SOUND EXPOSURE LEVELS (SEL) CHART FOR CIVIL JET TRANSPORT AIRCRAFT TAKEOFFS USING ATA PROCEDURES (Adopted: December 1976)
**TECHNICAL REPORT DATA**

<table>
<thead>
<tr>
<th>1. REPORT NO.</th>
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<th>3. RECIPIENT'S ACCESSION NO.</th>
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<td>2. ADDENDUM 1</td>
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**ABSTRACT**

EPA 550/9-77-450, presented a method for the manual calculation of day-night average sound levels (Ldn) due to aircraft operations. Information was presented for different aircraft and different operational procedures. Addendum 1 presents the additional information needed to predict the noise levels produced by aircraft which utilise the Air Transport Association (ATA) procedures which were adopted December 1976.

**KEY WORDS AND DOCUMENT ANALYSIS**

<table>
<thead>
<tr>
<th>DESCRIPTORS</th>
<th>IDENTIFIERS/OPEN ENDED TERMS</th>
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<tr>
<td>Noise levels, aircraft noise levels, day-night average noise levels, noise level prediction, airport noise levels</td>
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**EPA Form 2210-1 (9-72)**
SOUND EXPOSURE LEVELS (SEL) CHARTS FOR
CIVIL JET TRANSPORT AIRCRAFT TAKEOFFS
USING ATA PROCEDURES
(Adopted December 1976)

January 1978

Prepared for:
U.S. Environmental Protection Agency
Office of Noise Abatement and Control
Under Contract No. 68-01-4388

This report has been approved for general availability. The contents of this report reflect the views of the contractor, who is responsible for the facts and the accuracy of the data presented herein, and do not necessarily reflect the official views of policy of EPA. This report does not constitute a standard, specification, or regulation.
ADDENDUM I

SOUND EXPOSURE LEVEL (SEL) CHARTS FOR
CIVIL JET TRANSPORT AIRCRAFT TAKEOFFS USING
ATA PROCEDURES ADOPTED DECEMBER 1976

This addendum presents sound exposure level (SEL) charts for civil jet transport takeoffs based on the revised air transport association (ATA) procedures adopted in December 1976. For studies of current and forecast operations involving air transport aircraft using ATA procedures, these charts (as shown in the table below) should replace the takeoff charts given in Attachment 1, Calculations of Day-Night Levels ($L_{dn}$) Resulting From Civil Aircraft Operations, EPA Report 550/9-77-450.

<table>
<thead>
<tr>
<th>Aircraft Types</th>
<th>Aircraft Code</th>
<th>Pages in Attachment 1</th>
<th>Pages in Addendum</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Engine LBPR turbofan</td>
<td>4-T-TFL</td>
<td>80-88</td>
<td>10-18</td>
</tr>
<tr>
<td>4-Engine LBPR turbofan (quiet nacelle)</td>
<td>4-T-TFL(Q)</td>
<td>111-119</td>
<td>19-27</td>
</tr>
<tr>
<td>3-Engine LBPR turbofan</td>
<td>3-T-TFL</td>
<td>142-147</td>
<td>28-33</td>
</tr>
<tr>
<td>3-Engine LBPR turbofan (quiet nacelle)</td>
<td>3-T-TFL(Q)</td>
<td>164-169</td>
<td>34-39</td>
</tr>
<tr>
<td>2-Engine LBPR</td>
<td>2-T-TFL</td>
<td>186-191</td>
<td>40-45</td>
</tr>
<tr>
<td>2-Engine LBPR turbofan (quiet nacelle)</td>
<td>2-T-TFL(Q)</td>
<td>203-213</td>
<td>46-51</td>
</tr>
<tr>
<td>4-Engine HBPR turbofan</td>
<td>4-T-TFH</td>
<td>229-237</td>
<td>52-60</td>
</tr>
<tr>
<td>4-Engine HBPR turbofan (quiet nacelle)</td>
<td>4-T-TFH(Q)</td>
<td>260-268</td>
<td>61-69</td>
</tr>
<tr>
<td>3-Engine HBPR turbofan</td>
<td>3-T-TFH</td>
<td>291-299</td>
<td>70-78</td>
</tr>
</tbody>
</table>

The ATA procedures adopted in December 1976 differ in some details from those used previously. A comparison of procedures is given in Table 1. A comparison of takeoff profiles for a
Boeing 727 aircraft is given in Figure 1.* Note that as in the examples shown in Figure 1, the outback to climb thrust is usually initiated at a lower altitude in the current ATA procedures than in the previous ATA procedures. Hence, aircraft taking off under the current procedures generally require a longer distance from the start of takeoff roll to reach a height of 3,000 feet.

