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planes

OFFICIAL PUBLICATION OF THE AIRCRAFT INDUSTRIES ASSOCIATION OF AMERICA

AIRLINES SET TRAVEL AND SAFETY RECORD

Aircraft Company Efforts Cut Costs

A new one-piece magnesium casting will eliminate 55 aluminum samplings and 1639 fasteners in conventional landing gear door construction, resulting in estimated savings of $1,060 per plane.

This is just one example of how the aircraft industry and the military are cutting the costs of building today's air power. This one project will save enough on the first 40 planes on which it is used to pay for the entire research program which developed it.

The aircraft industry and the U. S. military constantly keep a critical eye open for new ways to manufacture airplanes at lower costs, which means more defensive air power per dollar for the American taxpayer.

Manufacturing methods research projects by which the magnesium casting door was developed is one way in which the costs of modern high-speed jets are being reduced. These are research projects assigned to contractors by the military and are designed specifically toward developing improved manufacturing techniques and methods which will speed up production and eliminate costly processes.

A recent survey by the Air Materiel Command shows that 47 companies, two government agencies and

(See AIRCRAFT, page 4)

Tow Targets Today Tattle On Pilot Error

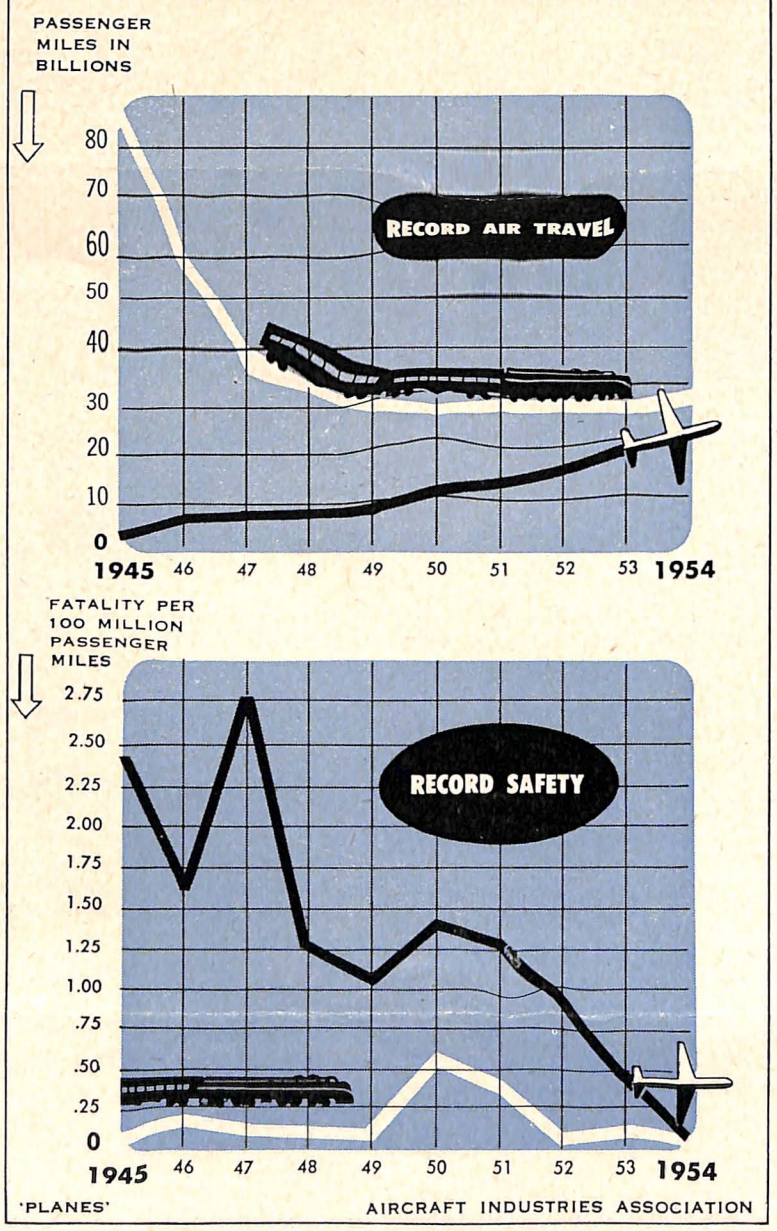
Gone are the days when fighter pilots had to make like *Davy Crockett* drawing a bead on the "*bar*" when firing their aircraft guns. Today's jet fighters and bombers are equipped with highly complex fire control systems that do most of the job.

