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## THE FORCES WHICH CAN LOWER AVIATION INSURANCE RATES\*

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We are asked "what forces can lower aviation insurance rates?" On all sides we hear a great deal about the high cost of aviation insurance. I suppose I was asked to speak on this subject because of the feeling that aviation insurance costs are high. Presumably the oil companies also receive complaints about the high cost of aviation gas and oil; the aviation manufacturers are probably often asked to explain the high cost of airplanes and engines; aviation repair depots must explain the high charges for replacements, overhauls and repairs; and so on through the whole field of aviation schools, radios, accessories and service. The answer in practically every case would be based on the law of supply and demand which also indirectly but strongly affects aviation insurance rates. After all there are only about 8000 airplanes in this country and a production of 3000 per year would be considered extraordinary. This explanation seems to satisfy most airplane operators when it concerns the high cost of tangible aviation commodities such as gas, oil, starters, engines and the airplanes themselves, but they fail to realize that insurance is also a commodity which unfortunately for the insurance companies, does not become tangible until the object insured becomes intangible! Insurance companies look forward to the time when rates can be cut, but the present rates cannot be lowered to a marked degree until there are more airplanes to insure and fewer accidents. Only one force can lower insurance rates, and that force is the reduction of insurance losses in relation to insurance income.

The word "high" has a relative meaning. Aviation insurance rates are "high" relative to what? Some people confuse the word "rate" with premium. A rate of  $\frac{1}{2}$  per cent for windstorm insurance is low but when applied to a \$10,000 airplane it amounts to a premium of fifty dollars. The rate may be low but the premium high because airplanes carry high valuations. When an airplane operator tells his insurance agent that rates are too high he is probably comparing aviation rates with other types of insurance.

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Since it is a means of transportation with which we are dealing, we presume that the operator is comparing his aviation rates not with other costs in aviation, but rather with the cost of insuring his automobile. The facts in the case show that aviation insurance rates do compare very favorably with automobile rates, and while the rates are higher for crash and personal accident, they are, for some coverages, even lower than automobile rates. But loss experience in other industries does not make rates in aviation. The aviation industry must make its own rates.

Rates are based on experience. The aviation industry is further assured that rates are fair through careful supervision by numerous state commissions to whom the insurance companies must report their premiums, their losses and their costs of doing business. The cost of doing business (overhead) is carefully restricted so that losses in relation to premiums become the dominating influence on rates.

It is well known that insurance companies try to eliminate the elements of gambling on the risks they insure by getting sufficient spread of business to permit the law of averages to work. This lesson was forcibly brought home to the underwriters in the great Chicago Hangar fire of 1930 when about \$600,000 worth of airplanes were destroyed in one fire. The insurance companies prefer to see the reservoir of funds, which they manage for the industry, filled by many small contributors in the form of small premiums rather than by a few large premiums. However, they cannot lower their premiums until experience justifies lower rates. Nevertheless, the "spread" is gradually getting wider and will continue to improve.

The discussion on how rates can be lowered then reduces itself into two associated parts:

1. How will aviation grow so that the volume and spread of insurance premiums will be increased?
2. How can insurance losses be reduced?

Barring conditions which might deflect the regular course of business, the growth of the commercial aviation industry and of aviation insurance is assured for the following reasons:

1. *Flying is becoming more convenient.* The great increase in airports and in aids to navigation assists the aviation industry in demonstrating the utility of the airplane, thereby increasing the aviation market which in turn will offer more planes to insure. Sportsmen, for example, now find flying into Florida or Michigan

much more convenient than a few years ago because of the large increase in landing fields. Airplanes can be used in business with more consistent results for the same reason.

2. *Costs of flying are getting less.* The lower cost of airplanes and the lower operating costs aided by the growing ease with which both airplanes and aviation insurance can be bought on time-payment plans at reasonable rates should increase the spread of insured airplanes.

3. *Flying instruction is more accessible.* As every life insurance salesman knows, 60% of his case is won if he can persuade his client to take a physical examination, even at no charge. The Bureau of Air Commerce has recently encouraged student instruction by eliminating the physical examination formerly required. A large increase in flying instruction should result, especially among the people who can afford to buy airplanes. More places for instruction are also available.

