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AIRCRAFT NOISE - FLIGHT OPERATIONAL ASPECTS

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INTRODUCTION

Contrary to public aspirations, it is impossible to hide something as large as an airport and to ignore the noise from the associated aircraft! It is a myth that pilots deliberately operate their aircraft to make noise except, perhaps, at aerobatic air-displays. Airlines therefore recognise that noise can cause nuisance to some people living and working in the vicinity of airports. British Airways and the rest of the airline industry believe that we adopt a sympathetic and responsible approach in working with communities to seek improvements which minimise the noise impact.

NOISE SOURCES

Airport noise originates from a number of sources, of which the aircraft is normally dominant. Many of you will be aware that aircraft noise is generated not only by the engines but also by the high speed passage of the aircraft itself through the atmosphere. Indeed, for some modern aircraft, nearly half the noise on approach to airports originate from the airframe. Jet engine and airframe design have been influenced by technology, regulation, passenger demand and economics and progressively refined over the past forty years. Huge noise reductions have been achieved. However, as we shall see later, further dramatic reductions are unlikely in the foreseeable future and any further improvements are increasingly difficult to achieve. Against this background, attention has turned towards alternative measures, e.g. Effective land-use controls and small but significant refinements to operational procedures and technologies. I will concentrate my presentation upon the latter activities. It is not within the scope of this paper to discuss other aspects of aircraft noise such as ground testing, the

provision of adequate enclosures for noise containment, Auxiliary Power Units and the use of separate Ground Power Units, to provide power during service and maintenance on the ground.

BA OBJECTIVES

British Airways has seven corporate goals. One of these is "To be a good neighbour, concerned for the community and the environment". Another, often called the number one goal is "To be a safe and secure airline". Thus the first priority of Flight Operations Management must be to achieve and maintain the highest possible standards of safety. Yet, at the same time we must demonstrate our commitment to being a good neighbour through minimising our noise impact on airport communities as well as taking action to manage our other environmental activities and promoting good relations through our many and varied community relations activities.

Indeed, safety is a most desirable, but intangible, objective, which cannot be directly managed. Safety results from a complex combination of appropriate activities from many individuals. The safe operation of aircraft depends upon not only the flight crew performance, but also management support, in the form of equipment provision, operating policies and procedures and training. Airlines have learned, from bitter experience, the value of establishing standard operating procedures (SOPs) for each aircraft type. SOPs are the glue which bind individual flight crew member activities into an effective team, in the pursuit of safety. Little or no flexibility is therefore given to pilots in the way their aircraft are to be operated during take-off or landing. Thus while there is some flexibility to introduce procedures that will result in noise reduction, consideration of safety is paramount and does constrain many of the possible options.

NOISE ALLEVIATION MEASURES

Except in the simulator, no one has yet invented a magic button for an aircraft to miraculously become airborne or land within the blink of an eyelid! Take-off involves the application of thrust, an acceleration along the runway and then a standard climb profile to a specified height above the airport, where transition takes place towards the normal climb speed. The specified height and transition procedure are known as the noise abatement procedures.

The International Civil Aviation Organisation (ICAO) has established international noise standards to regulate the certification of aircraft for take-off, lateral and approach prior to landing. In addition, because take-off generates the greatest noise, detailed noise abatement procedures have been developed to minimise noise and maximise safety. Without such standards, Operators would incur intolerable pressures from airport operators and local communities for local procedures, which would have an adverse impact upon safety. While there are locations where some

variation is made in standard procedures, these are relatively few and are normally based on sound geographical or demographical reasons, e.g. Nice, Hong Kong or Washington National airports. Whilst accidents are rare, communities in the vicinity of airports are gradually becoming more aware of the critical importance of balancing noise and safety considerations, and for the need for consistent procedures to reduce the risk of error.

ICAO specify two basic procedures to alleviate noise. One benefits a close-in community, the other a more distant community. The first requires a thrust reduction at 1000 ft. above the airport and a longer transition phase to accelerate and retract the wing flaps before achieving the normal climb speed. In this case, the close-in community secures a noise benefit at the expense of the distant community. The second requires a small acceleration at the same height, to enable the initial flap retraction to take place, before thrust reduction. Thereafter, the remainder of the transition phase proceeds more quickly. This procedure marginally extends the take-off noise impact at the airport for considerable improvements to the distant community. Older, noisier jet aircraft use the former, whilst modern, quieter jet aircraft use the latter, for obvious reasons.

Approach and landing is naturally quieter than on take-off but subject to different criteria. It is a truism that consistently good landings can only result from consistently good approaches! Therefore, we, along with most other airlines, insist that the approach from approximately 1000 ft down to the runway is flown in the landing configuration and at a stabilised final approach speed. Again, industry experience has shown this to be a basic safety requirement for all jet transport operations.

Further out on the approach, between around 6000 ft down to 1000 ft, flying manoeuvres are essentially an exercise in energy management. The aircraft must descend, slow down, extend flaps and landing gear ready for landing, whilst simultaneously observing Air Traffic Control instructions. Each BA fleet specifies the manner in which these activities are to be conducted and takes account of generating minimum noise nuisance commensurate with safety.

ICAO is now proposing to adopt refined noise abatement procedures, developed by Industry and recently adopted by the FAA. The FAA felt it necessary to make these changes to curb individual State authorised variations to federal aviation safety requirements. When adopted, the new ICAO procedures will improve safety standards, and give further small benefits in noise reduction. There is also on-going international activity pursuing further refinements with the growing availability of new technology and air-traffic control techniques.

FUTURE TECHNOLOGIES

Aviation Authorities and Airports have been slow to exploit the precise track-keeping capabilities of modern Flight Management System (FMS) equipment. The benefits of reduced noise impact and better energy management were first recognised in the USA. A specialist group of the Air Transport Association has been established to develop procedures and promote the concept, with success at a number of major airports e.g. Detroit, Los Angeles, Seattle and Washington National.

Europe lags behind. UK trials are taking place at Luton and Manchester. Results to date have been undoubtedly interesting, a little disappointing and have served to underscore the complexity of the task. Whilst there is other European activity, it is in Germany that the greatest progress is being made. There, the BFS, ATC Authorities and Lufthansa have established a well funded and supported initiative, which has resulted in the development of procedures for Frankfurt. Such progress may be related to the degree of State support for their national airline. This concept will migrate to all major German airports in the near future.

More advanced navigation systems are still under development, such as the Global Positioning System and the Microwave Landing System. When approved, such systems will enable a more efficient integration of continuous descent and approach, as well as tending to reduce airport congestion. Further details are beyond the scope of my presentation.

The proportion of older jet aircraft in airline fleets continues to diminish. They are being progressively replaced by modern jet aircraft, which are not only substantially quieter but also more efficient. This process has benefits for communities, airlines and passengers, to name but a few, but demands huge investment, which must be painstakingly earned.

New aircraft have arrived or are emerging, which will continue the steady downward trend in noise characteristics. The B777 sets remarkable standards fur such a large aircraft, in either matching or exceeding the excellent standards already established for the B767 - but with nearly double the passenger capacity. New versions of the B747 also improve upon those versions currently in service. Furthermore, British Airways has laid down even more challenging noise criteria to the aircraft manufacturers for their new large aircraft proposals of the future.

CONCLUSION

Pilots spend their working lives in the pursuit of safe and efficient operations. We are well aware of the need to achieve an optimum balance between flight safety and noise generation. I trust that I have been able to convince you how responsive our industry has been over many years and how British Airways anticipates continued improvements will be secured for the future.