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Datasheet for the decision of 27 June 2024

Case Number: T 0010/22 - 3.5.03

Application Number: 15160436.0

Publication Number: 2928214

IPC: H04R25/00, G10L25/78

Language of the proceedings: EN

Title of invention:
A binaural hearing assistance system comprising binaural noise reduction

Patent Proprietor:
Oticon A/S

Opponents:
Sivantos Pte. Ltd.
GN Hearing A/S

Headword:
User-controlled beamformer/OTICON

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - all claim requests (no)

Decisions cited:
T 0190/99, T 1408/04, T 2502/19, T 1924/20, T 1628/21, T 0447/22, T 0986/22

Catchword:

As to claim construction, the often used reference to "a mind willing to understand" is about relying on "a mind willing to objectively construe a claim", rather than "a mind willing to understand the applicant's or patent proprietor's alleged intention" (see point 2.3 of the Reasons).

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Case Number: T 0010/22 - 3.5.03

D E C I S I O N
of Technical Board of Appeal 3.5.03
of 27 June 2024

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Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 19 October 2021 concerning maintenance of the European Patent No. 2928214 in amended form.**

Composition of the Board:

Chair	K. Bengi-Akyürek
Members:	K. Peirs
	F. Bostedt

Summary of Facts and Submissions

I. The appeals lie from the interlocutory decision of the opposition division to maintain the opposed patent in amended form in accordance with the proprietor's "new auxiliary request 1" filed at the first-instance oral proceedings (Article 101(3)(a) EPC). The appealed decision had regard to the following prior-art documents:

D1: EP 2 506 603 A2;
D2: WO 2007/052185 A2.

II. The parties were summoned to oral proceedings before the board. A communication was issued under Article 15(1) RPBA including the board's negative preliminary opinion regarding compliance with Article 56 EPC.

III. Oral proceedings before the board were held on 27 June 2024. The parties' final requests were as follows:

- The appellant-proprietor ("proprietor") requested that the decision under appeal be set aside and that the patent be maintained in amended form based on the set of claims according to a **main request**, or in the alternative, that the patent be maintained in amended form based on the set of claims according to one of thirteen auxiliary requests, in the following order: **auxiliary requests 1, 2, 2A** and **3 to 12**.

- The appellant-opponent (opponent 2) requested that the decision under appeal be set aside and that the

patent be revoked.

- The other opponent (opponent 1) requested, as a party as of right, that the appeal of the proprietor be dismissed.

At the end of the oral proceedings, the board's decision was announced.

IV. Claim 1 of the **main request** and of **auxiliary request 1** reads as follows (board's bold-face emphasis and feature labelling (a), (b) and (c)):

"A binaural hearing assistance system (BHAS) comprising left and right hearing assistance devices (HAD_l, HAD_r) adapted for being located at or in left and right ears of a user (U), or adapted for being fully or partially implanted in the head of the user,

(a) each of the left and right hearing assistance devices (HAD_l, HAD_r) comprising:
a) A multitude of input units IU_i, i=1, ... , M, M being larger than or equal to two, for providing a time-frequency representation $X_i(k,m)$ of an input signal signal $x_i(n)$ at an i^{th} input unit in a number of frequency bands and a number of time instances, k being a frequency band index, m being a time index, n representing time, the time-frequency representation $X_i(k,m)$ of the i^{th} input signal comprising a target signal component and a noise signal component, the target signal component originating from a target signal source (S_s) at a **location** (x_s, y_s, z_s) relative to the user;
b) a multi-input unit noise reduction system comprising a multi-channel beamformer filtering unit (Beamformer) connected to said multitude of

input units IU_i, i=1, ... , M, and configured to provide a beamformed signal *Y(k,m)*, wherein signal components from other directions than a direction of the target signal source are attenuated, whereas signal components from the direction of the target signal source are left un-attenuated or attenuated less than signal components from said other directions;
CHARACTERIZED IN THAT

(b) the binaural hearing assistance system further comprises a user interface (UI) configured to communicate with said left and right hearing assistance devices (HAD_l, HAD_r) and to allow the user to influence functionality of the left and right hearing assistance devices, including to allow the user to indicate the **location** (x_s, y_s, z_s) of the target signal source (S_s) relative to the user (U) via said user interface (UI),

(c) and wherein the hearing assistance system is further configured to:
• synchronize the respective multi-channel beamformer filtering units (Beamformer) of the left and right hearing assistance devices so that both beamformer filtering units focus on the **location** (x_s, y_s, z_s) of the target signal source (S_s)."

