Chapter 4 Noise

1. Airport noise

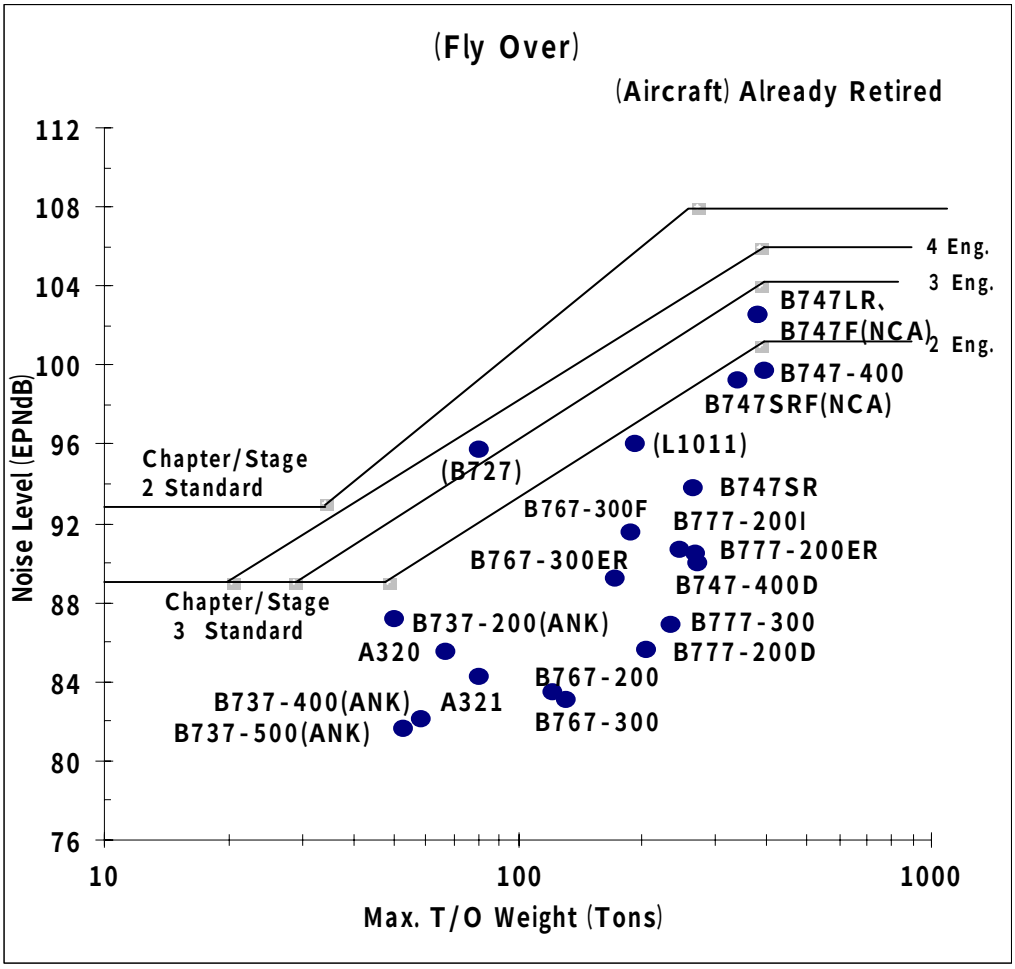
Airport noise includes the following:

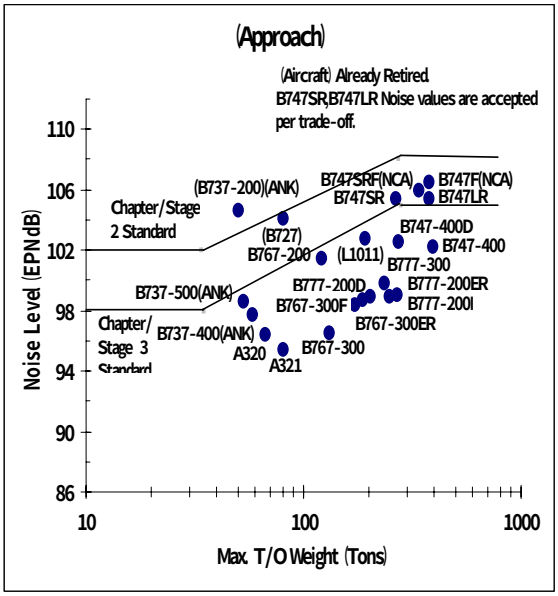
1) Flight noise (engine noise during takeoff and landing)
2) Ground noise
   (i) Aircraft engine operation noise on the ground
   (ii) APU (Auxiliary Power Unit of aircraft) operation noise
   (iii) GPU (Ground Power unit) operation noise
   (iv) Others (ground vehicles, maintenance factories, etc.)

2. Flight noise standards

ICAO (International Civil Aviation Organization) Annex 16 determines the noise standard for semisonic jet airplanes. The initial standards were included in Chapter 2 and "Chapter 3 of Annex 16, and in October 2001 a new and more strict "Chapter 4 standard" was added at the ICAO Plenary Meeting.

1) Chapter 2 standard
   Airplanes conforming to Chapter 2 standard were banned from operation in major countries including Japan starting from April 1, 2002. The ANA Group has already retired every airplane conforming to the Chapter 2 standard.
2) Chapter 3 standard
   This standard was the most strict noise standard before the addition of the new Chapter 4 standard. All ANA airplanes have conformed to the Chapter 3 standard since 1994(refer to Fig. 4-1). The new Chapter 4 standard was adopted at ICAO Plenary in October 2001. Contents of the Chapter 3 standard are shown in Reference 1 at the end of this chapter.
3) Chapter 4 standard
   By ICAO's resolution, the ICAO Annex 16 was revised in March 2002, and the new Chapter 4 standard was added. The new standard will be applicable for the new airplanes after January 1, 2006, and for airplanes currently in service, the application details of the new standard are still in the preparation process, and no approval has been issued to any existing airplanes. Of the ANA group fleet, all airplanes except B747SR, B747LR, and B747F (NCA) will conform to the Chapter 4 standard. ANA plans to retire all B747SR and B747LR airplanes, which do not conforme to the Chapter 4 standard, by the end of fiscal 2006, and will introduce new B777-300 airplanes. The contents of the 33rd ICAO Plenary resolution on the Chapter 4 standard are shown in the Reference page at the end of this chapter.





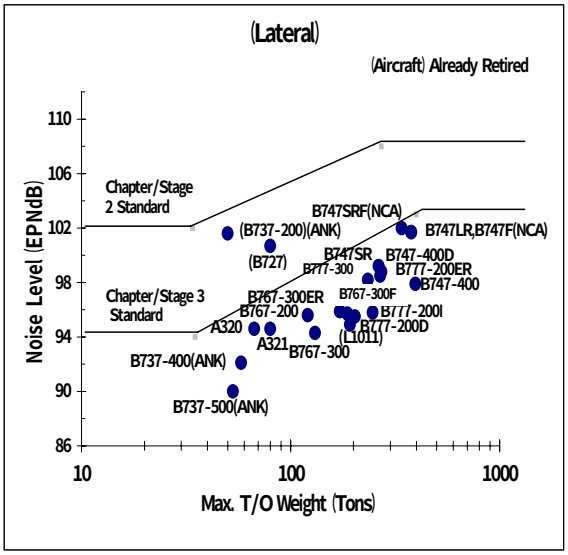


Fig.4-1 ANA Group Fleet Noise Level and ICAO Standards (Chapter 3)

