

PLANES

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

The purpose of *Planes* is to:

Foster a better public understanding of Air Power and the requirements essential to preservation of American leadership in the air;
Illustrate and explain the special problems of the aircraft industry and its vital role in our national security.

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ALL MATERIAL MAY BE REPRODUCED—MATS OF ALL CHARTS ARE AVAILABLE FREE

Sound Progress

Through the years the United States aircraft industry has fought for superior military and civil air power. Its record is excellent. It brought man's aeronautical dreams of centuries into reality in little more than 50 years.

But the achievement of flight produced an endless challenge to fly faster, farther and higher. The emphasis throughout aeronautical history in this nation—indeed the world—has been on power, power and more power.

During the last ten years, the gains made in aircraft engine power and horsepower-to-weight ratios by our engine manufacturers, have bordered on the incredible. During World War II, the industry was justifiably proud of its 2,000 horsepower engines. Today, jet engines developing 25,000 equivalent horsepower are commonplace, and engines of far greater power are in prospect. Ten years ago aircraft engines produced one horsepower per pound and-a-half of weight. Today they produce one horsepower per four ounces of weight.

But, riding the tails of these spectacular engines is an unwanted guest—noise. This is due to the urgent defense requirements for turbojet engines of greater power. Performance is the paramount consideration and its inevitable by-product—noise—is not a major factor.

The march of civil transport toward turbine powerplants, to meet the demands of the air travelling public, has been inevitable. Recently, piston engine manufacturers, to gain a still higher margin of power, have added the compound feature to their reciprocating engines. In the compound engine, the exhaust gasses pass through a turbine wheel which extracts more energy before their release to the atmosphere. Although today's compound engines are of greater horsepower, their noise is no greater.

More recently, new turboprop powered transports have joined our civil air transport fleets. Their reception by residents near airports has been good. There is no quarrel with turboprop aircraft engine noise.

The turboprop aircraft climbs swiftly. As it becomes airborne, the noise that occurs in its engine falls off rapidly. Relatively little energy is left in its exhaust to make noise, and it has none of the pulsations inherent in the piston engine and even less than those in the compound engine. Beneath the turboprop aircraft, and also the turbojet, there is noticeably lacking the sort of vibration that emanates from the piston-powered aircraft passing overhead at low altitude.

The impression the public has of the turbojet engine so far has come entirely from military jet aircraft. And the jet afterburner, a device for producing quick bursts of speed, has been a prime reason for the noise produced by military jet aircraft. The afterburner will *not* be used on commercial jet transports.

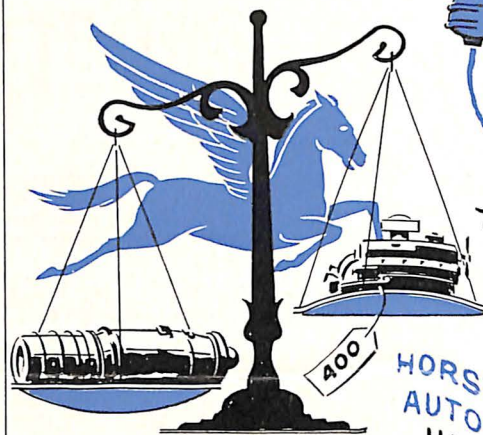
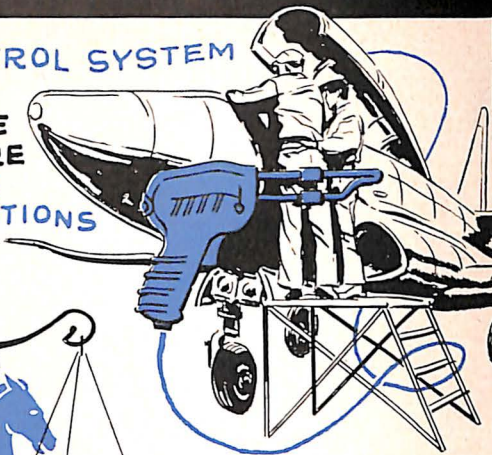
The entire aircraft industry, conducting its operations always in the public, military and civil interests, is aware of its responsibilities in the field of aircraft engine noise. So from coast to coast, hundreds of engineers are working continually on sound suppression devices for ground test engine operations, as well as for aircraft in flight.