V. Claim 1 of **auxiliary request 2** differs from claim 1 of the main request in that feature (b) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis feature (b)):

(d) "the binaural hearing assistance system further comprises a user interface (UI) configured to communicate with said left and right hearing assistance devices (HAD_l, HAD_r) and to allow the

user to influence functionality of the left and right hearing assistance devices, including to allow the user to indicate the location (x_s, y_s, z_s) of the target signal source (S_s) relative to the user (U) by providing information about a target direction of and a distance to the target signal source (S_s) via said user interface (UI),".

VI. Claim 1 of **auxiliary request 2A** differs from claim 1 of auxiliary request 2 in that feature (c) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis feature (c)):

(e) "and wherein the hearing assistance system is further configured to:
• synchronize the respective multi-channel beamformer filtering units (Beamformer) of the left and right hearing assistance devices so that both beamformer filtering units focus on the indicated location (x_s, y_s, z_s) of the target signal source (S_s)."

VII. Claim 1 of **auxiliary request 3** differs from claim 1 of auxiliary request 2 in that sub-feature b) of feature (a) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis sub-feature b)):

(f) "a multi-input unit noise reduction system comprising a multi-channel beamformer filtering unit (Beamformer) operationally connected to said multitude of input units IU_i, i=1, ... , M, and configured to provide a beamformed signal $Y(k,m)$, wherein signal components from other directions than a direction of the target signal source are

attenuated, whereas signal components from the direction of the target signal source are left un-attenuated or attenuated less than signal components from said other directions;".

VIII. Claim 1 of **auxiliary requests 4 to 6, 8, 9 and 11** differs from claim 1 of the main request in that sub-feature b) of feature (a) is replaced by feature (f).

IX. Claim 1 of **auxiliary request 7** comprises all the features of claim 1 of auxiliary request 6 and, in addition, comprises, between features (b) and (c), the following feature (board's feature labelling):

(g) "wherein the user interface is fully or partially implemented in or by an auxiliary device,".

X. Claim 1 of **auxiliary request 10** differs from claim 1 of the main request in that sub-feature b) of feature (a) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis sub-feature b)):

(f') "a multi-input unit noise reduction system comprising a multi-channel beamformer filtering unit (Beamformer) (i) operationally connected to said multitude of input units IU_i, i=1, ... , M, and (ii) configured to provide a beamformed signal $Y(k,m)$, wherein signal components from other directions than a direction of the target signal source are attenuated, whereas signal components from the direction of the target signal source are left un-attenuated or attenuated less than signal components from said

other directions;".

XI. Claim 1 of **auxiliary request 12** differs from claim 1 of auxiliary request 5 in that feature (c) is replaced by the following feature (board's feature labelling; the board also underlined differences vis-à-vis feature (c)):

(h) "and wherein the hearing assistance system is further configured to:
• synchronize the respective multi-channel beamformer filtering units (Beamformer) of the left and right hearing assistance devices using source localization data received from the respective other hearing assistance device (HAD_l, HAD_r) so that both beamformer filtering units focus on the location (x_s, y_s, z_s) of the target signal source (S_s)."

Reasons for the Decision

1. *Technical background*

1.1 The opposed patent concerns noise reduction in a binaural hearing-assistance system. This noise reduction is carried out by a beamformer in the left and right hearing aids of the binaural hearing-assistance system. For such beamformers, it is, according to the opposed patent, often assumed that the sound source of interest is located directly in front, i.e. in the direction in which the user of the hearing aids is looking. Frequently, however, a conversation partner is sitting to the side, like at a dinner table. Correspondingly, the user must in those situations be

able to "listen to the side".

