowed only by tomorrow's needs.

### The Matter of Cost

It is plain that the action of competitive forces in the aircraft industry has helped keep the industry's eyes fixed firmly on the need for qualitative superiority. There is equal



But the true story is not told only in the lists of multi-million dollar economies. Perhaps more important is the fact that competition has imposed the requirement for continuing attention to even the smallest item of cost. It has resulted in the use of time- and money-saving expedients that lop cents off here, dollars off there—and that whittle away constantly at the burgeoning cost of today's complex air defenses.

These economies are typical of dividends accruing constantly to the taxpayer as a result of competitive incentives in the industry.

### Heavy Reinvestment of Earnings

At the same time, the same competitive forces have resulted in heavy reinvestment by the aircraft industry of its relatively low profits. The Air Force has pointed out that between 60 and 70 per cent of aircraft earnings in recent years have been reinvested in the business—to provide facilities, working capital, and research and development for U. S. air power. Fourteen major companies, for example, have reported that they plan expenditures of more than \$370 million for capital improvements in 1956, 1957 and 1958.

Such heavy reinvestment of earnings has made it necessary for companies to adhere to extremely conservative dividend policies. In the case of an East Coast airframe manufacturer, 77 per cent of profits over the past seven years have been used for new and improved facilities, for tools to work with, or

depends on design advances.

In one interesting case an aircraft builder, using company funds, began construction of the prototype of a jet tanker-transport in 1952. This prototype was completed in 1954 at a cost of about \$16-million. The Government later recognized the need for the tanker-transport and placed orders for it, yet the company will not recover from the Government any of the \$16-million spent in producing the prototype itself.

### Financial Risks

THE manufacturer of this aircraft assumed the financial risk of design and development, and of production of a prototype, without indication from the Government that the plane would ever be ordered. Because the company did risk its funds in this way, the Department of Defense will save an estimated \$50-million on the initial program through incorporation of necessary changes and refinements which became known during intensive flight testing of the prototype. Further, the manufacturer reports, the experience gained in constructing the prototype will contribute substantially to reducing production costs on the operational aircraft, and these planes will be delivered to the Air Force a number of months sooner than would otherwise have been possible.

This same company, incidentally, financed research on a swept-wing bomber for three

conditions a company such as ours is operating under:

"First, a single large customer; second, a violently fluctuating demand over a period of years, intense competition on a design basis, rapid technological progress and a very heavy demand ahead, long time-cycle, complete system responsibility and lastly, the specialized nature of our capabilities and facilities."

### A Record of Cost-Consciousness

IN THE face of these unusual conditions, the industry has forged ahead on the technological front, has reinvested a major portion of all earnings in the business of building aircraft for national defense, and has achieved a remarkable record of economy through cost-consciousness.

"In effect," according to Air Force Assistant Secretary Sharp, "the industry has become an indispensable part of our national defense team. We strongly believe the present relationship to be the right one and have rejected the suggestion that existing Government agencies could be expanded to design and produce the superior weapons we must have. This would be a step backward and, we believe, unthinkable."

The preservation of this competitive system is important to every American. If we are to push ahead in the technological field—and if we are to assure that scientific progress and aircraft production are achieved in the most efficient and economical manner—this competition should be stimulated and encouraged. In particular,

1. Government procurement policies should continue to be directed toward creating a climate of stability and competitive challenge.
2. Encouragement should be given to policies which enable the industry to maintain financial health adequate to retain, and fully use, its skilled engineering, manufacturing and management teams.
3. Recognition should be given in procurement planning and policy to the (a) key role played by research and development in the creation of superior air power, and (b) need for financial soundness within the industry to prosecute vigorously such research and development activities.