Figures 2 through 6 show the takeoff profiles for the revised ATA procedures which were utilized to develop the SEL charts given in this addendum. These takeoff profiles may be compared with those given in Figures 2-3 through 2-7 of EPA Report 550/9-77-450.**

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*Detailed differences in the procedures will occur with aircraft type.

<table>
<thead>
<tr>
<th>Phase</th>
<th>First Phase</th>
<th>Second Phase</th>
<th>Third Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Procedures Adopted August 1972</strong></td>
<td><strong>Procedures Adopted December 1976</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Takeoff to 1500 ft.</strong></td>
<td><strong>Takeoff to 1000 ft.</strong></td>
<td><strong>Takeoff to 3000 ft.</strong></td>
</tr>
<tr>
<td></td>
<td>Takeoff (TO) thrust</td>
<td>Takeoff (TO) thrust</td>
<td>Reduce aircraft pitch to maintain 500 to 1000 rpm climb rate. Accelerate and</td>
</tr>
<tr>
<td></td>
<td>$V_2 + 10$ airspeed</td>
<td>$V_2 + 10$ airspeed</td>
<td>initiate flap retraction at appropriate minimum speeds. Reduce engine power to</td>
</tr>
<tr>
<td></td>
<td>TO flaps</td>
<td>TO flaps</td>
<td>climb thrust during/following cleanup of flaps and slats. Climb to 3000 ft.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>at zero flap speed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>1500 to 3000 ft.</strong></td>
<td><strong>3000 ft. and Above</strong></td>
</tr>
<tr>
<td></td>
<td>Reduce thrust to maximum</td>
<td>Reduce thrust to maximum</td>
<td>Accelerate to 250 Kt.</td>
</tr>
<tr>
<td></td>
<td>climb thrust</td>
<td>Maintain $V_2 + 10$ airspeed</td>
<td>Maintain rate of climb of 500 to 1000 rpm during acceleration, then continue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and TO flaps</td>
<td>climb at 250 Kt.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Maintain $V_2 + 10$ airspeed and TO flaps</strong></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
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</table>

* Procedure varies with aircraft model.
FIGURE 1. COMPARISON OF ATA PROCEDURES FOR 3-ENGINE LBPR TURBOFAN TRANSPORT AIRCRAFT - 727 SERIES (3-T-TFL) - PROFILE 1
Figure 2. ATA Takeoff Profiles for 4-Engine LBPR Turbofan Transport Aircraft - DC-8, 707 Series (4-T-TFL) - Revised Procedures Adopted December 1976
FIGURE 3. ATA TAKEOFF PROFILES FOR 3-ENGINE LBPR TURBOFAN TRANSPORT AIRCRAFT - 727 SERIES (3-T-TFL) - REVISED PROCEDURES ADOPTED DECEMBER 1976
Figure 4. ATA Takeoff Profiles for 2-Engine LBPR Turbofan Transport Aircraft - DC-9, 737 Series (2-T-TFL) - Revised Procedures Adopted December 1976
Figure 5. ATA Takeoff Profiles for 4-Engine HBPR Turbofan Transport Aircraft - 747 Series (4-T-TFH) - Revised Procedures Adopted December 1976
FIGURE 6. ATA TAKEOFF PROFILES FOR 3-ENGINE HBPR TURBOFAN TRANSPORT - DC-10, L-1011 SERIES (3-T-TFH) - REVISED PROCEDURES ADOPTED DECEMBER 1976
4-ENGINE LBPR TURBOFAN TRANSPORT
(707/DC8) RANGE 0 - 1,000 N. MILES

TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 - 6,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE LBPR TURBOFAN TRANSPORT (707/DC8) RANGE 0 - 1,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 14,000 ft.
Flight Track Distance Range
6,000 - 25,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 13 -
4-ENGINE LBPR TURBOFAN TRANSPORT
(707/DC8) RANGE 0 - 1,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
25,000 - 110,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in db

Distance from Aircraft Flight Track Centerline in feet

- 14 -
4-ENGINE LBPR TURBOFAN TRANSPORT (707/DC8) RANGE 1,000 - 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 18,000 ft.

