MAY 1973

Lecture presented by Mr. BLCKPCEL (Canada)

Mr. Chairman, Ladies and Gentlemen :

As we are all aware, the bird strike problem is likely going to be with us in the foreseeable future. Completely bird-proof aircraft are not yet designed, let alone manufactured or flown. Aviation, both civil and military, is increasing at very high rates, and new airports are being built. In the meantime, bird numbers are not decreasing. Although numbers of raptors are coming down, numbers of even more troublesome species (starling and gulls) are on the increase.

Altough some problems in some areas have been solved, there still remains a lot to be done. Generally speaking, it would seem to me that many problems have solved, at best, only partially. Yet, I think that we now know much better than 10 years ago what our problems are, and that many of our "bird problems" are in fact "people problems". Also, it seems to me that we now realize that complicated problems of multi-disciplinary teamwork, rather than solitary biologists or engineers.

Nevertheless in the last ten years, a lot of work has been accomplished both in some European countries and in Canada. Although there have been many meetings, conferences, working groups, etc... that have produced a lot of manuals, guidelines, position papers, recommendations, etc... etc..., there still is no book that comprehensively covers all aspects of the bird strike problem.

We in Canada, have decided that such a book, if written in a simple, lucil style, would be of great interest to anyone who is involved in or concerned about bird strikes (i.e. pilots, air traffic controllers, airfield maintenance people, aircraft designers, flight safety engineers, etc...). Also, such a book might have a wide appeal to all laymen with interest in either aviation or ornithology.
Mr. Kuhring, now the ex-chairman of the National Research Council's Associate Committee on Bird Hazards to Aircraft, and I have been assigned the task to put together such a book.

Birds and aircraft fly across national borders. Thus we would like to give the book a world coverage. In order to get a clear idea of the problem in the various countries around the world, we have sent letters to the Chairman of National Committee requesting information with respect to

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bird strike numbers, particular local problems, and local methods that prove successful.

For those of you who did not receive such a letter let me very briefly explain the basie layout of the book. The first chapter deals with birds an bird movements, the second with aircraft movement. In the following chapter, we will present an analysis of bird strike statistics. The rest of the book will cover the methods to deal with the problems. We will describe each method and technique in simple terms and then illustrate the theory with examples from actuel operations.

I have a few extra copies of the draft contents of the book with me, se please do not hesitate to ask me if you want one.

I would like to invite your comments and suggestions on the proposed book and I will be around today and tomorrow to meet anyone who might wish to discuss it with me.

Thank you very much.

H. BLOKPOEL

Contents

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2. Numbers of bird strikes ; crashes ; near-disasters ; distribution over the world ; seasonal fluctuations ; daily distribution pattern ; heights of strikes ; strikes en "route" versus strikes at the airfield ; bird strike rates ; comparison of strike rates for different airports.

3. Amount of damage ; deaths ; injuries and disablements ; dollars ; lost flying hours ; passenger inconvenience ; trends.

4. Types of damage to aircraft ; engine , cockpit, fuselage and undercarriage ; effect of aircraft's speed ; effect of bird's size ; differences between aircraft types.

5. Bird species involved in strikes ; evidence for different behaviour with respect to aircraft.

6. Conclusions ; identification of "subproblems " ; research and development priorities.

VII BIRD-PROOFING AIRCRAFT

1. Theoretical considerations ; magnitude of strike impact ; vulnerability of aircraft ; engine, cockpit, fuselage and undercarriage ; frontal areas ; critical bird mass.

2. Bird worthiness designing ; engine, cockpit ; fuselage.

3. Testing of new designs ; air gun ; rocket sleigh ; airplane flight.

4. Results and effectiveness ; engine , cockpit, fuselage ; future developments.

VIII PREVENTION OF BIRD STRIKES AT AIRPORTS

1. Introduction ; the airfield as biotope ; résident birds ; local transient birds ; migrants ; scaring and habituation ; trapping and habituation ; killing and immigration ; habitat manipulation.

2. Bird observation methods ; visual observation ; infrared ; radar.

3. Phonoacoustics ; the hearing of birds ; methods for obtaining distress calls ; play back techniques and equipment ; results and effectiveness ; future developments.

4. Pyrotechniques ; performance criteria ; Foreign Object Damage (FOD) hazard ; teleshot shellcracker ; Verey Flare ; smoke puff ; results and effectiveness ; future developments.

5. Hawls and flacons ; hunting techniques and prey preference in the wild ; falconry ; conservation of nearly extinct species ; legal and organizational aspects of obtaining birds of prey ; organization of a hawk group ; results and effectiveness ; future developments.

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6. Dummies of birds of prey ; models ; techniques ; results and effectiveness ; future developments.

7. Trapping and removal ; trap designs ; trapping techniques ; results and effectiveness ; return of removed birds ; future developments.

8. Killing ; general limitations ; legal and organizations espects ; shooting and FOD problems ; types of poisons ; use of poisons ; side effects of poisons ; mechanical techniques ; results and effectiveness ; future developments.

9. Miscellaneous methods ; stuffed birds in panic position ; orange runway lights; blue runways.

10. Habitat management : land use planning ; general landscaping garbage dumps ; grass and grass length ; crops and agricultural techniques ; ornamental shrubs ; alternative ground cover ; earthworm problems ; results and effectiveness ; future developments.

IX PREVENTION OF BIRD STRIKES "EN ROUTE "

1. Introduction ; general considerations ; methods to reduce impact ; methods to get rid of birds in front of the aircraft ; methods to detect and avoid birds.

2. Impact reduction methods ; lowering of speeds ; double visor.

3. Methods to get rid of birds in front of the aircraft ; laser beam ; radar beam ; strobe lights ; future developments.

4. Current methods to avoid birds ; long-term migration forecasts ; short-term migration forecasts ; bird warnings and "birdtams " ; bird distribution map.

5. Radar and radar bird detection ; principles of radar ; "angels"; birds as targets ; identification of "angels" as bird echoes ; radar cross section of birds ; radar signature analysis ; birds causing radar "white-outs " ; methods to get rid of bird echoes; the capabilities of airborne radar.

6. A bird radar for "civil " aviation ; general consideration ; preliminary experiments ; design of bird radar ; future developments.

7. A bird radar for "military " aviation ; general consideration ; research needs ; future developments.