But even these firing automatons need aerial practice to "zero-in" on their targets. In earlier air-to-air combat training, a slow, cumbersome canvas "sock" was towed behind a tow plane. The pilots would make passes at the "sock" and their accuracy was determined simply by counting the holes in the towed target. While this did much to improve the pilot's marksmanship, it did little to aid in improving the fire control systems.

Engineers designing the expensive

(See TOW TARGET, page 4)

TRAVEL TRENDS



Top Specialists On 32 A. I. A. Committees Reduce Costs, Improve Plane Quality

The nation's aircraft industry is constantly seeking new ways to improve the quality and at the same time cut the cost of America's military aircraft.

One major way in which the industry tackles the problems which are of concern to all aircraft manufacturers is through high level committees of the Aircraft Industries Association.

These men spearhead cooperative, industry-wide efforts in investigating, studying and solving mutual manufacturing problems, increasing efficiency, eliminating costly duplication of time and experience and fostering a free flow of information.

Today, there are more than 1,200 top aircraft executives in 32 highly specialized areas who serve on AIA committees, devoting thousands of hours to common industry problems.

Thirty-nine presidents or chief executive officers of major airframe,

(See SPECIALISTS, page 4)

Air Travel Market To Soar in 1955

The scheduled airlines of the United States in 1954, carrying an all-time record of 34,131,000 passengers, also established the best safety record in the history of airline travel.

During the 12-months beginning January 1, through December 31, 1954, the airlines, on domestic and international routes, flew 34,131,000 passengers more than 20,411,884,000 passenger miles.

The scheduled airlines proved that they are one of the safest means of transportation in the world. Although there were 34,131,000 passengers carried by these airlines, there were only 16 passenger fatalities. This is the equivalent of flying 1.3 billion passenger miles for each passenger fatality.

The scheduled airline passenger fatality rate was .08 per cent for every 100 million passenger miles flown. This is within .01 per cent of the fatality rate recorded by the railroads with 21 passenger fatalities during 1954.

This tremendous achievement in providing safe transportation by the airlines is highlighted by the recent disclosure of the American Automobile Association that 36,300 Americans lost their lives during 1954 in automobiles and busses traveling the nation's highways and city streets.

Safety Is No Accident

Safety in airline travel is no accident. Providing safety for the air traveler is the prime objective of the airline and aircraft industries, and the government.

Perhaps the most safety-conscious individuals in the nation, along with airlines operating and maintenance personnel, are the thousands of engineers in the aircraft industry who are responsible for making the airliner one of the safest means of public transportation. Their efforts are largely overlooked because the air traveler simply knows that his safety "is being looked after."

Mechanical and technological advances in airline safety are not apparent to the passenger. They include such developments as automatic feathering the reversible pitch propellers, anti-skid braking, steerable nose-wheel, high-strength nylon cord tires, very high frequency (weather proof) communications, omni-range navigation, ground-con-

(See AIRLINES, page 3)

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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Quid Pro Quo

The following Editorial Comment is quoted from the British publication AVIATION REPORT. It appeared on 11 February, 1955:

"Any salesman who has tried competing with the British knows what an advantage it is to have the Government foreign office 'soiling its hands' with commerce. U.S. State Department men overseas are not actually rude to visiting American salesmen, but they literally couldn't care less what they do, so long as they behave in the country. They will not lift a finger to help them sell U.S. merchandise. British Ambassadors can naturally sail through into high places while American salesmen are sitting outside waiting for (and hoping to get) an interview.

"Americans take this difference in Government outlook quite philosophically and they feel the best hope of doing business is to sell on technical merits. The policy is to try and get in at the highest level especially where sales deals have a political aspect to them, but to put the main efforts into selling the engineers who have to use the equipment. Britain's main emphasis is placed at the high level political contact end, and technical merit in such talk is not mentioned, it being taken as read that products are comparable.

"The reason British technique is so powerful is that major military or civil sales deals do involve the buying country moving economically and technically closer to the seller, and the British are prepared to make all kinds of quid pro quo finance arrangements with a government willing to do this. It has been shown in some cases that even if the British product were technically less effective than a competitor's, a favourable finance deal for a poor country would be enough to swing a decisive advantage.

