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AIR TRAFFIC MANAGEMENT DIVISION
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HONG KONG INTERNATIONAL AIRPORT

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**TERMINATION OF ALLOCATION OF SLOTS TO
NON-CHAPTER 4 EQUIVALENT AIRCRAFT OPERATING AT NIGHT
TO/FROM HONG KONG INTERNATIONAL AIRPORT**

1. Introduction

- 1.1 Since July 2002, all subsonic jet aircraft landing or taking off in Hong Kong have been required to meet the noise standards stipulated in Volume I, Part II, Chapter 3 of Annex 16 to the Convention on International Civil Aviation (“Chapter 3”).
- 1.2 For the purpose of improving the local noise environment, operations of Marginally Compliant Chapter 3 (MCC3)¹ aircraft have been restricted into the Hong Kong International Airport (HKIA) since the Summer Season of 2014. The Civil Aviation Department (CAD) has not been allocating slots to flights which are proposed to be operated by MCC3 aircraft to land or take off in Hong Kong throughout the whole day.
- 1.3 To further reduce the noise impact to the local communities while giving more preparation time to aircraft operators, the CAD will tighten the restriction and will not allocate slots to Non-Chapter 4 Equivalent aircraft in a progressive manner. Commencing from the slot allocation for the Summer Season of 2019², no slot will be allocated to Non-Chapter 4 Equivalent aircraft operating between 1400 UTC and 2259 UTC (“Prohibited Period”). In June 2018, an advisory note was incorporated into the Slot Allocation List (SAL) issued to aircraft operators applying for slots in the Winter Season of 2018 for the purpose of providing advance notice of the planned requirement.

2. Non-Chapter 4 Equivalent Aircraft

- 2.1 Chapter 4 aircraft refer to civil subsonic jet aircraft that meet the noise standards stipulated in Volume I, Part II, Chapter 4 of Annex 16 to the Convention on International Civil Aviation. The Chapter 4 noise standards that are more stringent than the Chapter 3 noise standards applied to aircraft which are type-certificated between 2006 and 2017.

¹ Marginally Compliant Chapter 3 (MCC3) aircraft are defined as subsonic jet aircraft which comply with the noise standards stipulated in Volume I, Part II, Chapter 3 of the Annex 16 to the Convention on International Civil Aviation by a cumulative margin of not more than 5 EPNdB. Some commonly known aircraft types, include Boeing B727, Boeing B737 (-100 and -200 series), Boeing B747 (-100, -200, -300 and SP series), McDonnell Douglas DC-10 etc., are considered as MCC3 aircraft. The methodology in ascertaining whether an aircraft meets this definition is shown in the Attachment hereto.

² Start of Season on 31 March 2019.

2.2 For the purpose of implementing the abovementioned restriction, Chapter 3 aircraft that have met the criteria stipulated in Section 4.4 of the aforementioned ICAO Annex 16 provisions are considered as **Chapter 4 Equivalent aircraft**, despite the fact that they might not have been re-certificated to Chapter 4 noise standards by the relevant authority or manufacturer. Those which are UNABLE to meet such criteria are then considered as **Non-Chapter 4 Equivalent aircraft**. The methodology in ascertaining whether an aircraft meets the definition of Non-Chapter 4 Equivalent aircraft is shown in the Attachment hereto. Some commonly known Non-Chapter 4 Equivalent aircraft are the older models of A321 and B737-300 and B737-400.

2.3 In theory, the MCC3 aircraft are also Non-Chapter 4 Equivalent aircraft. For the avoidance of doubt, the MCC3 aircraft restriction will continue to apply throughout the whole day as per paragraph 1.2.

3. **Pre-assessment of Commonly Known MCC3 Aircraft or Non-Chapter 4 Equivalent Aircraft**

3.1 As the certificated noise performance of individual aircraft may vary depending on its engineering configuration, it is possible that an aircraft, though its type is one of the commonly known MCC3 or Non-Chapter 4 Equivalent aircraft types, may indeed be fall outside the respective definitions. Therefore, to facilitate the smooth implementation of the restrictions, an operator is recommended to carry out a self-assessment of the noise performance of its aircraft as early as possible in accordance with the methodology in the Attachment before submitting slot requests.