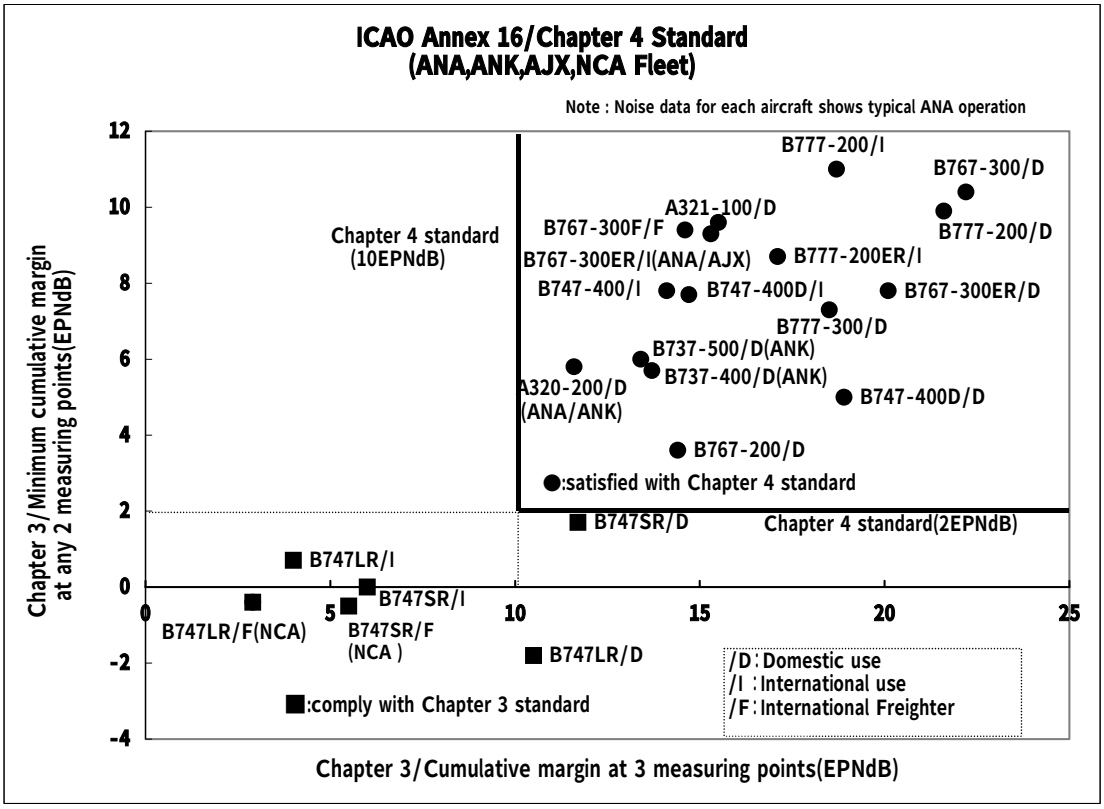


Fig.4-2 ANA Group Fleet Noise Level and ICAO Standards (Chapter 4)

(2) Change in Noise Contour

The area influenced by the same noise level has been reduced with the introduction of new quieter aircraft. (Refer to Figure 2-3).

ANA has been participating in "Aircraft Noise Issue Sub-committee" and its working group that are formed by the government and the people combination, and continuing the review work to improve the accuracy of the noise-forecast program.

(3) Balanced approach / No phase-out of Chapter 3 Aircraft

ICAO Assembly/33 in 2001 adopted following conclusions.

(i) New Standard is intended for certification purposes only and is not intended to be used as a basis for operational restrictions

(ii) The results of the cost/benefit analyses conducted do not support general phase-out of Chapter 3 aircraft in the non-exempt regions

(iii) The four elements of the balanced programme had to be applied on an airport-by-airport basis

- Source noise reduction
- Land-use management
- Noise abatement procedure
- Noise mitigation measures

(iv) The results of the cost/benefit analyses conducted do not support any regional phase-out

(v) Operating restrictions should be considered under the ICAO balanced programme of noise mitigation and there is a need for further work on ICAO framework conditions of operating restrictions as part of the ICAO balanced programme

Aircraft Noise Contour Footprint (Comparison of noise contour)