"Thus the most effective British aviation sales people are a small number of British leaders (and indeed one or two wives of those men) who take a vacation to a country and discuss informally long term credit on a massive scale. An aviation deal then becomes an incidental part of such credit arrangements as can be fixed up between courses at a banquet."

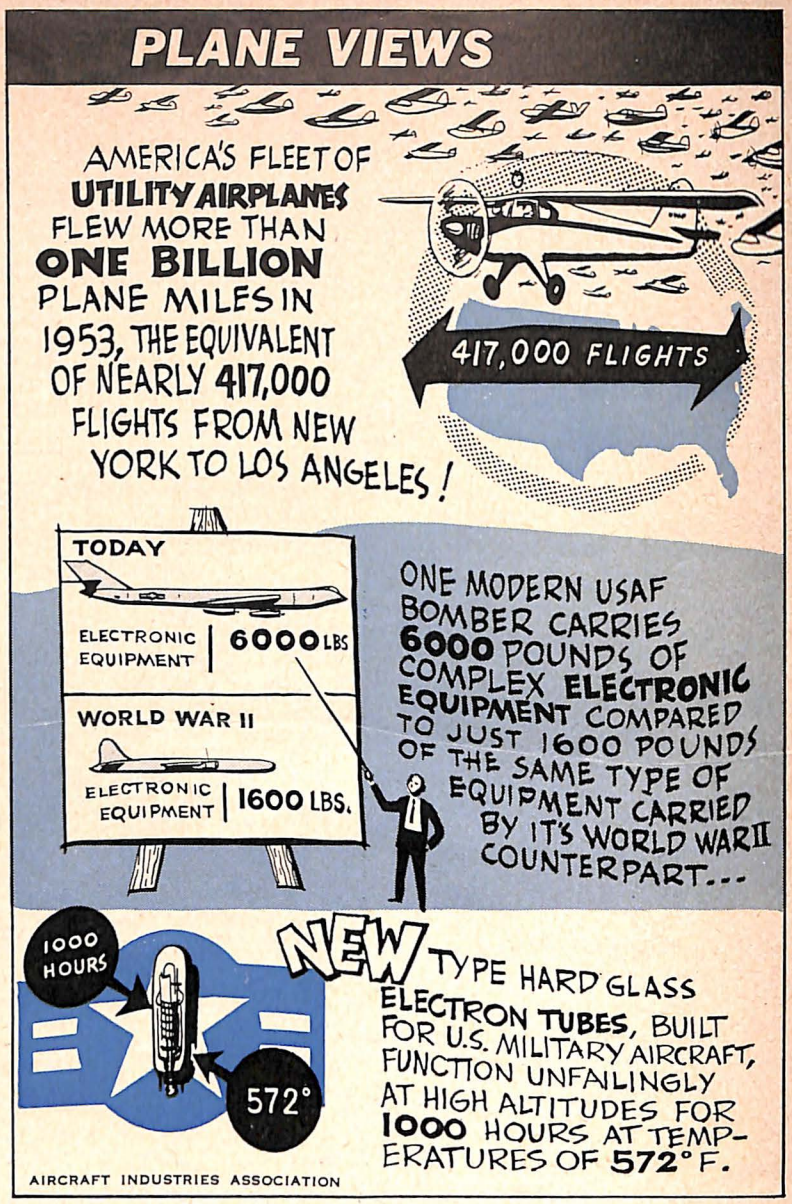
For the record, the American aircraft industry and its salesmen are proud that American aviation products are purchased by the free nations of the world on the basis of technical merit alone.

It is the spirit of competition and free enterprise that has made this country the leader among nations. As a result of this competition within the aircraft industry for a better product—as well as in international sales—potential buyers know that "Made in America" means quality and imagination.

The American aircraft industry salesmen need no crutch to sell their merchandise. While American salesmen have been eminently successful in their efforts as the record shows, obviously they would appreciate—and welcome—a greater degree of interest on the part of our government representatives at home and abroad.

Despite the aids offered to the British Aircraft Industry in selling their wares, the aviation export records of both nations speak for themselves. During 1954, Great Britain exported £56,050,323 pounds sterling ($156,940,904 U.S.) in aircraft, engines, parts, electrical equipment, tires and instruments (including both military and civil sales export).

