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**Datasheet for the decision  
of 23 October 2017**

**Case Number:** T 0627/12 - 3.4.01

**Application Number:** 04252655.8

**Publication Number:** 1477824

**IPC:** G01R33/561

**Language of the proceedings:** EN

**Title of invention:**

Parallel MR imaging

**Applicant:**

Toshiba Medical Systems Corporation

**Headword:**

**Relevant legal provisions:**

EPC 1973 Art. 83, 84, 54(1), 54(2), 56

EPC Art. 123(2)

**Keyword:**

Claims - clarity (yes)

Amendments - allowable (yes)

Sufficiency of disclosure - (yes)

Novelty - (yes)

Inventive step - (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

European Patent Office  
D-80298 MUNICH  
GERMANY  
Tel. +49 (0) 89 2399-0  
Fax +49 (0) 89 2399-4465

Case Number: T 0627/12 - 3.4.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.01**  
**of 23 October 2017**

**Appellant:** Toshiba Medical Systems Corporation  
(Applicant) 1385 Shimoishigami  
Otawara-shi, Tochigi-ken 324-0036 (JP)

**Representative:** Moreland, David  
Marks & Clerk LLP  
Aurora  
120 Bothwell Street  
Glasgow G2 7JS (GB)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted on 27 October 2011  
refusing European patent application No.  
04252655.8 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 examining division refused European patent application No. 04 252 655.

In its decision, the examining division held that the requirements of Art. 123(2) EPC, Art. 83 EPC 1973, Art. 84 EPC 1973, Art. 54(1), (2) and 56 EPC 1973 were not met for a then pending main request. Further, the examining division did not admit an auxiliary request into the proceedings, since it held that not all of the objections raised against the main request were overcome and the amendments made to the auxiliary request as compared to the then pending main request gave rise to new objections under Art. 123(2) EPC and Art. 84 EPC 1973.

- II. The appellant (applicant) filed an appeal against the decision.

With the grounds of appeal, the appellant requested that the decision be set aside and that a patent be granted on the basis of an enclosed set of claims according to a main request or an auxiliary request, respectively.

- III. At the appellant's request, a summons to attend oral proceedings was issued.

In a communication pursuant to Art. 15(1) RPBA, the appellant was informed about minor clerical mistakes in independent claims 1 and 3, about a needed clarification for amended description pages and that the Board intended to set aside the decision under appeal and to remit the case to the first instance with

the order to grant a patent according to a correspondingly corrected main request.

- IV. In reply, the appellant requested, as a new main request, that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

claims 1 to 3, as filed on 13 October 2017;

original description pages 2 to 4, 12 to 22, 24, 25, and 28;

description pages 1, 5 to 11 (with original page 8 cancelled), 23, 26, 27 and 29, as filed with the statement setting out the grounds of appeal;

figures 1A, 1B, 1C, 2, 3A, 3B and 4 to 12, as originally filed.

The appellant also requested oral proceedings, as an auxiliary request.

- V. Since the appellant's main request was considered to be allowable, the scheduled oral proceedings were cancelled.

- VI. Claim 1 of the appellant's main request reads:

*"1. A magnetic resonance imaging system provided with a receiver, a transmitter, a gradient amplifier and a multiple RF coil composed of a plurality of element coils, the element coils electrically connected to the receiver, the magnetic resonance imaging system configured to use the multiple RF coil to perform parallel imaging for an object to be imaged with a*

*planned field of view, hereinafter referred to as FOV, the system comprising:*

*a host computer (6), said host computer being configured to, based on software procedures stored within a memory:*

*execute a sensitivity-map scan for acquiring sensitivity map data of the element coils;*

*provide an interface for an operator and receive via said interface a reduction rate for parallel imaging, the planned-FOV and an indication of a desired pulse sequence;*

*determine an acquisition-FOV from the reduction rate and the planned-FOV, the acquisition-FOV being determined so as to be reduced from the planned-FOV in a phase-encode direction by a factor equal to the reduction rate;*

*determine an unfolding-FOV, wherein the size in the phase-encode direction of the unfolding-FOV becomes larger than that of the planned-FOV, the upper limit of the ratio of the size of the unfolding-FOV to that of the acquisition-FOV being the number of element coils;*

*instruct a sequencer of said magnetic resonance imaging system to perform a parallel imaging scan using said multiple RF coil and the acquisition-FOV, wherein said sequencer is electrically connected to control the operation of the gradient amplifier, the transmitter and the receiver;*

*obtain an acquisition-FOV reconstructed image for each of the element coils;*

*apply, on the basis of the unfolding-FOV, unfolding processing to the acquisition-FOV reconstructed images so that the acquisition-FOV reconstructed images are unfolded using an unfolding scale defined by the ratio of the size of the unfolding-FOV to that of the acquisition-FOV for the entirety of the acquisition-FOV reconstructed image and said sensitivity map data to*

*provide an unfolding-FOV image, wherein the size of the unfolding-FOV image in the phase-encode direction is equal to the unfolding-FOV; and produce an image, the size of the image in the phase-encode direction equal to the planned-FOV from the unfolding-FOV image obtained by the unfolding processing."*

Independent claim 3 is a correspondingly formulated claim for a method for performing parallel imaging. Claim 2 is a dependent claim.

## **Reasons for the Decision**

### 1. Applicable law

It is noted that the revised version of the Convention (EPC 2000) does not apply to European patent applications pending at the time of its entry into force (13 December 2007), unless otherwise provided. In the present decision, where Articles or Rules of the former version of the EPC apply, their citation is followed by the indication "1973".