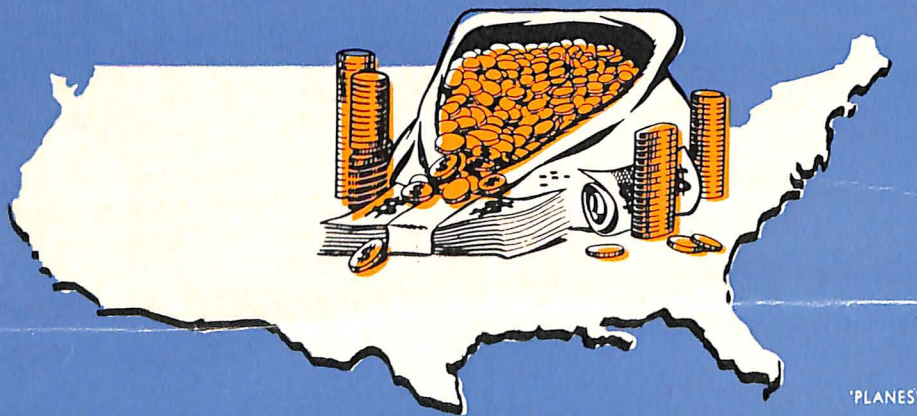
### Future Prospects

With these three essentials—competitive challenge and stability, retention and full utilization of industry engineering, production and management teams, and sufficient financial strength to maintain modern facilities and a high level of research and development—America's aircraft industry in the future can be expected to reach new peaks of accomplishment.

Certainly we can rely upon one characteristic of our industry which has no counterpart in totalitarian systems. That characteristic is competition—the contest between companies in a free enterprise system which has its payoff only when a business is able to do *more* for less than other comparable businesses.

This interaction of competitive forces is an insurance policy, made out to the American taxpayer, that the air power dollar will purchase the maximum amount of air defense.

**\$50,000,000 SAVINGS TO GOVERNMENT  
BY ONE AIRCRAFT MANUFACTURER**



for operating capital. Only 23 per cent of this company's earnings during the period were paid to stockholders as a return on their investment. A Midwestern manufacturer in the period from mid-summer 1951 through mid-summer 1955 paid to the owners of the business only 19.5 per cent of the company's net earnings.

In many instances, too, aircraft companies—anticipating future military needs—have invested their own funds in development of planes, engines and components without assurance of Government contracts. This has been made necessary because of the extremely long lead-time in design, development and production of aircraft—and the knowledge that the company's competitive position de-

years before receiving an Air Force contract for two prototype aircraft.

Investments on this order involve obvious risks in view of the peak-and-valley nature of the aircraft industry. One airframe company president recently discussed some of the uncertainties peculiar to the industry:

"Because of the nature of the product, we have an unusually long design and manufacturing cycle. This . . . magnifies the competitive hazards of the business, since technical innovations or changed requirements may render a line of development obsolescent and result in a company having no production potential in that category for a period of several years.

"So let me recapitulate these unusual con-

# Air Carriers Place \$2 Billion Order For New Jets and Turboprops

(Continued from page 1)

North Atlantic in 12 months. This is almost the number carried by the ocean liner United States in 1955. The SS United States was built at a cost of \$70 million four years ago.

Probably the first of these great new jet airliners will fly the international routes between America and Europe, and transcontinentally in the U.S. The turbojet airliners will serve primarily the so-called long haul operations.

To serve the medium haul market, such as St. Louis to Chicago and New York to Washington, or Dallas to Houston, the airlines have placed orders with the aircraft industry for the turboprop-powered type airliner. In this type of plane, a jet turbine engine is geared to turn a propeller. One major airline claims that the turboprop-powered plane, with its 400 mile-per-hour speed, is ideally suited to the shorter routes. Two aircraft manufacturers are also working on turbojet-engined airliners which offer great promise for the medium haul market.

In terms of travel time, the jet transport presents some startling facts. When the jets enter airline service, it will be possible to travel from Dallas to New York in 2 hours and 36 minutes; from Los Angeles to Chicago in 3 hours and 24 minutes; from New York to Rio de Janeiro in 8 hours, 30 minutes; and from New York to Rome in 7 hours.

Today, even with our finest piston-engined planes, a transcontinental trip consumes most of a business day, a transatlantic flight somewhat more. With turbojets, transcontinental flights outside the regular business hours will be entirely possible. Conceivably, a passenger could leave New York after work, have dinner with a business associate on the West Coast, and be back at his desk in New York the next morning.

As another way of measuring the impact of our U. S. aircraft industry's newly developed tool for commerce, let's look at the work a jet airliner can do. One early modern airliner was a 14-passenger plane which cruised at about 110 miles an hour and cost about \$87,000. Either of the two new long-range jet transport types being manufactured in this country will cost something over \$5 million each. But either of these jet planes will do in 24 hours the job that it took 50 of those old 14-passenger airliners to do.