3.2 If an operator has reason(s) to believe that its aircraft may NOT be classified as MCC3 or Non-Chapter 4 Equivalent aircraft, it is advised to request the Airport Standards Division of the CAD to conduct an official noise assessment of the aircraft. The operator is required to submit the data necessary for such assessment which include registration mark, certificated maximum take-off mass, number of engines and certificated noise levels of each aircraft. Operators should provide documentary evidence on the data submitted. The assessment by the Airport Standards Division will be registration mark-specific. Each individual aircraft, which is classified as Non-MCC3 or Chapter 4 Equivalent aircraft after the assessment, will be issued a Pre-assessment Non-MCC3 Reference Number or a Pre-assessment Chapter 4 Equivalent Reference Number, as the case may be.

3.3 The contact details of the Airport Standards Divisions are:

Airport Standards Division
Civil Aviation Department
Level 5, CAD Headquarters
1 Tung Fai Road
Hong Kong International Airport
Lantau, Hong Kong

Telephone: (852) 2769 6969
Fax: (852) 2795 8469
Email: aircraftnoise@cad.gov.hk

4. Requesting Slots for Commonly Known MCC3 Aircraft (for operation throughout the whole day) or Non-Chapter 4 Equivalent Aircraft (for operation during the Prohibited Period)

- 4.1 For a slot request proposing the use of an aircraft type commonly known as MCC3 aircraft for operations throughout the whole day, the CAD Hong Kong Schedule Coordination Office (HKSCO) will apply the MCC3 restriction as per paragraph 1.2, unless the slot applicant has included in the Slot Clearance Request/Reply (SCR) message under Supplementary Information (SI) the corresponding Pre-assessment Non-MCC3 Reference Number(s) of the aircraft to be used in the proposed operation. In the absence of a valid Pre-assessment Non-MCC3 Reference Number, no slot will be confirmed or offered by HKSCO.
- 4.2 For a slot request proposing the use of an aircraft type commonly known as Non-Chapter 4 Equivalent aircraft for operations during the Prohibited Period, subject to paragraph 4.3 below, the HKSCO of the CAD will apply the restriction as per paragraph 1.3, unless the slot applicant has included in the SCR message under SI the corresponding Pre-assessment Chapter 4 Equivalent Reference Number(s) of the aircraft to be used in the proposed operation. In the absence of a valid Pre-assessment Chapter 4 Equivalent Reference Number, no slot will be confirmed or offered by HKSCO.
- 4.3 The requirement on the inclusion of a valid Pre-assessment Chapter 4 Equivalent Reference Number in the SCR message for slot requests proposing the use of aircraft types A321, B737-300 or B737-400 during the Prohibited Period will generally be waived. However, the slot applicant shall ensure that the operating aircraft is Chapter 4 Equivalent. The CAD will take appropriate action against any repeated and intentional misuse of this arrangement.
- 4.4 Should the slot applicant be applying for a noise assessment with the Airport Standards Division at the same time as submitting the slot request, the SCR message should be emailed to HKSCO at hkgslot@cad.gov.hk and copied to Airport Standards Division at aircraftnoise@cad.gov.hk. The SCR should include (i) under SI: *Request for a noise assessment with Airport Standards Division* and (ii) as an attachment all the documentary evidence required as per paragraph 3.2. It should be noted that the Airport Standards Division normally needs three (3) working days to assess whether the aircraft concerned is classified as a Chapter 4 Equivalent aircraft or not. To avoid delay to their slot requests, operators requesting for such a noise assessment are strongly advised to submit their requests as early as possible in advance of their planned schedules.

5. Dispensation for the Use of MCC3 Aircraft or Non-Chapter 4 Equivalent Aircraft within the Prohibited Period in Unforeseen Circumstances

- 5.1 If an operator allocated with a slot needs to operate an MCC3 aircraft due to unforeseen circumstances (such as aircraft deployment needs), the CAD will be prepared to consider such a request on a case-by-case basis but the operator concerned will be required to provide a written report to the Airport Standards Division with the justifications within 96 hours after the flight is flown.

