WITH AFFECTION

THIS WORK

DEDICATED TO

MY PARENTS, GRANDPA

AND

BHABHI FOR THEIR ENCOURAGEMENT

A PRACTICAL GUIDE TO CLINICAL MASKING

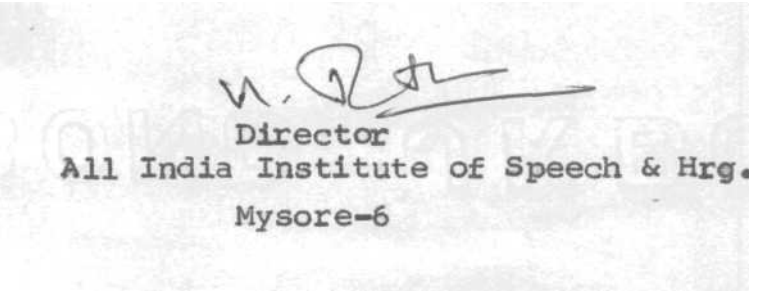
Register No. 8407

An Independent project submitted to the University of Mysore in partial fulfilment of the requirement for the degree of master of science in speech and hearing

MAY 1984

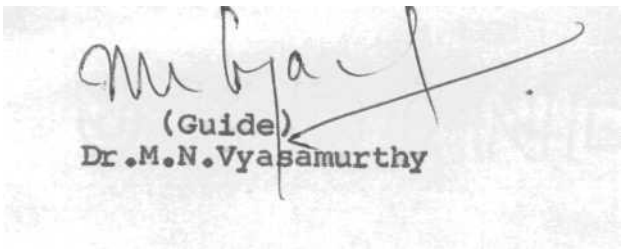
C E R T I F I C A T E

This is to certify that the Independent Project entitled "A Practical Guide toClinical Masking" is the bonafide work in part fulfillment for First Year M.Sc (Speech and Hearing) of the student with Register Number



C E R T I F I C A T E

This is to certify that Independent Project has been prepared under my supervision.



DECLARATION

This Independent Project entitled "A Practical Guide To Clinical Masking" is the result of my own work undertaken under the guidance of Dr M N Vyasamurthy, Lecturer in Audiology, All India Institute of Speech and Hearing, Mysore 570 006, and has not been submitted earlier at any University or Institution for any other Diploma or Degree.

Mysore: Reg.No. 8407

Date:

ACKNOWLEDGEMENT

I derive immense pleasure in thanking my guide Dr M N Vyasamurthy for his guidance and help during my project work.

The thanks are extended to Vakali Prasad Sah and Brij Mohan Kumar Singh for their help.

PREFACE

Clinical masking is one of the very important topics in Audiology. A thorough knowledge in clinical masking is essential for all the audiologists. Since clinical masking procedure appears to be difficult, an attempt has been made to explain the masking procedure with many examples. It is hoped that this guide in clinical masking would be useful to the audiologists.

CONTENTS

Question - What is masking?

Answer - Masking is the elevation in threshold for one signal (the test tone) by the presence of a second signal (the masking noise) (Sanders, 1978).

Question - What are the three fundamental questions in masking?

Answer - 1. When should masking be used?
2. What kind of masking noise should be used?
3. How much masking should be used?

Question - WheN should masking be used?

Answer - In air conduction testing, the nontest ear should be masked whenever the signal presented to the test ear exceeds bone Conduction sensitivity in the nontest ear by more than 40 dB (Studebaker, 1967

In bone Conduction testing, the nontest ear should be masked whenever the test ear exhibits an air-bone gap (Studebaker, 1964) of 10dB.

Question - What kind of masking noise should be used?

Answer - To mask pure tones, narrow band noise should be used for superior masking efficiency (Sanders, 1978) The selection of narrow band noise for masking pure tone is based on critical band concept. According to the critical band concept, the energy of the frequency centred around the test frequency

is responsible for masking the test tone. For example, to mask 2OOO Hz tone the energy of the frequencies 1950 to 2050 Hz in the noise is responsible for masking the 2000 Hz tone. The bandwidth of 100 Hz is the critical bandwidth for 200O Hz. The critical bandwidth varies depending on the frequency of the test tone.

Question - What is effective masking level?

Answer - Effective level is defined as the number of dB that the total energy in the critical band is above, the threshold energy for a pure tone whose frequency is at the centre of the band.

Effective level can also be regarded as the threshold shift in decibels produced in the masked ear by a given amount of noise - Thus, if we determine effective level according to the normal ear and express it in decibels on the hearing threshold level scale, we can interpret it as the hearing threshold level to which an ear will be shifted by a given amount of noise (Sanders, 1978).

For example, if 50 dBHL tone is masked by 60 dB HL noise i.e. when both the tone and noise are presented to the same earphone,

masking factor = noise level - tone level

= 60 - 50 = 10 dB

If 50 dB HL noise masks 50 dBHL tone then

masking factor = noise level - tone level

= 50 - 50

= 0

If masking factor is zero dB, then the noise level in dB HL can be regarded as effective level i.e. the dial reading of the noise attenuator indicates effective level. If the dial reading is 60 dBHL, the effective level is also 60 dB.

Throughout this guide the noise level is expressed in terms of effective level.

Question - What is minimum effective masking level?

Answer - It is the level of noise in the non-test ear which is just sufficient to mask the test tone in the nontest ear.

Question - What is maximum effective masking level?

Answer - It is the level of the noise in the nontest ear which is just insufficient to mask the test tone in the test ear.

Question - How much masking should be used?

Answer - For AC testing -

Min EML = unmasked AC threshold of the test ear -40 + Air bone gap of nontest ear.

Max EML = BC threshold of the test ear + 40

For BC testing :-

Mint EML = unmasked BC threshold of the non test ear

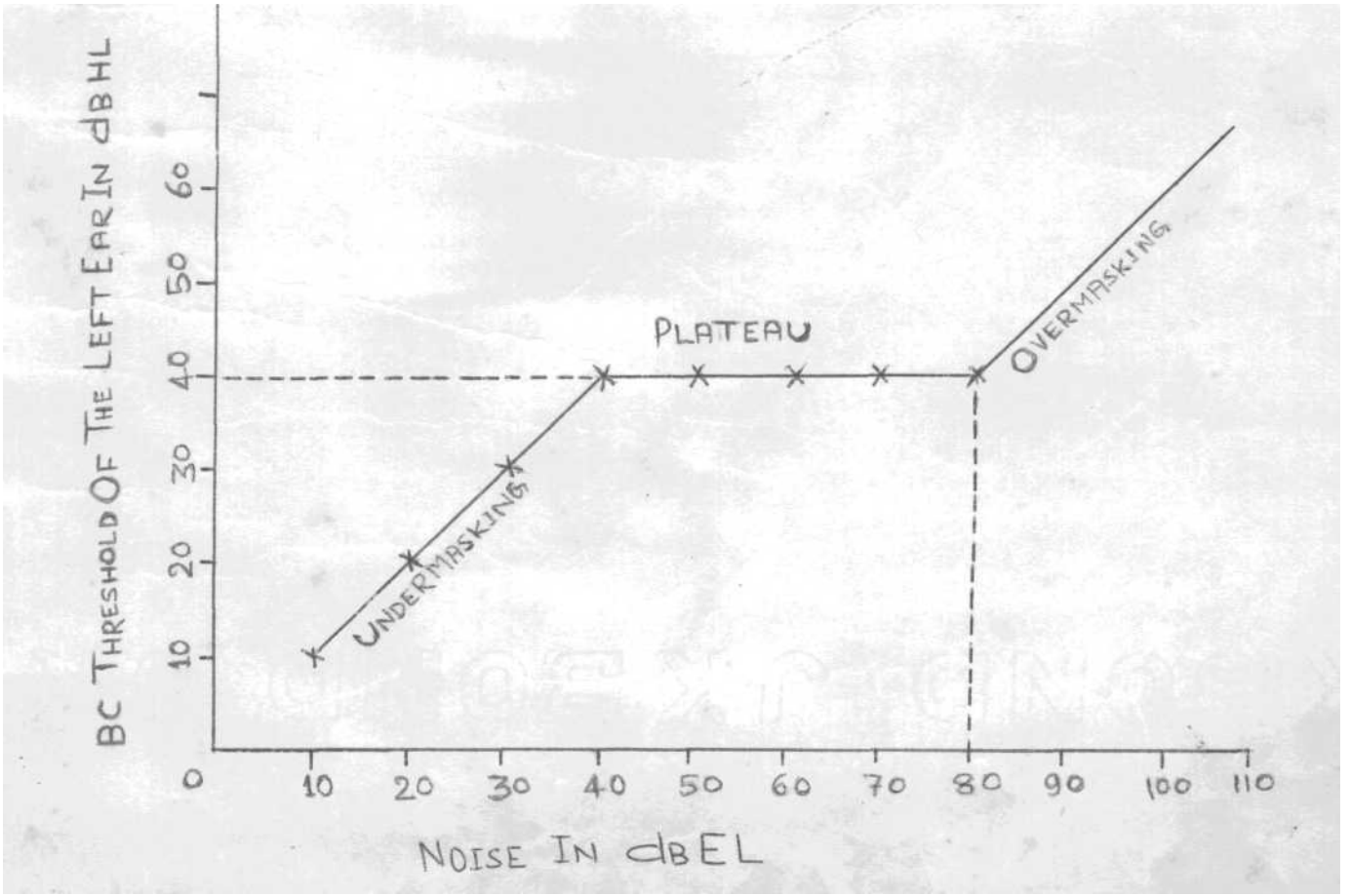
40 + Airbone gap of non test eaR

Max EML = BC threshold of the test ear +40

Question - How to determine the masked threshold of the test ear?

Answer - Consider a case of unilateral mild S-N loss. Let the AC thresholds of right ear be OdB HL and the AC thresholds of left ear be 40dB HL, To know the correct BC thresholds of the left ear, right ear should be masked.

The figure given below illustrates the procedure for finding the BC threshold of the left ear at 2 KHz.



Place the BC vibrator on the left mastoid and an earphone on the right ear (left ear should not be covered by the earphone). Present BC tone (2000 Hz) at 10 dB HZ. The patient responds to the tone. Now, introduce MB noise at 10 dB EL through the earphone placed on the right ear. In the presence of 10 dBEL noise the patient responds to the BC tone. Increase the noise by 10dB. The moment the noise is increased by 10 dB, the patient stops responding to the tone. The level of the tone at which the tone is just heard in the presence of noise is considered as masked threshold. Find the masked thresholds at different levels of the noise. Plot the results on a graph i.e. noise levels on X = axis and BC tone levels on Y-axis, when this is done, it will be observed that the masked threshold remains the same when the noise is increased from 40 dBEL to 80 dB EL. The masked threshold which does not change with increase in the noise level, is called 'Plateau'. In otherwords, 'Plateau' represents the true BC threshold of the test ear (left ear).

The reason for the change in masked thresholds when the noise level is increased from l0dBEL to 40 dBEL is that due to undermasking - the patient's responses to BC tone at 10 to 30 dBHL were from the better ear (right ear). Since noise was present in the better ear, the subject was not hearing the

BC tones whenever the noise level was increased.

When the BC tone was 40 dBHL, the subject's response was from the left ear. The masked threshold remained the same even when the noise level was increased upto 80 dBEL, because the noise was not interfering the tone which was heard from the left ear i.e. the response of the subject was from the left ear.

When the noise level in the right ear was 90 dBEL or more, the BC tone at 40 dBHL was not heard because of overmasking i.e. the noise could mask (through cross masking) the BC tone which was heard in the left ear.

Thus, the procedure of finding the true threshold of the test ear by masking the non test ear consists in finding the 'plateau'

'Plateau' should be obtained to know the true threshold of the test ear.

'Plateau' will be absent if Min EML = Max EML. This usually happens in bilateral conductive hearing loss.

THE RULES REGARDING MASKING:

Rule 1

When to mask in AC testing?

When the difference between the unmasked AC threshold of the test ear and BC threshold of the nontest ear, is more than 40 dB, the nontest ear is required to be masked.

Rule 2

When to mask in BC testing?

When the difference between the AC threshold of the test ear and BC threshold of the nontest ear is more than 10 dB, the nontest ear will have to be masked while testing the BC threshold of the test ear

Rule 3

When to mask in supra threshold testing?

Presentation level (PL) - BC threshold of nontest ear > 40

Rules 4

How much noise level (effective level) is required during supra threshold testing?

Presentation level - 40 + Airbone gap of nontest ear

FORMULAE

Formula 1

Min EML for AC testing

Min EML = Unmasked AC threshold of the test ear
- 40 + Air bone gap of nontest ear

Formula 2

Min EML for BC testing

Min EML = Un masked BC threshold of the test ear
+ Air bone gap of NTE (or occlusion effect if air bone gap is absent)

Occlusion effect is 20 dB at 250 Hz, 15 dB at 500 Hz, 10 dB at 1000 Hz

Note: If the air bone gap is less than 10 dB, occlusion effect is considered.

Formula 3 Max EML for AC testing:

Formula 3 a:

Assumed Max EML = Common BC threshold + 4O

Formula 3 b:

Real Max EML = BC threshold of the test ear + 40

Formula 4 Max EML for BC testing:

Formula 4 a:

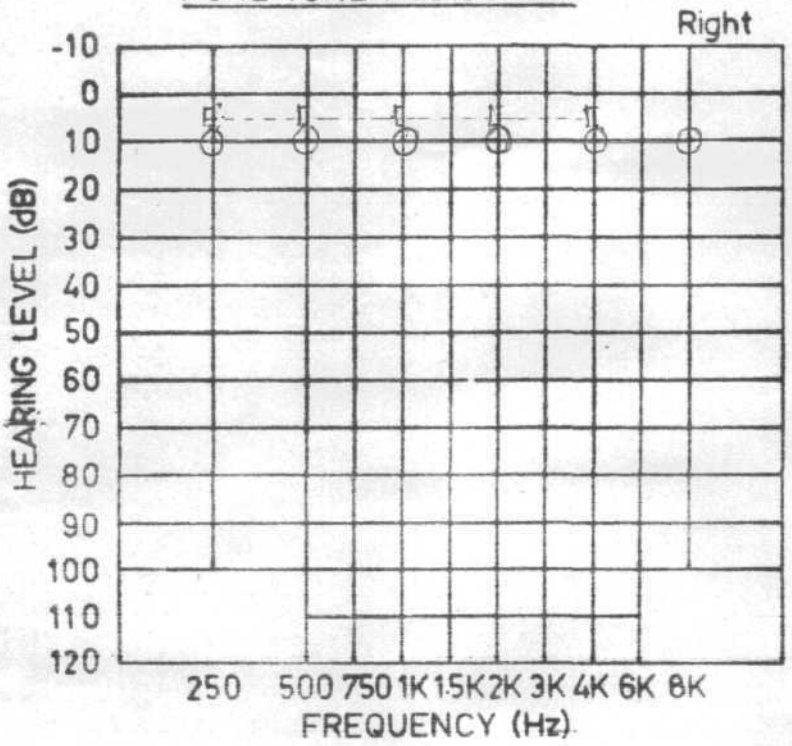
Assumed MaxEML = Common BC threshold + 40

Formula 4 b:

Real max EML = BC threshold of the test ear + 40

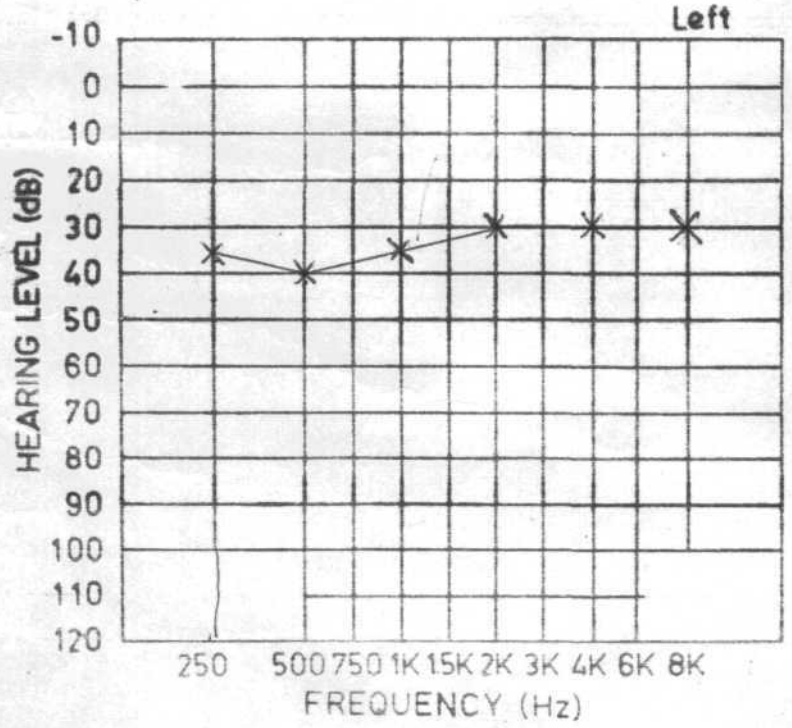
Case No: 1

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊢	⊣
No response		



DISCUSSION ABOUT CASE NO.1

Qaestion No.l : Is masking necessary while testing the AC thresholds of the left ear?

