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Datasheet for the decision of 14 March 2017

Case Number: T 2649/11 - 3.4.01

Application Number: 06728010.7

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IPC: G01R33/3415, G01R33/58

Language of the proceedings: EN

Title of invention:
METHOD AND CIRCUIT ARRANGEMENT FOR OPERATING MULTI-CHANNEL TRANSMIT/RECEIVE ANTENNA DEVICES

Applicants:
Koninklijke Philips N.V.
Philips Intellectual Property & Standards GmbH

Headword:

Relevant legal provisions:
EPC Art. 123(2)
EPC 1973 Art. 84, 83

Keyword:
Amendments - added subject-matter (yes)
Claims - clarity (no)
Sufficiency of disclosure - (no)

Decisions cited:

Catchword:

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Case Number: T 2649/11 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 14 March 2017

Appellant: (Applicant 1)	Koninklijke Philips N.V. High Tech Campus 5 5656 AE Eindhoven (NL)
Appellant: (Applicant 2)	Philips Intellectual Property & Standards GmbH Steindamm 94 20099 Hamburg (DE)
Representative:	de Haan, Poul Erik Philips International B.V. Philips Intellectual Property & Standards High Tech Campus 5 5656 AE Eindhoven (NL)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 4 August 2011 refusing European patent application No. 06728010.7 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Assi
Members:	T. Zinke
	J. Geschwind

Summary of Facts and Submissions

I. The appeal, filed on 3 October 2011, lies from the decision of the examining division, posted on 4 August 2011, refusing European patent application No. 06 728 010.7, published with publication No. 1 877 814 (WO-A-2006/114749). The statement setting out the grounds of appeal was filed on 12 December 2011.

II. In its decision the examining division refused the application according to a then pending single request due to contravention of Article 123(2) EPC and Rule 137(5) EPC, lack of clarity and support by the description (Article 84 EPC 1973), insufficiency of disclosure (Article 83 EPC 1973) and lack of an inventive step (Articles 52(1) and 56 EPC 1973).

III. With the statement setting out the grounds of appeal, the appellants (applicants) filed amended claims according to a new single request and requested to grant a European patent on the basis of these amended claims.

The appellants also provided counter-arguments with regard to the objections raised by the examining division in the decision under appeal.

IV. By summons of 3 November 2016, the appellants were summonsed to oral proceedings due to take place on 14 March 2017. A communication under Article 15(1) RPBA was issued on 12 January 2017 drawing attention to the issues to be discussed during oral proceedings. In particular, the Board raised doubts concerning the original disclosure and clarity of the amendments made to claim 1 (Article 123(2) EPC, Article 84 EPC 1973)

and concerning the sufficiency of disclosure (Article 83 EPC 1973).

V. The appellants did not provide any comments to the Board's communication.

VI. With a letter of 13 March 2017, the representative informed the Board that the applicants would not be represented at the oral proceedings and requested that a decision be taken on the basis of the written submissions according to the state of the file.

VII. The oral proceedings took place as scheduled in the absence of the appellants.

VIII. Claim 1 of the single request reads as follows:

"1. Circuit arrangement for operating a multi-channel transmit and receive antenna device or arrangement, comprising a plurality of RF antenna elements (TxRx1,.. TxRx2,..TxRxn), for generating an RF excitation field in, and for receiving RF relaxation signals from an examination object in an MR imaging system, and a plurality of local pick-up coils (PU1,...PUm) which are positioned within the RF excitation field and are individually assigned to each RF antenna element for individual measurements of the same, the circuit arrangement comprising:
- a plurality of transmit channels (121,...12n) for generating RF transmit signals,
- a plurality of receive channels (131,...13n) for digitalization and further processing of received RF relaxation signals,
- a plurality of first transmit receive switches (31,..3n),