5.2 If an operator with an allocated slot within the Prohibited Period needs to operate a Non-Chapter 4 Equivalent aircraft due to unforeseen circumstances (such as aircraft deployment needs, unavoidable operational delay, etc.), the CAD will be prepared to consider such a request on a case-by-case basis but the operator concerned will be required to provide a written report to the Airport Standards Division with the justifications within 96 hours after the flight is flown.

5.3 The CAD will take appropriate action against any failure to provide the written report with the justifications, repeated and intentional misuse of the above arrangements.

6. Dispensation for the Use of MCC3 Aircraft in Insurmountable Circumstances

6.1 If an operator needs to operate an MCC3 aircraft due to insurmountable operational circumstances, the operator is required to submit its request with strong justifications supported with documentary evidence and information in relation to the aircraft to the Airport Standards Division for consideration. It must be stressed that the CAD will only grant exemption for operation of an MCC3 aircraft under very exceptional circumstances.

7. Exempted Aircraft

7.1 Non-Chapter 4 Equivalent and MCC3 aircraft operated as State aircraft, or for emergency, medical and humanitarian purposes are exempted from the above restriction.

8. AIC 16/14 is hereby superseded.

This Circular is issued for information, guidance and necessary action
by direction of the Director-General of Civil Aviation
Simon LI

Assessment of Noise Standards of an Aircraft

Example 1 – B737-200

Aircraft	:	B737-200		
Maximum Take-off Weight (MTOW)	:	52,400 kg		
Number of engines	:	2		
Aircraft Certificated Noise Levels	:	- Lateral (L1)	96.2	(EPNdB)
		- Approach (A1)	98.4	(EPNdB)
		- Flyover (F1)	87.7	(EPNdB)

Applicable standards in ICAO Annex 16, Vol. I, Chapter 3, 3.4

Table

M = Maximum take-off mass in 1 000 kg		0	20.2	28.6	35	48.1	280	385	400	
Lateral full-power noise level (EPNdB) All aeroplanes			94				$80.87 + 8.51 \log M$			103
Approach noise level (EPNdB) All aeroplanes			98				$86.03 + 7.75 \log M$		105	
Flyover noise levels (EPNdB)	2 engines or less			89			$66.65 + 13.29 \log M$		101	
	3 engines		89				$69.65 + 13.29 \log M$		104	
	4 engines or more	89					$71.65 + 13.29 \log M$		106	

Calculation of ICAO Limits

a) Lateral Full Power (L)

$$\begin{aligned} L &= 80.87 + 8.51 \log (52,400/1,000) \\ &= \underline{95.5 \text{ (EPNdB)}} \end{aligned}$$

b) Approach (A)

$$\begin{aligned} A &= 86.03 + 7.75 \log (52,400/1,000) \\ &= \underline{99.4 \text{ (EPNdB)}} \end{aligned}$$

c) Flyover (F)

As the aircraft has 2 engines and with MTOW 52,400 kg, the equation $66.65 + 13.29 \log M$ applies.

$$\begin{aligned} F &= 66.65 + 13.29 \log (52,400/1,000) \\ &= \underline{89.5 \text{ (EPNdB)}} \end{aligned}$$

Assessment of compliance

Criteria 1

Non-MCC3 aircraft are defined as civil aircraft that meet Chapter 3 standards by a cumulative margin of more than 5 EPNdB.

Calculation :

Sum [L+A+F]	:	[95.5+99.4+89.5]	=	284.4 (EPNdB)
Sum [L1+A1+F1]	:	[96.2+98.4+87.7]	=	282.3 (EPNdB)
		Difference	=	2.1 (EPNdB) i.e. <u>not</u> > 5

Criteria 1 has not been met.