Answer : As per Rule 1, masking of the right ear is not necessary while testing the AC threshold of the left ear

Question No.2 : Is masking necessary while testing the BC threshold of the right ear?

Answer : As per rule 2, masking of the right ear while testing the BC threshold of left ear, is necessary.

Question No.3 : How much masking should be used?

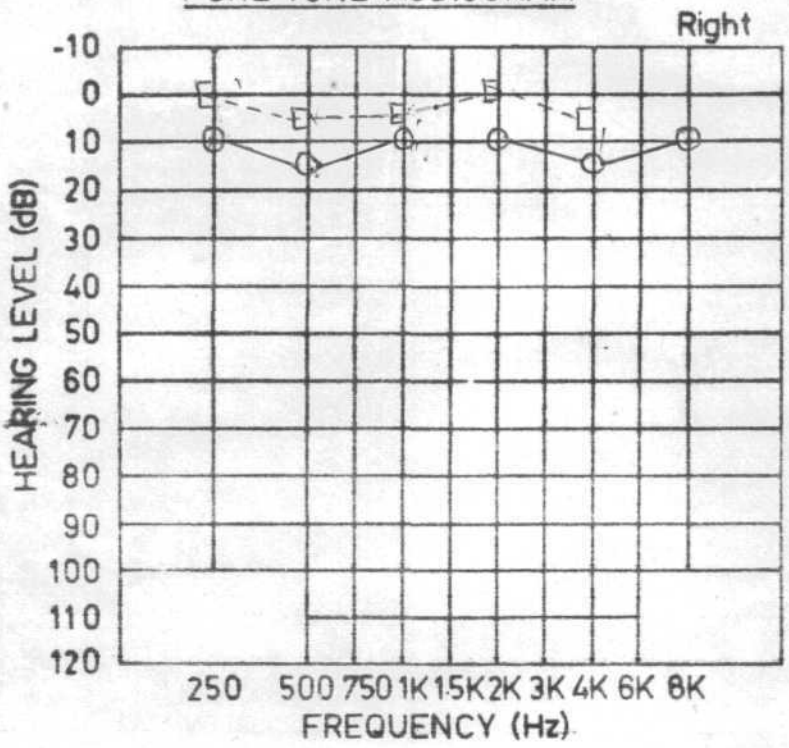
Answer : Minimum and maximum effective masking levels at different frequencies are :-

		250 HZ	500 Hz	1 KHz	2 KHz	KHz
Min EML		25 + 5	29 + 5	15 + 5	10	10
Max	Assumed	50	50	50	50	50
	Real	7 + 40	7 + 40	7 + 40	7 + 40	7+ 40

Note: Although right ear shows 5 dB air bone gap, this is not considered a real gap, BC thresholds are assumed to be equal to AC thresholds of the right ear.

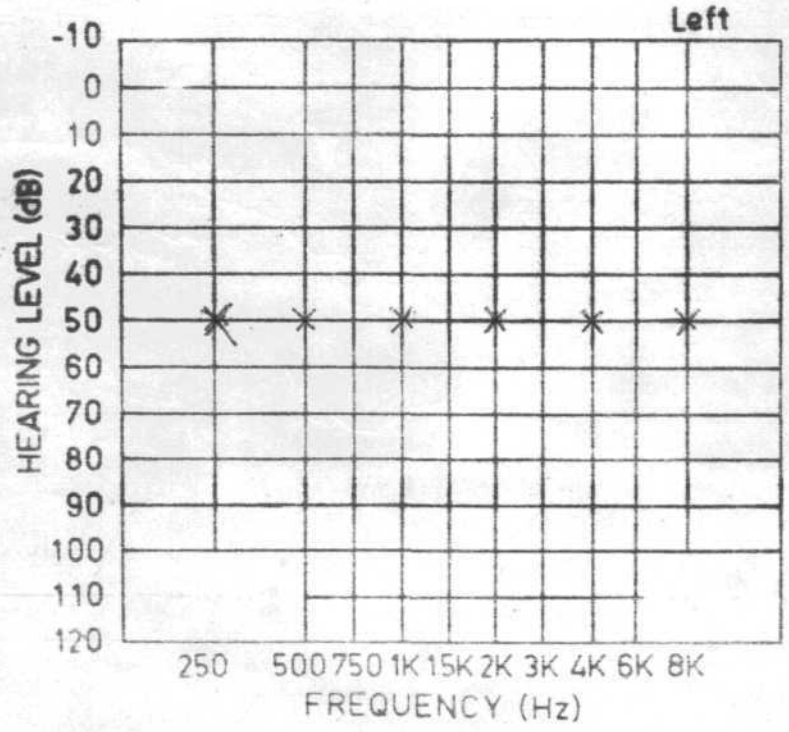
Case No: 2

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	X
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.2

Question No. 1 : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the AC threshold of the left ear.

Question No. 2 : How much masking should be used?

Answer : Minimum and maximum effective masking levels at different frequencies are :-

	250Hz	500 Hz	1KHz	2KHz	4 KHz	8KHz
Min EML	10	20	10	10	10	10
Assumed	50	55	50	50	55	50
Max EML Real	? + 40	? +40	? + 40	? +40	? +40	? +40

Note: at 8 KHz, BC threshold is assumed to be 10 dB.

Question No. 3 : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, masking of the right ear while testing the BC threshold of the left ear is necessary.

Question No.4 : How much masking should be used ?

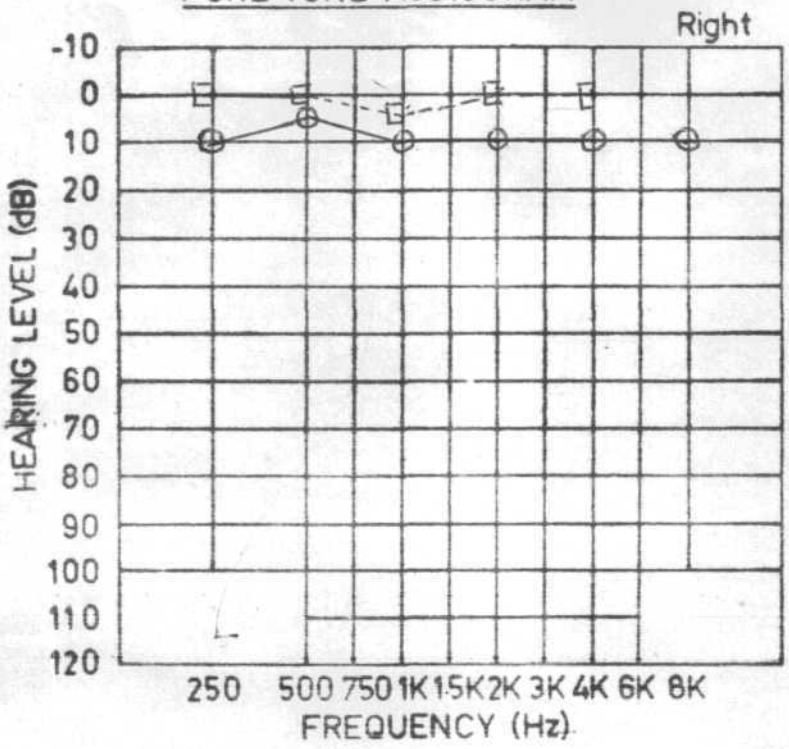
Answer : Minimum and maximum effective masking level at different frequencies are :-

		250 Hz	500 Hz	1KHz	2KHz	4 KHz
Min EML		30	30	20	10	15
Max EML	Assumed	50	55	50	50	55 *
	Real	? +40	? +40	? + 40	? + 40	? + 40

* Although right ear shows 10 dB airbone gap, this is not considered a real gap, BC thresholds are assumed to be equal to AC thresholds of right ear.

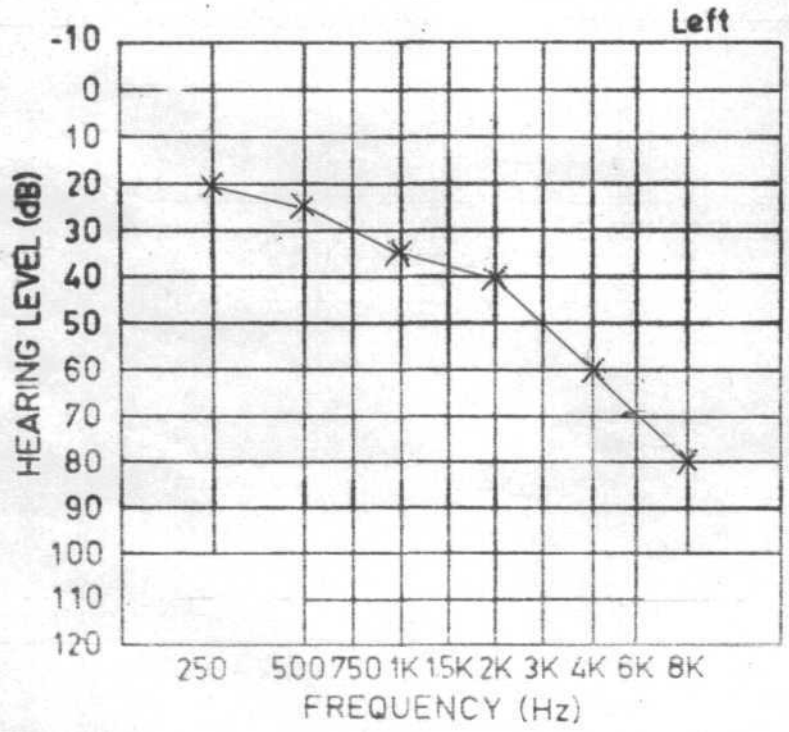
Case No: 3

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	[	]
No response		



DISCUSSION ABOUT CASE NO.3

Question No.l : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing AC threshold of the left ear at frequencies 6 KHz and 8KHz.

Question No.2 : How much masking should be used?

Answer : Minimum and Maximum effective masking level at different frequencies are:-

		4 KHz	8 KHz
Min EML		20	40
Max EML	Assumed	10 + 40	16 + 40
	Real	? + 40	? + 40
If left ear has S-N loss		60 + 40	80 + 40

Question No.3 : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, masking of the right ear while testing the BC thresholdof the left ear, is necessary.

Question No.4 : How much masking should be used?

Answer : Minimum and maximum effective masking levels at different frequencies are:-

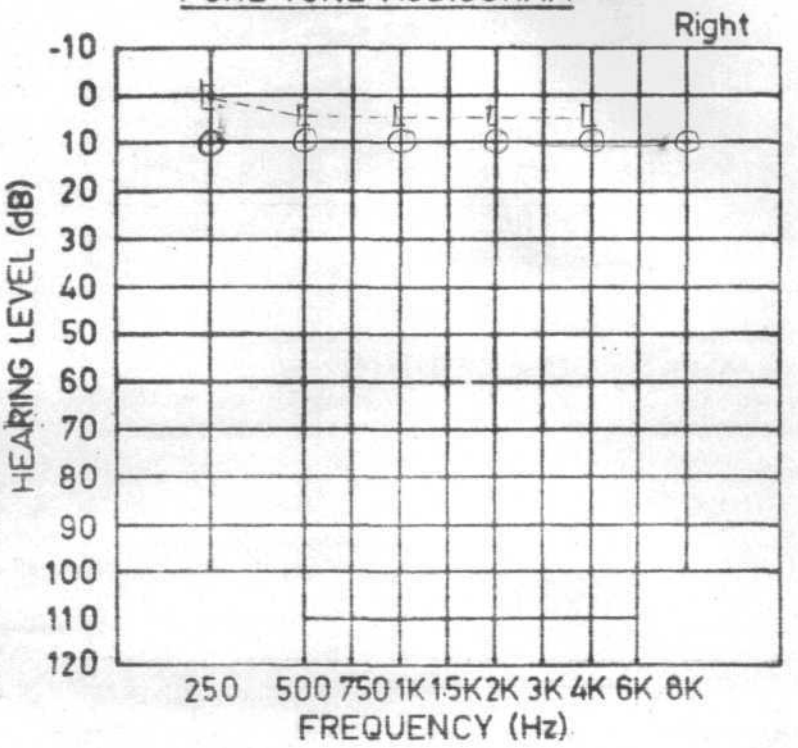
16

		250 Hz	500Hz	1KHz	2KHz	4 KHz
MIN EML		30	20	20	10	10
* Max EML	Assumed	10+40	5+40	10+46	10+40	5+ 40
	Real	?+40	?+40	?+40	? +40	? +40
If left has S-N loss		20+40	25+40	35+40	40+40	60+ 40

* Although right ear shows 5 to 10 dB air bone gap, this is not considered a real gap, BC thresholds are assumed to be equal to AC thresholds of the right ear.

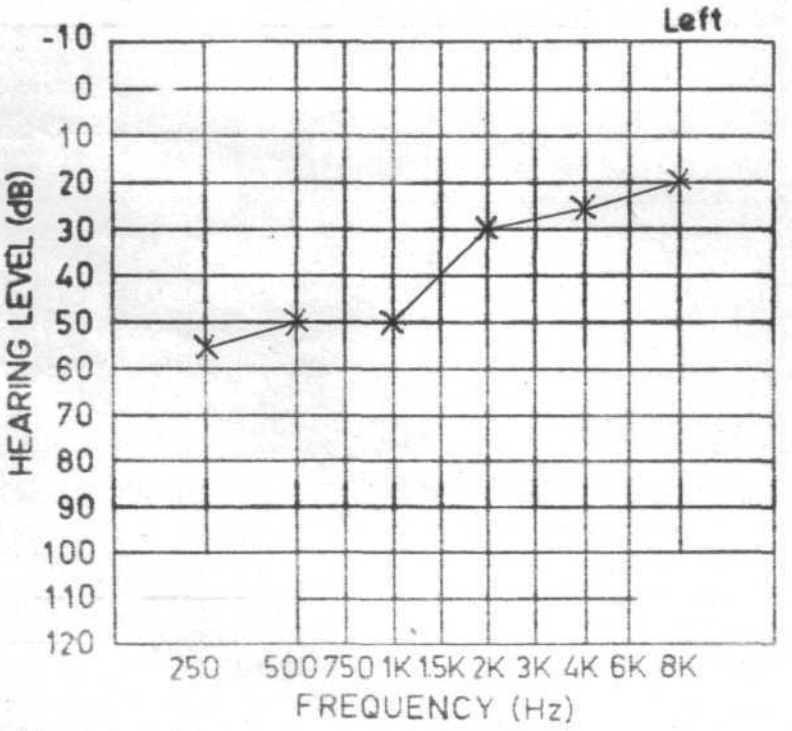
Case No: 4

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.4

Question No.l : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary at 250 Hz, 500 Hz and 1 KHz while testing the AC threshold of the left ear.

Question No.2 : How much masking should be used?

Answer : Minimum and masking effective masking level at different frequencies are: -

		250 Hz	500 Hz	1 KHz
Min EML		15	10	10
Max EML	Assumed	40+10	40+10	40+10 *
	Real	?+40	? +40	?+40
If left ear has S- N loss		55+40	50+40	50+40

Question No.3 : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, masking of the right ear while testing the BC threshold of: the left ear, is essential.

Question No.4 : How much masking should be used?

Answer : Minimum and maximum effective masking level at different frequencies are:-

		250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Min EML		30	25	20	10	10
Max EML	Assumed	40+10	40+10	40+10	40+10	40+10 *
	Real	?+40	?+40	?+40	?+40	?+40
If left ear has S—N loss		55+40	50+40	50+40	30+40	25+40

Comments Assumed Max EML values and max EML values (if left ear has SN loss) differ considerably. The wide difference between these values shows the importance of knowing whether left ear has SN loss or not. If we go by assumed max EML values, undermasking may result. By some means we should know that the left ear has S-N loss or not. We may depend on acoustic reflex tests for deciding whether left ear has S-N loss or

(I) Reflex testing

In the above condition, if reflex is present left ear can be considered to have S-N loss.