4. *Business demands more airplanes.* The ever faster tempo of business is creating a demand for airplanes. Competition is forcing business executives to save time by using the air. Oil companies, mining engineers, textile manufacturers, newspapers and machinery manufacturers are among the prominent users. Other industries will follow.

5. *The younger generation is air-minded.* The generation which has grown up air-minded is about to reach maturity and achieve purchasing power. Fear as a sales resister will be of minor significance when these young people acquire funds to buy airplanes. Let us hope that their flight instruction will be such as to result in good flying insurance experience.

6. *Agents are waking up.* Insurance agents are becoming more active in aviation and are persuading more aircraft owners to insure. Their clients are asking about the cost of aviation insurance; their air-minded sons are entering the insurance business.

7. *Flying is becoming easier.* Aircraft are being developed which require less skill to fly safely, thus opening the aircraft market to a wider public. Flying is becoming less of an art and more of a pleasure by virtue of reliable radios, sturdy undercarriages, adequate stability, better handling qualities, sound-proofed comfortable cabins, prompt, efficient ground service, improved cooperation with the weather services, good landing fields, reliable power plants.

8. *More owners are insuring.* The aircraft operators are beginning to realize that insurance rates are reasonable and that

when they insure they not only protect their investments but also shelter their moral obligations. Flying was until recently, a young man's adventure. These young men have now matured to the stage when they think in terms of finance rather than adventure.

Some aircraft manufacturers are encouraging their clients to buy insurance because insurance will provide funds for replacement in the event of loss.

There is also a growing realization that in case of lawsuits following an airplane accident, the courts and juries no longer regard aviation as an adventure, and consequently large sums are being awarded to the plaintiffs. A few years ago the attitude of the lower courts seemed to be that if any one was crazy enough to fly, he assumed the risk. This is changing. The courts are now taking the attitude that in the light of present developments in aviation, flying should be safe. Accidents are considered a result of negligence. More cases are being brought to court so more owners are insuring.

All these facts should stimulate the sale of aircraft and correspondingly a greater number should be offered for insurance. The sales outlook is good. Larger volume and a wide spread of risk seem assured. But if losses also increase in the same proportion, rates must remain about the same.

How can losses be reduced? There are two kinds of losses, and, therefore, two kinds of insurance. Hull insurance, which refers to the insurance of the airplane itself and liability insurance which protects the legal liability of the owner of the airplane. Let us first consider hull insurance, which includes fire, theft, wind-storm, land damage, mooring and crash.

**Fire:** Fire rates can be reduced by improvement in engine installations so that fires due to broken fuel lines, leaking carburetors, and especially carburetor backfires, would be eliminated or at least quickly extinguished. The growing use of remotely controlled fire extinguishers should be very beneficial. The type of fuel hose which is used on some European airplanes might also help. Instead of being made of metal it is composed of several layers of a flexible skin-like substance. Because it resembles cloth more than metal it is not so easily cracked and is less susceptible to vibration failure. Some instances of engine fires are:

*Case F:* "Aircraft caught fire while flying over the airport—apparently a gasoline feed pipe broke and sprayed fuel over the motor and exhaust pipes—the blaze spreading through the ship—totally destroyed."

*Case G:* "Pilot states that after taking on his passengers and while taxiing across the field just preparatory to a take-off, there seemed to be a slight backfire in the engine, and almost immediately smelt burning and realized that something was wrong with the engine. Aircraft destroyed by fire."

*Case H:* "Motor backfired and took fire as pilot was taking off. He had attained about 200 ft. altitude and was over some woods—he set plane down in a pine tree—plane was totally destroyed."

*Case I:* "Pilot was removing battery when it arced igniting gasoline fumes from gas valve, fire extinguisher ineffective when gas tanks exploded, totally destroyed."

The development of fire-proof dopes would eliminate a lot of fire losses other than those due to gasoline catching fire. For instances here are some typical losses taken at random:

*Case A:* "Tail post was being welded when sparks from the torch ignited the fuselage."

*Case B:* "Plane out on line near plant—engine was warming up awaiting appearance of the pilot. He failed to appear and the gas was shut off and the motor speeded up to run the gas out of the gas lines—the last explosion however previous to the motor stopping caused a backfire in the exhaust manifold and the flames caught the butt end of the right wing and spread over the entire ship before they could be extinguished."