Flight Track Distance Range
6,000 - 30,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dB
4-ENGINE LBPR TURBOFAN TRANSPORT (707/DC9) RANGE > 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 – 8,000 ft, from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dBA
4-ENGINE LBPR TURBOFAN TRANSPORT (707/DC-8) RANGE > 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 30,000 ft.

Flight Track Distance Range
8,000 - 35,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 19 -
Sound Exposure Level (SEL) in dB

4-ENGINE LBPR TURBOFAN TRANSPORT
(707/DC9) RANGE > 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
35,000 - 140,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

- 20 -
4-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(707/DC8) RANGE 0 - 1,000 N. MILES

TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 - 6,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 21 -
4-ENGINE LB PR TURBOFAN TRANSPORT
QUIET NACELLES
(707/DC8) RANGE 0 - 1,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 15,000 ft.
Flight Track Distance Range
6,000 - 25,000 ft. from start of Takeoff Roll
4-ENGINE LBPR TURBOFAN TRANSPORT QUIET NACELLES
(707/DC8) RANGE 1,000 - 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 20,000 ft.
Flight Track Distance Range
6,000 - 30,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 25 -
4-ENGINE LBPR TURBOFAN TRANSPORT

QUIET NACELLES

(707/DC8) RANGE 1,000 - 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
30,000 - 140,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(707/DC9) RANGE > 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(707/DC8) RANGE > 2,000 N. MILES

TAKEOFF-ATA (Revised 1976)
Power Cutback at 30,000 ft.

Flight Track Distance Range
8,000 - 35,000 ft. from start of Takeoff Roll
3-ENGINE LBPR TURBOFAN TRANSPORT
(727) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dB
3-ENGINE LBPR TURBOFAN TRANSPORT (727) RANGE 0 - 500 N. MILES
TAKEOFF - AT (Revised 1976)
Power Cutback at 18,000 ft.
Flight Track Distance Range
8,000 - 30,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
3-ENGINE LBPR TURBOFAN TRANSPORT
(727) RANGE 0 - 500 N.MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
30,000 - 140,000 ft. from start of Takeoff Roll
Sound Exposure Level (SEL) in dB

3-ENGINE LBPR TURBOFAN TRANSPORT
(727) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 10,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet
3-ENGINE LBPR TURBOFAN TRANSPORT
(727) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 20,000 ft.
Flight Track Distance Range
10,000 - 35,000 ft. from start of Takeoff Roll
3-ENGINE LBPR TURBOFAN TRANSPORT
(727) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
35,000 - 140,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 35 -
3-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(727) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 18,000 ft.
Flight Track Distance Range
8,000 - 30,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
3-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(727) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
30,000 - 140,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 38 -
3-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(727) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 10,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 39 -
3-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(727) RANGE > 500 N, MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
40,000 - 140,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
2-ENGINE LBPR TURBOFAN TRANSPORT (DC-9/737) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 6,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 42 -
2-ENGINE LBPR TURBOFAN TRANSPORT
(DC-9/737) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 16,000 ft.
Flight Track Distance Range
6,000 - 22,000 ft. from start of Takeoff Roll
2-ENGINE LBPR TURBOFAN TRANSPORT
(DC-9/737) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
22,000 - 100,000 ft. from start of Takeoff Roll
2-ENGINE LBPR TURBOFAN TRANSPORT
(DC-9/737) RANGE > 500 N, MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 = 8,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
2-ENGINE LBPR TURBOFAN TRANSPORT
(DC-9/737) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 18,000 ft.
Flight Track Distance Range
8,000 - 25,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB vs Distance from Aircraft Flight Track Centerline in feet
2-ENGINE LBPR TURBOFAN TRANSPORT
(DC-9/737) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
25,000 - 120,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dB

- 47 -
2-ENGINE L8PR TURBOFAN TRANSPORT
QUIET NACELLES
(DC-9/737) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 6,000 ft, from start of Takeoff Roll

2-T-TFL(Q)-TO(1)-R-1

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
2-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(DC-9/737) RANGE 0 - 500 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 16,000 ft.