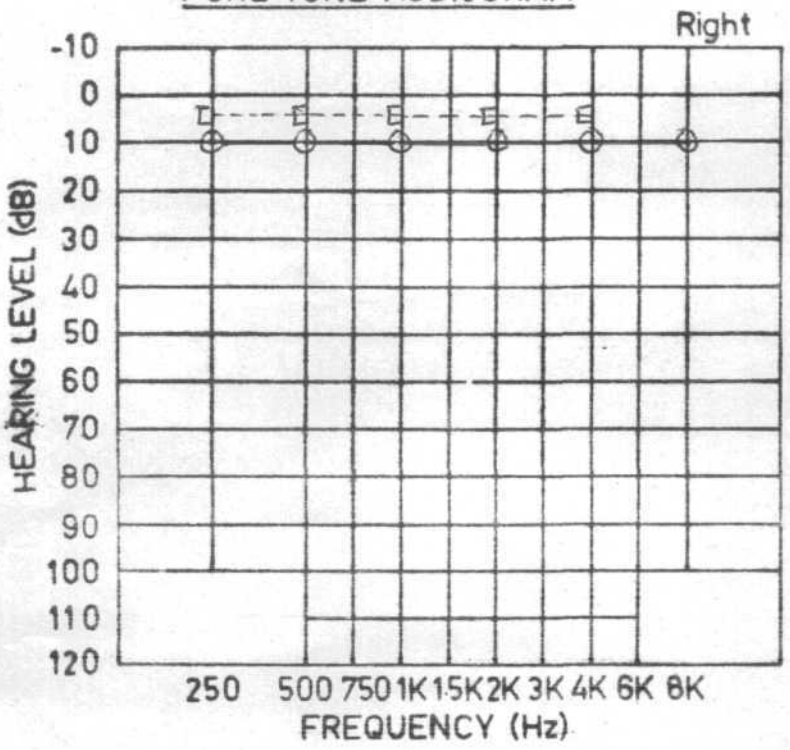
(II) Weber testing

If the weber is lateralised to right ear that is also suggestive of S-N loss in the left ear.

* Though right ear shows 5 to 10 dB air bone gap, this is not considered a real gap, BC thresholds are assumed to be equal to AC thresholds of the right ear.

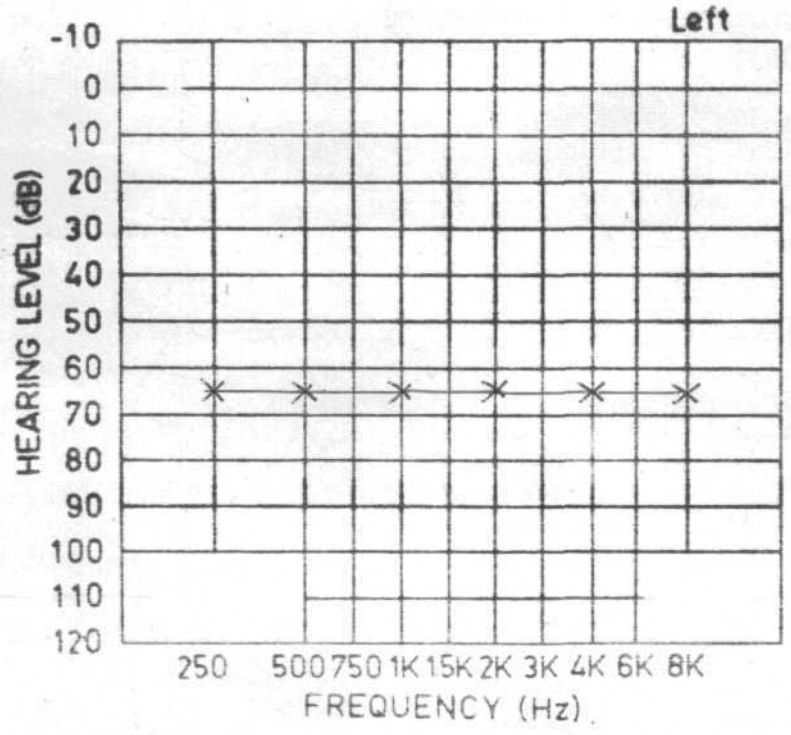
Case No: 5

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	[	]
No response		



DISCUSSION ABOUT CASE NO.5

Question No. 1 : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the AC threshold of the left ear

Question No. 2 : How much masking should be used?

Answer : Minimum and maximum effective masking level at different frequencies are :-

		250Hz	500 Hz	l000Hz	2000HZ	4000Hz	8000Hz
Min EML		25	25	25	25	25	25
Max EML	Assumed	50	50	50	50	50	50 *
	Real	7+40	7+40	7+40	7+40	7+40	7+40
If left ear has S-N Loss		65+40	65+40	65+40	65+40	65+40	65+40

Note: BC threshold at 8 KH1 is assumed to be 10 dB.

Question No. 3 : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, masking of the right ear while testing the BC threshold of the left ear, is essential.

Question No. 4 : How much masking should be used?

Answer : Minimum and maximum effective masking level at different frequencies are:-

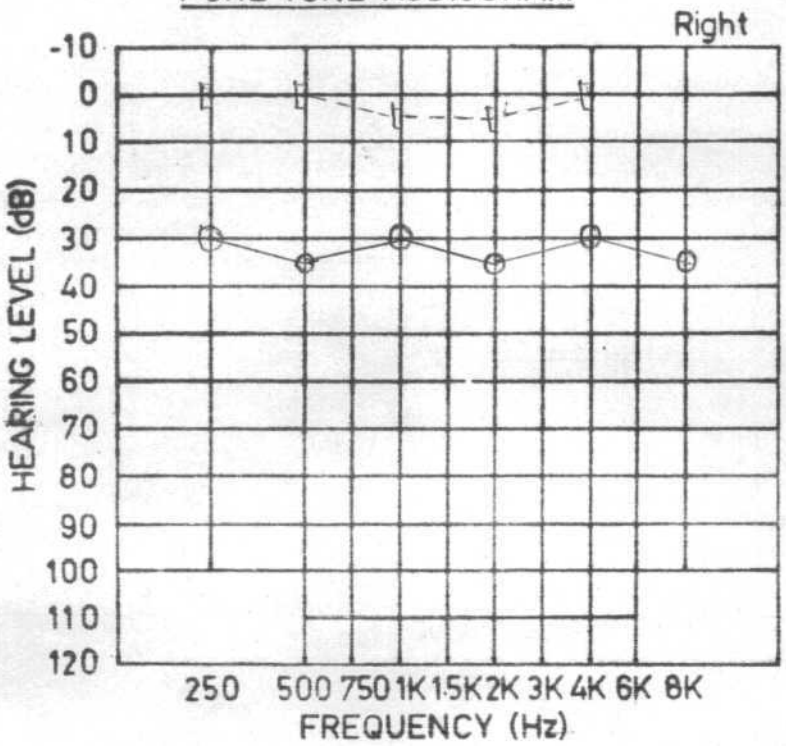
		250 Hz	500Hz	1KHz	2KHz	4 KHz
Min EML		30	25	20	10	10
Max EML	Assumed	50	50	50	50	50 *
	Real	?+40	?+40	?+40	?+40	?+40
If left ear has S- N Loss		45+40+	65+40	65+40	65+40	65+40

+ max BC threshold at 250 Hz is 45 dB

* Though right ear shows 5 dB air bone gap. This is not considered a real gap, BC thresholds are assumed to be equal to AC thresholds of the right ear.

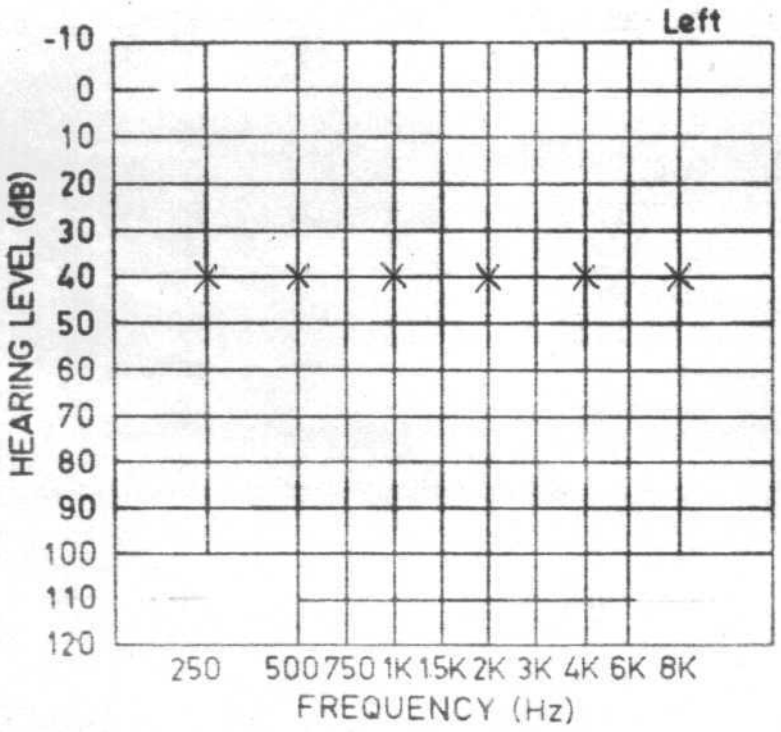
Case No: 6

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	X
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.6

Question No.l : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the RC threshold of the left ear, is not necessary.

Question No.2a: Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, masking of the right ear while testing the BC threshold of the left ear, is essential.

Question No.2b: How much masking should be used?

Answer : Minimum and maximum effective masking level at different frequencies are :-

		250 Hz	500 Hz	1 KHz	2 KHz	4 KHz
Min EML	Assumed	30	35	30	35	30
	If left ear has S-N loss	40+30	40+35	40+25	40+25	40+30

		250 Hz	500 Hz	1 KHz	2 KHz	4 KHz
Max EML	Assumed	40	40	45	45	40
	Real	?+40	?+4O	?+40	7+40	7+40
	If left ear has S-N loss	40+40	40+40	40+40	40+40	40+40

Question No. 3 : Is masking necessary while testing the AC threshold of the right ear ?

Answer : As per rule 1, masking of the left ear is not necessary while testing right ear AC threshold.

Question No. 4a : Is masking necessary while testing BC threshold of the right ear?

Answer : As per rule 2, masking of the left ear while testing BC threshold of the right ear is essential.

Question No. 4b: How much masking should be used?

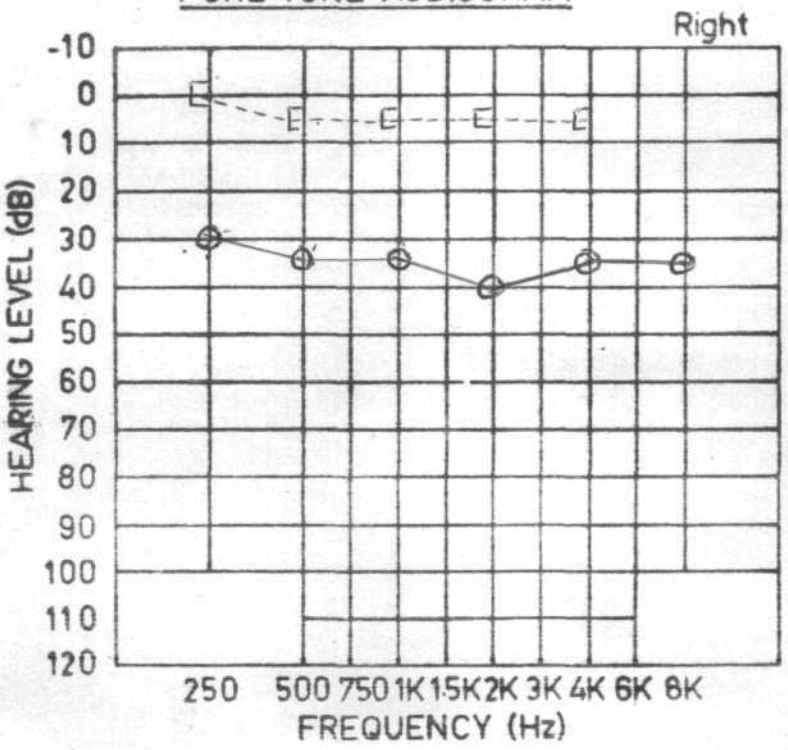
Answer : Minimum and maximum effective masking level at different frequencies are :-

		250 Hz	500 Hz	1 KHz	2KHz	4KHz
Min EML	Assumed	40	40	40	40	40
	If right ear has S-N loss	30 + 40	35+40	30+35	35+35	30+40

		250 Hz	500 Hz	1 KHz	2 KHz	4 KHz
Max EML	Assumed	40	40	45	45	40
	Real	? + 40	? +40	?+40	?+40	?+40
	If right ear has SN loss	30 + 40	35+4O	30+40	35+40	30+40

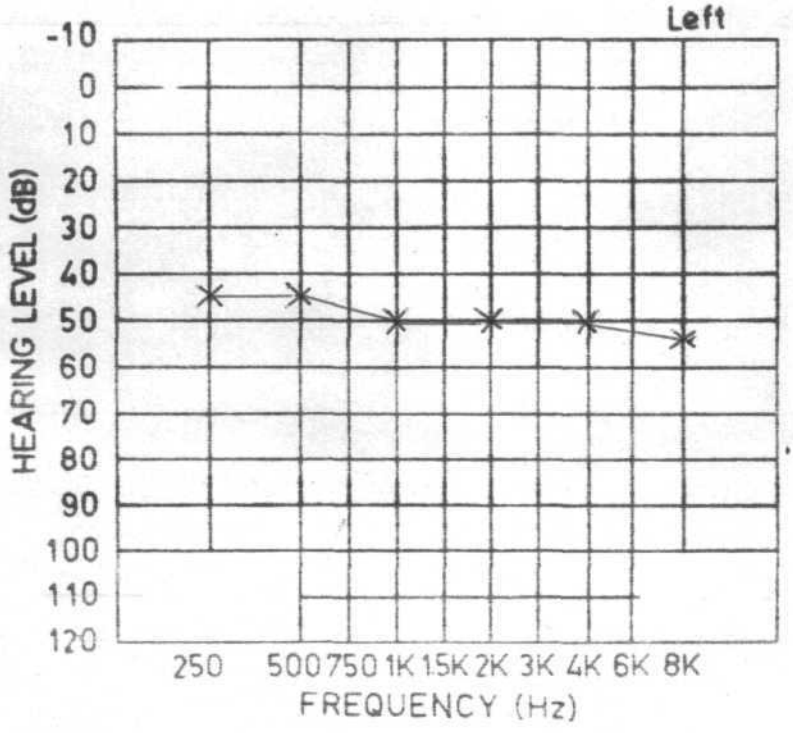
Case No: 7

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.7

Question No.1 : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the AC threshold of the left ear.

Question No.2 : How much masking should be used?

Answer : Minimum and maximum effective masking levels at different frequencies are:-

		250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Min EML		35	40	45	40	50*	
Max EML	Assumed	40	45	45	45	40	
	Real	?+40	?+40	?+40	?+40	?+40	
If left has S-N loss		45+40	50+40	5O+4O	50+40	55+40	

* BC threshold! at 8 KHz is assumed to be OdB

Comments: 1. If the right ear BC thresholds are same as the common BC thresholds;

Min EMLs = Max EMLs, hence masking is not possible.

There is wide difference between assumed max EML and max EML (If left ear has S-N loss). The wide difference between these values show the importance of knowing whether the left ear has S-N loss or not. If we go by assumed max EML values, undermasking may result. By some means we should know that the left ear has S-N loss or not. We may depend

on acoustic reflex test for deciding whether left ear has S-N loss or not.

In the above condition (see fig) if reflex is pres
left ear can be considered to have S-N loss

Question No.3a-: Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, while testing the BC threshold of the left ear masking of the right ear is essential.

Question No.3b : How much masking should be used?

Answer : Min EML and Max EML at different frequencie are:-

Min EML	Assumed	30	35	35	40	35
	If left ear has S-N loss	45+30	45+30	50+30	50+35	50+30
		250Kz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	40	45	45	45	45
	Real	7+40	7+40	7+40	7+40	7+40
	If left ear has S-N loss	45+40	45+40	50+40	50+40	50+40

Comments -

Assumed EML and max EML (if left ear has SN loss) the wide difference between these values show the importance of knowing whether the left ear has S-N loss or not.

If we go by assumed max EML values, under-masking may result. By some means we should know that the left ear has S-N loss or not We may depend on acoustic reflex test for deciding whether left ear has S-N loss or not.

In the above condition, it reflex is prese left ear can be considered to have S-N los

Question No.4 : Is masking necessary while testing the AC threshold of the right ear?

Answer : As per rule 1, masking of the left ear is not necessary while testing right ear AC threshold.

Question No.&a : If masking necessary while testing BC threshold of the right ear?

Answer : As per rule 2, while testing BC threshold of the right ear, masking of the left ear is essential.

Question No.5b : How much masking should be used?

