



Fitting Post - Fitting Management

Prescription of gain and output

47	POGO	half gain rule
Berger, Libby1/3, National Acoustics laboratory (NAL), revised NAL - R, Prescription of gain and output (POGO)	Target gain	250 10 dB, 500 5 dB, 1000 6000
	half gain	10 dB reserve gain

Berger method

압축보청기의 Formulas

masking effect	“upward spread of masking”	Prescriptive formula	NAL, POGO, Berger gain
		linear	
		level - dependent gain requirement	
	Gain	500, 1000, 2000, 3000, 4000 6000	prescriptive formula
	reserve gain	10 dB	가
			formula가
			formula loudness perception

Libby 1/3 gain

Independent Hearing Aid Fitting Forum(IHAFF)

gain method	1/3	1/3	IHAFF
	MCL		가
			3
Libby 1/3 gain formula	1/3		software가
250 Hz 5 dB, 500 Hz 1/3 hearing threshold level (HTL) 3 dB			CONTOUR Loudness software VIOLA
1000 6000 HTL 1/3 gain			Software APHAB
Libby 2/3 gain rule	half gain		software

NAL - R

CONTOUR

	half - gain rule	1/3 slope	Loudness growth	warble tone
rate	upward spread of		5 dB	가
masking	gain	NAL - R	7, 1)	, 2) (soft)
formula	Target gain		, 3)	, 4)
	250 6000		(comfortable)	, 5)
	0.31 0.05x(HTL at 500+1000+2000)		, 6)	(loud)
			, 7)	
			250 Hz	4000 Hz
			500 Hz	3000 Hz

3

VIOLA  
 Loudness growth data speech sp-  
 spectrum (soft speech), (com-  
 comfortable speech), (loud speech)  
 1000  
 Hz (soft  
 sound) 0.53 가 (soft speech)  
 , (soft sound) 0.85  
 가 (comfortable speech)  
 , (comfortable sound) 0.44  
 가 (loud speech)  
 dynamic range가  
 500 Hz  
 3000 Hz loudness growth  
 input/output function gain, ,  
 ,  
 Desired Sensation Level Formula(DSL) I/O  
 Leonard Cornelisse, Richard Seewald, Don Jami-  
 eson formula dy-  
 namic range . DSL I/O  
 IHFAA loudness perception  
 . formula  
 loudness perception

target curve 40 dB  
 , 90 dB  
 .  
 formula .  
**Fitting Verification**  
 Prescriptive formula가 가  
 gain .  
 2가 functional gain real ear rea-  
 ssurement(REM) insertion gain . Func-  
 tional gain insertion gain 가  
 probe - microphone  
 2 cc coupler REM  
 . Insertion gain  
 fitting  
 CIC functional gain  
 probe - microphone  
 가 CIC  
 , 가  
 gain feedback  
 probe 가  
 CIC  
 가

. formula  
 dynamic range  
 가 .  
 .  
 FIG. 6  
 DSL I/O formula  
 loudness data . formula 1993  
 Killion Fikret - Pasa " Three types  
 of sensorineural hearing loss "  
 loudness growth  
 software . 40, 65, 90 dB SPL

**Insertion gain**  
 Insertion gain  
 sound pressure  
 level(SPLs) probe -  
 microphone . Insertion gain  
 functional gain  
 Real - Ear Probe - Tube Measurement(REM)  
 Real - Ear Unaided Response(REUR)  
 REUR probe tube microphone

SPL concha Functional gain  
 가 Functional gain  
 REUR 2,700 Hz 17 dB psychoacoustic measurement  
 REUR insertion gain field Sound  
 가 functional gain 가  
 Real - Ear Occluded Response(REOR) wobble tone narrow band  
 REOR probe - tube masking noise standing wave

Real Ear Aided Response(REAR) 가 func-  
 REAR probe - tional gain  
 tube SPL Headphone Functional Gain Conventio-  
 feedback 가 CIC  
 Real - Ear Insertion Gain(REIG) microphone low gain  
 REIR probe - tube circumaural headphone functional gain  
 SPL 가

Real - Ear Insertion Response(REIR)  
 REIR , REUR REAR  
 SPL probe - tube 가  
 가  
 가

