NOISE ABATEMENT PROCEDURES

1. Introduction

Many airports today impose restrictions on aircraft movements. These include:

- Curfew time
- Maximum permitted noise levels
- Noise surcharges
- Engine run up restrictions
- APU operating restrictions
- Preferential runways
- Minimum noise routing

These restrictions are based on ICAO international standards and recommended practices.

The noise abatement procedures describe the methods for noise abatement when environment requires it.

They can be:

- Use of noise preferential runways to direct the initial and final flight path away from noise sensitive areas
- Use of noise preferential routes to assist aeroplanes in avoiding noise-sensitive areas on departure and arrival
- Use of noise abatement take-off or approach procedures in order to minimise the overall exposure to noise on the ground
- Minimum use of reverse thrust after landing
- Displaced landing threshold

Nothing in these procedures shall prevent the pilot-in-command from exercising authority for the safe operation of the aeroplane.

2. Noise preferential runways and routes

2.1. Noise preferential runways

A runway for take-off or landing may be nominated for noise abatement purposes.
The objective is to utilize whenever possible those runways that permit aero planes to avoid noise-sensitive areas during the initial departure and final approach phases of flight.

Runways should not be selected for noise abatement procedure for landing operations unless they are equipped with suitable path guidance like ILS (instrument landing system) or a visual approach slope indicator system (PAPI,VASI…).

Noise abatement shall not be a determining factor in runway nomination under the following circumstances:

- Runway surface conditions are adversely affected by for example snow, ice, water, mud, oil …
- Landing conditions: ceiling is lower than 500ft (150m) above aerodrome elevation
- Landing conditions: when visibility is less than 1900m
- Landing conditions: Ceiling is lower than 800ft (240m) above aerodrome elevation when approach requires vertical minima greater than 300ft (100m) above aerodrome elevation
- Landing conditions: Visibility is less than 3000m when approach requires vertical minima greater than 300ft (100m) above aerodrome elevation
- Take-off conditions: Visibility is less than 1900m
- Wind shear has been reported or forecast and expected to affect the approach or departure
- Thunderstorm has been reported or forecast and expected to affect the approach or departure
- Crosswind component, including gusts, exceeds 15kt (28km/h), or the tailwind component, including gusts exceeds 6kt (9km/h).

2.2. Noise preferential routes

Noise preferential routes are established to ensure that departing and arriving aircraft avoid overflying noise-sensitive areas in the vicinity of the aerodrome as far as practicable.

In establishing noise preferential routes the safety criteria of standard departure and standard arrival routes regarding obstacle clearance climb gradients and other factors described in ICAO documents should be taken into full consideration.

Noise abatement flight procedures can be one of these:

- Noise abatement arrival procedure (NAAP)
- Continuous descent arrival or approach (CDA)
- Noise abatement departure procedure (NADP)
- Low power or low drag approach profile

These routes and all standard departure and standard arrival routes should be compatible.

An aircraft should not be diverted from its assigned route unless:

- Departing aircraft has attained the altitude which represents the upper limit for the noise abatement procedure

  It is necessary for the safety of the aircraft like avoidance of severe weather, resolving traffic conflicts, pan or emergency declared by the pilot.

3. Aircraft operating procedure

This chapter provides guidance with regard to aircraft noise-mitigating measures associated with the application of departure climb, approach and landing procedure and the use of displaced runway thresholds.

3.1. Operational limitations

The pilot in command has the authority to decide not to execute a noise abatement departure procedure if conditions preclude the safe execution of the procedure.

Aircraft operating procedures for the departure climb shall ensure that the safety of flight operations is maintained while minimizing exposure to noise on the ground:

- Noise abatement climb procedures is secondary to meeting obstacle clearance requirements
- The power or thrust settings specified in the aircraft operating manual are to take account of the need for engine anti-icing when applicable
- Noise abatement considerations are no longer applicable if aircraft face a failure or shutdown of an engine or any other apparent loss of performance at any stage of the procedure (take-off, departure, arrival, landing)
- Noise abatement considerations are no longer applicable when wind shear warning exists or the presence of wind shear activity is suspected
- The maximum acceptable body angle specified for an aircraft type shall not be exceeded.

Initial power or thrust reductions shall not be executed below a height of 800ft (240m) above aerodrome elevation.

Noise abatement procedures shall not contain a prohibition of use of reverse thrust during landing.