Answer : Min EML and Max EML at different frequenci are:

		250HZ	500HZ	1KHZ	2KHZ	4KHZ
Min EML	Assumed	45	45	50	50	50
	If right has S-N loss	30+45	35+45	35+50	40+50	35+50

		250HZ	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	40	45	45	45	45
	Real	?+40	?+40	?+40	?+40	?+40
	If right ear has S-N loss	30+40	35+40	35+40	40+40	35+40

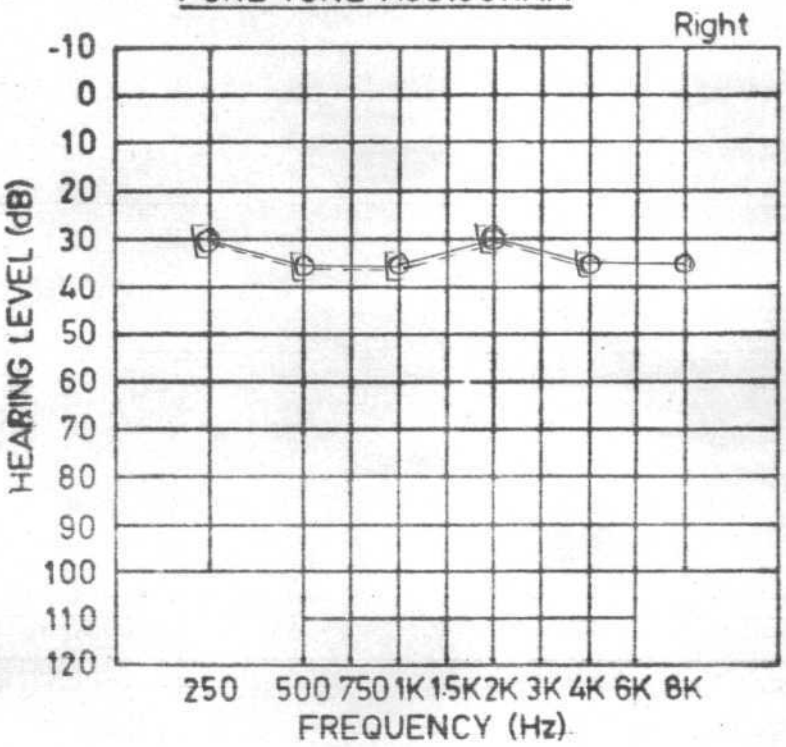
Comments - If right ear BC thresholds are same as the common BC thresholds

Min EMLs Max EMLs hence masking is not possible.

If right ear has S-N loss then also Min EML, Max EMLs, hence masking is not possible.

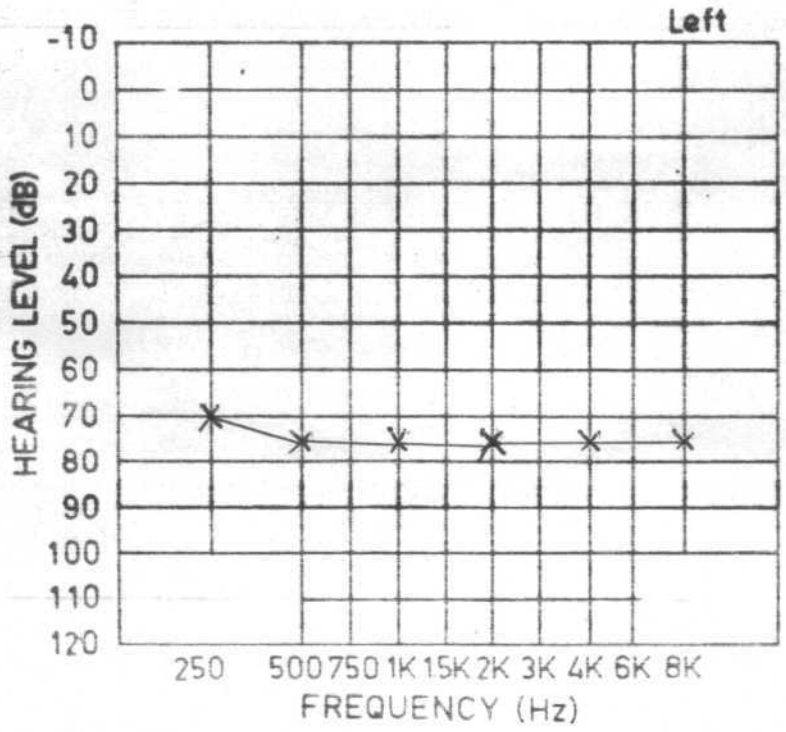
Case No: 8

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.8

Question No. la : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the AC threshold of the left for frequency 2 KHz.

Question No. lb : How much masking should be used?

Answer : Min EML and Max EML at frequency

		2KHz
Min EML		35
Max EML	Assumed	70
	Real	?+40
	If left ear has S-N loss	75+40

Comments - Left ear AC threshold can be determined by masking right ear as max EMLs > Min EMLs.

Question No. 2a : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, while testing the BC threshold of the left ear, masking of the right ear is essential.

Question No. 2b : How much masking should be used?

Answer : Min EML and max EML at different frequencies are :-

			250Hz	500Hz	1 KHz	2 KHz	4 KHz
	Min EML	Assumed	50	50	45	30	35
		If right ear has S-N loss	45+20	70+15	70+10	70+10	70+10

Max

BC output at 250 Hz = 45 dB

BC output for other fa = 70db

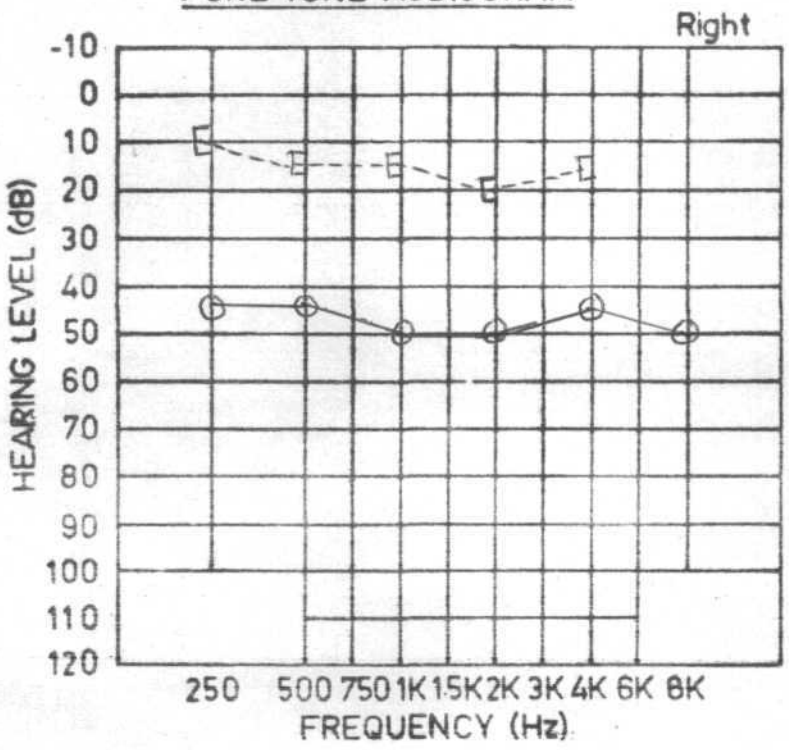
			250 Hz	500 Hz	1KHz	2KHz	4KHz
	Max EML	Assumed	70	75	75	70	75
		Real	?+40	?+40	?+40	?+40	?+40
		If left has S-N loss	75+40	70+40	70+40	70+40	70+40

Comments - If left ear BC thresholds are same as common BC thresholds, left ear BC threshold can be determined by masking right ear has max EMLs > Min EMLs.

If left ear has S-N loss then also BC threshold of left ear can be determined by masking right ear as max EMLs > Min EMLs.

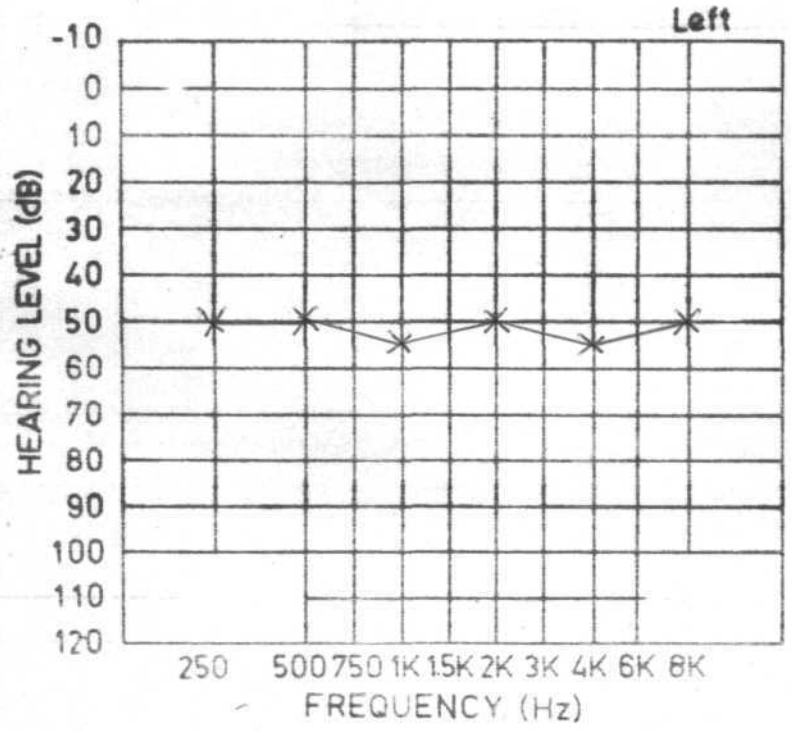
Case No: 9

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response	O↙	×↘
Bone conduction		
Unmasked	[	]
Masked	[	]
No response	[↓	]↓



DISCUSSION ABOUT CASE NO.9

Question No.l : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is not necessary while testing the AC threshold of the left ear.

Question No.2a : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, while testing the BC threshold of the left ear, masking of the right ear is essential.

Question No.2b : How much masking should be used?

Answer : Min EML and Max EML at different frequencies are :-

		250 Hz	500Hz	1KHz	2KHz	4KHz
Min EML'	Assumed	45	45	50	50	45
	If left has S-N loss	45+35	50+30	55+35	50+30	55+30

Note - Max BC out put at 250 Hz = 45dB

		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	50	55	55	60	55
	Real	?+40	?+40	?+40	?+40	?+40
	If left ear has S-N loss	45+40	50+4O	55+40	50+40	55+40

Comments - If common BC thresholds are the BC thresholds of the right ear, Min EMLs will be equal to

max EMLs. Hence masking is not possible. (This is known as Maunton's dilemma)

If left ear has S-N loss, Min EMLs will be nearly equal to max EMLs. Hence the true BC thresholds of the left ear cannot be determined by masking the right ear. (vide rule, if the air-bone gap of the nontest ear is more than 30 dB the BC thresholds of test (S-N loss) ear cannot be determined (Vyasamurthy, 1980)

Question No.3 : Is masking necessary while testing the AC threshold of the right ear?

Answer : As per rule 1, masking of the left ear is not necessary while testing right ear AC threshold.

Question No.4a: Is masking necessary while testing BC thresholds of the right ear?

Answer : As per rule 2, while testing BC threshold of the right ear, masking of the left ear is essential.

Question No.4b: How much masking should be used?

Answer : Min EML and max EML at different frequencies are:-

		37 250Hz	500Hz	1KHz	2KHz	4 KHz
Min EML	Assumed	50	50	55	50	55
	If rightear S-N loss	45+40	45+35	50+40	50+30	45+40

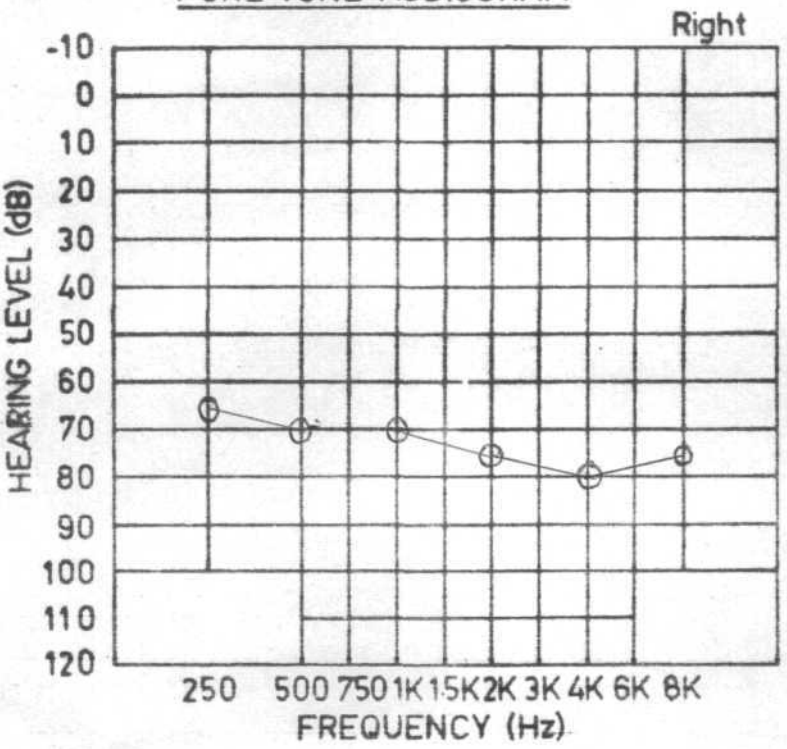
		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	50	55		60	55
	Real	?+40	?+40	?+40	?+40	?+40
	If right has S-N loss	45+40	45+40	50+40	50+40	45+40

Comments - If the BC thresholds of the right are the same as the common thresholds, Min EMLs will be egual to Max EMLs. Hence, masking is not possible (This is known as Naunton's dilemma).

If right ear has S-N loss, Min EMLs max EMLs. Hence the true BC thresholds of right ear can not be determined by masking the left ear (Vide rule, if the air bone gap of the nontest ear is more than 30 dB the BC thresholds of the test (SN loss) ear cannot be determined (Vyasamurthy, 1980).

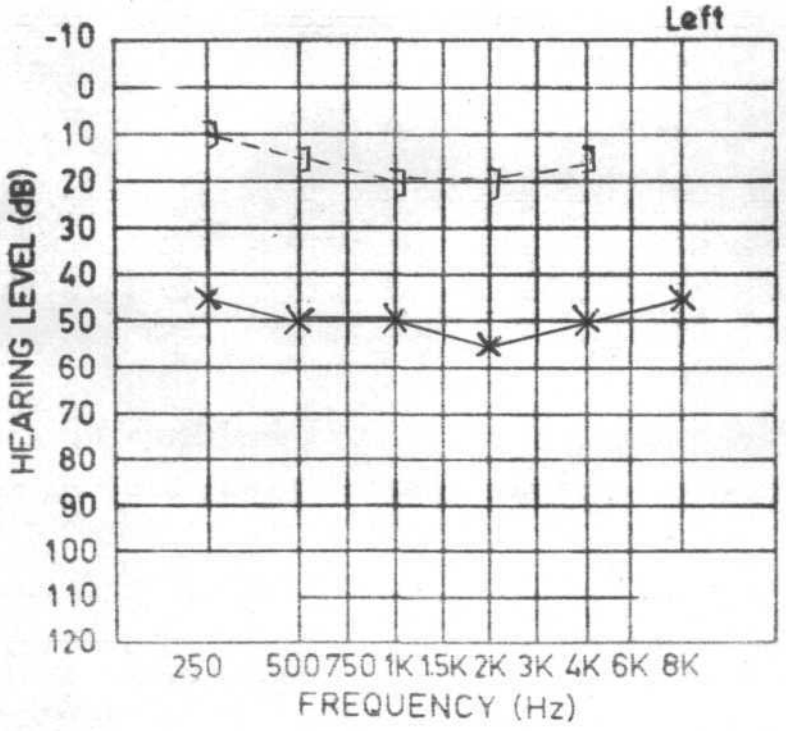
Case No: 10

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO. 10

Question No.la : Is masking necessary while testing the AC threshold of the right ear?

Answer : As per rule 1, Masking of the left ear is necessary while testing right ear AC threshold.

Question No.lb : How much masking should be used?

Answer : Min EML and Max EML at different frequenci are:-

Min EML		60	65	60	70	75	65 *
Max EML	Assumed	50	55	60	60	55	55
	Real	?+40	?+40	?+4O	?+40	?+40	?+40
	If right has S-N loss	65+40	70+40	70+40	75+40	8O+4O	75+40

* BC threshold is assumd to be 15 dB at 8 KHz

Comment - Min EML and assumed EML, if Common BC thresholds of the right ear min EMLs may be nearly equal to max EMLs, hence masking is not possible.

If the true AC thresholds of the right ear and if right ear has S-N loss, masking is possible i.e. masked thresholds of the right ear can be obtained by masking left ear (because max EMLs > min EMLs)

As per the rule (Vyasamurthy 1980) AC thresholds of the S-N loss ear can be tests by masking the nontest ear. If the AC threshold < 130 - airbone gap of the non test ear. In the above example the AC thresholds of the right ear are less tha 130 - air bone gap of non test ear. Sp, masking is possible.

If the true AC thresholds of the right ear are greater than (130 - air bone gap of left ear), masked thresholds of the right ear cannot be obtained.

Question No.2a : Is masking necessary while testing the BC threshold of the right ear?

Answer : As per rule 2, while testing the BC threshc of the right ear masking of the left ear is essential.

Question No.2b : How much masking should be used?

Answer : Min EML and max EML at different frequences are:-

		250Hz	500 Hz	1KHz	2KHz	4 KHz
Min EML	Assumed	45	50	50	55	50
	If right has S-N loss	* 45+35	30+35	70+30	* 70+35	70+35

		25CHz	500 Hz	1 KHz	2KHz	4KHz
Max EML	Assumed	50	55	60	60	55
	Real	?+40	?+40	?+40	?+40	?+40
	If right 1 has S-N loss	45+40	70+40	70+4O	70+40	* 70+40

Comments - If the true BC thresholds of the rights ear are same as the common BC thresholds, Min EMLs max EMLs, hence masking is not possible.