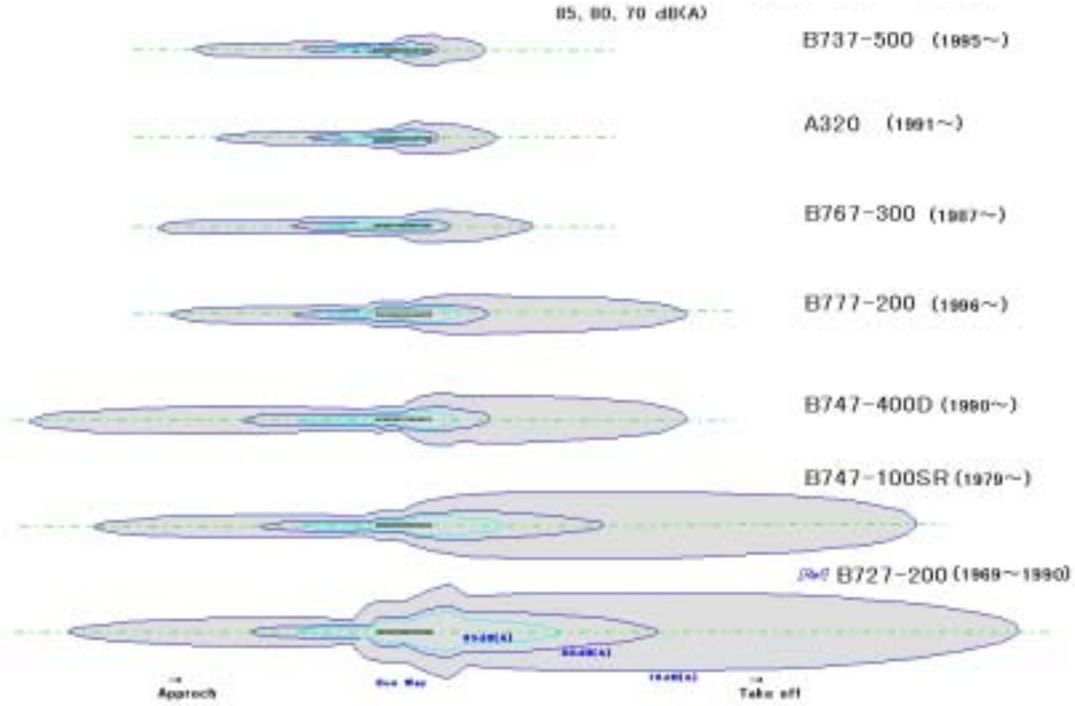


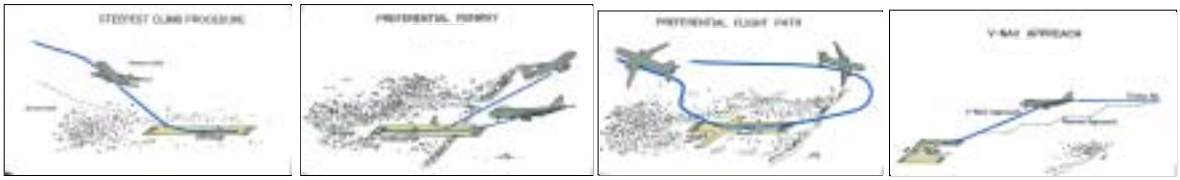
Fig. 4-3 Comparison of noise contour by aircraft type

3. ANA's noise abatement procedures

1) Introduction of noise abatement flying procedures

ANA introduced its noise abatement procedures based on the review by the "Committee to Promote Noise Abatement Operation Procedures," jointly established by JCAB and airlines in 1975. The procedures have been improved and are still in use today.