Conclusion :

Since Criteria 1 cannot be met, the aircraft is a **Marginally Compliant Chapter 3 aircraft.**

Assessment of Noise Standards of an Aircraft

Example 2 – B737-300

Aircraft	:	B737-300		
Maximum Take-off Weight (MTOW)	:	58,967 kg		
Number of engines	:	2		
Aircraft Certificated Noise Levels	:	- Lateral (L1)	90.3	(EPNdB)
		- Approach (A1)	100.0	(EPNdB)
		- Flyover (F1)	85.5	(EPNdB)

Applicable standards in ICAO Annex 16, Vol. I, Chapter 4, 4.4

Table

M = Maximum take-off mass in 1 000 kg		0	20.2	28.6	35	48.1	280	385	400
Lateral full-power noise level (EPNdB)	All aeroplanes	94	$80.87 + 8.51 \log M$						103
Approach noise level (EPNdB)	All aeroplanes	98	$86.03 + 7.75 \log M$						105
Flyover noise levels (EPNdB)	2 engines or less	89				$66.65 + 13.29 \log M$			101
	3 engines	89	$69.65 + 13.29 \log M$						104
	4 engines or more	89	$71.65 + 13.29 \log M$						106

Calculation of ICAO Limits

a) Lateral Full Power (L)

$$\begin{aligned} L &= 80.87 + 8.51 \log (58,967/1,000) \\ &= \underline{95.9 \text{ (EPNdB)}} \end{aligned}$$

b) Approach (A)

$$\begin{aligned} A &= 86.03 + 7.75 \log (58,967/1,000) \\ &= \underline{99.8 \text{ (EPNdB)}} \end{aligned}$$

c) Flyover (F)

As the aircraft has 2 engines and with MTOW 58,967 kg, the equation $66.65 + 13.29 \log M$ applies.

$$\begin{aligned} F &= 66.65 + 13.29 \log (58,967/1,000) \\ &= \underline{90.2 \text{ (EPNdB)}} \end{aligned}$$

Assessment of compliance

Criteria 1

Para. 4.4.1 The maximum permitted noise levels are defined in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, and shall not be exceeded at any of the measurement points.

Illustration :

$L1 < L$ (Lateral Full Power)

$A1 < A$ (Approach)

$F1 < F$ (Flyover)

Calculation :

L1 < L	:	L1 = 90.3 (EPNdB)	L = 95.9 (EPNdB)	i.e. L1 < L
A1 < A	:	A1 = 100.0 (EPNdB)	A = 99.8 (EPNdB)	<u>i.e. A1 is not < A</u>
F1 < F	:	F1 = 85.5 (EPNdB)	F = 90.2 (EPNdB)	i.e. F1 < F

Criteria 1 has not been met.

Criteria 2

Para. 4.4.1.1 The sum of the differences at all three measurement points between the maximum noise levels and the maximum permitted noise levels specified in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, shall not be less than 10 EPNdB.

Illustration :

$$\text{Sum [L+A+F]} - \text{Sum [L1+A1+F1]} \geq 10$$

Calculation :

Sum [L+A+F]	:	[95.9+99.8+90.2]	= 285.9 (EPNdB)
Sum [L1+A1+F1]	:	[90.3+100.0+85.5]	= <u>275.8 (EPNdB)</u>
		Difference	= 10.1 (EPNdB) i.e. ≥ 10

Criteria 2 has been met.

Criteria 3

Para 4.4.1.2 The sum of the differences at any two measurement points between the maximum noise levels and the corresponding maximum permitted noise levels specified in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, shall not be less than 2 EPNdB.

Illustration:

Sum [L+A] – Sum [L1+A1]	≥ 2
Sum [A+F] – Sum [A1+F1]	≥ 2
Sum [L+F] – Sum [L1+F1]	≥ 2

Calculation :

Sum [L+A] – Sum [L1+A1]	:	[95.9+99.8] - [90.3+100.0]	= 5.4 (EPNdB)	i.e. ≥ 2
Sum [A+F] – Sum [A1+F1]	:	[99.8+90.2] - [100.0+85.5]	= 4.5 (EPNdB)	i.e. ≥ 2
Sum [L+F] – Sum [L1+F1]	:	[95.9+90.2] - [90.3+85.5]	= 10.3 (EPNdB)	i.e. ≥ 2

Criteria 3 has been met.