**보청기의 Modification**  
 (Completely in the Canal, CIC)  
 “ baffle ”  
 probe - tube microphone system  
 prescriptive formula  
 target insertion gain 가 2 kHz  
 insertion gain 2 cc cou- 20~25 dB 가 (Chasin, 1994).  
 pler 2  
 cc coupler gain REIG real - ear coupler  
 difference (RECD) RECD , (Behind the Ear,  
 microphone , ear mold BTE) ear-  
 2가 mold concha “ baffle ”  
 Zwislcki coupler  
 KEMAR

2000 Hz  
damper filter receiver  
가 가  
damper  
680, 1500, 2200, 3300,  
4700 ohm  
Damper  
earmold damper damper  
가 가 peak  
가  
(Killion, 1988). Damper  
earmold damper  
Earmold acoustic cou- 60 dB SPL probe - micro-  
pler , 가 phone damper  
가 earmold peak  
earmold 가 가 damper  
Earmold peak  
가 (Valente, 1984). damper  
가 가 가  
Earmold receiver  
가 bore Vent  
horn 가  
vent, damper  
. Vent 500 Hz vent  
damper 2000 Hz 가 vent  
, earmold bore vent  
horn 가 earmold vent  
Damper Filter vent  
가 가  
peak . vent  
vent 가  
peak  
damper, filter (Dilon, 1991).  
. Damper Earmold가 가  
가 가 earmold 가  
가 damper vent

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가 . Vent parallel earmold  
 vent, diagonal vent, external vent 3 가  
 parallel vent earmold 1000  
 old가 diagonal vent . diag- Hz 2000 Hz 가  
 onal vent 가 diag- (Austin, 1990).  
 parallel vent 가 bore 가 가  
 onal vent 가 bore 가  
 earmold 가  
 bore (Egolf, 1980).  
 external vent 가  
 가 ,  
 vent earmold  
 Vent 가 Horn  
 vent gain Earmold  
 . vent 0.06~0.8 earmold earmold가  
 mm 가 compliance 가 . Libby Horn  
 . vent 13 , 1.9 mm  
 가 vent 21~22 mm 3 mm 4 mm  
 earmold vent vent  
 1 mm 250~300 Hz 가 bore  
 2 mm 500 Hz (Lybarger, 1985).  
 가 500~700 Hz 가 bore 가  
 가 (Staab, 1982). bore가  
 . Bore가  
 earmold 가 horn 가  
 Earhook sound bore  
 (inside diameter, ID) 가 조절기의 조정에 의한 증폭음의 변형  
 tube (potentiometer, pot, trimmer) 1~6  
 가 . National Association of 가  
 Earmold Laboratory (NAEL)  
 13 가 1~  
 가 가 thick 2 가 ,  
 double wall 가 4 6

(gain control), (frequency response), (maximum output, SSPL 90) (compression ratio) , knee point, programmable digital HIPRO interface Noah software BTE UCL (maximum output) (UCL) saturation SPL(SSPL) 90 dB SPL Knee Point Knee point(KP) (compression threshold) (Gain control) dB SPL (recruitment phenomenon) dynamic range KP screw driver gain KP KP가 70 dB SPL (linear amplification) (high pass filter) (low pass filter) KP , dynamic range (Compression Ratio) 1 : 1 가 가 가

가 dynamic range 가 dynamic range 가 dynamic range가 100 dB 40 dB 가 가 40 dB 가 2.5 : 1

Post-Fitting Management

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earmold, , vent

(Fig. 1). 가

가 가

earmold 가

(Chasin, 1997).

earmold earshell

soft sealing, seal ring, sleeve

가

receiver

Receiver

가

6 (Gatehouse, 1993).

가 가

가

소리의 되울림(Feedback)