Recently, jet engine sound suppressors have been developed that markedly decrease the noise level with little or no reduction in engine power. Every month shows new progress toward even better engine silencing devices.

Research teams of industry and government are devoting great effort at high priority to engine sound abatement projects. Progress already justifies public confidence that by the time the industry's swift and comfortable jet transports go into airline operation, their engines will be much less disturbing than the transport aircraft engine sounds today.

Plane Views

THE FIRE CONTROL SYSTEM OF A MODERN COMBAT PLANE CONTAINS MORE THAN 70,000 SOLDER CONNECTIONS



THE ENGINES OF A NEW U.S. JET BOMBER, FLYING AT ONLY 375 MPH, DEVELOP MORE HORSEPOWER THAN 400 AUTOMOBILES OF 200 HORSEPOWER EACH

RUBBER USED IN THE LANDING GEAR SYSTEM OF A MODERN JET BOMBER IS SUFFICIENT TO MANUFACTURE 100 AUTOMOBILE TIRES



Aircraft Year Book To Be Published

The thirty-seventh annual edition of *The Aircraft Year Book*, official publication of the Aircraft Industries Association, will be published March 15.

Known nationally as the standard reference work of American aviation, the current edition's 476 pages are profusely illustrated and completely indexed. There are pictures and three-view drawings of all production aircraft produced in the United States, together with specifications and performance data of each.

In addition, there are twenty pictorial pages of outstanding aviation events of 1955. The book also presents a complete status report of the nation's aircraft industry and the vital role it plays in the economic and military welfare of the United States today.

Ideal for school and college libraries, it is, of course, the standard for professional reference to U. S. aviation manufacturing. The *Aircraft Year Book* for 1955, price \$6.00, may be ordered from the Lincoln Press, Inc., Publishers, 1143 National Press Building, Washington 4, D. C.

PLANE FACTS

The Forrester, the Navy's newest aircraft carrier, has an air-conditioning system sufficient to completely aircondition two Empire State buildings.

More than 44 per cent of the airframe weight of the giant transport built by one U. S. manufacturer is sub-contracted. Out of every tax dollar spent for these airplanes, USAF pays 28 cents directly to sub-contractors. Of the remaining 72 cents, the company pays out an additional 47 cents in sub-contracting. Only 25 cents remains with the company for its own operations.

A new high intensity lighting system at New York's Idlewild airport, used to guide landing pilots to the runway, possesses a total of 600 million candlepower. Each of the 20 light tubes, possessing 30 million candlepower (several times more powerful than the largest U. S. light-house), is controlled to flash twice each second for one-five-thousandth of a second. Because they each flash too rapidly for the brilliant glare to be retained by the human eye, the lights flashing in sequence appear only as a white glowing arrow in clear night air—or through heavy fog.

Air Mail Move Gains Favor

(Continued from Page 1)

livery time with hundreds of millions of letters reaching their destinations an average of 11½ hours sooner than if they had moved by surface.

Income derived by the Post Office from stamp sales on these letters was \$29,500,000. The Post Office paid the airlines \$1,830,000 for carrying those letters and retained \$27,670,000 or 94 per cent for profit and ground costs.

This new service does not conflict with the regular six-cent air mail service. Space is contracted and air transportation is guaranteed for air mail. It continues to have priority over other mail as well as passengers and cargo.

Post Office officials said they "interpret the term 'first class mail' literally to be first class mail that should be given preferential service whenever and wherever possible." This means transportation of mail by air.

The word "subsidy" always has had unfortunate connotations. A more accurate description, as applied to Government payments to certain segments of the air transport industry, would be public service revenues.

These payments are for the benefit of a community or area, rather than for the benefit of the airlines since the money helps to pay for scheduled services at points that need the service but do not generate enough business to support it.