If right ear has S-N loss then also masking is not possible, because min EMLs max EMLs.

Here the rule (Vyasamurthy 1980) BC thresholds of the S-N loss ear cannot be obtained by masking the nontest ear. If the non teast ear has $\geq$ 30 dB air bone gap. Since in the above example, air bone gap of the left ear is 30 dB, BC thresholds of the right ear (If right ear has S-N loss cannot be obtained.

Question No.3a: Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is not necessary while testing AC threshold of the left ear.

Question No.4 a: Is masking necessary while testing BC threshold of the left ear?

Answer : As per rule 2, while testing BC threshol of the left ear, masking of the right ea is essential.

Question No.4b : How much masking should be used?

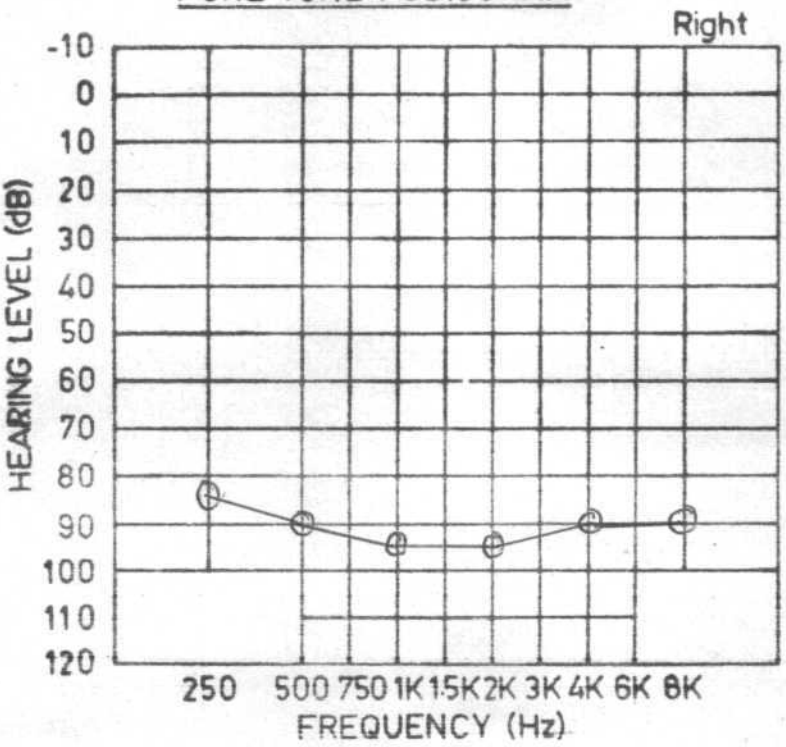
Answer : Min EML and max EML at different frequer cies are:-

		250Hz	500Hz	1 KHz	2KHz	4KHz
Min EML	Assumed	65	70	70	75	80
	If left has S-N loss	45+55	50+55	50+50	55+55	5O+65

		250Hz	500 Hz	1KHz	2KHz	4KHz
Max EML	Assumed	50	55	60	60	55
	Real	?+40	?+40	7+40	7+40	7+40
	If left has S-N loss	45+40	50+40	50+40	55+40	50+40

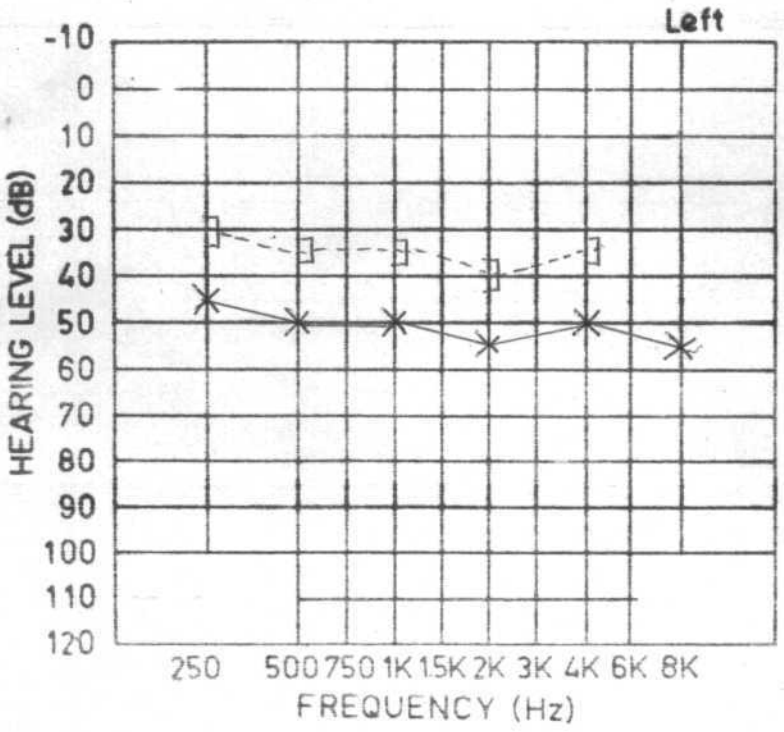
Case No: 11

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.11

Question No.1a : Is masking necessary while testing the AC thresholds of the right ear?

Answer : As per rule 1, masking of the left ear is necessary while testing right AC thresholds.

Question No.lb : How much masking should be used?

Answer : Min EML and max EML at different frequencies are:-

		250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Min EML		60	65	70	70	65	70*
Max EML	Assumed	70	75	75	80	75	75
	Real	?+40	?+40	?+40	?+40	?+40	?+40
	If right ear has S-N loss	85+40	90+40	95+40	95+40	90+40	90+40

*BC thresholds at 8KHz is assumed to be 35 dB.

Question No.2a : Is masking necessary while testing the BC thresholds of the right ear?

Answer : As per rule 2, while testing the BC threshold of the right ear masking of the left ear is essential.

Question No.2b : How much masking should be used?

Answer : Min EML and max EML at different frequencies are:-

		250Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	45	50		55	50
	If right ear has S-N loss	43+15	70+15	70+15	7O+15	70+15

Note: Max BC output at 250 Hz = 45dB
Max BC output at other fq = 70dB

	250Hz	500Hz	1KHz	2KHz	4KHz
Max Assumed	70	75	75	80	75
Real	?+40	?+40	?+40	?+40	?+40
If right has S-N loss	45+40	70+40	70+40	70+40	70+40

Comments - If right BC thresholds are the same as common BC thresholds masked BC thresholds of right ear can be obtained by masking the left ear as max EMLs > Min EMLs.

If right ear has S-N loss, it may not be possible to get the masked BC thresholds of the right ear by masking the left ear as the difference between max EMLs and Min EMLs is just 15 dB. (Max EMLs is assumed to be 100 dB HL and the maximum BC output is assumed to be 70 dB HL)

Question No.3 : Is masking necessary while testing the AC thresholds of the left ear?

Answer : As per rule 1, masking of the right ear is not necessary while testing AC threshol of the left ear.

Question No.4a : Is masking necessary while testing BC thresholds of the left ear?

Answer : As per rule 2, while testing BC thresholds of the left masking of the right ear is essential.

Question No.4b : How much masking should be used?

Answer : Min EMLs and max EMLs at different frequencies are :-

		250Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	85	90	95	95	90
	If left has S-N loss	45+55	50+55	50+60	55+55	50+55

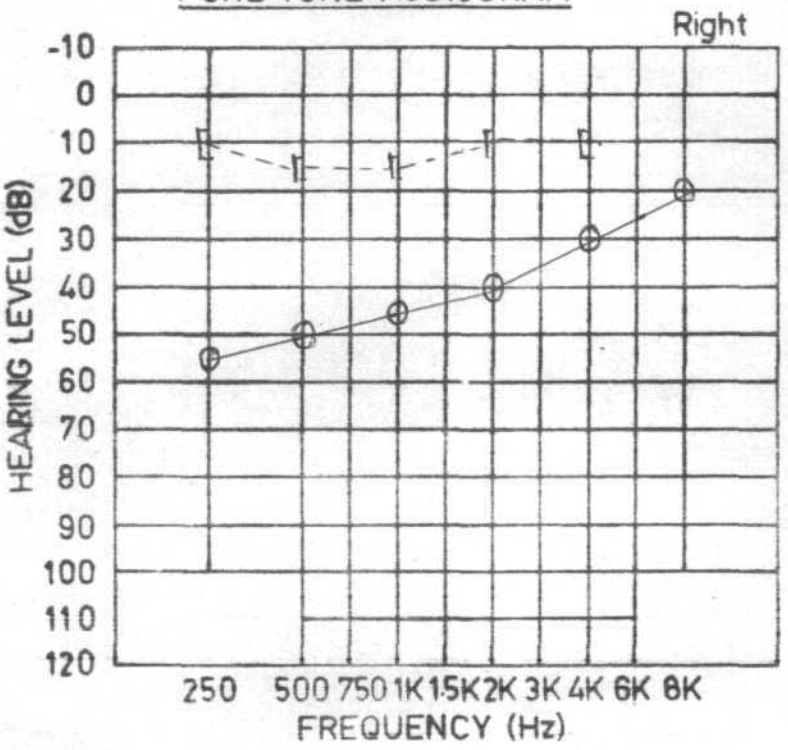
		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	70	75	75	80	75
	Real	?+40	?+40	?+40	?+40	?+40
	If left has S-N loss	45+40	50+40	50+40	55+40	50+40

Comments - If left ear BC thresholds are same as the common BC thresholds, right ear threshold can not be determined by masking the right ear. As min EMLs > max EMLs.

If left ear has S-N loss the BC thresholds of the left ear can not be determined by masking the right ear. As min EMLs > max EMLs. (The rule. By Vyasamurthy 1988 BC threshold of S-N loss ear cannot be determined by masking the nontest ear if the nontest ear has air bone gap of more than 30 dB, is relevant here.

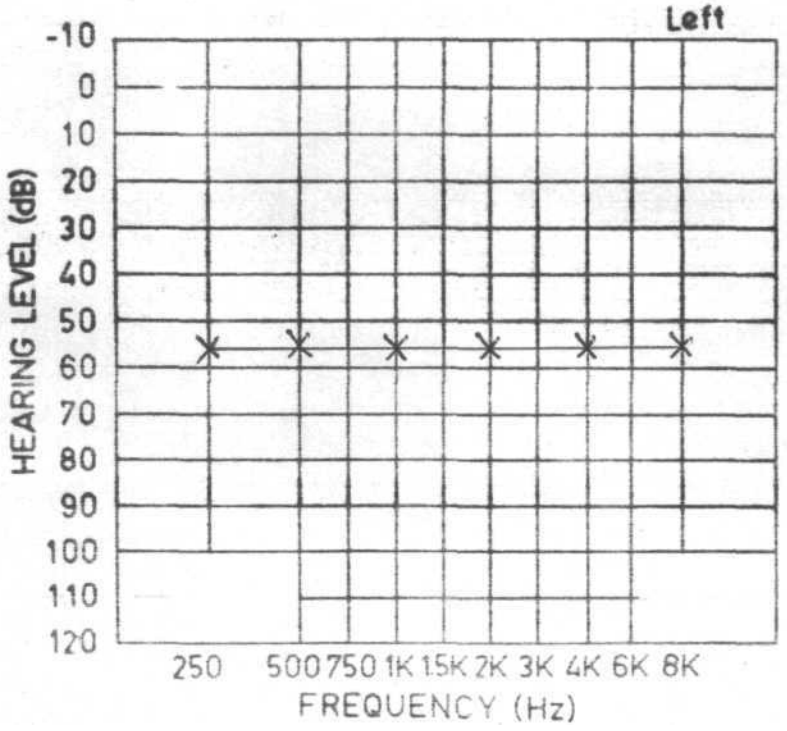
Case No: 12

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response	O↘	×↘
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response	[↓	]↓



Question No.la : Is masking necessary while testing the AC threshold of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the AC threshold of the left ear at 250 Hz.

Question No.1b : How much masking should be used?

Answer : Min EML and max EML at frequency 250 Hz

Min. EML		60
Max EML	Assumed	50
	Real	?+40
	If left has S-N loss	55+40

Comments - If left ear has conductive loss, AC threshold of left ear at 250 Hz cannot be determined by masking the right ear as min EML > max

On the other hand if left ear has S-N loss, AC threshold of left ear can be determined by masking right ear as max EML > min EML (95 > 6O)

Question No.2a : Is masking necessary while testing the BC thresholds of the left ear?

Answer : As per rule 2, while testing the BC threshol of the left ear, masking of the right ear is essential.

Question No.2b : How much masking should be used?

Answer : Min EML and max EML at different frequencies are:-

		250Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	55	50	45	40	30
	If left has S-N loss *	45+45	55+35	55+30	55+30	55+20

		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	50	55	55	40	40
	Real	? +40	?+40	?+40	7+40	7+40
	If left has S-N loss *	45+40	55+40	55+40	55+40	55+40

Comments - If left ear BC threshold is same as common BC threshold, left ear BC threshold cannot be determined by masking the right ear as min EMLs Max EMLs (Naunton's dilemma) If left ear has S-N loss, BC threshold of left ear cannot be determined by masking right ear, as min EMLs max EMLs. The rule that (Vyasamurthy 1980) BC thresholds of the S-N loss ear can not be determined by masking the nontest ear if the nontest ear has air bone gap of more than 30dB, is relevant in the above example.

Question No.3a : Is masking necessary while testing the 50 AC threshold of the right ear?

Answer : As per rule 1, masking of the left ear is necessary while testing the AC thresho of the right ear at 250 Hz.

Question No.3b : How much masking should be used?

Answer : Min EML and max EML at 250 Hz

		250 Hz
Min EML		60
Max EML :-	Assumed 50	
	Real	?+40
	If right has S-N loss	55+40

Comment — If right ear, cond loss AC threshold of right ear can not be determined at 250 Hz by masking the left ear as MIN EMLs > Max EMLs.-

If right ear has S-N loss the AC threshold of right ear can be determined by masking the left ear, as max EML > min EML (95 > 60)

Question No.4a : Is masking necessary while testing BC thresholds of the right ear?

Answer : As per rule 2, while testing BC threshold of the right ear, masking of the is essential.

Question No.4b : How much masking should be used?

Answer : Min EML and max EML at different frequencies are:-

		250Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	55	55	55	55	55
	If right has S-N loss	45+45*	50+40	45+40	46+45	30+45

		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	50	55	55	50	50
	Real	?+40	?+40	?+40	?+40	?+40
	If right has s-N loss	45+40*	50+40	45+40	40+40	30+40

* Max BC threshold output at 250 Hz = 45 dB.

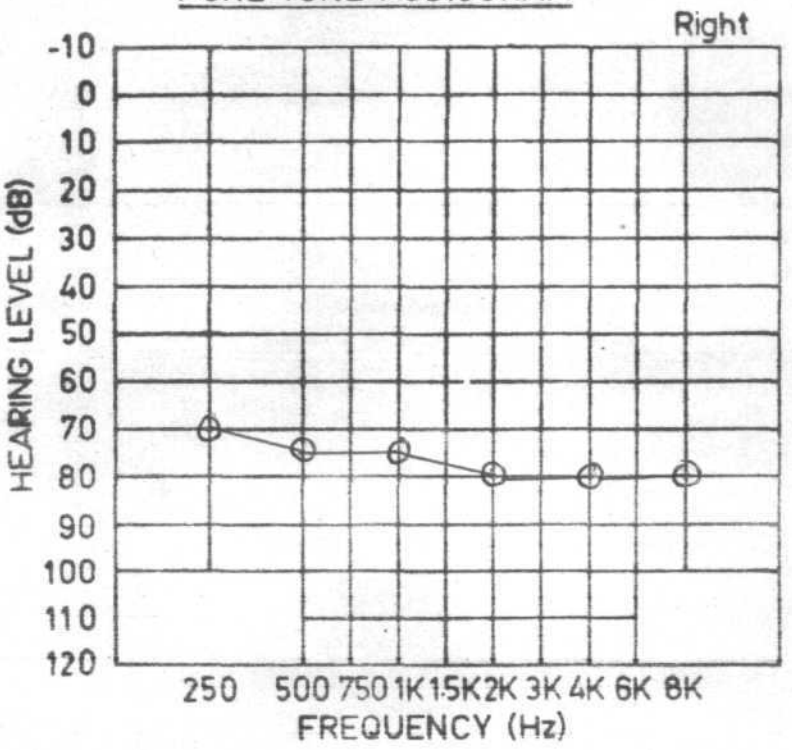
Comments - If right has conductive loss the BC threshod of right can not be determined by masking the left ear as Min EMLs max EMLs (Naunton's dilemma)

If right ear has S-N loss, BC threshold of right ear can not be determined by masking the left ear as Min EMLs max EMLs.

The rule that (Vyasamurthy 1980) the BC thresholds of the S-N loss ear cannot be determined by masking the nontest ear if the nontest ear has an air bone gap of 30 dB, is relevant here.