- a multi-channel RF amplifier (2) or a plurality of one-channel RF amplifiers, the inputs of which are connected with the outputs of the transmit channels (121,...12n), and the outputs of which are connected with inputs of the first transmit receive switches (31,..3n),
- a control unit (10) which is connected with:
-- the transmit channels (121,...12n) for individually and independently adjusting the amplitudes and / or phases and / or frequencies of the generated RF transmit signals,
-- the multi-channel RF amplifier (2) or the one-channel RF amplifiers, for individually and independently controlling the amplification of the RF transmit signals generated by the transmit channels (121,...12n),
-- [t]he first transmit receive switches (31,..3n), for independently switching the same between a transmit mode for selecting RF antenna elements (TxRx1, TxRx2,...TxRxn) for transmitting the generated RF transmit signals, and a receive mode for selecting RF antenna elements (TxRx1, TxRx2,...TxRxn) for receiving RF relaxation signals, and
- a pick-up coil detection unit (15) having a plurality of inputs, each of which for connecting with each one of the local pick-up coils (PU1,...PUm),
characterized in that the pick-up coil detection unit (15) comprises:
-- a pick-up coil controller (150) which is controlled by the control unit (10) for controlling the processing of RF signals, which are received by the pick-up coils (PU1,...PUm), wherein the pick-up coil controller (150) is connected with and controls:
-- a plurality of RF to DC converters (151), each of which is connected with each one of the inputs of the pick-up coil detection unit (15), for converting the RF

signals received by the connected pick-up coil (PU1,...PUm) to a DC voltage signal,
-- a plurality of storages (153), each for storing a trip level which is independently preset for each pick-up coil (PU1,...PUm), and
-- a plurality of trip level comparators (152), to which each one of the DC voltage signals is routed, for comparing the DC voltage signal with the trip level which is preset for the related pick-up coil and stored in the related storage (153), wherein:
- the control unit (10) is provided for controlling the multi-channel RF amplifier (2) or the one-channel RF amplifiers for blanking the same for inhibiting a further transmission of RF transmit signals by an RF antenna element (TxRx1, TxRx2,...TxRxn) if the DC voltage signal derived from the assigned pick-up coil (PU1,...PUm) exceeds the related preset trip level."

Claims 2-5 are dependent on claim 1.

Claim 6 concerns a spectrometer comprising a circuit arrangement according to at least one of claims 1 to 5.

Claim 7 concerns a magnetic resonance imaging system comprising a circuit arrangement according to at least one of claims 1 to 5.

Reasons for the Decision

1. The appeal is admissible.

2. Admissibility of the pending request

The pending request was filed with the statement setting out the grounds of appeal. It is, therefore, admitted into the appeal proceedings according to Article 12(1)(a) RPBA.

3. Amendments

3.1 Amended claim 1, line 23, includes a spelling mistake. It is the Board's understanding that the feature should read as "*the first transmit receive switches (31,...,3n) ...*" (amendment emphasized by the Board).

3.2 The amendment in claim 1 defining that the pick-up coils *"are individually assigned to each RF antenna element for individual measurements of the same"* is not originally disclosed (Article 123(2) EPC) and not clear (Article 84 EPC 1973).

3.2.1 According to the Board's understanding, the basis for this amendment seems to be a combination of a first embodiment describing the use of pick-up coils for individual measurements of the multi-channel elements (cf. page 6, lines 18 to 27, of the originally filed specification) and a second embodiment according to which *"By assigning individual local pick-up coils (or tune coils and pick-up coils) to each coil or coil segment (or each multi-channel element), any receive*

path can individually be protected" (cf. page 7, lines 3 to 5, of the originally filed specification).

3.2.2 The first embodiment describes how to measure the individual **transmission** of multi-channel elements (cf., for instance, the passage on page 6, lines 22 to 25, which suggests to use a plurality of pick-up coils to measure the **transmission** of a single RF transmit receive coil).

3.2.3 On the other hand, the second embodiment describes how the pick-up coils protect the **receive** paths of the multi-channel elements by measuring the field at each of the **receive** antenna elements. This would be done while using a 1:1 relation between receive antenna elements and pick-up coils.

3.2.4 It is not disclosed, however, how the measurements in transmission mode and reception mode can be combined with a single assignment of pick-up coils to antenna elements. Hence, the amendment contravenes Article 123(2) EPC.

3.2.5 Further, due to the mixing of the embodiments, it is unclear, how exactly the pick-up coils and antenna elements are **assigned** to each other, so that the respective wording in claim 1 does not respect Article 84 EPC 1973.