1.2 The invention underlying the opposed patent tries to accommodate for this wish to "listen to the side" by providing a "user interface" (**feature (b)**) with which the user themselves can provide information on the location of a "target signal source". This user interface can be the touch screen of a smartphone, a pointing device like a pen or even an EEG electrode. Figure 6A (reproduced below) of the opposed patent illustrates how a user is equipped with a binaural hearing-assistance system according to the invention having hearing aids HAD_l and HAD_r together with an auxiliary device AD. On a touch-sensitive display of auxiliary device AD, the user can then indicate the location for a current target signal source (see Figure 6B of the opposed patent, also reproduced below).

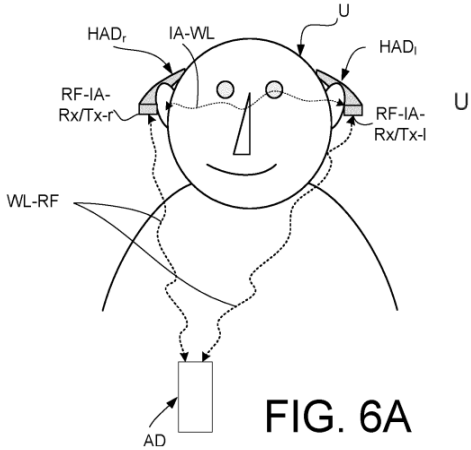

FIG. 6A

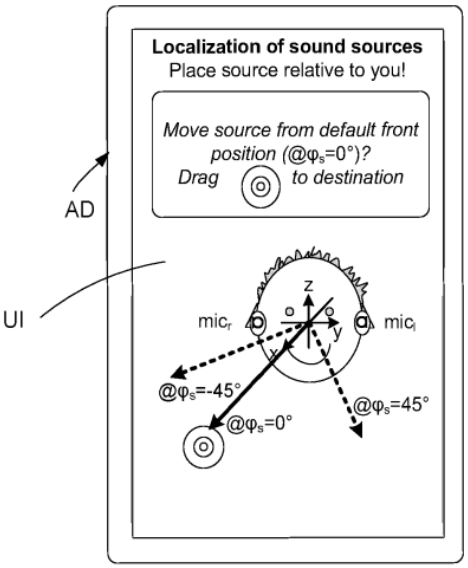

FIG. 6B

1.3 In addition, the beamformers of the left and right hearing aids are synchronised (**feature (c)**) such as to

"focus" on the same area in space.

2. *Main request and auxiliary request 1: claim 1 - claim construction*

The construction of the term "**location**" mentioned in sub-feature a) of **feature (a)** and in **features (b) and (c)** was disputed between the parties (the board highlighted the occurrences of this term in point IV above in bold face for ease of reference).

The board's viewpoint on this is as follows:

2.1 As to the meaning of the term "location" itself, Reasons 16.1.4 of the appealed decision relies on paragraph [0012] of the patent's description to opine that the skilled reader may, within the context of claim 1, deviate from the "normal use" of the term "location" and interpret this term as "also encompassing a direction only".

The board holds, however, that the skilled reader would read and interpret the claims based essentially on their own merits (see e.g. **T 1924/20**, Reasons 2.7; **T 1628/21**, Reasons 1.1.7). There is no reason for the skilled reader to interpret the term "location" in claim 1 differently than it is normally understood, i.e. as "a point in space or at least a limited area".

2.2 The proprietor deemed, however, the "location" in feature (c) to refer to the location *indicated* by the user in accordance with feature (b). It emphasised in this context that the user's input of the location of the "target signal source" according to feature (b) was virtually the only data item in claim 1 that allowed the system to achieve the "focusing" according to

feature (c).