	Procedure	Description	Airport
Takeoff	Steepest climb procedure	Continue a steeper takeoff ascent to a higher altitude than usual (to 3000 ft.), so as to keep noise contained to the airport region as much as possible, while controlling noise by attaining high altitude in residential areas (refer to the figure)	All airports of Japan
Landing	Delayed flap-down approach procedure	Delay flap-down and landing-gear-down operations to reduce air resistance to the airframe, so as to decrease engine thrust requirement, thereby reducing noise.	Almost every airport in Japan
	Low flap angle landing procedure	Set smaller flap angle for use during final approach to reduce air resistance to the airframe, so as to decrease engine thrust requirement, thereby reducing noise	Airports with longer runway length
Landing and takeoff	Preferential runway procedure	If one side of runway does not have a residential area, then perform takeoff and landing in the preferred direction, as long as wind direction and speed permits(refer to the figure)	Haneda, Matsuyama, Sendai, etc.
	Preferential flight path procedure	In the airport vicinity (lower altitude), select flight paths that circumvent residential areas as much as possible by turning, or that passe over rivers (refer to the figure).	Haneda, Narita, Itami, Nagoya, Sendai, etc.
	V-NAV approach continuous descent procedure	During descent, maintain higher altitude until the vicinity of airport, then continuously descend, so as to control the changes in engine thrust, thereby abating noise. This procedure can save fuel as well (refer to the figure).	New Chitose
	FMS/LLZ flight procedure	Use FMS/LLZ/RNAV in the airport vicinity and fly while avoiding residential areas and shortening flight path. In the case of late night landing in Haneda, avoid passing through Kisarazu (land area), and approach by taking a short cut over the ocean.	Haneda, Frankfurt, Paris, Bangkok, etc.



ANA adopted the FMS/LLZ procedure in 1999 for late night flights to Haneda Airport, and started to operate the V-NAV approach procedure at New Chitose Airport in 2002. We plan to expand the use of these procedures in the future.

2) Kansai International Airport

After the opening of the Kansai International Airport, ANA used the airspace over Kushimoto for its Kansai to Haneda route, but starting in December 1998, it became possible to use a shorter flight path over Suzuka Mountains, shortening the flight time by about six minutes.

In June 2001, Kansai International Airport Corporation issued its "Environmental Management Plan for Kansai International Airport," which aims to make the airport friendly to people and nature, while minimizing the environmental impact on Osaka Bay and its vicinity. In 2003, it issued a notice to airmen (Notam) advising airlines to halt APU operations when parked on the ground, as in the case of Narita Airport.

The airport is building a new B Runway, with a plan to start usage from 2007.

3) Osaka International Airport (Itami)

It was concluded that noise has been significantly reduced at Kansai International Airport through the introduction of low noise jets, the distribution of functions to Kansai International Airport, and the abatement of landing noise, and in March 1998, the Ministry of Transportation presented a proposal to review Osaka International Airport's zone for noise abatement measures. Later, in April 2000, the zone for noise abatement measures under the Law of Aircraft Noise Abatement was reduced. Today the number of flights has reached the maximum level as part of the Plan of Noise Abatement Measures; therefore, measurement and confirmation of noise is scheduled in the latter half of 2003.

4) Tokyo International Airport (Haneda)

Due to the start of the new C runway use in March 1997, noise levels in the Haneda Airport region were greatly improved. Based on the result, Haneda Airport became a 24-hour airport starting in July 1997. In March 2000, a new B runway started being used, thereby completing the plan to Shift A, B, and C runways offshore for noise abatement. Starting February 2001, the operation of late night international charter flights was allowed, and ANA started the operation of such flights. At present, Haneda has a plan to construct a new runway for side winds at the mouth of the Tama River.

5) Narita Airport

A 2180-meter temporary parallel runway was built at the end of November 2001, and it started being used in April 2002. Using this runway, ANA has increased its services for short-distance international flights as well as domestic flights, using mid-range aircraft.

4. Ground noise

1) Osaka International Airport

While ANA built noise-blocking walls in 1997, for its engine test runs, ANA still makes every effort to shorten its test operation times and high power output operation times.