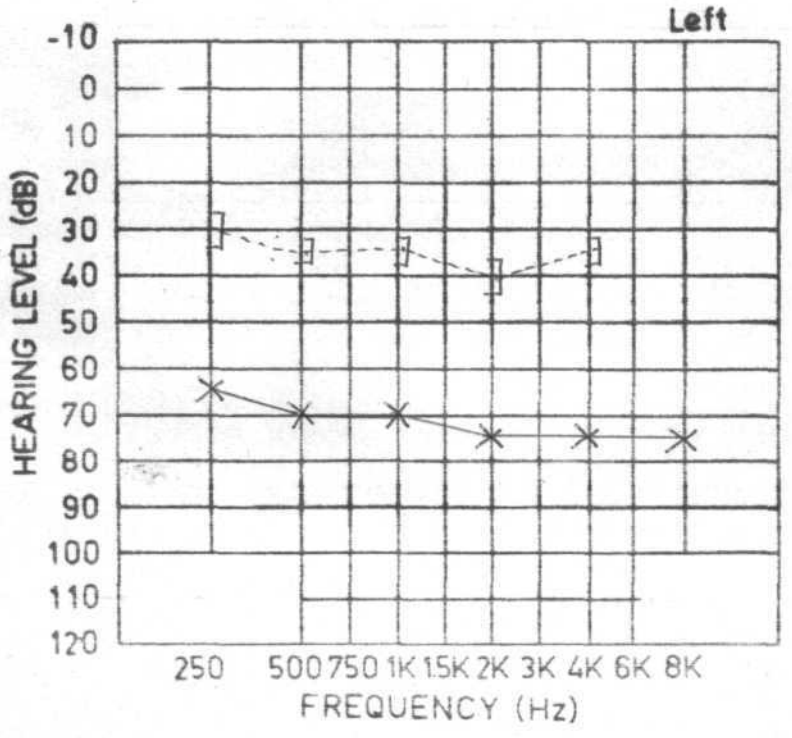
Case No: 13

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.13

Question No.1a : Is masking necessary while testing the AC threshold of the right ear?

Answer : As per rule 1, masking of the left ear is accessary while testing AC threshold of right ear at 4 KHz and 8 KHz.

Question No.lb : How much masking should be used?

Answer : Min EML and max EML at frequencies 4KHz : and 8 KHz.

		4KHz	8KHz
Min EML		83	75*
Max EML	Assumed	75	75
	Real	?+40	?+40
	If right has S-N	80+40	80+40

* BC threshold at 8 KHz is assumed to be 35 dB.

Comment - If right ear BC threshold are same as common BC thresholds masked AC threshold of right at 4 KHz and 8 KHz can not be determined as Min EMLs max EMLs (The rule, if the sum of the air-bone gap is > 80dB, Nauton's dilemma results; is relevant here, Ref. Vyasamurthy 1980).

If right ear has S-N loss, masked AC threshol at 4 KHz and 8 KHz of right ear can be determined by masking the left ear as max EMLs min EMLs.

Question No.2a : Is masking necessary while testing the BC threshold of the right ear?

Answer : As per rule 2 while testing the BC threshold of the right ear, masking of the left ear is essettial.

Question No.2b : How much masking should be used?

Answer : Min EML and max EML at different frequencies are:

		250 Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	65	70	70	75	75
	If right has S-N loss	45+35	70+35	70+35	70+35	7O+45

Max BC threshold at 250 Hz is 45 dB

Max BC threshold at other frequency is 70 dB.

		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	70	75	75	80	75
	Real	?+4O	?+40	?+40	?+40	?+40
	If right has S-N loss	45 +40	70+40	70+40	70+40	70+40

Comments: If the BC threshold of right ear are the same as the common BC thresholds; BC thresholds of right ear can not be determined by masking the left ear as mag EML min EML.

If right ear has S-N loss, BC thresholds of right ear can not be determined by masking the left ear as max EML ~ min EMLs (A rule: BC threshold of the S-N loss ear can not be determined by masking the non-test ear if the nontest ear has air-bone gap of more than 30 dB is relevant here, ref Vyasamurthy 1980)

Question No.3 : Is masking necessary while testing the AC threshold of the left ear?.

Answer : As per rule 1, masking of the right ear is not necessary while testing AC threshold of the left ear.

Question No.4a: Is masking necessary while testing BC thresholds of the left ear?

Answer : As per rule 2, while testing BC thresholds of the left ear, masking of the right ear is essential.

Question No.4b: How much masking should be used?

Answer : Min EML and max EML at different frequencie are:

		250Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	70	75	75	80	80
	If left has S-N loss	45+40*	70+40	70+40	70+40*	70+35*

		250 Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	70	75	75	80	75
	Real	?+40	?+40	?+40	?+40	?+40
	If left has S-N loss	45+40*	70+40	70+40	75+40	70+40

Comments : If left ear EB thresholds are same as the common BC thresholds, left ear BC threshold cannot be determined by masking right ear a max EMLs min EMLs.

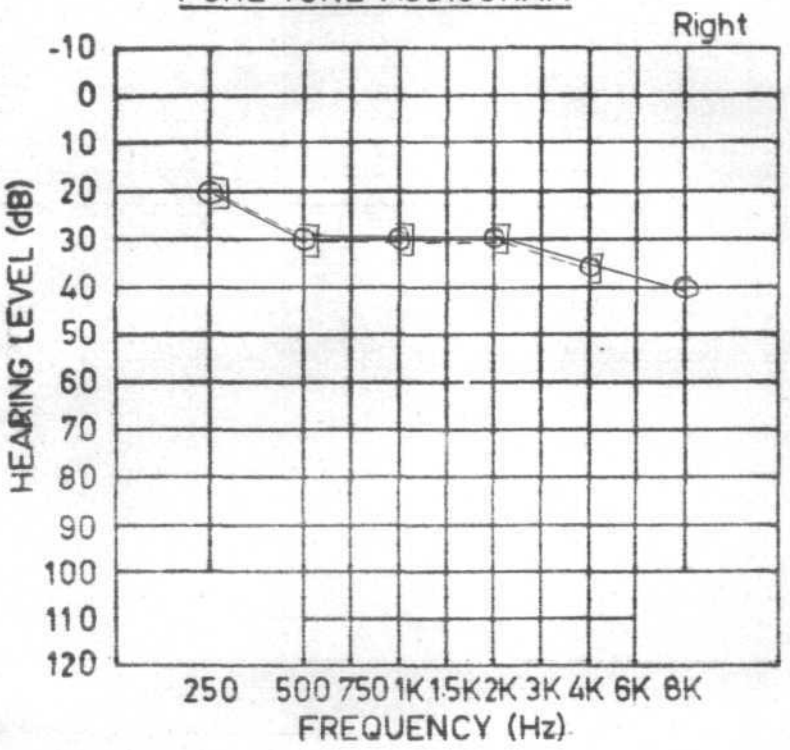
Also if left ear has S-N loss BC threshold of left ear cannot be determined by masking the right ear as Min EMLs max EMLs.

* Max BC threshold at 250 Hz = 45 dB

Max BC threshold at 500 Hz tp 4 KHz - 70 dB

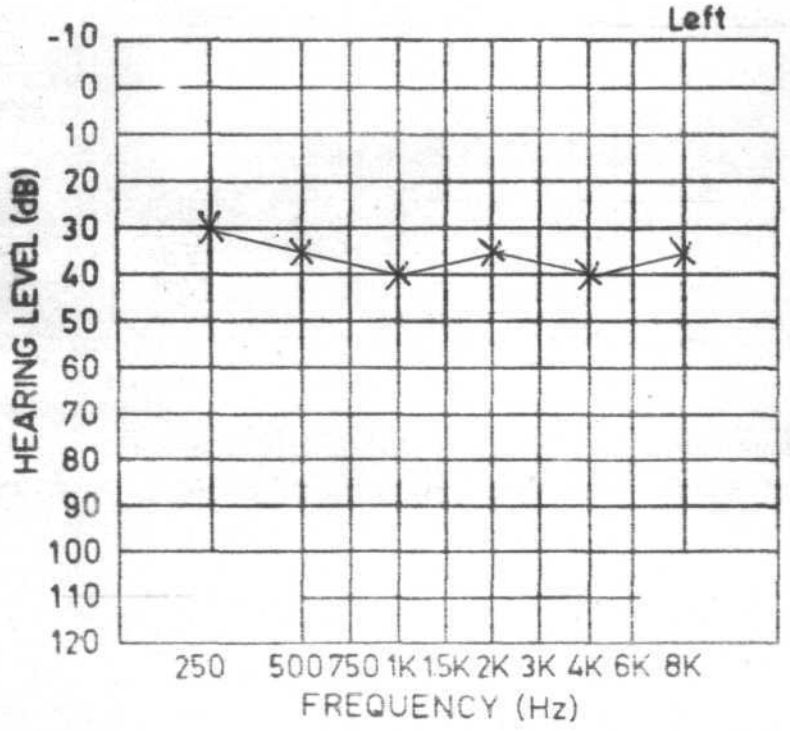
Case No: 14

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response	O↘	×↘
Bone conduction		
Unmasked	[	]
Masked	⌈	⌉
No response	[↓	]↓



DISCUSSION ABOUT CASE NO.14

Question No.l : Is masking necessary while testing the AC thresholds of the left ear?

Answer : As per rule 1, masking of the right ear is npt necessary while testing the AC threshold of the left ear.

Question No.2 : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, while testing the BC threshold of the left ear, masking of the right ear is not essential.

Question No.3 : Is masking necessary while testing the AC thresholds of the right ear?

Answer : As per rule 1, masking of the left ear is not necessary while testing the AC threshold of the right ear.

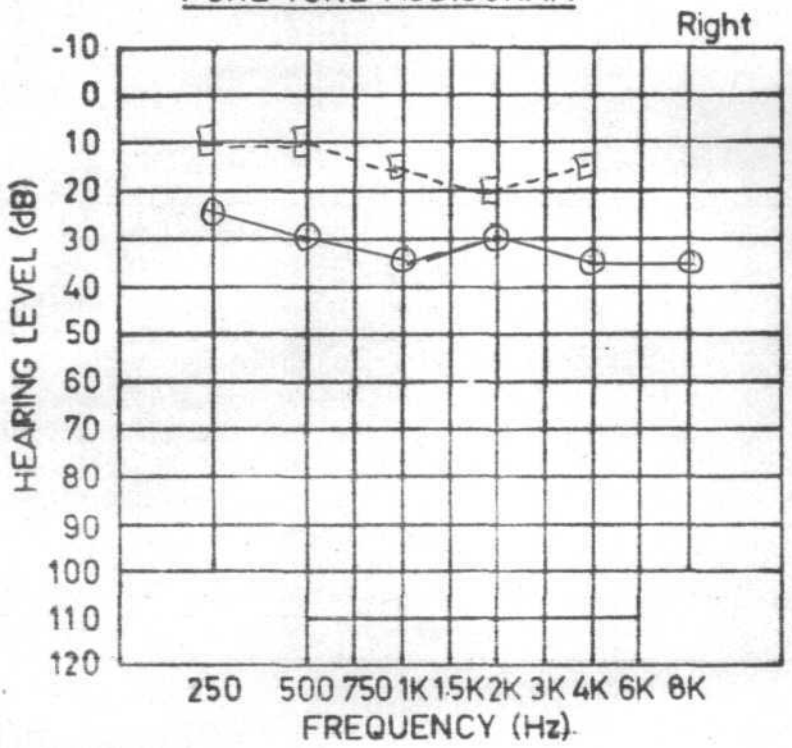
Question No.4 : Is masking necessary while testing BC thresholds of the right ear?

Answer : As per rule 2, while testing BC threshold of the right ear masking of the left ear is not essential.

Comments - If the common BC thresholds are same as the AC thresholds of the two ears i.e. if there is no air-bone gap is either ear, it is not necessary to determine the BC threshold of both the ears. BC threshold of one ear would be enough.

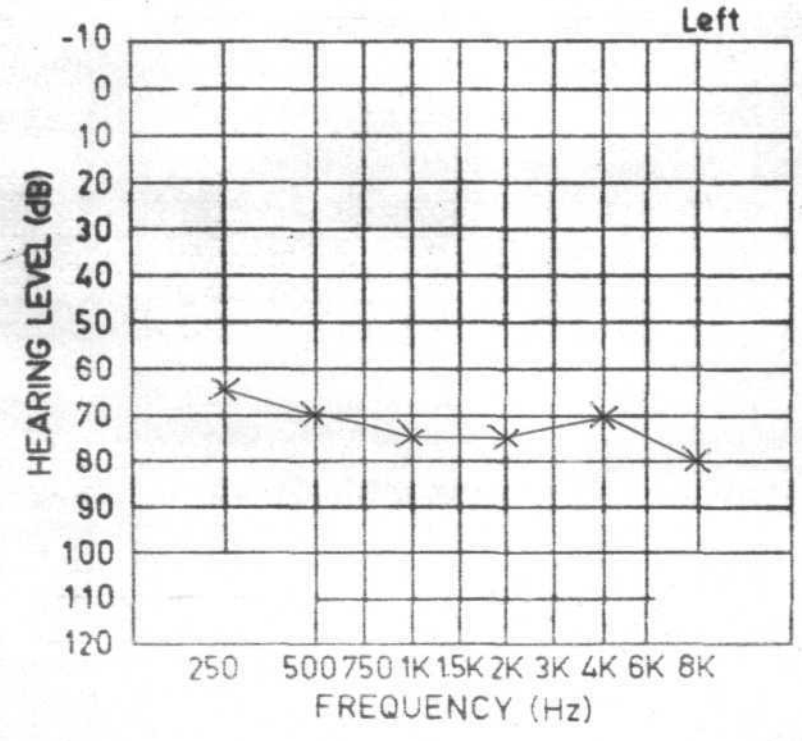
Case No: 15

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⌈	⌉
No response		



DISCUSSION ABOUT CASE NO.15

Question No.la: Is masking necessary while testing the AC thresholds of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the AC thresholds of the left ear.

Question No.lb: How much masking should be used?

Answer : Min EML and max EML at different frequencies are:-

		250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Min EML		40	50	55	45	40	55*
Max EML	Assumed	50	50	55	60	55	55
	3 Real	?+40	?+40	?+40	?+40	7+4O	?+40
	If left has S-N loss	65+40	70+40	75+40	75+40	70+40	80+40

* BC threshold at 8KHz is assumed to be 15 dB.

Comments - If left ear BC thresholds are same as the common BC thresholds masked AC thresholds of the left ear can not be determined by masking the right ear as Min EMLs max EMLs.

If left ear has S-N loss, AC thresholds of left ear can be determined by masking the right ear as max EMLs > Min EMLs.

Question No.la: Is masking necessary while testing the BC thresholds of the left ear?

Answer : As per rule 2, while testing the BC thresholds of the left ear, masking of the right ear is essential.

Question

Answer : Min EML and Max EML at different frequence are:-

		350Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	25	30	35	30	35
	If left has S-N loss	45+15	70+20	70+20	70+10	70+20

Note: BC max out put at 250 Hz = 45dB

BC max at other for = 70dB

		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	50	50	55	60	55
	Real	?+40	?+40	?+4e	?+40	?+40
	If left has S-N loss	45+40	70+40	70+40	75+40	70+40

Comments - If left ear BC thresholds are same as common BC thresholds, left ear BC threshold can be determined by masking right ear as max EMLs > min EMLs.

If left ear had S-N loss, BC thresholds of S-N loss ear can not be determined by masking the right ear as min EMLs max EMLs.

Question No.3 : Is masking necessary while testing the AC thresholds of the right ear?

Answer : As per rule 1, masking of the left ear is not necessary while testing the AC threshold of the right ear.

Question No.4a : Is masking necessary while testing BC thresholds of the right ear?

Answer : As per rule2, while testing BC threshold of the right ear, masking of the left ear is essential.

QuestionNo.4b : How much masking should be used?

Answer : Min EML and max EML at different frequencie are:-

		250Hz	500Hz	1KHz	2KHz	4KHz
Min EML	Assumed	65	70	75	75	70
	If right has S-N loss	25+55	30+60	35+60	30+55	35+55 .