During the first ten months of 1954, (complete year sales figures compiled by the U.S. Census Bureau not yet available) United States aviation exports amounted to $539,604,000—*nearly three and one-half times the British aviation export for the entire year.*



Enemies Are Red... Friendlies Are Blue

A new color radar system, capable of distinguishing between friendly and enemy aircraft, is now undergoing evaluation tests by the military services.

The color radar can now indicate the position of unidentified aircraft in two colors (depending upon flight altitude), over earth surfaces which appear in another color.

The jet fighters and bombers needed to maintain U.S. air supremacy are becoming capable of such speeds that split second methods of identifying and tracking their positions on radar can be vital to the national security.

The military services believe that color may be the answer to assist the radar operation in "sorting" the "blips" traced out on the radar screens.

The new color radar indicates aircraft as bright orange dots traveling over chartreuse colored land areas.

The radar indicates planes flying at high levels over the chartreuse land areas in bright orange while those flying at lower altitudes show up with a more greenish hue. Current radars, now in operation, indicate aircraft only as colorless "blips" at any altitude.

PLANE FACTS

- Commercial airline sales of one major aircraft company exceeded in 1954 the value of all United States gold produced in 1954. Yet those sales represented on 12 per cent of that aircraft manufacturer's total business for the year.

- Each swept-back wing of one of this nation's latest jet bombers contains 14,698 bolts and rivets.

- One Air Force flying tanker squadron transferred more aviation gas (563,273 gallons) in sixteen flying days of aerial refueling operations than the average automobile service station would pump in three years. The same squadron has delivered 6,000,000 gallons of aviation fuel in aerial refueling operations to USAF bombers and fighters during the last four years.

- A new military air transport plane, which the United States Air Force classes as a "medium combat transport," has a clear cargo compartment longer and wider than a standard railroad freight car. It can carry a 20-ton payload and its engines develop enough horsepower to pull four 40-car railroad trains.

Airlines Set Highest Air Travel And Best Safety Record In History

(*Continued from page* 1)

trolled-approach instrument landing systems, thermal anti-icing systems, evolutionary improvement of engines, cockpit standardization, improved exterior lighting, fire detection and extenguishing systems, nonflammable hydraulic fluid, fire resistant materials, and a host of others.

The government actively became involved in airline safety in 1918. At that time the Post Office Department maintained its own Air Traffic Control System and began installation of radio ranges and other navigational aids now known as the "common system." Today, this system has been expanded into a coordinated "Federal Airways System of Air Navigation and Traffic Control." The Federal Airways system controls more than 100,000 miles of air space. It has more than 10,000 engineers and airways operation specialists operating a vast nationwide electronic network on a 24-hour a day basis guarding the air traveler's safety.

The net result of this combined and intensive approach to providing unequalled safety in air travel by industry, government and the airlines is evidenced by the 1954 airline safety record.

Air Travel Increasing

In 1953, the latest year for which complete transportation statistics (other than airline) are available, the airlines flew 14,700,000,000 passenger miles, while comparable pullman travel amounted to only 8,200,000,000 passenger miles. In that same year, more than 60 per cent of all persons entering or departing from the United States traveled by airlines. United States international airlines carried 1,714,618 passengers, and ocean voyaging steamships carried 1,112,117 passengers.

Based on current trends, estimates are that U. S. airlines by 1965 will be carrying well over 87 million passengers—more than half the present population of the United States.

Similar studies also disclose that there will be an accompanying increase in mail and cargo between now and 1965 when the airlines are expected to be carrying around 229,000,000 ton-miles of mail (138 per cent over 1953) and approximately 581,100,000 ton-miles of cargo (124 per cent over 1953).

Air Mail Cheaper, Faster

Since October of 1953, the scheduled airlines have been conducting an experiment for the Post Office Department which is bringing improved service to the public and at the same time reducing the Department defisit. The airlines are carrying first class mail by air on several routes—at first class postal rates—when air movement will give the fastest service.

For example, the airline run between New York and Chicago alone is realizing revenues for the Post Office Department, after payment to the airlines, of more than $2,000 per ton of mail flown. One ton of mail moved between the two points brings a gross revenue of $2,314.00 to the Department. Of that amount $134.66 is paid to the airlines; the balance, 94.2 per cent, is retained by the Post Office to pay for its operating ground expenses.