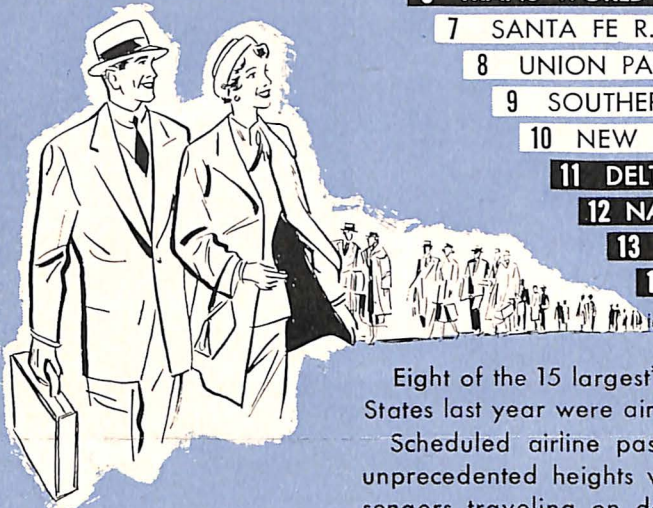
The airlines have made great progress toward becoming subsidy-free. The domestic trunklines today are virtually off subsidy. Subsidy payments are still made to four other segments of the air transport industry. These include local service carriers which serve the nation's important intermediate areas, international airlines, territorial carriers and helicopter services. All are making substantial strides toward lessening the need for subsidy.

The air transport industry also is a vital backstop to military air power. Planes used by the airlines can be quickly converted to military use under the Civil Reserve Air Fleet program.

The Civil Reserve Air Fleet (CRAF) consists of modern four-engine aircraft. Totalling approximately half of the entire scheduled airline four-engine fleet, they're valued at \$400,000,000. If the government operated and maintained this fleet it would cost taxpayers nearly \$300,000,000 each year. The nearly \$300,000,000 same size fleet is approximately the same size as the Military Air Transport Service which is charged with global aerial logistics for the defense establishment. The CRAF fleet, and their crews, are subject to call within 48 hours.

The air transport industry, backed by the progress continually made by the aircraft industry in producing better, more economical aircraft, is giving the American people one of its best bargains.

AIR TRAVEL PROGRESS



'PLANES'

NATION'S LARGEST PASSENGER CARRIERS IN ORDER

- 1 AMERICAN AIRLINES
- 2 UNITED AIR LINES
- 3 EASTERN AIR LINES
- 4 PENNSYLVANIA R.R.
- 5 NEW YORK CENTRAL R.R.
- 6 TRANS WORLD AIRLINES
- 7 SANTA FE R.R.
- 8 UNION PACIFIC R.R.
- 9 SOUTHERN PACIFIC R.R.
- 10 NEW HAVEN R.R.
- 11 DELTA AIR LINES
- 12 NATIONAL AIRLINES
- 13 NORTHWEST AIRLINES
- 14 CAPITAL AIRLINES
- 15 BURLINGTON R.R.

Eight of the 15 largest* passenger carriers in the United States last year were airlines.

Scheduled airline passenger travel in 1955 soared to unprecedented heights with an estimated 42 million passengers traveling on domestic and international routes topping 1954's record by more than 20 per cent.

*BASED ON PASSENGER MILES TRAVELED

Simulators for Aircraft Saving Taxpayers Millions Annually

Electronic simulators, developed for flight training by the aircraft industry, are saving the taxpayers millions of dollars each year, and even more significantly, have proved of tremendous importance in increasing safety in the air, according to the U. S. Air Force.

It costs approximately \$400 to keep a four-engine aircraft aloft for an hour. But for less than \$30 per hour, pilots and crews can "fly" the electronic simulator and gain experience identical to actual flight without ever leaving the ground—

thereby releasing multi-million dollar equipment for earning, not learning.

The simulator is constructed around the actual crew compartment of the aircraft it represents. It is actually a complex arrangement of computers that actuate, through servo-mechanisms, the controls and instruments, thus reproducing all flight characteristics of the prototype. For all practical purposes the pilot is flying.

The feel of flying to the pilot is in the response of his controls. His instruments are in action. A "trouble" console can present him with problems he might not encounter in months of actual experience—ice, snow, sleet, malfunction of equipment, turbulence. Varying sounds warn him of trouble, and red lights tell him of danger.

To familiarize crews with the weather, geography and seasons which they will later experience, the simulator can reproduce any route in the world, all navigational problems, complete to such things as radio static—all at the flick of a switch.

So effective is flight simulation, and so vital to the economics of crew familiarization, that the Air Force has specified simulators for every type of operational aircraft scheduled for production. Major airlines, as well as the military, have ordered and reordered simulators—the most effective and economical means of developing skilled crews.

Recent U. S. Air Force studies reveal that the simulator is saving over \$4,000,000 per year at one training base alone.