This could not persuade the board. The synchronisation as per feature (c) does not explicitly rely on the user's location indication according to feature (b). Technically, there is also no need for this: as set out by opponent 2, the skilled reader would be familiar, based on their common general knowledge, with binaural hearing-assistance systems in which the location of a sound source is *automatically* detected, without any input on the part of the user. That the term "target signal source" as per feature (a) may encompass a subjective influence by the user as put forward by the proprietor could not sway the board either. This is because hearing-assistance devices such as those mentioned in claim 1 will, by their very nature, often focus on speech. As a result, the "target signal source" will normally be a person's voice. The associated component in the "input signal" provided by the microphones of the hearing-assistance devices is typically identified by means of "voice-activity detectors". As a matter of fact, the opposed patent itself (e.g. paragraph [0013]) indeed mentions the use of such detectors, as convincingly argued by opponent 2.

2.3 The board therefore does not agree with the proprietor that "the skilled person, with a mind willing to understand and to give the claim a natural, meaningful, and not artificially distorted construction, readily construes feature (d) [now feature (c) in the feature labelling adopted in point IV above] in such a way that its 'location' refers to the user indicated location of feature (c) [now feature (b)]". The board recalls in this respect that the concept of "a mind willing to understand" simply means that "the skilled person when

considering a claim should rule out interpretations which are illogical or which do not make technical sense" (**T 190/99**, Reasons 2.4; **T 1408/04**, Reasons 1; **T 447/22**, Reasons 13.1, 5th paragraph). In particular, this concept cannot be understood to mean that a claim should be construed in the way that the proprietor (in the specific circumstances) regards to be convenient. Instead, when construing a claim, the deciding body should take into account all technically meaningful interpretations of this claim, taken by itself, that would objectively occur to a skilled reader (cf. also **T 2502/19**, Reasons 2.2 and **T 986/22**, Reasons 2.2.3). In other words, when it comes to claim construction, the often used reference to "a mind willing to understand" is about relying on "a mind willing to objectively construe a claim" (which from the outset excludes illogical or technically nonsensical interpretations to avoid "a mind desirous of misunderstanding" as invoked in T 190/99), rather than "a mind willing to understand the applicant's or patent proprietor's alleged intention". This is mainly so because it would be to the detriment of third parties and the public if claim construction depended on the alleged intention of the applicant or proprietor.

2.4 Even if the skilled reader were to interpret claim 1 drawing upon paragraph [0012] of the opposed patent as suggested by the proprietor, they would still not necessarily conclude that feature (c) must take into account the user's location indication according to feature (b). This paragraph [0012] indeed explains, as the proprietor emphasised, that the idea underlying the opposed patent is "to let the hearing aid user 'tell' the hearing assistance system" the location of the target signal source. However, it does not, as correctly pointed out by opponent 1, indicate how, if

at all, this user input is used by the binaural hearing-assistance system.
The proprietor had acknowledged in this regard that a certain amount of "training" may be necessary for the user before they can give a reliable input of the location of the target signal source in accordance with feature (b). This "training" can, in the board's view, be used as an example for a scenario in which the user's indication as per feature (b) can actually be put to practical use without impacting the focusing according to feature (c). To illustrate this, the board observes that, during such a "training", the claimed binaural hearing-assistance system can be set to automatically detect the location of the target signal source. The "user interface" in accordance with feature (b) could then invite the user to provide an indication of where the user perceives the "target signal source" to be located. The user's input can then be evaluated and feedback can be provided to the user, thereby closing the training loop. Nonetheless, it goes without saying that the user's location indication as per feature (b) can also be used in other ways. In fact, there is no need for it to be taken into account at all by the claimed "binaural hearing-assistance system".

2.5 Therefore, one technically sensible construction that, in the board's opinion, would objectively occur to the skilled reader is that features (b) and (c) *individually* refer to the same "location", namely the one mentioned in sub-feature a) of feature (a).

