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LAST FRENCH EXPÉRIMENTS CONCERNING BIRD-STRIKE HAZARDS REDUCTION (1981-1986)

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FRANCE

SUMMARY This paper give briefly the results obtained in four differents expeniments carried out in France since 1981 in civil aviation :

- Falconry,
- Radio controlled models aircrafts,
- Noisy synthetic sounds along the runways,
- On-board flashing lights.

I. FALCONRY

The results of two tests, at Toulouse-Blagnac in 1983/84 and Charles-de-Gaulle (Paris) in 1985/86, are summarized below:

- for only one of the species, the lapwing at Toulouse, the number of bird strikes went down by 75% during the 6-month test, which employed 2 full-time falconers in two 4-wheel drive vehicles and 5 peregrine falcons. However, no improvement was recorded for the other species, i.e. day and nights birds of prey. The airfield was medium-sized (800 hectares) and the problem was specifically caused by lapwings wintering there. The cost of the trials was $57 200 annually (photo 1).

- a check test was carried out on the same air-field in 1984/85 and 1985/86 with 2 full-time bird dispersal agents using conventional bird scaring equipment, i.e. distress calls, pyrotechnics means and hunting. Exactly the same results were obtained for an annual cost of $37 200.

- on a larger airfield of 3 200 hectares (Charles-de-Gaulle) with a more complex bird hazard problem (20 species involved), the bird strikes dropped by 60% for gulls, seagulls, lapwings and pigeons (the species hunted by the falconers) whereas the decrease was 30% fo all the species. The 8-month test with 3 falconers and 15 birds cost $100,000 per year. This method proved remarkably efficient for the scare duration, the areas covered (i.e. 400 hectares by a "good" falcon) and the motivation of the personnel. Nevertheless, the drawbacks cannot be ignored: the difficulty in finding qualified falconers, falcons (born in captivity) and goshowks (captured wild); the need for isolated quarters for accommodating the falconers and their birds day and night; the high cost of the method; the time necessary for training the falcons to be agressive, for keeping them and for retrieving them when they leave the airport area; the lack of effectiveness on several species such as other birds of prey, starlings and partridges; night and bad weather operations in fog, high winds, rain, very hot spells, etc.; the

question of airport responsibility for any falcon ingestion in a turbojet engine.

- in comparison, conventional means are much easier to operate, less costly and give very good results when used by motivated and competent staff. They are more concentrated around the runway and its verges but cannot clear large areas.

II. RADIO-CONTROLLED MODELS AIRCRAFTS.

Starting in 1981, close to 50 tests have been performed on airfields and domestic garbage dumps. The tests involved several species, such as black-headed gulls, WOOD PIGEONS, starlings and lapwings, and used 8 models with planforms representing large birds of prey, a small aircraft and geometric shapes (triangle, circle). The models were painted in different colours and powered by combustion engines or electric motors (photo 2). The model shape, colour and noise did not significantly affect the results.

After about 50 tests at Paris-Orly, Paris-Charles de Gaulle, Toulouse-Blagnac, and on waste-discharge sites, it appears that the shape, colour, and noise level of the model aircraft have no significant influence on the results obtained. Whatever the model aeroplane used, as soon as it takes off the birds on the ground rise also and flee the zone being overflown, before landing again a few hundred metres away.

In comparison to the attack by a diving falcon, the results are very different. The nuisance birds take off, but they never adopt the escape flight behaviour characterized by a rapid climb to about 500 metres altitude and then heading toward a fallback position a few kilometres away. In addition, the zone freed of birds by the model aircraft is only about 25 hectares (61.75 acres) whereas a well-trained falcon can keep 400 hectares (988 acres) free of nuisance birds, Furthermore, the scare-off time drops from several hours for a falcon to only several minutes for a model aircraft.

Finally, despite the refinement of the operational conditions (delta-wing model, robust, reliable, relatively cheap), this method remains more difficult to employ than falconry and also requires the full-time services of at least two employees per airport to operate the model aircraft with the requisite safety.

III. SYNTHETIC NOISE GENERATORS ALONG RUNWAYS

The method, which acoustically protects runways, is derived from the American "Av alarm" system. It consists of automatically generating intolerable artificial acoustic signals over the runways to prevent the birds from alighting. For a 3600-metre runway, the equipment includes a sound synthesis card with a microprocessor and 2 timers, 3 240-watt amplifiers and 24 30-watts loudspeakers spaced 150 metres apart (Photo 3). Developed by the Centre National de la Recherche Scientifique, the complex signals are a mixture of digitized distress calls with a required runway noise level of 75 dBA. The transmission sequences are random between 1 and 3 minutes and last for approximately 1 minute. In use on two thirds of the Orly (Paris) runways for the last 8 months, the device has resulted in an 80% improvement in bird strikes for black-headed gulls, wood pigeons, lapwings and starlings. The main advantages of this method are its very low cost, i.e. $14,000 per runway with a 10-year guarantee, and its completely automatic operation. Its drawbacks are the noise experienced by those living close to certain airports and the small area covered, i.e. only the 45-meter wide runway and its two 45-meter verges are protected, thus leaving large resting grounds unprotected for birds that may fly across the runway when disturbed. This system is being tried out on day birds of prey at Tarbes - Ossun - Lourdes.