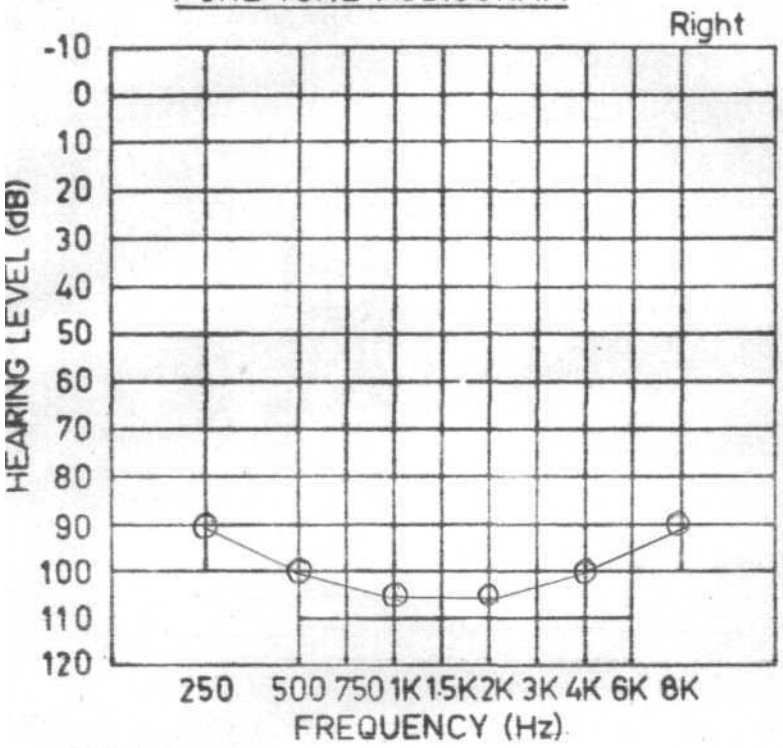
		250 Hz	500 Hz	2 KHz	2 KHz	4 KHz
Max EML	Assumed	50	50	55	60	55
	Real	?+40	?+40	?+40	?+40	?+40
	If right has S-N loss	25+40	30+40	35+40	30+40	35+40

Comments - If right ear BC thresholds are same as the common BC thresholds, right ear BC threshold can not be determined by masking the left ear as min EMLs > max EMLs.

If right ear has S-N loss, BC threshold of right ear can not be determined by masking left ear as min EMLs max EMLs (The rule Vyasamurthy 1980, BC threshold of the S-N loss ear can not be determined by masking the non-test ear, the non-test ear exhibits airbone gap of more than 30 dB, is relevant here)

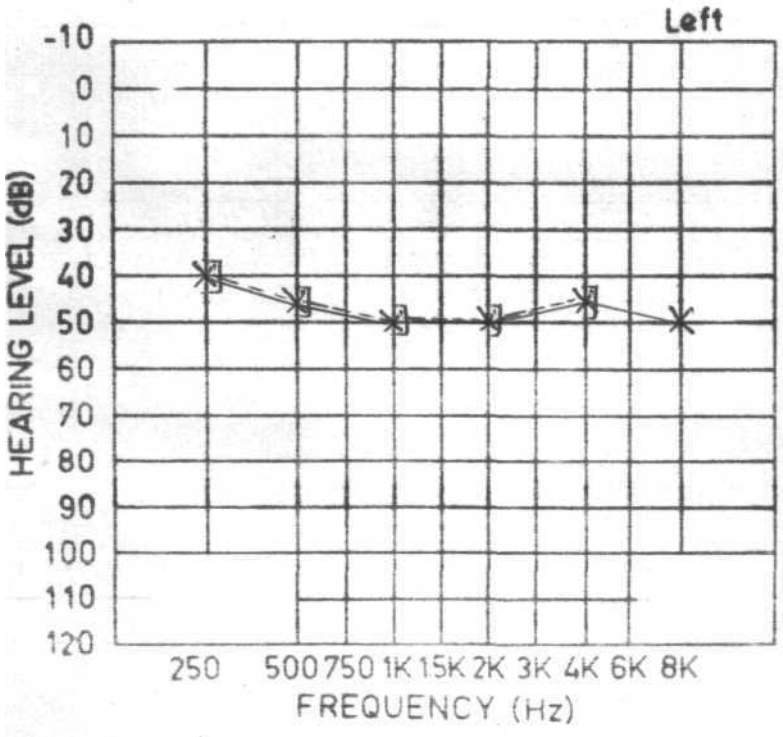
Case No: 16

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.16

Question No.la : Is masking necessary while testing the AC threshold of the right ear?

Answer : As per rule 1, masking of the left ear is necessary while testing AC threshold of right ear.

Question No.lb : How much masking should be used?

Answer : Min EML and max EML at different frequencies are:-

		250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Min EML		50	60	65	65	60	50*
Max EML	Assumed	80	85	90	90	85	90
	Real	?+40	?+40	?+40	?+40	?+40	?+40
	If right ear has S-N loss	90+40	100+40	105+40	105+40	130+40	90+40

* BC threshold of 8 KHz is assumed to be 50 dB.

Comments - If right ear BC thresholds are same as common BC thresholds right ear. AC threshold can be determined by masking the left ear as max EMLs > min EMLs.

If right ear has S-N loss, then also right ear AC threshold can be determined by maskig left ear as max EMLs > Min EMLs.

Question No.2a : Is masking necessary while testing the BC threshold of the right ear?

Answer : As per rule 2, while testing the BC threshold of the right ear, maskig of the left is essential.

Question No.2b : How much masking should be used?

Answer : Min EML and max EML at different frequencies:-

		250Hz	500Hz	1KHz	2KHz	4KHz
Min NML	Assumed	60	60	60	50	45
	If right has S-N loss	45+0	70+0	70+0	70+0	70+0

Max BC output at 250 Hz = 45 dB

Max BC output = 70 dB

		250H&	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	80	85	90	90	85
	Real	?+40	7+40	7+40	7+40	7+40
	If right has S-N loss	45+40	70+40	70+40	70+40	70+40

Comments - If right ear BC thresholds are same as common BC thresholds, right BC thresholds can be tested by masking left ear as max EMLs > Min EMLs.

If left ear has S-N loss the exact BC threshold of right can not be determined due to the maximum limit of the BC output. In most of the audiometer BC output Is 60 to 70 dB.

Question No.3 : Is masking necessary while testing the AC threshold of the left ear?

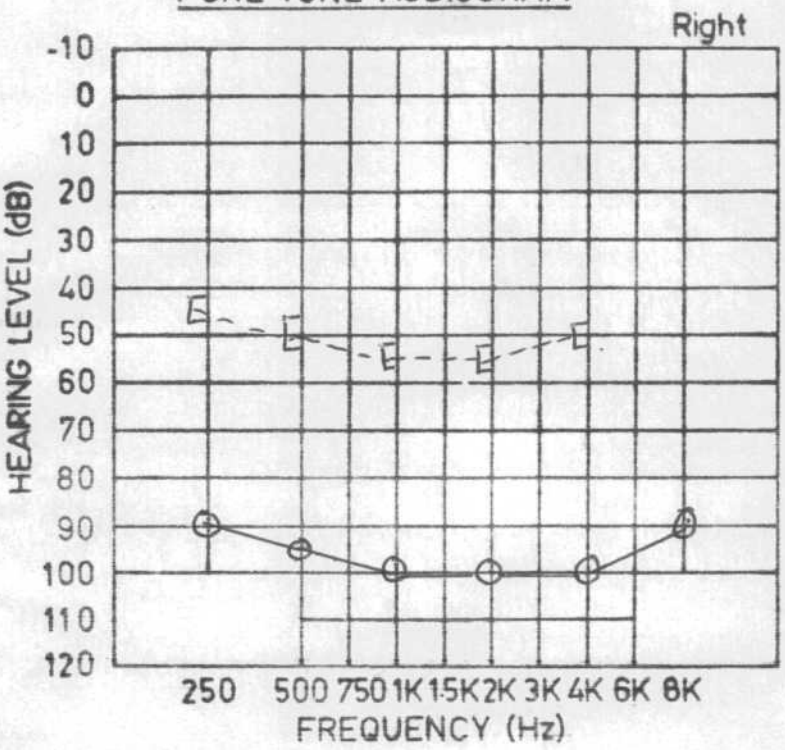
Answer : As per rule 1, masking of the left ear is not necessary while testing AC threshold of the right ear.

Question No.4a : Is masking necessary while testing BC threshold of the left ear?

Answer : As per rule 2, while testing BC threshold of the left ear masking of the right ear i not necessary.

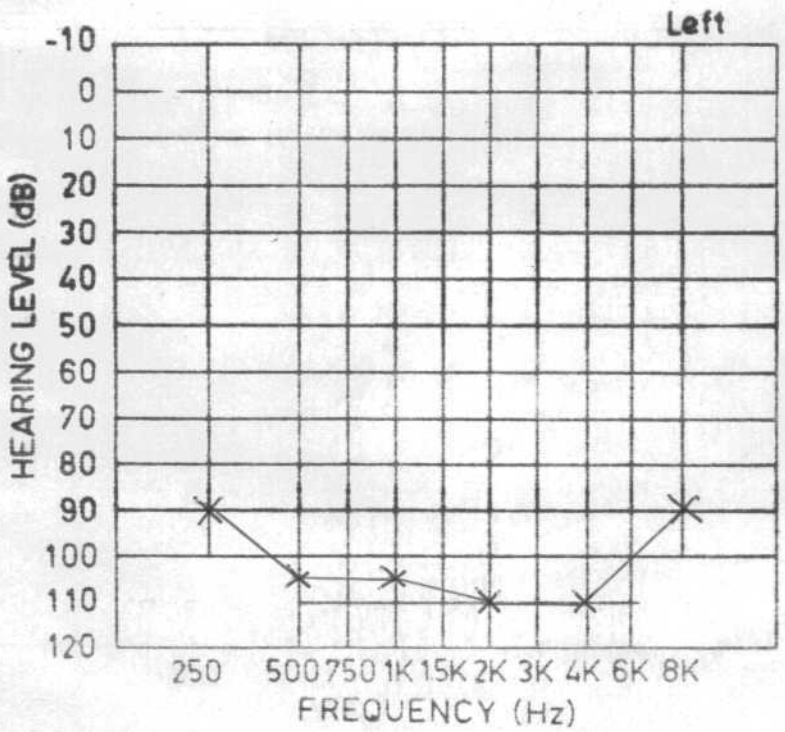
Case No: 17

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response	O with arrow	× with arrow
Bone conduction		
Unmasked	[	]
Masked	[	]
No response	[with arrow	] with arrow



Question No.la : Is masking necessary while testing the AC thresholds of the left ear?

Answer : As per rule 1, masking of the right ear is necessary while testing the AC thresholds of the left ear.

Question No.lb : How much masking should be used?

Answer : Min EML and Max EML at different frequencies:

		250Hz	500Hz	1KHz	2KHz	4KHz	3KHz
Min EML		95	110	110	115	120	90*
Max EML	Assumed	85	90	95	95	90	90
	Real	?+40	?+4O	?+40	?+40	?+40	?+40
	If left has S-N loss	90+40	105+40	105+40	110+40	110+40	90+40

*BC threshold at 8 KHz is assumed to be 50 dB.

Comments - Masked AC threshold of left ear cannot be determined by masking right ear as min EML exceeds the max EML available in the audio-meters.

Question No.2a : Is masking necessary while testing the BC threshold of the left ear?

Answer : As per rule 2, while testing the BC threshold of the left ear, masking of the right ear is essential.

Question No.2B : How much masking should be used?

Answer : Min EML and max EML at different frequenci are:-

		250Hz	500Hz	1KHZ	2KHz	4KHz
Min EML	Assumed	90	95	100	100	100
	If left has S-N loss	45+50	70+45	70+45	70+45	70+50

Max BC threshold (output) at 250 Hz-45 dB

Max BC threshold at other fq = 70 dB.

		250Hz	500Hz	1KHz	2KHz	4KHz
Max EML	Assumed	85	90	95	95	90
	Real	?+40	?+40	?+40	?+40	?+40
	If left has S-N loss	45+40	70+40	70+40	7O+4O	70+40

Comments - left ear BC thresholds can not be determine by masking the right ear as min EMLs max EMLs.

Even if left ear has S-N loss BC thresholds of left ear can not be determined as maximum BC output at different frequency is 7O dB HL.

Question No.3a : Is masking necessary while testing the AC thresholds of the right ear?

Answer : As per rule 1, masking of the left ear is necessary while testing the AC thresholds of the right ear.

Question No.3b : How much masking should be used?

Answer : Min EML ahd max EML at different frequencies are:-

		250 Hz	500Hz	1KHz	2KHz	4KHz	
Min EML		95	100	110	115	120	90*
Max EML	Assumed	85	90	95	95	90	90
	Real	?+40	?+40	?+40	?+40	?+40	?+40
	If left has S-N loss	90+40	95+40	100+40	100+40	100+40	90+40

* BC threshold at 8 KHz is assumed to be 50 dB. Masked AC threshold of right ear can be determined by masking left ear as min EMLS ~ EMLs.

Question No.4a : Is masking necessary while testing BC thresholds of the right ear?

Answer : As per rule 2, while testing BC threshold of the right masking of the left ear is essential.

Question No.4b : How much masking should be used?

Answer : Min EML and max EML at different frequencies are :-

		250Hz	500Hz	1KHz	4KHz	
Min EML	Assumed	90	105	105	110	110
	If right ear has S-N loss	45+45	70+55	70+55	70+55	70+60

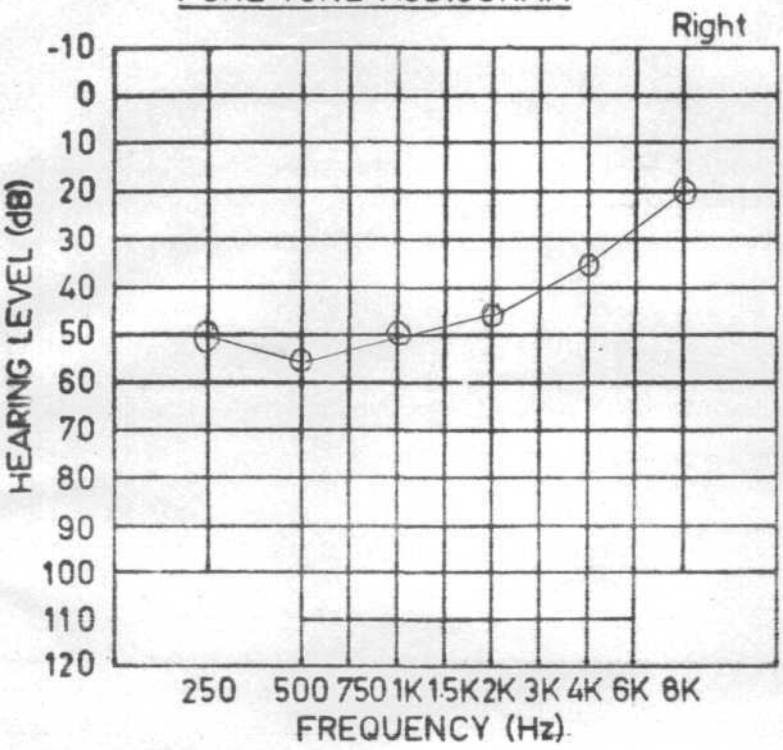
		250Hz	500Hz	1KHz	2KHz	4KHz
Max	Assumed	85	90	95	95	90
EML	Real	7+40	7+40	7+40	7+40	7+40
	If right ear has S-N loss	45+40	70+40	70+4O	70+40	70+40

Note: max BC threshold (output) at 250 Hz is 45dB and max VC threshold at other frequencies is 70 dB.

Comments - Masked BC threshold of right ear cannot be determined by masking the left ear as min EML exceeds maximum effecitve level available in the audiometers.

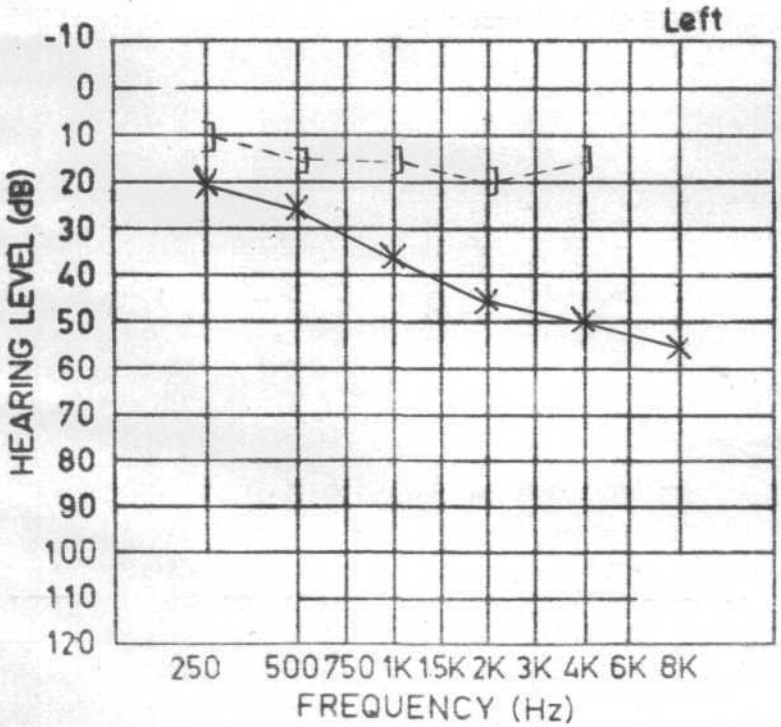
Case No: 18

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	×
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



DISCUSSION ABOUT CASE NO.18

Question No.l : Is masking necessary while testing the AC thresholds of the right ear?

Answer : As per rule 1, maskigg of the left ear is not necessary while testing AC thresholds of the right ear.

Question No.2a : Is masking necessary while testing the BC thresholds of the right ear?