3. *Main request and auxiliary request 1: claim 1 - inventive step*

The board's review, in the light of the parties' arguments on appeal, of the opposition division's inventive-step analysis as set out in Reasons 17.4 of the appealed decision starting from **D1** is as follows:

3.1 The proprietor contested the disclosure in D1 of **features (b) and (c)**. The board, however, holds D1 to disclose the former feature partially and the latter in its entirety, for the following reasons:

3.1.1 In relation to **feature (b)**, the portable processor unit ("tragbare externe Prozessoreinheit") mentioned in paragraph [0003] of D1 directly and unambiguously discloses a "user interface" which can communicate with left and right hearing-assistance devices of a binaural arrangement ("binauralen Versorgung" in this paragraph [0003]). It allows, moreover, the user to influence the functionality of these left and right hearing-assistance devices ("Fernbedienung des Hörhilfegerätes bzw. Hörhilfegerätesystems"). Document D1 does not disclose, however, that the user interface allows the user to indicate the location of the target signal source relative to the user via said user interface.

3.1.2 Concerning **feature (c)**, the arrangement shown in Figure 4 of D1 deserves special attention. It is described in paragraphs [0035] to [0039] of D1 and comprises left and right hearing aids HA1 and HA2. Both hearing aids involve a beamforming system ("das jeweilige Richtmikrofonsystem" in paragraph [0035] of D1). For the board, there is no doubt that these hearing aids HA1 and HA2 are accommodated in a binaural arrangement, such as the one mentioned in paragraph [0003] of D1. This follows essentially from paragraph [0036] of D1 describing how the microphone

signals "SF3" (belonging to hearing aid HA1 as shown in Figure 4 of D1) and "SF4" (belonging to hearing aid HA2 as illustrated in that Figure 4) are taken into account in the "cross-correlation analysis unit K1" of hearing aid HA1. Moreover, Figure 4 of D1 also clearly illustrates a data exchange between hearing aids HA1 and HA2, at least at the level of plausibility-check units P1 and P2 (cf. "Plausibilitätsprüfungseinheit P1" mentioned in the sentence in lines 48 to 54 of column 9 of D1).

The proprietor contested that the "plausibility-check units P1 and P2" were in any way related to "a focusing action of the beamformers of HA1 and HA2". It emphasised with reference to the directional microphone system shown in Figure 3 of D1 that this document was not concerned with steering the beams of two beamformers in the horizontal plane H towards a particular source AS. Instead, it was related to compensating for a non-ideal positioning of the microphones B and F, namely an angular deviation α of their connecting line L with respect to the horizontal plane H.

The board agrees with the proprietor to the extent that hearing aids in a binaural configuration *might* each focus on *different* sound sources, e.g. if a user wants to focus on a conversation happening in front of them while still being aware of sounds coming from other directions. Nonetheless, the board concurs with opponent 1 that the "default" mode of operation for a binaural hearing-assistance system is for its left and right hearing aids to focus on the *same* sound source. This is because the primary goal of binaural systems is to improve the user's ability to localise and understand sounds, particularly speech, in noisy

environments. By focusing both hearing aids on the *same* source, the binaural hearing-assistance system can typically enhance the signal-to-noise ratio and provide a more focused listening experience. Given that D1 is silent about the operational mode of the binaural hearing-assistance system in question, it is reasonable to assume that this system will be used in the "default" mode. This means that the skilled reader would understand the beamformers of these hearing aids HA1 and HA2 to necessarily focus on the same acoustic-source "location" (see also the terms "Schallquelle AS" and "akustische Signalquelle AS" in paragraph [0032] of D1). Therefore, "the location" as per feature (c) is disclosed in D1.

3.2 In summary, there is no reason for the board to disagree with Reasons 17.4.1 of the appealed decision in the sense that the only feature which is not disclosed in D1 is the following (board's labelling):

(A) "the user interface is configured to allow a user to indicate [the] location of [the] target signal source relative to the user".

