Airbus A380 noise measurements

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Background and context

- Why produce a report on noise measurements of a new aircraft type?
  - Airbus A380 is much larger than any preceding aircraft
    - 1970-1989 747 increased from 333 to 394 tonnes, increase 18%
    - A380 introduced in 2008, MTOW 569 tonnes, increase over 747-400 of 44%
  - Public noise requirements by the launch customer, Singapore Airlines
  - Commitment made in Heathrow Airport’s Noise Action Plan (Ref 1.5)
  - First aircraft specific noise measurement report, since CAA Paper 77007: Noise Data from the First Year of Scheduled Concorde Operations at Heathrow Airport – London
  - ERCD Report 1106 available on HAL website
Airbus A380

- Introduced at Heathrow in March 2008
  - Singapore Airlines to Singapore
  - Qantas Airways to Singapore
  - Emirates to Dubai
  - Adhoc Air France services to Paris
- Slow build up of flights to only two core destinations and limited resources delayed data collection, but enabled three years worth of data to be collected (Mar 2008 – Mar 2010)
- Measurements taken from fixed noise monitors and any deployed mobile monitors
- Report measured noise levels at each monitor in $L_{\text{Amax}}$ and SEL noise indicators
- Compare with Boeing 747
  - Not as straightforward as it might first seem
Airbus A380 summary (1)

- Noise measurements reported for all available monitors in terms of both $L_{\text{max}}$ (peak level) and Sound Exposure Level (SEL), which takes into account the duration of the noise event.
- Compared with other long-haul types: Boeing 747-400, 777-300, 777-300ER, and Airbus A340-600.
- Departure:
  - Confirms that the Airbus A380 is quieter than the Boeing 747-400.
  - In some circumstances it is noisier than other QC/2 aircraft due to the longer distances currently flown (Singapore 5,900nm, average distance flown by the 747-400 is less than 4,000nm).
  - Noise performance is comparable with other QC/2 aircraft on departure after accounting for distance flown.
  - As a wider number of operators introduce the aircraft in future years, it is expected that the average distance flown will reduce, reducing average departure noise levels.
Peak noise levels ($L_{A_{\text{max}}}$) for departures to Singapore

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Monitor Site</th>
<th>Average $L_{\text{max}}$ (dBA)</th>
<th>89</th>
<th>B</th>
<th>F</th>
<th>101</th>
<th>76</th>
<th>94</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Runway</td>
<td></td>
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<td>09R</td>
<td>27R</td>
<td>09R</td>
<td>27R</td>
<td>27R</td>
<td>27R</td>
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<tr>
<td></td>
<td>Distance from SOR (km)</td>
<td></td>
<td>4.4</td>
<td>5.9</td>
<td>6.4</td>
<td>9.1</td>
<td>12.6</td>
<td>13.8</td>
</tr>
<tr>
<td>B747-400 (PW engines)</td>
<td></td>
<td></td>
<td>100.7</td>
<td>91.6</td>
<td>86.8</td>
<td>-</td>
<td>81.7</td>
<td>81.4</td>
</tr>
<tr>
<td>B747-400 (RR engines)</td>
<td></td>
<td></td>
<td>99.5</td>
<td>91.0</td>
<td>82.7</td>
<td>81.9</td>
<td>80.1</td>
<td>79.4</td>
</tr>
<tr>
<td>B747-400 (GE engines)</td>
<td></td>
<td></td>
<td>-</td>
<td>90.2</td>
<td>83.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A380-800 (RR engines)</td>
<td></td>
<td></td>
<td>92.7</td>
<td>87.2</td>
<td>81.2</td>
<td>79.8</td>
<td>78.5</td>
<td>75.4</td>
</tr>
<tr>
<td>B777-300ER (GE engines)</td>
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<td></td>
<td>92.6</td>
<td>85.2</td>
<td>78.0</td>
<td>75.8</td>
<td>73.8</td>
<td>-</td>
</tr>
</tbody>
</table>
Airbus 380 summary (2)

- Approach:
  - Quieter than the Boeing 747-400
  - Wider than expected difference between the two engine types.
    - The Engine Alliance-powered variant is quieter than previous best performing wide-body aircraft, the A340-600 and B777-300ER.
    - RR-powered variant is slightly noisier than the A340-600 and B777-300ER.
  - Working with RR to understand the reasons for the difference
  - Further away from the airport, differences between aircraft differ, likely reflecting operational factors, not just source noise/technology.
A380 & B747-400 Approach Noise Levels

Sound Exposure Level (SEL), dBA

distance to touchdown, km

- Airbus A380-800 (RR engines)
- Airbus A380-800 (EA engines)
- Boeing 747-400 (GE engines)
- Boeing 747-400 (PW engines)
- Boeing 747-400 (RR engines)

BA flights, summer 2014