For APU, we try to shorten our operation time, and use GPU(ground power units) such as cars with low-noise type for nighttime maintenance.

For further reduction of ground noise, a new engine test run facility by JCAB was built with large- scale noise blocking walls, and started operation in 2003. Because of this, ANA's noise blocking walls were closed down.

New engine test run facility (white building at the back), and ANA's noise blocking facility (in red and white) which has been in use for 30 years.

(2) New Tokyo International Airport (Narita)

(i) With the beginning of the operation of terminal 2, ANA consider an influence over the area near taxiway, and voluntarily refrain from operating APU at the time of ramp-in and ramp-out. As for our operation of APU, APU OFF operation has been our standard since 1992 from the viewpoint of ramp noise reduction according to a request from NAA as well as from the viewpoint of the fuel cut down (the reduction of CO_2 emission). When the repair of terminal 1 was completed, NAA notified all the airlines "to implement APU OFF operation as much as possible from April 1, 1998" with a document from the viewpoint of the global warming prevention.

(ii) The hangar type noise suppression facility (engine ground running noise) for the south wind was constructed by a joint investment of ANA, JAL, and NAA in April 1999, which is a part of the countermeasures on the aircraft noise.

It is expected to be more efficient than the existing facilities for the north wind, to be possible to correspond to all kinds of airplanes, to be possible to operate for 24 hours, and to contribute to the region environmentally. The modification of facility to resist the crosswind and to improve the performance was carried out in March 2000. Full-dress operation started from April 2001. Engine run-up for maintenance purpose during midnight and early morning (22:00 to 06:00) has to be done in this facility.

Hangar type noise suppression facility (Narita)

(3) Tokyo International Airport (Haneda)

(i) New run-up area was established in offshore area of Haneda and started its operation from January 1994. The noise problem to the area was considerably eased by the operation of 7 spots in total.

(ii) ANA built the new engine test cell in October 1995, which is considered to restrain low frequency noise, and also built an APU run-up facility aside in April 1998.

ANA Facilities (Haneda Airport)

(4) Countermeasure on Noise of Maintenance Facilities and Vehicles

ANA has been carrying forward the renewal of our vehicles to low noise type and all of the AC power supply cars ANA possess are low noise type. Also, ANA introduced 1 low-noise type de/anti-icing vehicle with blower by 2001, and 5 in 2003.

Low-noise type AC Electrical Power Supply Car

Low-noise type de/anti-icing vehicle (New Chitose Airport)

[Note]

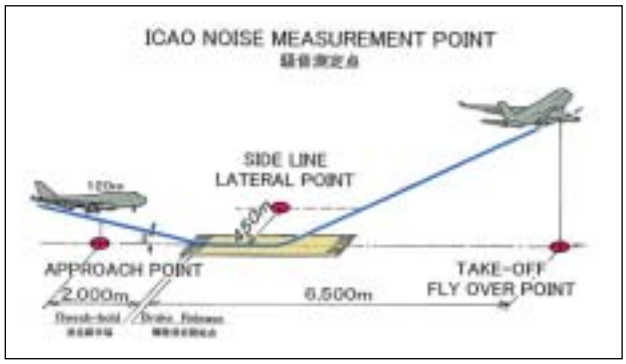
1. ICAO Chapter 3 Noise Standard

Three Measurement Points

(1) Lateral reference noise measurement point: 450m from the runway center line

(2) Flyover reference noise measurement point: 6.5km from the start of roll

(3) Approach reference noise measurement point: 2.0km from the threshold



2. New ICAO Chapter 4 Noise Standard (ICAO Assembly Resolution)

(1) A cumulative margin of 10 dB over current Chapter 3 levels

(2) The sum of the improvements at any two measurement points shall be at least 2 dB

(3) No trade-offs are permitted

(4) The applicability date is 01 January 2006

(5) New noise standard is only intended for certification purposes and not for the purpose of new operational restrictions such as phase-outs

(6) Specific consideration for exemptions from new operating restrictions for developing countries