The practice of using a displaced runway threshold as a noise abatement measure shall not be employed unless aircraft noise if significantly reduced by such use and the runway length remaining is safe and sufficient for all operational requirements.

3.2. Noise abatement departure climb guidance

Aircraft operating noise abatement procedures for the take-off climb shall ensure that the necessary safety of flight operations is maintained while minimizing exposure to noise on the ground.

The first procedure **NADP 1** is intended to provide noise reduction for noise-sensitive areas in close proximity to the departure end of the runway.
The second procedure **NADP 2** is intended to provide noise reduction for noise-sensitive areas more distant from the runway end.

The two procedures differ in that the acceleration segment for flap/slat retraction is either initiated prior to reaching the maximum prescribed height or at the maximum prescribed height. To ensure optimum acceleration performance, thrust reduction may be initiated at an intermediate flap setting.

These methods are present ICAO methods but they do not constitute the only methods to be followed. These procedures are provided as examples because the noise reduction obtained greatly depends on the type of aircraft, engine type, thrust required and the height at which thrust is reduced.

Commercial airlines are encouraged to develop own procedures that maximize noise reduction from their aircraft.

3.2.1. Noise abatement climb NADP1

This procedure involves:

- Power or thrust reduction at or above the prescribed minimum altitude 240m or 800ft above aerodrome elevation.
- Initial climbing speed is not less than V_2 + 10kt or V_2 + 20 km/h and below V_2 + 20kt or V_2 + 40 km/h
- Delay of flats/slats retraction until the prescribed maximum altitude 900m or 3000ft is attained
- At the prescribed maximum altitude 900m or 3000ft, the aircraft is accelerated and the flaps/slats are retracted on schedule while maintaining a positive rate of climb, to complete the transition to normal en-route climb speed.

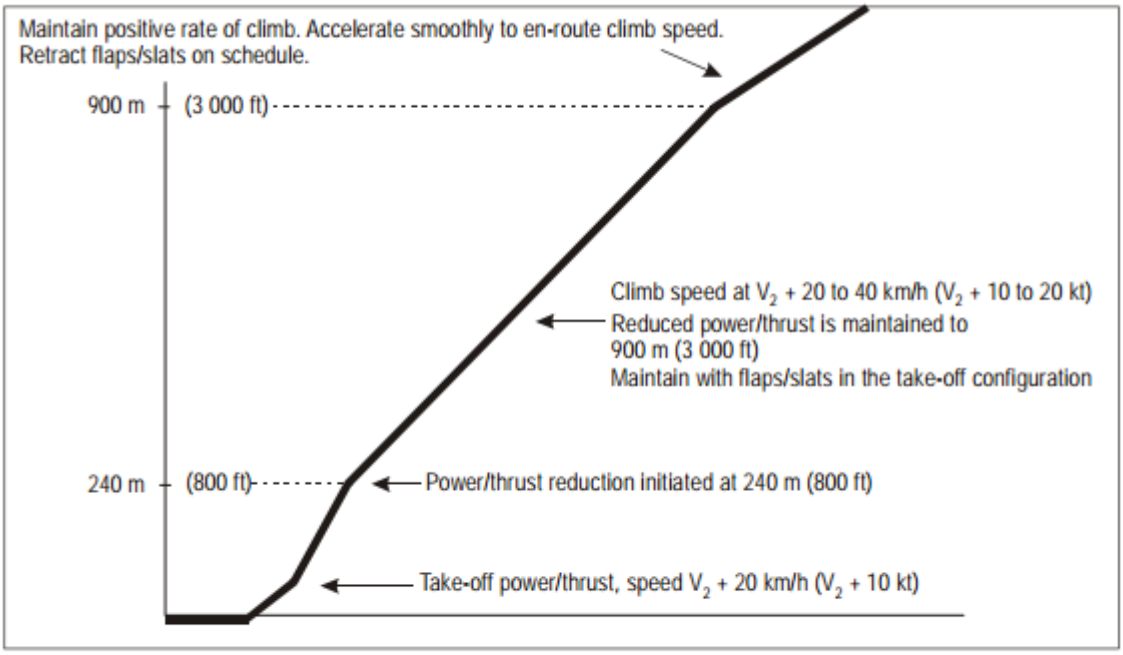

Figure I-7-3-App-1. Noise abatement take-off climb — Example of a procedure alleviating noise close to the aerodrome (NADP 1)

