AIR INDUSTRY BOOSTS RESEARCH SPENDING

Combat Planes Get New Pilot Aid

With the development of an electronic device designed to smooth out "bumps in the sky," the U. S. aircraft industry has now succeeded in giving Navy jet pilots an almost superhuman helping hand in controlling their craft.

A jet pilot whose plane hits an "air bump" in the sky at extremely high speed is somewhat in the same situation as the man driving an automobile without shock absorbers over a washboard road at 80 miles an hour. The plane, under some weather conditions, could be very difficult to control. And at present speeds of more than 600 miles-per-hour, before the pilot could correct the roll, pitch, or yaw, his plane might be miles off the correct flight path. In combat his plane might be rendered ineffective before he could fire a shot.

In order to eliminate this problem, one of this nation's aircraft companies devised an electronic helper, which at the first "bump"—caused either by natural air currents or by any other air disturbance—immediately analyzes the situation, then automatically adjusts the controls to keep the plane flying level. With this electronic copilot, the plane still rolls on the first shock, but then smooths out quickly, returning to level flight.

This new flight control system also leaves the pilot free to attend to such important duties as checking instruments and navigation, or to take a well-deserved rest from flying the plane. Once the automatic copilot is set, the plane flies on course automatically.

When the pilot hits an air bump, the device reacts so quickly that the pilot hardly knows it happens at all; but he knows that his plane flies steadier, easier when he turns the electronic co-pilot.

Air Travel a Winner

Las Vegas, Nevada, is one of the top U. S. communities in number of air passengers it originates in relation to population. According to a government survey, 191,923 travelers flew from this city of 25,000 explained from this city of 25,000 during the 1955 fiscal year—as many as came out of Birmingham, Alabama, with its 500,000 population.

The phenomenal growth of air mail in the United States stems from an insistence by the public that mail be carried by the fastest means possible.

Air mail had its beginning in 1918 when service was started between New York and Washington. The advantages were so immediate and obvious, that three years later letters were being flown coast-to-coast in 33 hours. Today, it is possible to mail an air mail letter in New York at the close of business and have it delivered in San Francisco the following morning.

Airlines in 1954 carried more than one billion letters. Use of air mail has increased more than 500 per cent since 1938. Transport aircraft today carry more mail in any 30-day period than they flew in the entire year of 1938.

This amazing gain in service is due to progressive thinking of the Post Office Department and the benefit of the partnership of U. S. airline and the airway industry that has continually produced transport aircraft that fly heavier loads over greater distances less fuel.

Payment to airlines for carrying mail is still confused with subsidy which is paid to the airlines for other services. Subsidy and air mail have been separated since 1951. Air mail today makes a substantial profit for the Post Office Department. During 1954, the Post Office made about $8,500,000 on air mail carried, and provided the separation of air mail and subsidy amounted to $22,000,000 at the end of 1954. Ninety-eight per cent of the mail carried was flown on subsidy-free airlines during 1954.

The most recent experiment in improving mail service was inaugurated in September 1953 when the Post Office decided to make the benefits of air transport's speed available to more people. The experiment was known as the surface-mail-by-air-plan.

On a space available basis, ordinary first-class mail has the opportunity of going by air over certain East Coast routes. The plan was later extended to major points on the West Coast.

The experiment has proved a success. During the first year, surface mail carried by air saved its senders nearly ten billion hours of delay.

Policing the Airways

Eighty-five planes, equipped with racks of electronic testing equipment, are used by the Civil Aeronautics Administration to check the accuracy of the ground aids to air navigation on the 100,000 miles of U. S. airways.

United States industry is currently spending upwards of $3.7 billion for research and development, according to the National Science Foundation. More than 20 per cent of this total will be expended by the aircraft industry, which is charged with maintaining world air superiority.

Because of the rapid rate of aeronautical progress throughout the world, and particularly behind the Iron Curtain, the American aircraft industry has had to plow back an unusually large percentage of its profits into research and development.

In 1953, the latest year for which complete figures are available, the aircraft industry spent approximately $58 million for research and development projects. This amount is equivalent to 12 per cent of aircraft industry total sales dollars, while the national all-industry average expenditure during the same period amounted to only 2 per cent of total sales dollars.