Answer : As per rule 2, while testing the BC threshold of the right ear, masking of the left ear is essential.

Question No.2b : How much masking should be used?

Answer : Min EML and Max EML at different frequencies are:-

			250Hz	500Hz	1KHz	2 KHz	4KHz
EML	Min	Assumed	40	40	35	45	50
		If right has S-N loss	45+20*	55+15	50+20	45+20	35+35

			250Hz	500Hz	1KHz	2KHz	4KHz
	Max	Assumed	50	55	55	60	55
	EML	Real	?+40	?+40	?+40	?+40	?+40
		If right has S-N loss	45+40*	55+40	50+40	45+40	35+40

* Max BC threshold (output) at 250 = 45 dB.

Comments - If right ear BC thresholds are same as the Common BC thresholds it may be difficult to get the masked BC threshold of right ear as max EML is slightly greater than Min EMLs (Max EML - min EML < 20)

If right ear has S-N loss the BC threshold of right ear at 250 Hz, 500 Hz and 1 KHz can be determined by masking the left ear. BC thresholds at 2 KHz and 4 KHz of right ear can not be determined by masking the left ear as max EML - Min EML < 20.

Question No.3: Is masking necessary while testing the AC thresholds of the left ear?

Answer : As per rule 1, masking of the right ear is not necessary while testing AC threshold of the left ear.

Question No.4a: Is masking necessary while testing BC thresholds of the left ear?

Answer : As per rule 2, while testing BC thresholds of the left ear, masking of the right ear is essential.

Question No.4b : How much masking should be used?

Answer : Min EML and max EML at different frequencies are :-

		250Hz	500Hz	1KHz	2 KHz	4 KHz
Min EML	Assumed	50	55	50	45	35
	If left has S-N loss	20+40	25+40	35+45	45+25	50+20

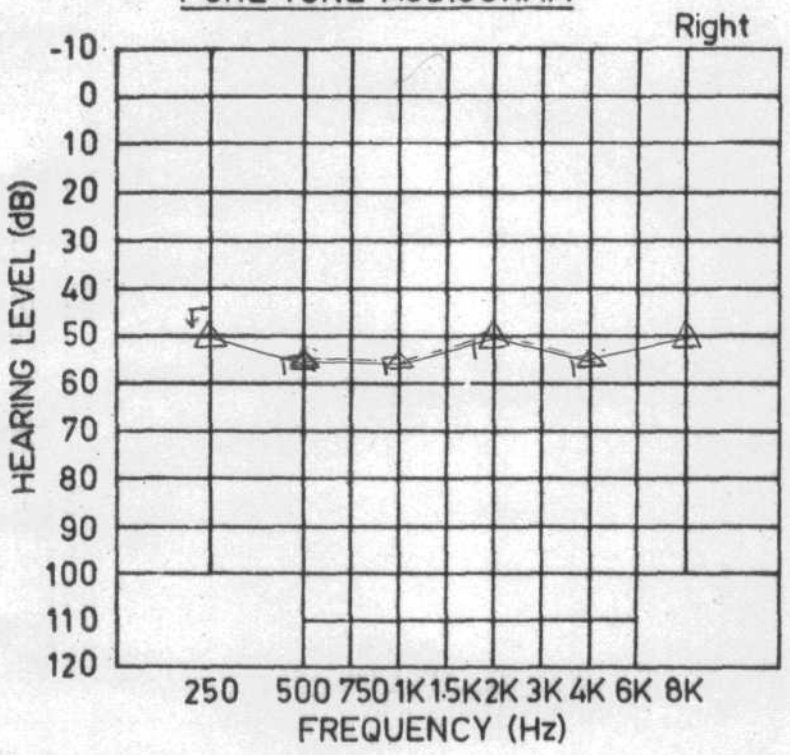
		250Hz	500Hz	1KHz	2 KHz	4KHz
Max EML	Assumed	50	55	55	60	15
	Real	?+40	?+40	?+40	?+40	?+40
	If left has S-N loss	20+40	25+40	35+40	45+40	50+40

Comments - If left ear BC thresholds are same as common BC thresholds, left ear BC threshold cannot be determined by masking right ear min EMLs Max EMLs.

If left ear has S-N loss, left ear BC threshold can not be determined by masking the right ear (The rule that the BC threshold of S-N loss ear can not be determined by masking the nontest ear, if the nontest ear has air bone gap of more than 30 dB, is relevant here).

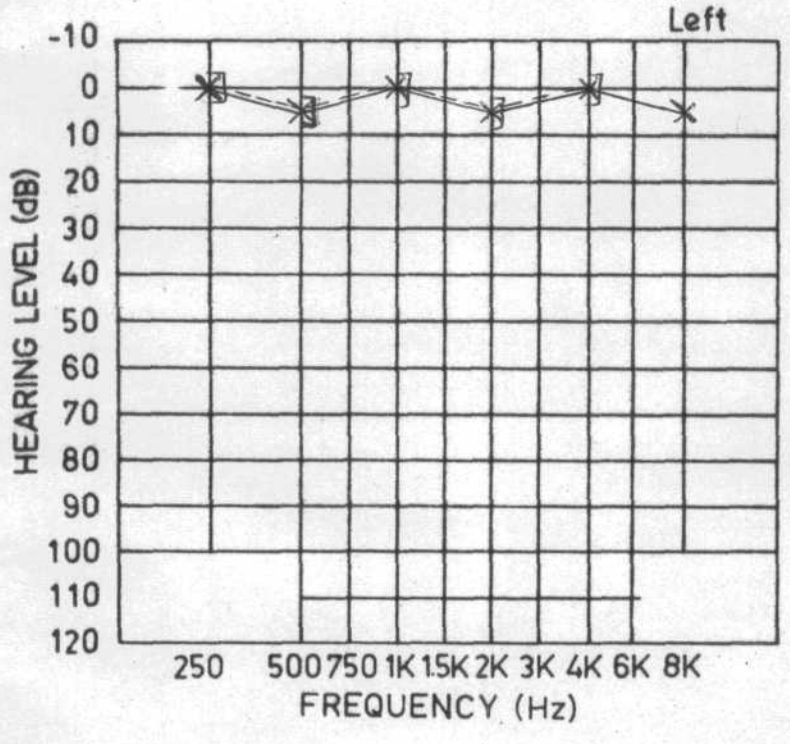
Case No: 19

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	X
Masked	△	▽
No response	O↓	X↘
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response	[↓	]↓



DISCUSSION ABOUT CASE NO.19

Question No.la : Is masking necessary while administering SISI test in the right ear at 1 KHz, 2KHz and 4KHz?

Answer : According to rule 3, while administering SISI test in the right ear at 1KHz, 2KHz, & 4KHz, the non-test ear (left ear) should be masked.

Question No.lb : How much masking noise should be given?

Answer : According to rule 4, the noise level required for masking the nontest ear at 1 KHz is 70 - 40 + 0 = 30 dBEL

(SISI test is to be administered at 70 dBHL) or higher level of audibility)

2 KHz = 70 - 40 + 0 = 30 dBEL

(SISI test is to be administered at 70 dBHL)

4KHz = 70 - 40 + 0 = 30 dB EL

(SISI test is to be administered at 70dB HL)

Question No.2a : While administering TDT (Olsen) in the right ear at 500 Hz, 1 KHz and 2 KHz, should we mask the left ear?

Answer : Left ear should be masked while administering TDT in right ear at 500 Hz, 1 KHz and 2 KHz according to rule 3.

Question No.2b : How much masking noise should be used?

Answer : According to rule 4

at 500 Hz = 55+20 - 40+0 = 35 dBEL

at 1 KHz = 55 + 20 - 40 + 0 = 35 dBEL

at 2 KHz = 50 + 20 - 40 + 0 = 30 dBEL

Note: 1 : While administering tone decay test, it is better to present maximum noise as we will be increasing the tone level whenever the subject fails to hear the tone.

Note: 2 : Audiologists should remember that the amount of tone decay increases in the presence of contralateral noise, hence the Interpretation should be made with caution.

Question No.3a: Is masking necessary while administering SRT (Speech reception threshold) in the right ear.

Answer : According to rule 3, the nontest (left) ear should be masked.

Question No.3b: How much Masking noise should be used?

Answer : According to rule 4,

masking noise level = PTA + 20 - 40 + 0

= 53.3 + 20 - 40 + 0

= 33.3 dBEL.

Note: To determine SRT, usually the prevention level in 20 dB above the PTA.

Question No. 4a : Is masking necessary while administering SDS (speech discrimination score) in the right ear.

Answer : According to rule 3, the nontest ear (left) should be masked.

Question No.4b : How much masking noise should be used?

Answer : According to rule 4,

masking noise level = PTA + 40 - 40 +0

= 53.3 + 40 - 40 +0

= 53.3 dBEL

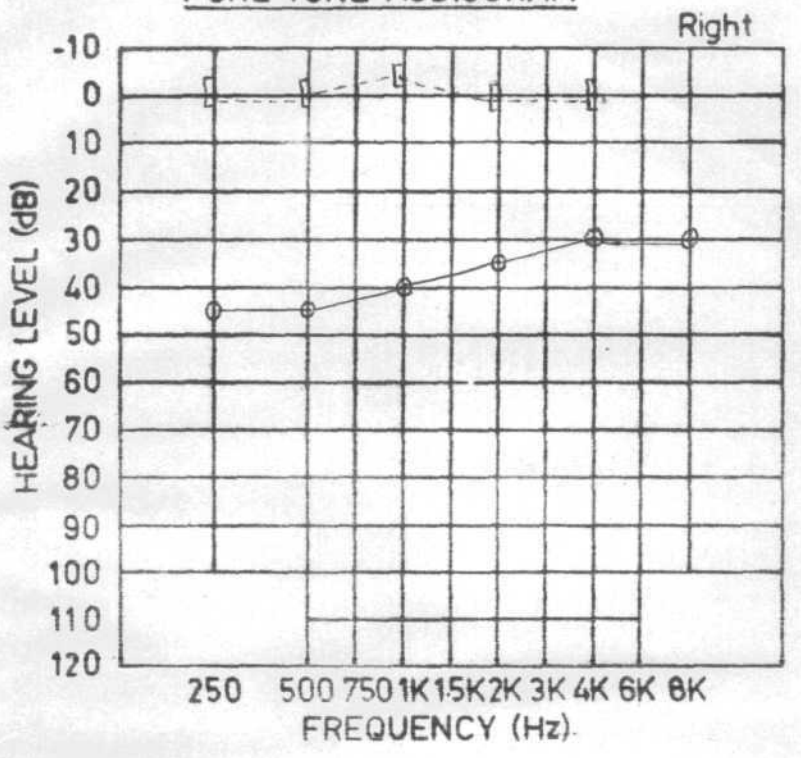
Note 1 : To determine SDS, usually the presentation level is 40 dB above the PTA.

Question No.5 : Is masking necessary while administering supra threshold tests in the left ear?

Answer : According to rule 3, while administering any supra threshold tests in the left ear, right ear need not be masked.

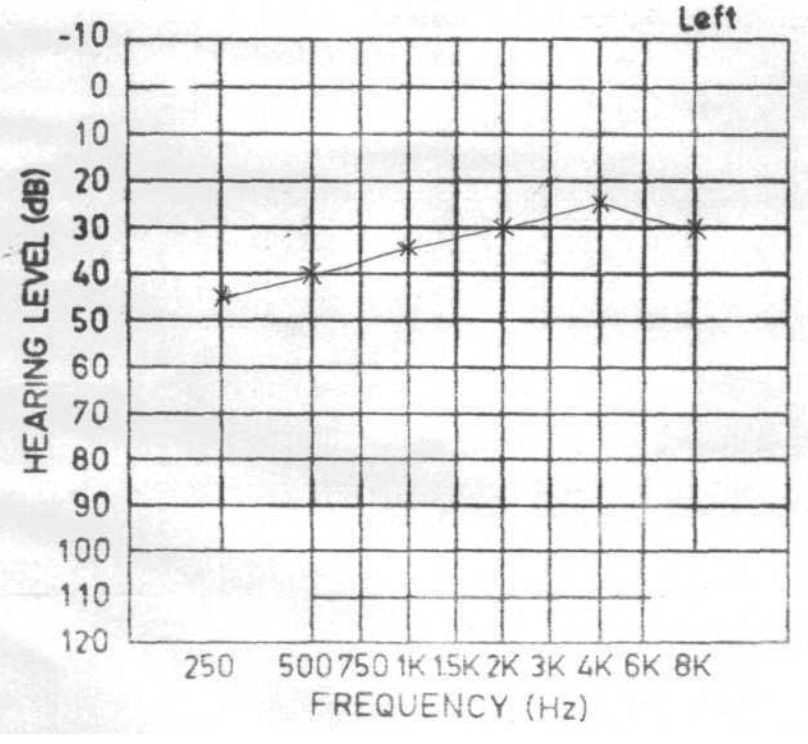
Case No: 20

PURE-TONE AUDIOGRAM



Key to symbols

	Rt.	Lt.
Air conduction		
Unmasked	O	X
Masked	△	▽
No response		
Bone conduction		
Unmasked	[	]
Masked	⊏	⊐
No response		



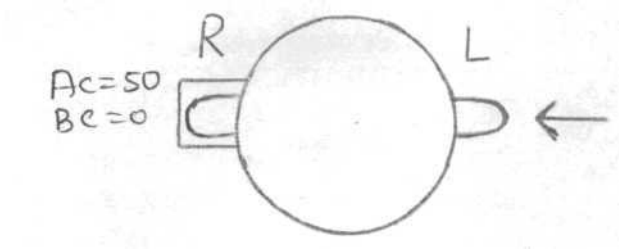
DISCUSSION ABOUT CASE NO.20

In this case.

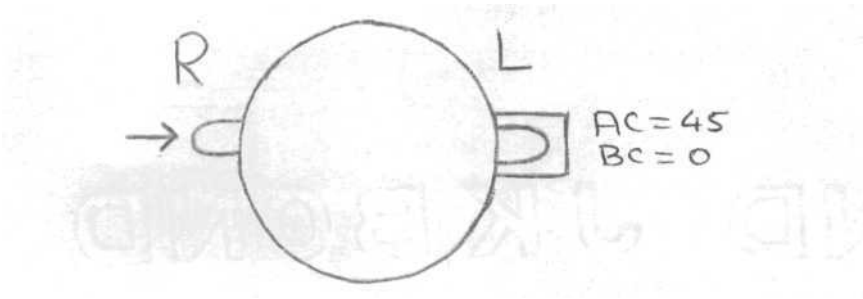
Right ear has Conductive hearing loss

Left ear has S-N hearing loss

These are confirmed by Reflex testing and Weber test.



Here left ear is probe ear and right ear is phone ear, reflex threshold of right ear are around 125 dB HL. Since reflex is present when the left ear is probe ear, middle ear pathology in left ear can be ruled out.



Right ear is the probe ear and left ear is phone ear, here reflex is absent in right ear which shows conductive hearing loss.

WEBER TEST

It is lateralized to right ear which also indicates there is conductive component in right ear.

Question No.l : Is masking necessary in the left ear while administering supra threshold tests in the right ear?

Answer : According to rule 3, the left ear need not be masked (PL - Both of left ear is not greater than 40 dB)

Question No.2a : Is masking necessary while administering SISI test in the left ear at 1 KHz, 2 KHs and 4 KHz?

Answer : According to rule 3, while administering SISI test in the left ear at 1 KHz, 2 KHz and 4 KHz, the nontest ear (right) should be masked.

Question No.2b : How much masking noise should be given?

Answer : According to rule 4, the noise level required formasking the right ear at 1 KHz is 70 - 40 + 45 = 75 dBEL.
(SISI is to be administered at 70 dBEL)
at 2 KHz
70 - 40 + 35 = 65 dBEL
(SISI is to be administered at 70 dBHL)
at 4 KHz
70 - 40 + 30 = 60 dBEL
(SISI is to be administered at 70 DBHL)

Question No.3a : While administering TDT (Olsen) in the left ear at 500 Hz, 1 KHz, and 2 KHz, should we mask the right ear?

Answer : Right ear should be masked while administering TDT in left ear at 500 HZ, 1 KHz and 2 KHz according to rule 3.

Question No.3b : How much masking noise should be used?

Answer : According to rule 4 .

at 500 Hz = 45 + 20 - 40 +45 = 70 dBEL

at 1000 Hz = 35 + 20 - 40 +45 = 60 dBEL

at 2000 Hz = 30 + 20 - 40 +35= 45 dBEL

Question No.4a : Is masking necessary while administering SRT in the left ear?

Answer : According to rule 3, the nontest ear (right) should be masked.

Question No.4b : How much masking should be used?

Answer : According to rule 4,

masking noise level = PTA+20-40+40

= 35+20 -40+40

= 55 dBEL

Question No.5a : Is masking necessary while administering SDz (speech discrimination score) in the left ear?

Answer : According to rule 3, the nontest ear (right) should be masked.

Question No.5b : How much masking should be used?

Answer : According to rule 4

masking noise level = PTA+40-40+40
= 35+40-40+40
= 75 dBEL

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