Conclusion:

Since criteria 1 cannot be met, the aircraft is a **Non-Chapter 4 Equivalent aircraft.**

Assessment of Noise Standards of an Aircraft

Example 3 – A321-211

Aircraft	:	A321-211		
Maximum Take-off Weight (MTOW)	:	89,000 kg		
Number of engines	:	2		
Aircraft Certificated Noise Levels	:	- Lateral (L1)	97.7	(EPNdB)
		- Approach (A1)	96.9	(EPNdB)
		- Flyover (F1)	88.0	(EPNdB)

Applicable standards in ICAO Annex 16, Vol. I, Chapter 4, 4.4

Table

M = Maximum take-off mass in 1 000 kg		0	20.2	28.6	35	48.1	89,000	280	385	400	
Lateral full-power noise level (EPNdB)	All aeroplanes	94						$80.87 + 8.51 \log M$	103		
Approach noise level (EPNdB)	All aeroplanes	98						$86.03 + 7.75 \log M$	105		
Flyover noise levels (EPNdB)	2 engines or less	89							$66.65 + 13.29 \log M$	101	
	3 engines	89						$69.65 + 13.29 \log M$	104		
	4 engines or more	89						$71.65 + 13.29 \log M$	106		

Calculation of ICAO Limits

a) Lateral Full Power (L)

$$\begin{aligned} L &= 80.87 + 8.51 \log (89,000/1,000) \\ &= \underline{97.5 \text{ (EPNdB)}} \end{aligned}$$

b) Approach (A)

$$\begin{aligned} A &= 86.03 + 7.75 \log (89,000/1,000) \\ &= \underline{101.1 \text{ (EPNdB)}} \end{aligned}$$

c) Flyover (F)

As the aircraft has 2 engines and with MTOW 89,000 kg, the equation $66.65 + 13.29 \log M$ applies.

$$\begin{aligned} F &= 66.65 + 13.29 \log (89,000/1,000) \\ &= \underline{92.6 \text{ (EPNdB)}} \end{aligned}$$

Assessment of compliance

Criteria 1

Para. 4.4.1 The maximum permitted noise levels are defined in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, and shall not be exceeded at any of the measurement points.

Illustration:

$L1 < L$ (Lateral Full Power)

$A1 < A$ (Approach)

$F1 < F$ (Flyover)

Calculation :

L1 < L	:	L1 = 97.7 (EPNdB)	L = 97.5 (EPNdB)	<u>i.e. L1 is not < L</u>
A1 < A	:	A1 = 96.9 (EPNdB)	A = 101.1 (EPNdB)	i.e. A1 < A
F1 < F	:	F1 = 88.0 (EPNdB)	F = 92.6 (EPNdB)	i.e. F1 < F

Criteria 1 has not been met.

Criteria 2

Para. 4.4.1.1 The sum of the differences at all three measurement points between the maximum noise levels and the maximum permitted noise levels specified in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, shall not be less than 10 EPNdB.

Illustration :

$$\text{Sum [L+A+F]} - \text{Sum [L1+A1+F1]} \geq 10$$

Calculation :

Sum [L+A+F]	:	[97.5+101.1+92.6]	= 291.2 (EPNdB)
Sum [L1+A1+F1]	:	[97.7+96.9+88.0]	= <u>282.6 (EPNdB)</u>
Difference			= 8.6 (EPNdB) <i>i.e. less than 10</i>

Criteria 2 has not been met.

Criteria 3

Para 4.4.1.2 The sum of the differences at any two measurement points between the maximum noise levels and the corresponding maximum permitted noise levels specified in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, shall not be less than 2 EPNdB.

Illustration :

Sum [L+A] – Sum [L1+A1]	≥ 2
Sum [A+F] – Sum [A1+F1]	≥ 2
Sum [L+F] – Sum [L1+F1]	≥ 2

Calculation :

Sum [L+A] – Sum [L1+A1]	:	[97.5+101.1] - [97.7+96.9]	= 4.0 (EPNdB)	i.e. ≥ 2
Sum [A+F] – Sum [A1+F1]	:	[101.1+92.6] - [96.9+88.0]	= 8.8 (EPNdB)	i.e. ≥ 2
Sum [L+F] – Sum [L1+F1]	:	[97.5+92.6] - [97.7+88.0]	= 4.4 (EPNdB)	i.e. ≥ 2

Criteria 3 has been met.