Orders for the airline industry's new fleets are enormously costly. To date, the tab approximates \$2 billion for jets and turboprop planes alone. Informed estimates indicate that over the next ten years the airlines will order from the U. S. aircraft industry as much as \$3 billions worth of equipment.

That's a very substantial bet on the future for our scheduled airlines. To insure this future, operators and investors both need assurance from the government that this highly competitive, yet highly regulated industry, will be permitted a

stable regulatory climate during the period ahead.

Today, the airline industry has virtually completed a transformation from an infant industry through subsidies begun years ago when the airlines came into being, to "substantial contributors to the government." In 1955, the subsidies paid to the carriers totalled \$34 million which was paid so that air service could be provided to American communities and territories which otherwise could not afford to have it and keep essential international routes in operation. A small amount of subsidy also went to develop helicopter service. During this same period, federal income taxes imposed on these airlines amounted to \$82 million, yielding a net intake of \$48 million from what had once been a state-supported operation.

The government has also found that the sale of airmail postage is one of its few genuinely profitable operations. In fiscal 1955, airmail revenues amounted to a little over \$142 million. The cost that the Post Office allocated to this service, including payments to the carriers, was \$122 million. This leaves a profit of \$20 million to the Post Office.

Even so, it could well be that the indirect benefits that the government is deriving from a healthy and vigorous air transportation system are still more valuable. In the words of one of the nation's largest airline operators: "Today, the number of long-range transports in the U. S. airline fleet exceed 700; by 1961, it will exceed 1,000. This civilian airlift represents the greatest reservoir of air transportation capability in the world, far exceeding the potential of any foreign fleet.

"It has been paid for by private capital. It has been maintained at the expense of the airlines. If it was the intention of our early statesmen, in their support of pioneer transportation, to cast bread upon the waters, their hopes have been justified."

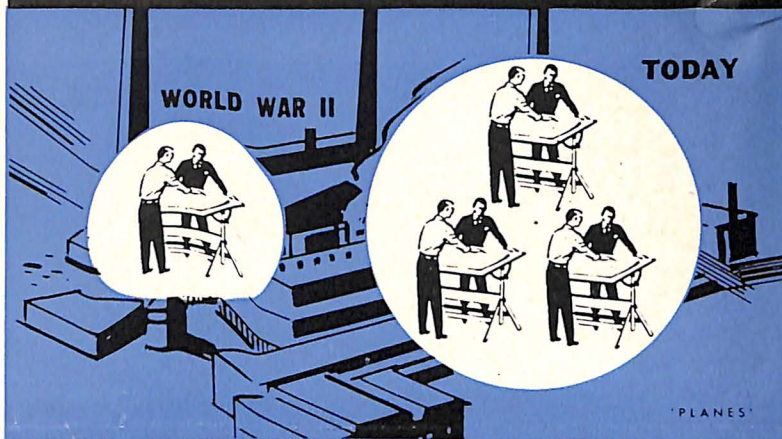
To any one familiar with the details of American history, one recalls the impact of the railroad upon the economic growth of the nation; that the federation of our states into one union made it possible for men and machines to be moved freely across our continent, and thus to lay the foundation for present-day America.

In later years, the might of this nation was often measured in numbers of ships. In the years ahead, the airplane will serve as the instrument for continuing to open new frontiers. The airplane is today the most powerful instrument of national defense. It is, because of the airline industry, probably one of the most effective instruments for the preservation of peace.

The transportation achievements of the past few years have been made possible only through the intelligent, cooperative efforts of both our U. S. aircraft industry and our airline industry.

## ENGINEERING AIR SUPERIORITY

The continuing performance increases of modern aircraft are made possible by a vastly accelerated technological effort of the aircraft industry. During World War II, one engineering hour was required for every fifteen hours of direct manufacturing. Today, with emphasis on development and smaller production orders, the ratio is one engineering hour for every three hours of direct manufacture.



### USAF 'Air Power' TV Series to Start Nov. 11 Over CBS Network

A new television series entitled "Air Power," depicting the role of the U. S. Air Force in the development of flight from the first powered flight by the Wright Brothers at Kitty Hawk to the supersonic aircraft in today's arsenal, will have its premiere performance over the CBS television network on Sunday, November 11, with a special hour-long program.

The remaining 25 programs in the series, which will be telecast on successive Sundays at 6:30 p.m. in each time zone, will each be of one-half hour duration. The "Air Power" series, produced by CBS in cooperation with the Department of the Air Force, has been two years in the making.