가

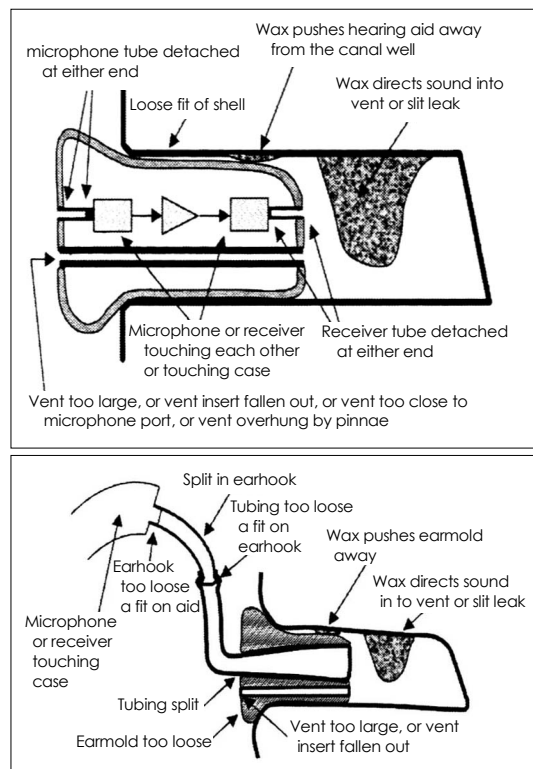


Fig. 1. Cause of feed back in CID and BTE hearing aids.



, vent damper 가  
 . Damper 가 “ ” 115 dB SPL  
 . damper ( “ upward spread of masking ” )  
 가 mesh , damper 80~95 dB가  
 . vent Earmold  
 earmold가  
 mm vent 200 Hz vent 2 8.5 dB 가  
 가 2~3 mm vent vent  
 , 가 receiver가  
 “ ” 28 125 Hz 20~25 dB, 200 Hz 8.5 dB  
 dB 가 shell (Berger, 1983).  
 가 earmold airspace  
 vent low cut high  
 250~500 Hz pass filter damper filter  
 20~30 dB, 1000 Hz 6 dB (Killion 1988). 10 dB 가 가  
 (loudness) 2 가가 주변소음  
 20~30 dB 가 3~4 loudness 가  
 가 (background noise)  
 “ ” 20~30 dB “ spread of masking ” ,  
 “ ” “ ” 140 dB SPL 가  
 probe - microphone “ ”

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가 tone damper .  
 earmold  
 receiver .  
 가 receiver  
 wax guard 가 , 가  
 (signal/noise ratio)가 가  
 가 , 가  
 가 가 , 가 .  
 가 receiver earhook  
 damper filter . ,  
 가 vent canal

소리 변형 1000 Hz  
 (reso- , 750 Hz 1500 Hz  
 nant distortion)  
 가  
 receiver  
 (tran- , ,  
 sient distortion)  
 receiver inertia .  
 가 intermodulation (Table 1).  
 damper filter .

### Fitting의 흔한 문제와 해결 방법

#### 보청기의 삽입의 어려움

가 가  
 가 가  
 helix lock . BTE  
 MCL UCL ITE  
 가 reference test position .  
 가 가  
 MCL UCL  
 가 가  
 가 가  
 가 가  
 vent size .

**Table 1.** Common problems and remedy in hearingaids fitting

Possible cause	Diagnosis	Remedy
Weak battery	Test battery or try a new one	Replace battery
Dirty battery contacts	Visual inspection	Clean with eraser
Corroded battery contacts	Visual inspection	Clean with abrasive paper, or return to manufacturer
Clogged sound bore or receiver	Visual inspection	Clean with loop
Clogged wax-guard (ITE/ITC/CIC)	Visual inspection, plus output restored when wax-guard removed	Replace wax guard
Clogged damper (BTE)	Output restored (and hearing aid feeds back) when earhook is removed	Replace damper
Clogged microphone inlet port	Visual inspection, or thump audible when the aid is tapped	Clean inlet port with a fine pick. Replace tubing if it is perished.
Inadvertent re-programming or de-programming	Check program settings (only applicable to programmable aids)	Re-program. Return to manufacturer if fault re-occurs.
Faulty microphone	Aid works on telecoil or audio input (if present), and internal noise audible at high volume control setting	Send to manufacturer
Faulty amplifier or transducer	No other discernable fault	Send to manufacturer

**조절기를 사용의 어려움**

ITE ITC  
 가  
 ( MT switch volume control)  
 보청기 외형의 불편감  
 Earmold, earshell, BTE  
 volume 가 , 가  
 Remote control 가  
 가

**보청기 제거의 어려움**

가 가  
 bluffing . CIC  
 가 가  
 가 가  
 가

**배터리 교환의 어려움**

가  
 가 Pirzanski(1998)  
 . BTE  
 가 가 가 가

earmold

helix lock

중심 단어 : Hearingaids · Fitting · Post - Fitting Management.

earshell

가

가

가

요 약

가

vent, damper,

가 가

가

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