*Case C:* "Ship damaged by fire—spark from steamroller on airport fell on wing."

*Case E:* "Fire occurred—aircraft almost totally destroyed by fire caused by an electric light being left unguarded against the fabric of the plane."

Development of a fuel which will not ignite so readily would reduce the hazards of gasoline. One of the large oil companies has made some progress in this direction.

The greatest cause of fire losses can be blamed either on ignorance or lack of discipline among ground personnel. Education in matters relating to good hangar housekeeping would reduce fire rates considerably; the elimination of flammable debris in the hangar, the installation of adequate fire extinguishers and insistence on their periodic inspection, safety rules for welding, separation of dope rooms from the remainder of the hangar, or insisting that fire doors be left closed are some suggestions which if adopted would reduce fire losses. One item alone, the unprotected extension light, has probably caused more fire losses than anything else. The hot electric light bulb is rested on seats, fabrics, or some other

flammable part of the airplane, the mechanic is called away to the telephone and when he returns the ship is in flames. That is a typical instance. It can be easily guarded against simply by putting a wire frame around the light. All well managed companies have lights protected in that way. Here are some more examples:

*Case J:* "Ship was being refueled—nozzle was grounded on the funnel, 20 gallons of gasoline had been pumped into the tank and the man at the pump just started on the next 5 gallons when without any warning the funnel caught fire—no one smoking in or about the boat."

*Case K:* "Parked close to another ship—mechanics were working on the other ship using gasoline and a pressure pump to clean the engine when due to a short in the wiring of the air compressor or a droplight, fire occurred—ship seriously damaged."

*Case L:* "Plane was undergoing complete overhaul—wings were standing against the wall of the hangar, having been removed from plane—a torch was being used about 8 feet from where the wing was damaged—a spark from the torch ignited the paper—doing considerable damage to the wing, gas tank had been drained of the gasoline but apparently fumes still remained in the tank which ignited causing it to explode—tank located in the wing."

*Case M:* "Airplane being cleaned after a flight—was standing on a field a short distance from gas station—removed part of the engine cowling and was just finishing spraying the engine with gasoline and was wiping parts when the plane suddenly took fire under the oil tank—caused by static electricity igniting the gasoline on the engine during the process of cleaning."

Good hangar housekeeping is the most outstanding way in which fire rates can be reduced. But if fire must occur the next logical precaution is to have adequate fire extinguishers easily available. Carbon dioxide types appear to be especially useful in combating airplane fires. A recent development, which should help a lot, is an apparatus which produces inert gases, carbon dioxide and nitrogen, at small cost. It is a very effective fire extinguishing medium and can be piped to hazardous areas for automatic fire protection. A wider use of the Deluge Sprinkler systems in hangars would also reduce losses.

The ideal arrangement from the standpoint of the underwriters would be to have airplanes stored in many small hangars of fire-proof construction rather than to have many airplanes in one large hangar with conventional fire protection. Concentration of risk is

not good underwriting policy. It is obvious that a fire in one airplane endangers all airplanes in the same hangar.

**Theft Insurance:** Theft insurance rates are already so low that no further reductions are anticipated and it is difficult to see how they can be reduced. However, it is inadvisable to leave airplanes, either good or damaged to the mercy of spectators. Most theft losses involve instruments and similar small articles which are usually stolen after a forced landing.

**Windstorm Rates:** Windstorm rates may be reduced by building hangars which will not so easily collapse on the airplanes within.

The tricycle undercarriage may be effective in reducing windstorm rates by eliminating the high angle of attack of the airplane wings on the ground. With the wings in flying position and with less "sail" area exposed to the wind, the airplane should be able to resist higher wind velocities. If owners would be more careful of how they park their planes and in their instructions to airport attendants, wind loss experience would improve.

**Land Damage:** Land damage insurance protects the owner against injury to the airplane while it is on the ground. Its cost can be reduced by better brakes, and especially by better field regulations in regard to the speed and methods of taxiing, the allotment of parking space, the location of possible obstructions. The tricycle undercarriage may help here because of better visibility while taxiing on the ground. Owners who keep their airplanes on farms should be cautioned against the great affinity of cows for doped fabric. One such loss cost the insurance companies over a thousand dollars.