"Air Power" is, according to an Air Force spokesman, an important endeavor which should materially contribute to public understanding of the progress and capabilities of air power. Many aircraft companies have given full cooperation to production of the series by providing film footage and filming facilities for use by the producers.

Five major American aircraft producers now hold firm orders or options from U. S. and foreign airlines for a total of 600 jet and turboprop transport planes valued at more than \$2 billion, an AIA survey discloses. Turboprop-powered airliners account for 259 planes on order or option. These are valued at \$323.5 million.

The remaining 341 aircraft are all four-jet transports valued at \$1,741 million.

More than 100 of the 600 gas-turbine-powered transport planes have been purchased or optioned by foreign airlines.

### New Technique Saves On Control Studies

By making adjustments in the control system of a standard production jet fighter, a team of USAF and aircraft industry engineers have been able to determine the control characteristics of a new, high performance, high altitude supersonic bomber without the necessity of building the usual costly prototype model.

Because modern military aircraft operate at extremely high speeds, speeds much faster than human reflexes, it has become necessary to equip them with power-operated controls, and at the same time, to equip such planes with "artificial feel" in the control systems.

In the case of the modified jet fighter which was used by the aircraft company to obtain control characteristics data for the supersonic bomber, the longitudinal control system was actuated by special hydraulic servos, permitting wide variations of the stability and control characteristics of the airplane.

In effect, what happened was that the geometry or shape of the airplane was varied in flight. This was accomplished by using an assemblage of highly specialized automatic, mechanical and electronic equipment which introduced stability through automatic movement of the plane's control surfaces independent of the pilot.

For testing the characteristics of the new bomber, engineers superimposed a knob system on the variable stability equipment of the jet fighter, which adjusted the stick force and motion to the amount desired by the pilot for proper control by feel.

Besides simulating design aircraft, this variable stability research has successfully explored automatic control systems which replace the tendency of aircraft to roll, yaw, or pitch with ideal stability characteristics. The airplane thus becomes a more accurate "gunnery and bombing platform" from the military viewpoint.

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With about 100,000 airplanes capable of taking to the air in this country, there must be control and regulation of traffic in the sky, and the pilots must know exactly where they are at all times while they are airborne.

In peacetime, each type of flyer has equal access to this "magic web," although the military can and does obtain priority for certain of its peacetime missions. But if an emergency should arise, the skies would be swept clear of all civil aircraft except those contributing directly to ending such an emergency.

This "magic web" costs a great deal of money, not only to install but to operate and maintain. The Federal Airways System today is valued by the Civil Aeronautics Administration at more than \$100,000,000. The cost of amortizing, operating and maintaining this web is approximately \$75,000,000 annually.

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## Rugged TV Camera Aids Weapon Tests

An invaluable aid to air weapons testing — a rugged new television camera — developed by industry, is undergoing tests by military armament experts. With the new camera, Navy, Air Force and Marine officials are able to watch the performance of high-powered advance weapons from a distance of only three feet — the distance the TV camera is located from the weapons — by viewing a motion picture size screen situated 150 feet away from the firing bay.

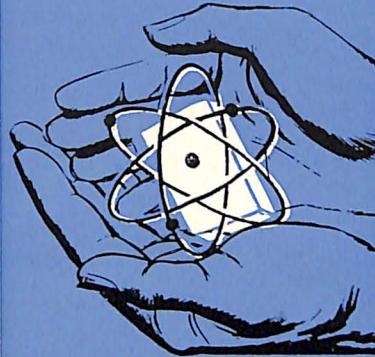
The closed circuit television equipment transmits clear, detailed images of the weapons test despite noise levels well over 120 decibels and the shock waves produced by the firing of the weapon. This new TV camera also provides close-up views of weapons in action which were previously impossible to obtain because of necessary safety factors.

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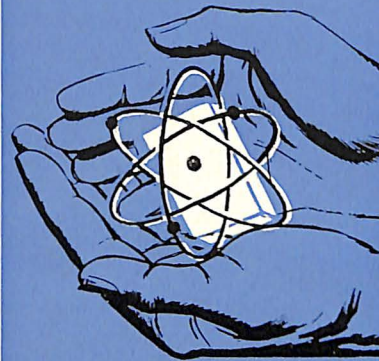
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