3.3 The determination of the technical effect which **feature (A)** would credibly achieve over the whole scope claimed and its associated objective technical problem turned out to be particularly challenging in the case in hand:

3.3.1 The appealed decision identified no technical effect that is credibly achieved by distinguishing feature (A). Instead, for reasons that remain unexplained, it directly formulated in Reasons 17.4.2 the objective technical problem as "how to overcome disadvantages of automatic selection of a target

direction for synchronized beamformers". In these appeal proceedings, opponent 2 initially adopted the same technical problem as the opposition division in the appealed decision but framed it during the oral proceedings before the board as "how to improve the sound-source localisation".

3.3.2 The proprietor considered that feature (A) facilitated "rapid focusing" by the binaural hearing-assistance system in the sense that the beams of the beamformers are steered "such that they overlap at the indicated location of the target signal source S_s the user is actually interested in". This made it possible to dispense with any "fancy algorithm" to detect the direction and distance of that sound source. It gave the user more control over the binaural hearing-assistance system. Correspondingly, the proprietor phrased the objective technical problem as "improving the hearing support performance of the system". During the oral proceedings before the board, it re-formulated this as "improving the signal processing of the hearing-aid system in D1" and as "improving the responsiveness of the hearing-aid system in D1".

3.3.3 The board is not satisfied that the technical effect considered by the proprietor is credibly achieved by feature (A) over the whole scope claimed. Likewise, the various technical problems mentioned in points 3.3.1 and 3.3.2 above cannot be derived from technical effects directly and causally related to the claimed features, especially to feature (A). This is particularly the case in view of the claim construction set out in point 2.5 above. It follows from this claim construction that the "user location indication" as per feature (A) is not necessarily taken into account in

the claimed "binaural hearing-assistance system". As a result, it is not apparent that feature (A) achieves any credible technical effect.

3.4 The absence of a credible technical effect means that feature (A) does not necessarily contribute to solving an objective technical problem. The consequence of this is that it cannot contribute to an inventive step.

3.5 In consequence, the subject-matter of claim 1 of the main request and of auxiliary request 1 does not involve an inventive step (Article 56 EPC). Hence, there is no reason for the board to overturn the opposition division's finding in Reasons 17 of the appealed decision in that regard.

4. *Auxiliary request 2: claim 1 - inventive step*

4.1 Concerning **auxiliary request 2**, i.e. the "new auxiliary request 1" underlying the appealed decision (cf. point I above), Reasons 21.1.2 of the appealed decision acknowledged an inventive step in relation to the combination of document **D1** with **D2** in view of the user's indication of the "target signal source location" by providing information about a "distance to the target signal source" as per **feature (d)**. The appealed decision, however, did not specify any technical effect that could be credibly attributed to providing such information. The opposed patent is also silent in this respect.

4.2 For the same reasons as those set out in point 3.3.3 above, the information provided about the "target direction" and the "distance to the target signal source" as per feature (d) is not necessarily taken into account in the claimed binaural hearing-assistance

system. The board can therefore not identify any technical effect that can be credibly imputed to feature (d) over the whole scope of claim 1 of auxiliary request 2. Therefore, this feature likewise cannot contribute to an inventive step.

4.3 Auxiliary request 2 is therefore, contrary to the finding in Reasons 21 of the appealed decision, not allowable under Article 56 EPC either.

5. *Auxiliary request 2A: claim 1 - inventive step*

5.1 For the assessment of inventive step in relation to claim 1 of **auxiliary request 2A**, the board considers document D1 to be a viable starting point. Starting from the analysis set out in point 3.1 above, it will assume that D1 does not disclose that (board's feature labelling and emphasis)

(B) the user interface allows the user to indicate the location of the target signal source relative to the user by providing information about a target direction of and a distance to the target signal source, where the synchronising takes place so that both beamformer filtering units focus on the indicated location as set out in feature (e).