**Mooring Insurance:** Mooring rates are not very high but we believe that the development of new, lighter and more effective anchors will help to reduce them further. Better mooring facilities in sheltered basins should be encouraged.

**Crash Insurance:** Crash insurance rates are the highest. When one considers that out of 8000 airplanes some 1600 accidents occur per year, the reason for the high cost of crash insurance is obvious. The underwriters also suffer from lack of *spread* in crash insurance. Experience to date does not show that sufficient reduction can be made to induce more people to carry crash insurance. It is a vicious circle. The whole matter goes back to the small number of airplanes that are available for insurance. Greater production would lower the cost of replacements, possibly lower the cost of repairs as well as give the underwriters a wider spread.

Crash rates would naturally be greatly improved if there were fewer accidents. The use of devices which would keep airplanes from stalling and spinning would be very useful in reducing rates because so many accidents occur by stalling. Amateur pilots seem to stall airplanes quite readily in good weather and even some experienced pilots, over-confident in their ability to fly on instruments, have stalled and cracked in bad weather.

Human nature is so constituted that a mechanical or aerodynamic improvement which might reduce hazards, usually tempts the pilot to see what advantage he can take of it to increase his operating efficiency. This attitude nullifies the safety advantages of the improvement. For instance when airplanes are built that will land on the proverbial postage stamp, pilots will try to land them in one corner of the stamp. While on the one hand this foible of human nature may be wholesome because it creates a demand for further improvements, on the other hand it reduces the favorable effect that the improvements might exert on insurance rates.

Crash insurance rates should be lowered by the increase in airports, better airport maintenance, improvements in weather forecasting, improvement in aids to navigation, stricter supervision of flying schools, of instructors and of flying curricula, increasing power plant reliability, and especially by testing airplanes in long and rigorous service before they are released to the public.

If pilots would learn to recognize their limitations and to operate strictly within them, accidents would probably be fewer. Over-confidence in ability to fly over unfamiliar terrain, carelessness in airmanship, belief in their proficiency with instruments, presumptuous attitude towards strange airplanes have resulted in many unnecessary accidents.

Liability and personal accident insurance rates are affected by the same operating conditions which affect land damage and crash rates. Of course the handling of passengers and the regulations governing the actions of spectators at airports also have an important influence on liability rates. Airports should be well fenced. Stray cattle and the use of airports for short cuts or playgrounds have resulted in serious and costly accidents. Limitations on liability, which some states already have in effect, would probably reduce passenger liability rates.

We have seen how conditions in the industry and how the operation of aircraft affect insurance rates. But my insurance organization is taking the initiative in trying to reduce losses through its own efforts. We are proceeding on the philosophy

that an "ounce of prevention is worth a pound of cure." I refer to our Engineering and Inspection Service. It is already producing results beneficial in the reduction of losses for which purpose it was intended. Through this Inspection System we are not only educating a great number of operators in good management, better hangar housekeeping, more careful attention to flying operations but we are also finding a number of defects in design about which we inform the manufacturers. We are also uncovering a surprisingly large number of dangerous structural conditions due to inadequate maintenance.

While all these considerations apply to the non-scheduled airplane operators, one other very important factor enters, particularly, into the operation of aircraft for hire. That factor, which is as important as anything else, is the experience and organizing ability of the manager of operations. The organization of charter services should be as solidly founded as the organization of a good airline. The details are too numerous to mention here but all large successful charter operators will eventually be required to have operating manuals, maintenance manuals, a chief pilot, a chief mechanic, a chief of maintenance, just as airlines have now. Many progressive charter operators are already well organized in this way.

The National Association of State Aviation Officials can help reduce insurance rates in two ways, first by encouraging the sale of airplanes through uniform regulations, aids to flying, and cooperation with aircraft owners in reducing their flying costs, secondly by preaching within their respective states the gospel of conservative operation, good instruction and careful maintenance.

It is a compliment to the aviation industry as well as to the discrimination and business sense of the aviation insurance underwriters that very appreciable reductions in rates have been made in the last few years. I wish to reiterate that there is only one force which can further reduce insurance rates and that force is the reduction of losses in relation to premium income. Some of the ways in which this objective can be reached have been outlined. Perhaps you have many more ideas on the subject. We can more quickly reach the desired goal of lower rates, if everybody cooperates for an increasing aviation business and for safety.