IV. ONBOARD FLASHING LIGHTS

This experiment was designed to test the effectiveness of high power flashing lights on the bird scare distance. The idea here was to make the aircraft more apparent to the birds, causing them to fly away earlier, and thus to avoid collisions. An initial white flashing light unit of 10^6 candela RMS with a frequency varying from 1 to 5 Hz was tested on one vehicle. The vehicle was driven towards groups of birds on the ground with the flasher on or off and the scare distance measured, i.e. when the birds took off. The results from 145 tests on herring gulls, black-headed gulls, lapwings and rooks were as follows:

- the scare distance D increases with the frequency F (D = 51 meter at F = 4 Hz)

- groups of 25-30 birds are the most difficult to scare (D is large for isolated birds and large groups).

- even at high frequency, the difference in the distance D measured with and without flashes is not statistically significant (without flashing D = 35 m). A second test series was conducted using two white, 2 x 10^5 candela, lights flashing in alternate phase at 4 Hz and providing a beam at 2.5° elevation and ± 10° azimuth. The flashing units were installed on the wings of a light aircraft, the Robin 2160 (photo 4). The aircraft was flown at very low altitude and at various speeds over captive birds tied to the ground by a 1-2 meter long wire. The scare distance D was measured by tracking the aircraft with a cinetheodolite and stopping it when the birds took to the air - signalled by another observer. The aircraft noise was also recorded when the birds took off. The results of 105 tests mainly on corvidae (plus a few positive tests on domestic pigeons, black-headed gulls, and negative tests on grey partridge and common buzzard) are given below:

- there was no significant difference between the measured scare distance with (D = 154 m) and without flashing (D = 153 m ± 12 m)
  ± 20 m
- the scare distance doesn't change with aircraft speed (between 70 and 120 Kts)
- the noise does not affect the scare distance as the birds don't take off sooner if the aircraft is noisy (no difference between 63 and 70 dBL)

CONCLUSIONS

Falconry does not appear to yield better overall results than the fulltime use of conventional scare methods. The reduced-scale models were not effective and were difficult to pilot. The runway acoustic protection system seems to be very promising since it is as effective as the other methods but its cost is substantially less. If required, the system could be complemented by a fulltime agent employing the conventional techniques. The onboard flashing unit does not increase the scare distance between the aircraft and birds.

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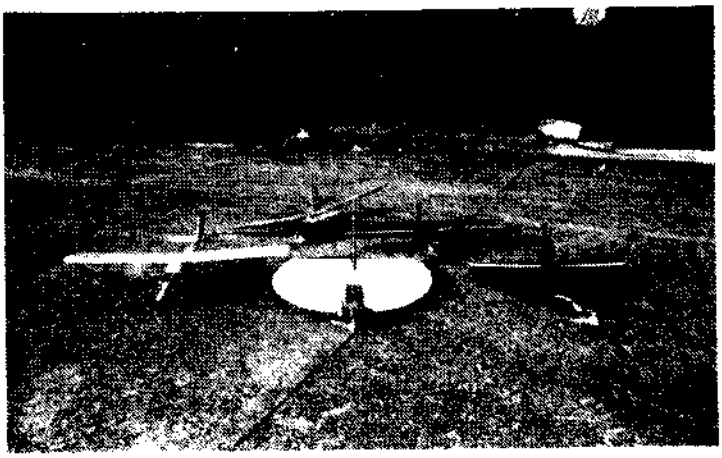

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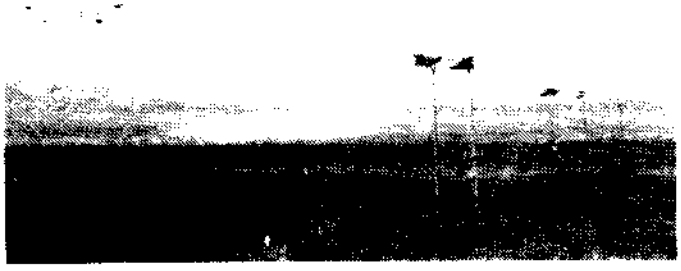

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