5.2 In relation to the technical effect which **feature (B)** would credibly achieve over the whole scope claimed and its associated objective technical problem, the parties considered the same as those recited in points 3.3.1 and 3.3.2 above. The board's analysis in that regard is as follows:

5.2.1 Even though the claim construction set out in point 2.5 above does not apply to feature (B), the board could not be persuaded of the credibility of the technical effect and the various associated objective technical problems considered by the parties: feature (B) does not credibly avoid any "disadvantages" or lead to "rapid focusing". The same applies to any form of "improving", neither of the "sound-source localisation", the "hearing support performance", the hearing-aid system's "signal processing" nor of this system's "responsiveness". This is because the user's indication of the sound-source location as per feature (B) is not necessarily faster or better than what the hearing-assistance system could automatically provide. This is especially the case if the "synchronising" step according to feature (c) is to take place such that both beamformer filtering units focus on a particular spot based *solely* on the user-indicated location. Automatic detection often offers additional benefits and can be more effective in terms of performance and precision, at least in certain situations. To give an example, automatic-detection algorithms can continuously analyse the acoustic environment and adapt the beamforming parameter, even if the "target signal source" moves or changes in intensity. This allows them to react quickly and in real-time to changes in the environment without requiring explicit user input. This can be crucial in dynamic situations where the "target signal source" moves or changes rapidly. User indication, on the other hand, might, if at all feasible, require frequent manual adjustments, putting a burden on the user and potentially introducing delays and inaccuracies. The binaural hearing-assistance system's "responsiveness" and "performance" is therefore not necessarily improved by feature (B). This is so even for a static and

constant sound source and with the user staying put as will be typically the case in the dinner-table example mentioned in point 1.1 above: the determination of the user indication on the "user interface" and the associated processing before it can be used for the "focusing" step in accordance with feature (c) typically introduce a delay which an automatic sound-source location detection normally does not have.

The board acknowledges in this respect that user input can, of course, be helpful to determine which sound source the user actually wants to focus on. Nonetheless, even with the necessary "training" referred to in point 2.4 above, a user will not always be able to provide a useful indication, at least not right away when prompted. This is in particular the case for complex acoustic situations with multiple overlapping sound sources. For such complex acoustic situations, the user may very well need several attempts before the correct sound source has ultimately been selected, if they manage to do so in the first place. This is valid regardless of feature (B) being silent on the type of user interface, where not all types of "user interfaces" in fact permit the indication of a sound-source location with a high level of precision (see also the user-interface examples in point 1.2 above, where the indication via an EEG electrode may be less precise than with a smartphone's touch screen).

The proprietor emphasised that the user input in the form of the "location indication" as per feature (B) dispensed with the "iterative approach" that would be, according to the proprietor, typically used by sound-source determination algorithms. The board does not find this to be credible either. Even if one adopts

the proprietor's viewpoint that this user input must be "sufficiently precise and reasonably useful" and that, in particular, the user were proficient enough to consistently pinpoint the location of their desired sound source, the following factors could still necessitate iterations:

- The acoustic environment can change dynamically (e.g. movement of people or changes in background noise). The beamforming algorithm taking care of the "synchronising" step as per feature (e) would still need to adapt to these changes, even if the user's initial input was accurate.
- The target signal source itself might move, requiring the beamformers to adjust their focus to maintain optimal performance.
- The beamforming algorithm might have inherent limitations in its ability to perfectly isolate the target signal source based on user input alone. Iterative adjustments could help refine the focus and improve performance.

Therefore, while user input which is "sufficiently precise and reasonably useful" can be beneficial, it does not negate the potential need for iterative adjustments in a beamforming system such as the one of the claimed "binaural hearing-assistance system". The degree of precision required to reduce iterations and the extent to which this reduction is possible will remain contingent upon various factors, including the specific algorithm, the acoustic environment and the desired level of performance.

5.2.2 Instead, the board considers that feature (B), at most, gives some indication of the purpose for which the user can apply the user interface. In this context,

paragraph [0003] of D1 only states that the portable processor unit referred to in point 3.1.1 above can act as a remote control for the hearing aid or hearing-aid system and, in addition, perform other tasks such as analysing the acoustic environment. Document D1 does however not specify further details in this context, especially not regarding which settings can be remotely controlled. The board therefore regards the objective technical problem that can be associated with feature (B) to be, at best, "to provide for a particular purpose of the portable processor unit mentioned in paragraph [0003] of D1".