Hedgehopper Pilots Give Grasshoppers Bad Time

The grasshopper of Aesop's time really had it good compared to his descendants of today. At least he could run to his friend, the ant, for succor in time of need. But there's no place the contemporary little bug can flee to, in order to escape the wrath of today's agricultural aircraft—much to the satisfaction of U. S. farmers.

The Western states might be knee-deep in grasshoppers this year if it weren't for airplanes, which were used to spray more than 1,600,000 acres for grasshopper control.

According to a government survey, 1955 wound up the biggest year in history for agricultural aviation, with more than 4,200 aircraft certificated for dusting and spraying operations. Coverage included, not only the ill-fated grasshopper, but the spraying of more than 3,180,000 acres of forest to control gypsy moth and spruce bud worm, as well.

Military Economy With Jet Transport Shown

Utilization of jet transports will permit the Military Air Transport Service to carry out tasks that now require 150 of the largest piston-engine transports, with only 30 jet transports. This is a dramatic example of the surging progress the aircraft industry is making in designing aircraft to do a transport job faster and at less cost.

A savings of \$40,000,000 could be made in direct operating costs in one year by three squadrons equipped with jet transports, according to an industry estimate. Fewer planes for the same assignment also means fewer air and ground crews, fewer spare engines and parts, fewer hangars, fewer stops on long hauls and less costs for aircraft fuel.

A recent Air Force airlift operation of ferrying 3,900 soldiers and equipment from Kentucky to Japan and 3,130 other soldiers from Japan to Kentucky required 43 large piston-engine transports. The same job could be done with only 8 jet transports. A typical MATS route from New Jersey to Germany now requires 18 to 24 hours, including two stops. A jet transport can make the flight non-stop in 7 hours.

Wings For Business

Many businessmen pilot single-engine planes, but most of those who use multi-engine planes depend on hired professionals to fly them.

An analysis of 1954 business flying shows 16,480 single-engine aircraft used primarily for business transportation, of which only 1,720 were flown by hired professional pilots. In contrast, 1,760 of the 2,080 multi-engine planes used for business flying were piloted by hired "pros."

Air Industry Increases Research Spending in Weapons Race

(Continued from Page 1)

opment of new aerial weapons, the aircraft industry has found it necessary to invest tremendous amounts of money in research and development test facilities. In contrast to pre-World War II years, when relatively small investments in facilities were needed, vast sums of private funds have become essential in order to maintain plant equipment and research facilities required for military design competitions.

It is conservatively estimated that the aircraft industry of this nation during the last five-year period has reinvested considerably over \$1 billion of their sales dollar into brick and mortar for research and development projects.

One aircraft company spent over \$16 million of its own funds in the development of a commercial jet tanker-transport when the government and the airline industry, as well, evidenced little interest in the project. Today, both are ordering the big jet transport in quantity.

A major aircraft engine manufacturer has recently ordered a \$75 million dollar expansion of its facilities in an effort to speed up research and development, as well as production of new and radically improved turbojet and turboprop powered engines for both military and civil use.

AIRLINE SERVICE

An over-dressed woman boarded a giant luxurious airliner recently. She found a vacant seat and reclined. But it was not long until she apprehended one of the young hostesses in a strident voice: "Young lady, young lady, come here." The hostess responded quickly. "Yes, madam, may I help you?"

"I want another seat," retorted the woman. With a "Just a moment, madam," the hostess scurried through the plane. She returned and said, "I'm sorry, but there are no other seats. Is there something wrong with this one?"

Our traveller declared in a voice that could be heard by all nearby passengers, "Well, I always heard that it was rough riding over the wheels, and I don't want a seat over the wheels."

With no change of expression, the young lady replied, "I think, madam, that you will find this seat very comfortable. The pilot pulls up the wheels when we're airborne."

Still another of our large companies producing both engines and aircraft has reinvested more than \$175 million during the last ten years in plant expansion for production, as well as for its developmental facilities. It has built with these funds what is probably the largest privately owned jet engine development and test facility in the world.

These are but a few of the more outstanding examples of the tremendous effort being expended by the United States aircraft industry on its own initiative and with its own capital to keep America supreme in the air—commercially with the free world and militarily with the Soviet bloc.

A recent aviation directory lists 50 aircraft manufacturing firms in the United States. At least 15 of these are large companies with development and production resources sufficient to handle major aircraft programs.