Conclusion :

Since both Criteria 1 and 2 cannot be met, the aircraft is a **Non-Chapter 4 Equivalent aircraft.**

Assessment of Noise Standards of an Aircraft

Example 4 – A330-343

Aircraft	:	A330-343		
Maximum Take-off Weight (MTOW)	:	233,000 kg		
Number of engines	:	2		
Aircraft Certificated Noise Levels	:	- Lateral (L1)	97.4	(EPNdB)
		- Approach (A1)	97.0	(EPNdB)
		- Flyover (F1)	90.7	(EPNdB)

Applicable standards in ICAO Annex 16, Vol. I, Chapter 4, 4.4

Table

M = Maximum take-off mass in 1 000 kg		0	20.2	28.6	35	48.1		280	385	400	
Lateral full-power noise level (EPNdB)	All aeroplanes	94	$80.87 + 8.51 \log M$								103
Approach noise level (EPNdB)	All aeroplanes	98	$86.03 + 7.75 \log M$							105	
Flyover noise levels (EPNdB)	2 engines or less	89		$66.65 + 13.29 \log M$							101
	3 engines	89	$69.65 + 13.29 \log M$								104
	4 engines or more	89	$71.65 + 13.29 \log M$								106

Calculation of ICAO Limits

a) Lateral Full Power (L)

$$L = 80.87 + 8.51 \log (233,000/1,000)$$

$$= \underline{101.0 \text{ (EPNdB)}}$$

b) Approach (A)

$$A = 86.03 + 7.75 \log (233,000/1,000)$$

$$= \underline{104.4 \text{ (EPNdB)}}$$

c) Flyover (F)

As the aircraft has 2 engines and with MTOW 233,000 kg, the equation $66.65 + 13.29 \log M$ applies.

$$F = 66.65 + 13.29 \log (233,000/1,000)$$

$$= \underline{98.1 \text{ (EPNdB)}}$$

Assessment of compliance

Criteria 1

Para. 4.4.1 The maximum permitted noise levels are defined in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, and shall not be exceeded at any of the measurement points.

Illustration :

L1 < L (Lateral Full Power)

A1 < A (Approach)

F1 < F (Flyover)

Calculation :

L1 < L	:	L1 = 97.4 (EPNdB)	L = 101.0 (EPNdB)	i.e. L1 < L
A1 < A	:	A1 = 97.0 (EPNdB)	A = 104.4 (EPNdB)	i.e. A1 < A
F1 < F	:	F1 = 90.7 (EPNdB)	F = 98.1 (EPNdB)	i.e. F1 < F

Criteria 1 has been met.

Criteria 2

Para. 4.4.1.1 The sum of the differences at all three measurement points between the maximum noise levels and the maximum permitted noise levels specified in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, shall not be less than 10 EPNdB.

Illustration :

$$\text{Sum [L+A+F]} - \text{Sum [L1+A1+F1]} \geq 10$$

Calculation :

Sum [L+A+F]	:	[101.0+104.4+98.1]	= 303.5 (EPNdB)
Sum [L1+A1+F1]	:	[97.4+97.0+90.7]	= 285.1 (EPNdB)
		Difference	= 18.4 (EPNdB) i.e. ≥ 10

Criteria 2 has been met.

Criteria 3

Para 4.4.1.2 The sum of the differences at any two measurement points between the maximum noise levels and the corresponding maximum permitted noise levels specified in Chapter 3, 3.4.1.1, 3.4.1.2 and 3.4.1.3, shall not be less than 2 EPNdB.

Illustration :

Sum [L+A] - Sum [L1+A1]	≥ 2
Sum [A+F] - Sum [A1+F1]	≥ 2
Sum [L+F] - Sum [L1+F1]	≥ 2

Calculation :

Sum [L+A] - Sum [L1+A1]	:	[101.0+104.4] - [97.4+97.0]	= 11.0 (EPNdB)	i.e. ≥ 2
Sum [A+F] - Sum [A1+F1]	:	[104.4+98.1] - [97.0+90.7]	= 14.8 (EPNdB)	i.e. ≥ 2
Sum [L+F] - Sum [L1+F1]	:	[101.0+98.1] - [97.4+90.7]	= 11.0 (EPNdB)	i.e. ≥ 2

Criteria 3 has been met.

Conclusion :

Since all three criteria have been met, the aircraft is a **Chapter 4 Equivalent aircraft.**