Military Air Travel

The Defense Department, responsible for the mass movement of personnel, is probably more conscious of efficiency and economy than any other "business" in the world. Prior to 1949, only two per cent of the military establishment's official group movements of 15 or more individuals traveled by air. Today, more than half of all military group movements, in that quantity, are made by the airlines.

For example, in 1953, the scheduled airlines handled more than 818,000 military passengers. The fast movement of these officers and men saved the government 22,054,325 man hours, representing a manpower *saving* of approximately *8,797 men working 48 hours per week for an entire year.* This is the equivalent to the productive time of more than one-half of an Army division. In terms of the base pay of an Army private, in productive time alone, the savings to the military would amount to $2,407,000.

The largest scheduled airline movement of military personnel to date involved over 3,000 men. Transcontinental air movements of 650 or more men are routine to the scheduled airlines.

Airline Costs Rise, Fares Drop

Despite the spiraling upward costs of operation, travel fares continue to decrease. In 1938, a scheduled airline passenger traveled at 5.2 cents per passenger mile, but he can now travel at 4.1 cents per passenger mile. This saving to the traveling American public has been achieved despite a 90 per cent increase in the general consumer price level since then. In addition, the vast improvement of service, comfort and safety is virtually incomparable.

The "New Look" in Utility Aircraft Means More Comfort, Safety

The "new look" in today's light airplanes—sleek, reliable one to five passenger aircraft—means safe and comfortable transportation for an original outlay that is the equivalent to about one half the price of planes before the last World War.

A comparison of the aerodynamically smooth 1955 models and a popular pre-World War II model shows that the modern businessman-pilot can fly just as far on a fourth less fuel with a lighter airplane that requires less horsepower for operation.

A typical pre-World War II airplane cost $11,785 at that time. Expressed in terms of today's dollar value, this plane would cost approximately $23,570. However, the equivalent plane rolling off the production lines now costs only $12,950 and includes many features found only on commercial airliner just a short while back.

The earlier model plane, some of which are still flying today, incorporated many of the advances of its day. Its present counterpart, however, is all metal construction, compared with the outmoded steel tubing and fabric, has cleaner lines and is much faster and safer.

In addition, it is a much more comfortable plane. It is easier to fly, much easier to maintain and although it has additional speed it needs shorter runways for takeoffs and landings.

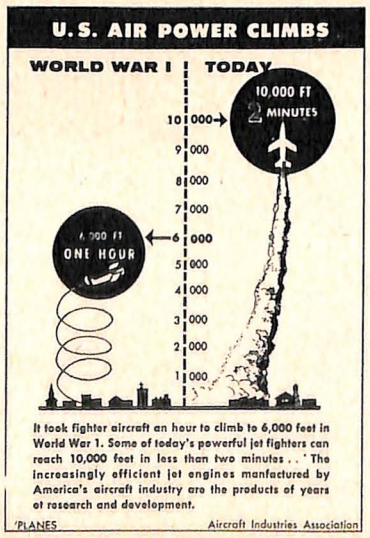
Whereas pre-WW II utility aircraft were almost 100 per cent single engine planes, today's models can be bought with as many as four engines. The larger models offer all the features and comfort of the most modern airliners. Many of them, which have been converted to executive type aircraft, offer all the reliance and, frequently, more comfortable accommodations than can be found on the finest overseas transports.

Some of them fly regular weekly schedules to far away bases halfway around the world while many are used within the country to transport busy executives and high priority cargo on a minute's notice.

Latest Civil Aeronautics Administration figures show that 35,070 utility planes of all types are currently being flown in business enterprises. In 1952, the latest figures recorded, these planes flew approximately 8.2 million hours.

To meet the demand for the lighter utility planes which are used principally for business, industrial and agricultural flying, America's aircraft manufacturers expect to produce close to 3,500 planes in 1955.

"TIME IN ITS FLIGHT . . ."



News travels rapidly. But if news is to keep abreast of the progress in aircraft performance, it's got to become supersonic.

On January 25, 1955, one of this nation's latest jet fighters climbed to 10,000 feet, from a standing ground start, in 83 seconds—considerably less than two minutes.

This fact was charted and rushed to press (see chart). In the span of time between press and issue date, February 21, that remarkable record was shattered three more times by fighter-interceptors of three aircraft manufacturers.

Hoping that the ink on these pages has time to dry before another climb-to-altitude record is set, PLANES reports that the latest unofficial climb record to 10,000 feet, from a standing ground start, is 56 seconds—four seconds less than one minute!

