



The shattered windshield of a Tutor jet, damaged by an eight-pound chicken carcass travelling at 212 miles an hour.

BIRD-PROOFING AIRCRAFT

A Canadian Pacific *Boeing 737* aircraft, carrying a full passenger load, coming in for a night landing at Winnipeg's International Airport in April 1969 ran into a flock of geese.

Seven of the 10- to 12-pound geese struck the aircraft, which was travelling at 335 miles an hour at an altitude of 3,000 feet. The fuselage was penetrated near the pilot's windshield, both engine cowlings took bird strikes and there was impact damage on the fuselage and on the starboard wing slots.

This bird-plane encounter had a happy ending in that no vulnerable parts were damaged and the pilot was able to bring his aircraft down safely. There are, however, incidents where bird strikes have caused air disasters.

The 1969 World Conference on Bird Hazards to Aircraft received reports indicating that, while a significant decrease in bird incidents involving aircraft in the vicinity of airports had been achieved through bird-clearing programs, the incidence of bird strikes showed signs of being on the increase. The Conference, held in Kingston, Ontario was sponsored by the National Research Council of Canada.

Aviation experts are of the opinion that the only measures offering any real assurance of reducing this type of danger is to "bird-proof" aircraft. Bird-proofing consists of increasing the strength and energy absorbing capabilities of vulnerable parts of the aircraft which are likely to be subjected to bird impacts, such as windshields, the leading edges of tail assembly sections and openings where ingestion into the engine can occur. Wing structures are generally considered to have sufficient depth to sustain a bird strike without suffering serious damage.

NRC RESEARCH PROGRAM

In an effort to find ways to reduce this hazard, the National Research Council of Canada is currently engaged in a bird-proofing research program. The main piece of equipment being used is a pneumatic cannon that fires chicken carcasses and simulated birds at speeds up to 620 miles an hour.

NRC is co-operating with the National Defence Department and Canadair Limited of Montreal in studies to determine whether a Canadair *Tutor* jet trainer can be refitted with a stretched acrylic windshield in place of its glass-vinyl-glass windshield.

At almost any operational speed the glass-vinyl-glass windshield "crazes" upon bird impact. The screen fragments into tiny particles and, while not necessarily separating from the vinyl, the crazing completely obscures all pilot vision.

The current study, is seeking to determine penetration velocity for given thicknesses of stretched acrylic. Owing to design problems, refit of the *Tutor* windshield is practical only to a thickness of up to nine-tenths of an inch.

The latest in a series of tests involved placing a *Tutor* cockpit under temperature control to simulate flight conditions in front of the cannon muzzle. Dummies with standard protective plastic face-visors were placed behind the windshield of the cockpit. With the glass-vinyl-glass windshield, bird hazards make visors mandatory for *Tutor* pilots on landing or take-off. A stretched vinyl windshield of eleven-sixteenths of an inch took the impact of a chicken carcass travelling at 212 miles an hour. The result: a foot-square hole in the windshield; chicken parts scattered in and around the fuselage; and an immediate start on planning for a further series of tests with a thicker windshield.