Flight Track Distance Range
6,000 - 22,000 ft. from start of Takeoff Roll
2-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(DC-9/737) RANGE 0 - 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
22,000 - 100,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
2-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(DC-9/737) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in db

Distance from Aircraft Flight Track Centerline in feet
2-ENGINE LBPR TURBOFAN TRANSPORT
QUIET NACELLES
(DC-9/737) RANGE > 500 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
25,000 - 120,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dB

- 53 -
4-ENGINE HBPR TURBOFAN TRANSPORT
(747) RANGE 0 - 1,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll
4-ENGINE HB PR TURBOFAN TRANSPORT
(747) RANGE 0 - 1,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Power Cutback at 18,000 ft.
Flight Track Distance Range
8,000 - 30,000 ft. from start of Takeoff Roll
4-ENGINE HSPR TURBOFAN TRANSPORT
(747) RANGE 0 - 1,000 MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
30,000 - 140,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE HBPR TURBOFAN TRANSPORT
(747) RANGE 1,000 - 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 57 -
4-ENGINE HBPR TURBOFAN TRANSPORT
(747) RANGE 1,000 - 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 25,000 ft.

Flight Track Distance Range
8,000 - 35,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE HBPR TURBOFAN TRANSPORT
(747) RANGE 1,000 - 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
35,000 - 140,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE HBPR TURBOFAN TRANSPORT
(747) RANGE > 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 = 10,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE HBPR TURBOFAN TRANSPORT
(747) RANGE > 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 35,000 ft,
Flight Track Distance Range
10,000 - 40,000 ft, from start of Takeoff Roll
4-ENGINE HBPR TURBOFAN TRANSPORT
(747) RANGE > 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
40,000 - 140,000 ft, from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

4-T-TFH-TO(111)-R-3
4-ENGINE HBPR TURBOFAN TRANSPORT QUITE NACELLES
(747) RANGE 0 - 1000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
0 - 8,000 ft, from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dB

- 63 -
4-ENGINE HBPR TURBOFAN TRANSPORT
QUIET NACELLES
(747) RANGE 0 - 1,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 20,000 ft.

Flight Track Distance Range
8,000 - 30,000 ft. From Start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 64 -
4-ENGINE HBPR TURBOFAN TRANSPORT QUIET NACELLES
(747) RANGE 1,000 - 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll
4-ENGINE HBPR TURBOFAN TRANSPORT QUIET NACELLES
(747) RANGE 1,000 - 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 25,000 ft.

Flight Track Distance Range
8,000 - 35,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
4-ENGINE HBP TURBOFAN TRANSPORT QUIET NACELLES (747) RANGE > 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range 0 - 10,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
3-ENGINE HBPFR TURBOFAN TRANSPORT
(DC10/L101) RANGE 0 - 1,000 N. MILES

TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll

- 72 -
3-ENGINE HBPR TURBOFAN TRANSPORT
(DC10/L1011) RANGE 0 - 1,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 20,000 ft.

Flight Track Distance Range
8,000 - 25,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

- 73 -
3-ENGINE HBPR TURBOFAN TRANSPORT (DC10/L1011) RANGE 0 - 1,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
25,000 - 140,000 ft. from start of Takeoff Roll
3-ENGINE HBPR TURBOFAN TRANSPORT
(DC10/L1011) RANGE 1,000 - 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 - 8,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet
3-ENGINE HOPR TURBOFAN TRANSPORT
(DC10/L1011) RANGE 1,000 - 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 25,000 ft.

Flight Track Distance Range
8,000 - 35,000 ft. from start of Takeoff Roll
3-ENGINE HBPR TURBOFAN TRANSPORT
(DC10/L1011) RANGE 1,000 - 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
35,000 - 140,000 ft. from start of Takeoff Roll
3-ENGINE HFPF TURBOFAN TRANSPORT
(DC10/L1011) RANGE > 2,000 N. MILES

TAKEOFF - ATA (Revised 1976)

Flight Track Distance Range
0 = 10,000 ft. from start of Takeoff Roll

Sound Exposure Level (SEL) in dB

Distance from Aircraft Flight Track Centerline in feet

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3-ENGINE HBPR TURBOFAN TRANSPORT
(DC10/L1011) RANGE > 2,000 N, MILES

TAKEOFF - ATA (Revised 1976)
Power Cutback at 30,000 ft.

Flight Track Distance Range
10,000 - 35,000 ft. from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dBA
3-ENGINE HBPR TURBOFAN TRANSPORT
(DC10/L1011) RANGE > 2,000 N. MILES
TAKEOFF - ATA (Revised 1976)
Flight Track Distance Range
35,000 - 140,000 ft, from start of Takeoff Roll

Distance from Aircraft Flight Track Centerline in feet

Sound Exposure Level (SEL) in dBA