Specialists On 32 Committees To Reduce Costs, Improve Quality

(*Continued from page* 1)

engine and component manufacturers serve on the Aircraft Manufacturers Council of AIA. Eleven presidents or board chairmen serve on the Utility Airplane Council, and eight company chief executives serve on the Helicopter Council.

Standardization of a simple bolt as a result of one group's efforts has resulted in savings exceeding a million dollars a year in aircraft manufacture.

Ideas for the uses of new adhesives and plastics has resulted in the savings of thousands of man-hours of effort and have made modern planes lighter and tougher. Even methods of conservation, salvaging of waste materials and packaging units for shipment have been coordinated among companies and have resulted in additional cost reduction formulas.

The men who serve on these industry commitees represent 38 manufacturers of aircraft, aircraft engines and airframes and 55 manufacturers of accessories, parts and materials.

Typical of these committees and the problems to which they are assigned is the "Aircraft Technical Committee," whose members are concerned with the research, engineering design, development, construction, testing and operating safety of both civil and military aircraft.

This committee places particular emphasis on representation of coordinated industry views regarding design producibility, Government research policies, possible consolidation of Government regulations and methods of preventing duplication in technical data requirements.

Another is the "Aircraft Research and Testing Committee," dealing with problems of technical development offering possibilities for cooperative endeavor in applied research and testing.

The emphasis of this committee is placed on elimination of undesirable duplication of effort in company laboratories through providing a means for exchange of technical data among aircraft companies and through cooperative testing of new structures, new materials and new processes.

A further example is the "Noise Control Committee" which is concerned with sound-control problems, particularly engineering aspects of noise problems related to the manufacture, testing and operating of such products as jet engines, afterburners, rockets and propellers.

It works on problems incident to the control and suppression of noise affecting plant personnel, as well as noise affecting areas external to the plants, and engages in cooperative efforts in this field with other interested aviation agencies.

Aircraft Company Efforts Cut Costs

(*Continued from page* 1)

one college are presently working on or have just completed work on 90 of these research projects.

These contractors are typical businesses, some large, some small, but representing a cross-section of American industrial strength. Not only are they contributing to cost-reduction in the defense program, but they are contributing to the economic health of the 50 cities in 17 states in which they are located. They span the nation from New Hampshire to California and from Wisconsin to Texas.

The projects which these companies are handling range from determining the potential and extended use of castings in airplane manufacture to re-designing a jet engine to reduce the requirements for critical material.

Typical of the savings being developed through these research projects:

- Tow targets fabricated of fiber glass reinforced plastic laminates will save an estimated 60,000 pounds of aluminum per month based on current procurement;
- Development of high-volume production of plastic droppable fuel tanks will save $50 per tank in addition to conserving many pounds of aluminum;
- Development of high-volume production of certain Klystron tubes, resulting in improved quality and a cost reduction from $7,500 each to $2,500;
- Designing, developing and constructing an exhaust machine for electron receiving tubes, representing a potential yearly savings of $14,250,000;
- Developing a process for producing hollow forged parts. Reduction of up to 60 per cent in material used and 50 per cent in machine time anticipated.

Tow Targets Today Tattle On Pilot Error

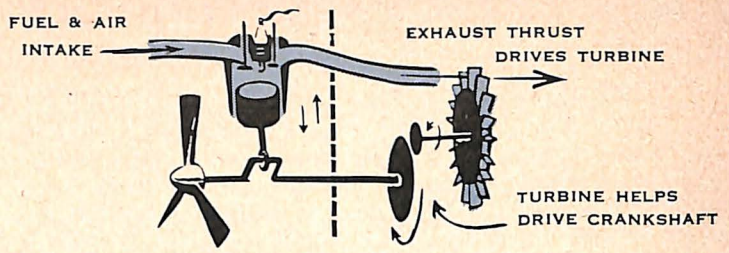
(*Continued from page* 1)

and highly complex fire control systems of current production fighters and bombers have to know the faults of individual fire-controls. Because the system is unable to "speak for itself" the job of tattling on an aircraft pilot's fire control has been turned over to the tow target.