### 2. The appeal is admissible.

### 3. Main request

#### 3.1 Admissibility

Since the amendments incorporated into the claims for the revised main request were made in response to objections raised by the Board in its communication under Art. 15(1) RPBA, the Board admitted the revised main request into the appeal proceedings in accordance with Art. 13(1) RPBA.

3.2 Amendments (Art. 123(2) EPC)

The amended claims comply with Art. 123(2) EPC.

The objections raised by the examining division in the decision under appeal are overcome.

3.3 Clarity (Art. 84 EPC 1973)

The amended claims comply with Art. 84 EPC 1973.

The objections raised by the examining division in the decision under appeal are overcome.

With particular regard to sections 1.1.10 to 1.1.12 of the decision under appeal, the appellant convincingly argued that the technical effect of reducing aliasing artefacts was achieved over the full range of the claimed subject-matter, should such artefacts occur. Whether other technical effects may be identified, for example an increase of the SNR, is irrelevant as long as the intended technical effect as mentioned above is still present.

3.4 Sufficiency of disclosure (Art. 83 EPC 1973)

The application complies with Art. 83 EPC 1973. In particular, the objections under section 3.1 of the decision under appeal are overcome by the amended description specifying that the arrangement concerning the *"trapezoidal smoothing technique"* is not an embodiment of the present invention.

Further, as mentioned above, the invention can be carried out over the full scope of the claim.



3.5 Novelty and inventive step (Art. 54(1), (2) and 56 EPC 1973)

3.5.1 With the amendment specifying that *"the acquisition-FOV reconstructed images are unfolded using an unfolding scale defined by the ratio of the size of the unfolding-FOV to that of the acquisition-FOV for the entirety of the acquisition-FOV reconstructed image"* (emphasis added by the Board), the subject-matter of claim 1 is novel as compared to documents D1 or D2, since both documents disclose that the unfolding-FOV is individually chosen for each pixel in accordance with the actual number of overlapped aliased replicates at each pixel (cf. also the discussion in the decision under appeal, Reasons, section 4.1, page 14, last paragraph). This pixel-individually chosen unfolding-FOV indeed results in different unfolding scales for different pixels and not in the same unfolding scale for the entirety of the acquisition-FOV reconstructed image.

3.5.2 Neither the application nor the the statement setting out the grounds of appeal mention any technical effect of the distinguishing feature identified above as compared to the disclosure of D1 or D2.

However, a technical effect may be seen in achieving an image with less unfolding artifacts in an easier and possibly faster manner, since the unfolding ratio has not to be defined for each individual pixel, but can be determined, where applicable even in advance, for all pixels together.

3.5.3 Neither document D1 nor document D2 provide a hint for a person skilled in the art towards the claimed

solution. As pointed out by the appellant, both documents relied on a different approach to achieve an image with less artifacts, so that they should be regarded as teaching away from the proposed solution as claimed.

- 3.5.4 It is also not evident how a person skilled in the art could come to the claimed solution based on his common general knowledge, since nowhere in the documents on file there is a hint that in parallel imaging an unfolding process with the same unfolding ratio for all pixels would result in an image with less artifacts.
- 3.5.5 The argumentation in section 4.2 of the decision under appeal (cf. page 15) is not convincing. In this section, the examining division objected that the scope of the then pending claims was not defined in such a manner that only technically meaningful imaging methods would be covered. In this respect, a case where no aliasing effects occurred was discussed.

However, it is noted that the technical effect of the claimed subject-matter is to reduce aliasing effects, if they occur. Should no aliasing effects be present in the image, there would be no need to rely on the present invention.

- 3.5.6 With regard to the approach relied upon by the examining division when discussing inventive step (cf. Reasons, section 4.3, pages 15-17), i.e. starting from document D3 and combining it with any one of documents D4 to D8, the argumentation produced by the appellant in the statement of grounds is convincing.

Indeed, the combination of document D3 with the teaching of any one of documents D4 to D8 would not

lead to the claimed subject-matter. In D4 to D8 the planned-FOV is automatically enlarged before an acquisition-FOV is determined using a reduction factor. After unfolding the acquisition-FOV with an unfolding scale that is equal to the reduction factor, the unfolding-FOV has the same size as the automatically enlarged FOV. However, present claim 1 clearly states that the unfolding scale is larger than the reduction rate.

Further, as argued by the appellant in the statement setting out the grounds of appeal (cf. page 20, last paragraph), *"by increasing the image FOV in D3, the D3 method requires an increased number of image acquisition scans"*. This is not the case for the subject-matter of the current claims, since the acquisition-FOV and the number of image acquisition scans is - as conventionally - only determined by the user-specified planned-FOV and the user-specified reduction rate.

- 3.5.7 Hence, the subject-matter of independent claim 1 is novel and involves an inventive step.  
The same argumentation applies to independent claim 3.
- 3.6 In conclusion, the main request is allowable.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the examining division with the order to grant a patent in the following version:

claims 1 to 3, as filed on 13 October 2017;

original description pages 2 to 4, 12 to 22, 24, 25,  
and 28;

description pages 1, 5 to 11 (with original page 8  
cancelled), 23, 26, 27 and 29, as filed with the  
statement setting out the grounds of appeal;

figures 1A, 1B, 1C, 2, 3A, 3B and 4 to 12, as  
originally filed.

The Registrar:

The Chairman:



N. Schneider

G. Assi

Decision electronically authenticated