Each of these firms knows that success depends upon its ability to design and develop better aircraft than its competitors. The competition is orderly and efficient because it is guided by Air Force and Navy procurement divisions whose job it is to buy the most effective weapons America can produce.

The competition is keen and continuous, starting with the initial design concept and running through the entire development and production cycle. This strong free enterprise system of the aircraft industry is typically American. Full utilization of its capability through competition is the vital key to technical leadership and survival.

Flight Test Device Saves Time, Money

Telemetry—the technique best known for its use in tracing guided missiles, from the ground—will be used for testing many functions of new experimental aircraft in flight.

While the pilot guides the test plane into climbs, dives and other maneuvers at various speeds and altitudes, electronic devices on the plane will sense such things as engine speeds, internal pressures, temperatures and rates of fuel flow. These are converted into radio signals and instantly recorded on the ground.

Developed by the aircraft industry as a method to accurately determine test performance, the new technique will save hundreds of man-hours on urgent military projects.

SAFETY IS THE AIRWORD

In the six years of scheduled helicopter passenger service in the U. S. and Europe, there has never been a passenger fatality. Today, all helicopters flown by the world's airlines are of U. S. design and manufacture, or built abroad under U. S. license. This historic record is a tribute to quality of the research, design and engineering teams of the U. S. aircraft industry.



'PLANES'

Chicago Air Traffic Tops That of Five Major Foreign Airports Combined

America's leadership in civil aviation is dramatically demonstrated in a recent survey by the Aircraft Owners and Pilots Association.

One U. S. airport, Chicago's Midway, annually handles more total traffic than Amsterdam, Copenhagen, London, Paris and Zurich combined. Midway is the world's busiest airport.

Comparisons of air traffic between major cities of Europe in 1955, and U. S. cities handling comparable

traffic in 1954, are even more significant.

For instance, Amsterdam's total air traffic count in 1955 was 51,876; Grand Rapids, Michigan in 1954 registered 51,989. Brussels recorded a traffic rate of 41,520; Binghamton, N. Y., had 41,481. Copenhagen had 52,620; Yakima, Washington, had 52,891. London had 98,808; Tampa, Florida, had 99,363. Paris had 86,742; Ontario, Calif., had 86,544. U. S. air traffic figures for 1955 are not available, but year-end estimates indicate a 20 per cent increase over 1954.

Not a single major European airport had a traffic rate comparable to one of the 10 busiest U. S. airports.

Another indication of U. S. leadership: the U. S. has approximately 99,000 registered civil aircraft. Great Britain has 655.

Progress of civil aviation has been largely inspired by the U. S. aircraft industry with the design and production of planes capable of economical operation and high performance.

Air Quote

"We need more scientifically trained people, not only in the Air Force, but in all fields. We need thousands more scientists. I understand that there are important jobs waiting for more than 35,000 engineers. This is easy to believe when we realize that the engineering man hours to produce a fighter airplane have risen from 17,000 in 1940 to 1,380,000 hours in 1955.

"It is bad enough when we fail to meet our own demands. However, this is made even more serious by the fact that we may be on the way to losing our technical leadership to Soviet Russia.

"The Communists have realized that the key to success in this field lies in the hands of engineers and scientists. They are now outproducing us almost 3 to 1 in graduates from science and engineering schools. And the Soviet schools are good schools! Today there are 175 institutions in the Soviet Union which teach engineering exclusively. In contrast, most of our colleges and universities teach engineering merely as part of the over-all curriculum.

"While the number of technically educated college graduates in Russia continues to climb, ours declines.

"To me, this trend is almost as ominous as the Soviet production of bombers."—General Thomas D. White, Vice Chief of Staff, USAF October 27, 1955.

Child's Erector Set Aids Air Industry

The aircraft industry, which uses the most advanced systems of production engineering, has turned to a child's erector set for a solution to reduce costs and speed production of aircraft control instruments.

This unique kit consists of various-sized sheets of perforated fibre-board, an assortment of angle brackets, binding posts, stand-off legs, clamps, wings and hex nuts, perforated metal sheets and strips, bolts and other fixtures. It is used to build wiring and temporary inspection fixtures, electrical testing panels, wiring "mock-up" boards and other assembly fixtures to meet short-run production requirements.

As examples of the savings, the cost of a \$360 cementing fixture was cut to less than \$100; an aluminum holding fixture that might have cost \$100 was built for only \$15.