3.2.2. Noise abatement climb NADP2

This procedure involves:

- Power or thrust reduction at or above the prescribed minimum altitude 240m or 800ft above aerodrome elevation.
- Flats/slats retraction at or above the prescribed minimum altitude 240m or 800ft above aerodrome elevation but before the prescribed maximum altitude 900m or 3000ft
- Flaps/slats are retracted on schedule while maintaining a positive rate of climb
- Intermediate flap retraction, if required for performance may be accomplished
- Aircraft body angle of pitch is decreased, aircraft is accelerated towards V_{zf} (Minimum Safe manoeuvring Velocity with Zero Flaps)
- Initial climbing speed is not less than V_2 + 10kt or V_2 + 20 km/h
- Power or thrust reduction is initiated at a point along the acceleration segment that ensure satisfactory acceleration performance.
- At the prescribed maximum altitude 900m or 3000ft, the aircraft is accelerated to complete the transition to normal en-route climb speed.

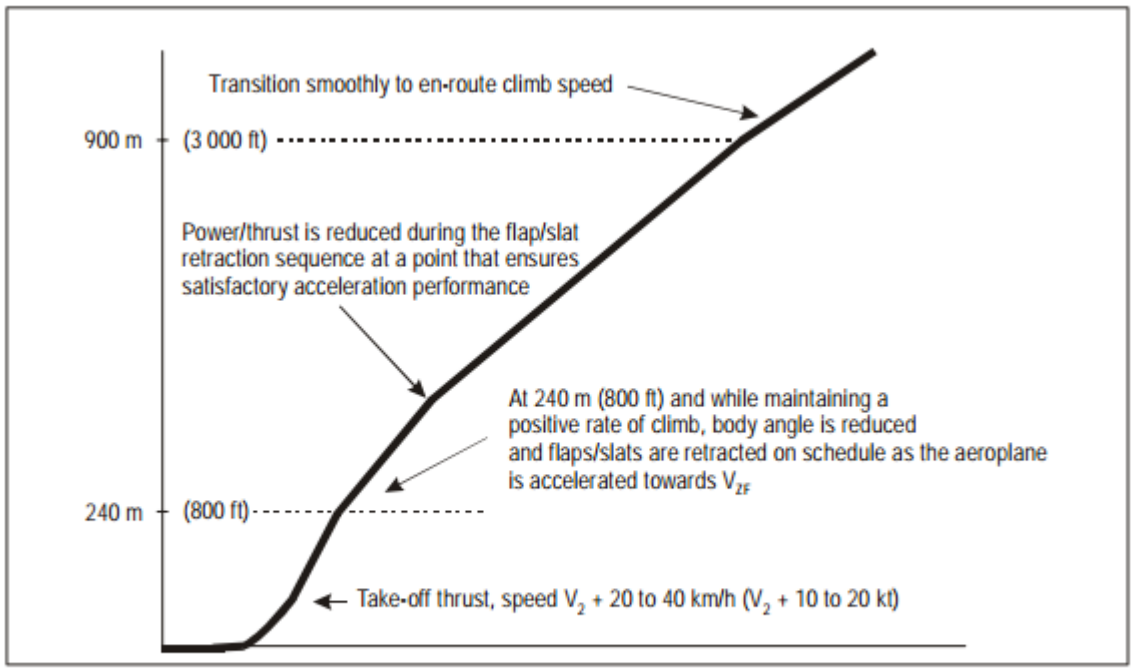

Figure I-7-3-App-2. Noise abatement take-off climb — Example of a procedure alleviating noise distant from the aerodrome (NADP 2)

4. Conclusion

Although noise abatement procedures may have quantifiable environmental benefits in terms of noise, effective implementation may be difficult.
Procedures must be developed, tested, and evaluated for:

- ATC impacts – variations in aircraft performance may make it difficult for controllers to efficiently sequence and space traffic
- Capacity requirements – NAPs may generate unacceptable delay and congestion
- Aircraft equipment – sophisticated flight management systems are required
- Pilot acceptance – NAPs often increase pilot workload
- Airport configuration and local community characteristics – availability of adjacent land mass to modify arrivals or departures
- Terrain and obstacles – terrain or manmade obstacles may severely limit
- ATC, airport and aircraft operators to implement simple and effective NAPs