5.3 In relation to obviousness, the board holds that the skilled person would, based solely on their common general knowledge, have been aware at the patent's priority date that a remote control can be used to set several parameters of a hearing aid or hearing-aid system. These settings can include the following:

- "volume control", adjusting the overall loudness of the hearing aid;
- "program selection", i.e. switching between different pre-configured listening programs (e.g. for quiet environments, noisy environments or music);
- "directional focus" in the sense of adjusting the focus of the microphones to prioritise sounds from specific directions (e.g. front, back, left, right)
- "noise-reduction level", where the intensity of noise-reduction algorithms to filter out background noise is set;
- "frequency response", i.e. adjusting the amplification levels for different frequency bands to personalise the sound for the user's

hearing loss.

Regarding the "directional focus" setting, the board notes that the last sentence of paragraph [0029] of document D1 teaches that several directional characteristics can be set in D1's binaural hearing-assistance system. This paragraph [0029] in fact mentions different directional characteristics (e.g. cardioid, super-cardioid, hyper-cardioid) that have varying degrees of sensitivity depending on the direction of the incoming sound. The selection of a specific characteristic indicates the general direction from which sound is to be received. For example, choosing a cardioid pattern suggests that the target signal source is likely in a relatively wide area front of the user, while a hyper-cardioid pattern indicates a narrower beam in a specific direction. Although not explicitly stated in paragraph [0029] of D1, the choice of directional characteristic can imply at least some information about the "distance to the target signal source". This is because different directional patterns have varying sensitivities to sound pressure levels. A more directional pattern (e.g. super-cardioid or hyper-cardioid) can be preferable if the target signal source is further away. This means that, even if the primary function of selecting a directional characteristic is to indicate the "target direction", it can also provide some indirect information about the "distance to the target signal source".

The skilled person would, nevertheless, also have realised that the "directional focus" setting is not restricted to merely selecting a directional characteristic as taught in paragraph [0029] of D1. Depending on the degree of control deemed to have been appropriate by the skilled person, this setting can

also bestow upon the user the ability to *manually* control the beamformer-steering parameters for use in the binaural hearing-assistance system shown in Figure 4 of D1. Similar to the way in which a spotlight operator uses a control panel or joystick to adjust multiple spotlights in a theatre to illuminate a specific actor or area on the stage in a coordinated fashion, the "directional focus" setting on a remote control would then have been used to manually steer the beamformers of the hearing aids described in D1 in a synchronised way. By doing so, information is provided about a "target direction" of and a "distance to the target signal source" defining a focus for those beamformers. Hence, when trying to solve the above-identified objective technical problem, the skilled person would have indeed arrived at feature (B) without exerting any inventive skill.

5.4 Hence, the subject-matter of claim 1 of auxiliary request 2A does not involve an inventive step (Article 56 EPC) either.

6. *Auxiliary requests 3 to 12: claim 1 - inventive step*

6.1 The amendments underlying **auxiliary requests 3 to 12** do not cure the deficiency of the higher-ranking requests regarding lack of inventive step:

6.1.1 **Feature (f)** is already disclosed in paragraph [0036] and Figure 4 of D1. The same applies to **feature (f')**.

6.1.2 **Feature (g)** would have been automatically arrived at by the skilled person according to the reasoning set out in point 5.3 above, because a "remote control" typically corresponds to an "auxiliary device".

6.1.3 Regarding **feature (h)**, the exchange of "source localisation data" between the left and right hearing aid of a "binaural hearing-assistance system", like the one shown in Figure 4 of document **D1**, would have been, based on their common general knowledge, a well-known practical way for the skilled person to perform the synchronisation in accordance with feature (c). Feature (h) therefore cannot lead to the acknowledgement of an inventive step, too.

6.2 Therefore, auxiliary requests 3 to 12 are also not allowable under Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chair:

B. Brückner K. Bengi-Akyürek

Decision electronically authenticated