This large and continually growing expenditure made by the nation's aircraft industry is particularly noteworthy when considering the usual primary sales area in which it operates. Biggest customer of the aviation industry, of course, is the United States government. The rate of profit is artificially restricted by government policy, while at the same time, the government is urging greater private investment in aviation research, development and production.

At the same time, because the government is virtually its sole customer, the financial hazards that aircraft manufacturers face in research and development and subsequent production can be awesome. Three years ago, for example, one major aircraft company lost 22 per cent of its net worth as the result of the termination of a single contract.

If this catastrophe had been due to an improper gauging of commercial supply and demand or to poor company management, it could be considered justifiable. In the case of this aircraft manufacturer, however, it was the result only of a change in military requirements.

In order to fulfill current military production requirements, in addition to anticipate future demands in production and particularly the deplorable (See AIR INDUSTRY, Page 4)
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 gases 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.
Air Mail Move Gains Favor

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livery time with hundreds of millions of letters reaching their destinations an average of 11/2 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 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 they 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 made to four other segments of the air transport industry. These include local service carriers which serve the nation's isolated, sparsely populated 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 airliners. Today there are approximately half of the entire scheduled fleet—1,720 four-engine fleet, they're valued at $400,000,000. If the government operated and maintained this fleet, it would cost taxpayers this fleet nearly $300,000,000 each year. The fleet is approximately the same size as the Military Air Transport Service. It is as closely tied with global socio economic policies for the defense establishment as the CRAF fleet, and their mission, the CRAF fleet, and their mission, fleet, are subject to call within 48 hours.

The air transport industry, backed by the progress continually made by the aircraft industry in producing more economical, faster aircraft, is giving the American people a saving, 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 and characteristics of the prototype. For all practical purposes the pilot is flying.

The feel of flying to the pilot is in the response of the 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, the Air Force has specified simulators for every type of operational aircraft. The Air Force has established the importance of this program to industry. By making available the equipment, the Air Force has ensured its success, and by ordering and reconditioning the simulators—-the most effective and economical means of developing skilled crews.

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

Simulators for Aircraft Saving Taxpayers Millions Annually

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 3,000 soldiers and equipment from Kentucky to Japan and 3,180 other soldiers from Kentucky to Korea 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 16,430 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 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 ten years period has reinvested considerably over $175 million in its own facilities, with 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 transport when the government and the airline industry, as well, evidenced little interest in the project.

Today, both are ordering the big jet dcmded little interest in the project. of its own funds transport when the government and company spent on these projects. The competition examines these efforts to 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 the nation 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

Telemetering—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 flow. These are converted into radio signals and instantly recorded on the ground.

Supervised 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.

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 new facilities, 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 a few of the more outstanding examples of tremendous effort being expended by the United States aircraft industry on its own initiative and with its own capital to produce by 1955 a military product that will dominate the world.

Research and development funds are poured into projects, some large and some small, that are being directed toward the growth of the American aerospace industry.

While some of these programs are classified and therefore not available for public discussion, there are many that are not classified and can be described briefly without injury to the national defense. The following, therefore, are only a few of the many significant developments under way in the American aerospace industry today.

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 hour to produce a fighter airplane have risen from 17,000 in 1940 to 138,000 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 Russia.

The Communists have realized that the key to success in this field lies in the hands of engineers and scientists. They are now outnumbering us almost 3 to 1 graduates from science and engineering schools. And the Soviet schools are good schools! Today there are 175 institutions in the 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 airplanes."—General Thomas D. White, Vice Chief of Staff, USAF October 27, 1955.

Chicago Air Traffic Tops That of Five Major Foreign Airports Combined

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Chicago's Midway airport handles more total traffic than Amsterdam, London, Paris and Tokyo combined.

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 51,476; 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; Yokima, Washington, had 52,381. London had 98,308; Tampa, Florida, had 99,363. Paris had 86,742; Ontario, Calif., had 86,544. U. S. air traffic figures for 1954 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 is that 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.

Child's Erector Set Aids Air Industry

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