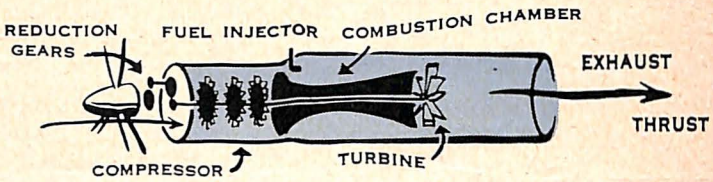
With the installation of many ingenious electronic devices, three dimensional streamlined targets towed at high subsonic speeds not only record the "hits" but record the "misses." Through electronic telemetering, one target system is able to listen for the misses, measure the distance of the miss, the angle of the miss, record it, and transmit the data to armament engineers on the ground.

In this way the fire-control engineer can tell why his "speechless" fire control system is erring and make the necessary "zeroing-in" modifications.

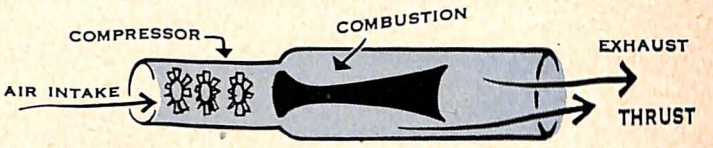
AIRCRAFT POWER PLANTS



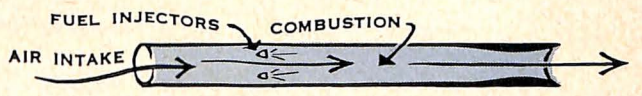
PISTON: Air is drawn into the carburetor, mixed with fuel and forced into the cylinder. The sparkplug ignites the mixture and the resulting explosion forces the piston to move. The movement turns a crankshaft to which the propeller is fixed. COMPOUND: To gain still more horsepower, engineers decided to utilize waste exhaust gasses. A turbine wheel is placed in the exhaust path and geared to the shaft, thus helping the piston in its job of rotating the propeller.



TURBOPROP: Air enters the compressor unit, comprised of a series of fans mounted on a shaft. The fans compress the air, forcing it into combustion chambers. The air is mixed with fuel and ignited. The resulting, greatly expanded gasses are forced through a turbine fan wheel causing it and the shaft to which it is attached to revolve. The propeller, attached to this same shaft, through a reduction gear system, revolves more slowly. The heated gasses, after passing through the turbine, are forced through a narrowed exhaust cone rearward to give added thrust power.

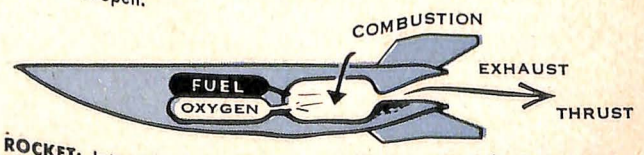


TURBOJET: Air enters the compressor unit, comprised of series of fans mounted on a single shaft. These blades compress the air into a smaller and smaller space, then eject it into combustion chambers where it is mixed with fuel and ignited. The heated gasses are forced through a turbine wheel and out through the tail cone. The turbine wheel, mounted on the same shaft as the compressor fans, causes the fans to turn, pumping more air into the combustion chamber and through the turbine. The expanded gases, ejected out through the narrowed tail cone, give the engine "thrust" power. Engines gain additional thrust by using an "afterburner." In this system, after passing through the turbine, the exhaust gasses are re-ignited, further expanded and ejected more forcibly. The term "ducted fan turbojet" refers to a system whereby some of the air in the compressor is ducted around the combustion chamber and is ejected rearward through a nozzle surrounding the tail cone.



RAM-JET: This engine has no moving parts and therefore is the simplest type jet engine. Air is compressed as it enters the engine because of the physical shape of the air inlet. Fuel is injected, mixed with the air, ignited and the greatly expanded gasses are forced out rearward. The ram-jet must be given assistance to start because it will only work at high speed.

PULSE-JET: Unlike other jets, this engine operates on a pulsating, rather than continuous, intake of air. Similar in design to the ram-jet, it has an added feature of shutter like air inlet valves. Air is compressed as it enters the engine and is ignited. Expansion of ignited gasses force the valves to shut, the gasses are ejected rearward creating low pressure in the combustion chamber. This causes the intake valves to reopen.



ROCKET: Internal combustion engines require atmosphere in which to operate. The rocket does not. This engine supplies its own oxygen for fuel ignition. The explosive ejection of ignited fuel gives a rocket its thrust power.

'PLANES' AIRCRAFT INDUSTRIES ASSOCIATION