3.3 A further amendment made to claim 1 is that "*the control unit (10) is provided for controlling the multi-channel RF amplifier (2) or the one-channel RF amplifiers for blanking the same for inhibiting a further transmission of an RF antenna element if the DC voltage signal derived from the assigned pick-up coil exceeds the related preset trip level*". This amendment

also lacks original disclosure (Article 123(2) EPC) and clarity (Article 84 EPC 1973).

3.3.1 On original page 5, lines 18 to 21, it is stated that "*If for example any of the DC voltages derived from all RF pick-up coils signals exceed the preset maximum trip level, a further transmission of RF signals can be inhibited by blanking the RF amplifiers 2 in order to avoid damage of system components*". Further, on page 6, lines 31 to 33, it is stated that "*If for example any of the measured local trip levels exceed related predefined trip levels, the RF amplifier 2 of the system can be blanked*". Hence, either the RF amplifier of the system (if only one RF amplifier is present) or **all** RF amplifiers (if each channel has its own amplifier) is/are blanked, if the preset trip level is exceeded. The current claim wording, however, encompasses the possibility that only one RF amplifier is blanked (i.e. the RF amplifier which is related to the "*assigned pick-up coil*" that detected the exceeded trip level). This possibility is not originally disclosed (Article 123(2) EPC).

3.3.2 Further, it is unclear (Article 84 EPC 1973), how the pick-up coils are arranged and assigned with respect to the antenna elements (see also discussion above). Hence, the wording of claim 1 defining the assignment of the pick-up coils does not necessarily define that there is a (single) pick-up coil being assigned to a transmit antenna element that could be used to identify the corresponding (single) RF amplifier that should be blanked.

3.4 Claim 1 lacks clarity for a further reason. Due to the used itemisation in claim 1, it is unclear what part of the circuit arrangement is actually restricted by the

passages starting with *"for"*, i.e. *"for individually and independently adjusting the amplitudes and/or phases and/or frequencies of the generated RF signals"*, *"for individually and independently controlling the amplification of the RF transmit signals generated by the transmit channels (121,...12n)"* and *"for independently switching the same between a transmit mode for selecting RF antenna elements (TxRx1, TxRx2,...TxRxn) for transmitting the generated RF transmit signals, and a receive mode for selecting RF antenna elements (TXRx1, TxRx2,...TxRxn) for receiving RF relaxation signals"*.

These restrictions could apply to the control unit (10), to the connection of the control unit (10) with the respective devices (*"transmit channels (121,...12n)"*, *"multi-channel amplifier (2) or the one-channel RF amplifiers"*, *"the first transmit receive switches (31,...3n)"*) or to the respective devices themselves.

3.5 Hence, claim 1 neither meets the requirements of Article 123(2) EPC nor of Article 84 EPC 1973.

4. Article 83 EPC 1973

4.1 In addition, as already pointed out by the examining division (cf. section 3 of the decision), in the original specification there is missing a clear teaching about the position and/or arrangement of the pick-up coils in relation to the coil array and how different positions/arrangements of the pick-up coils could be used in order to identify the corresponding (single) RF amplifier that should be blanked.

4.2 The explanations of the appellants under section III.3 (page 7) in the statement of grounds that *"the placement of the pick-up coils as indicated in the amended claim 1 is known from the prior art, and a person skilled in the art is able to position such pick-up coils such that the RF signals to which claim 1 refers are received by such coils"* and "*for realizing the principle of the invention, it is not relevant how these pick-up coils are actually oriented in relation to other components*" would be in disagreement with the argumentation in section II.4 of the statement of grounds, where it is discussed in detail that a major difference to the prior art of the claimed subject-matter is *"the RF power of the RF transmit signals transmitted by each individual RF antenna element is monitored (i.e. measured at each RF antenna element but not at the examination object)"*.

Such a monitoring of each individual RF antenna would necessarily imply a defined position and/or arrangement of the pick-up coils, which, however, is not originally disclosed.

4.3 Hence, the application does not meet the requirement of Article 83 EPC 1973.

5. Therefore, the pending request is not allowable.

6. Right to be heard (Article 113(1) EPC)

The reasons for the present decision are all mentioned in the Board's communication of 12 January 2017. The appellants, however, failed to make any submissions in reply. The Board has no reason to take another view.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

The Registrar: The Chairman:

D. Hampe G. Assi

Decision electronically authenticated