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**Datasheet for the decision  
of 22 October 2018**

**Case Number:** T 1774/14 - 3.5.07

**Application Number:** 10707272.0

**Publication Number:** 2404381

**IPC:** H03M1/46, H03M1/12, H03M1/68,  
H03M1/80

**Language of the proceedings:** EN

**Title of invention:**  
IR detector system and method

**Applicant:**  
Leonardo MW LTD

**Headword:**  
SARADC for IR detector/LEONARDO

**Relevant legal provisions:**  
EPC Art. 84  
RPBA Art. 12(2), 12(4)

**Keyword:**  
Statement of grounds of appeal - party's complete case - main  
request (not admitted)  
Claims - clarity - auxiliary requests (no)

**Decisions cited:**

G 0007/93, G 0001/04, T 2219/10, T 0971/11, T 1816/11



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

Boards of Appeal of the  
European Patent Office  
Richard-Reitzner-Allee 8  
85540 Haar  
GERMANY  
Tel. +49 (0)89 2399-0  
Fax +49 (0)89 2399-4465

Case Number: T 1774/14 - 3.5.07

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.07**  
**of 22 October 2018**

**Appellant:** LEONARDO MW LTD  
(Applicant) Christopher Martin Road  
Basildon, Essex SS14 3EL (GB)

**Representative:** Tolfree, Adam Joseph Benjamin  
Leonardo MW Ltd  
c/o Impetus IP Limited  
Suite 31, West Devon Business Park  
Brook Lane  
Tavistock, Devon PL19 9DP (GB)

**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 1 April 2014  
refusing European patent application  
No. 10707272.0 pursuant to Article 97(2) EPC**

**Composition of the Board:**

**Chairman** R. de Man  
**Members:** P. San-Bento Furtado  
M. Blasi

## Summary of Facts and Submissions

- I. The applicant (appellant) appealed against the decision of the Examining Division refusing European patent application No. 10707272.0, which was filed as international application PCT/EP2010/052837 published as WO 2010/100260. The application was refused for lack of a text submitted or approved by the applicant on which examination could be based, Article 113(2) EPC. The set of claims 1 to 4 submitted by the applicant by letter dated 12 March 2014 was not admitted into the proceedings under Rule 137(3) EPC on the grounds that it had been filed after the final date for making written submissions fixed in accordance with Rule 116(1) EPC and that it *prima facie* did not fulfil the requirements of Articles 84 and 123(2) EPC.

In an *obiter dictum*, the Examining Division expressed the view that the subject-matter of claim 1 did not involve an inventive step.

- II. With the statement of grounds of appeal, the appellant requested, as a main request, that "the decision under appeal be set aside and that late filed amendments be allowed" (see point 1 of the statement of grounds of appeal) and, as auxiliary requests, that the application be remitted to the Examining Division "for reconsideration" (points 2, 3 and 43 of the statement of grounds of appeal). The appellant filed two sets of claims as first and second auxiliary requests, the claims of the second auxiliary corresponding to claims 1 to 6 of the first auxiliary request. Furthermore, under point 46 of the statement of grounds of appeal, the appellant requested that the Board "directs that the application proceeds to grant on the

basis of the Main Request or the First or Second Auxiliary Requests".

III. The summons to oral proceedings was issued on 24 May 2018 and received by the appellant on 31 May 2018. In a subsequent communication under Article 15(1) RPBA, the Board interpreted the appellant's requests to be that the decision under appeal be set aside and that a patent be granted on the basis of the main request, corresponding to the request filed by letter of 12 March 2014 not admitted into the proceedings by the Examining Division, or on the basis of the first or second auxiliary request. The appellant was requested to clarify its requests on file.

The Board informed the appellant that it was not inclined to admit the main request into the appeal proceedings. It questioned whether the auxiliary requests should be admitted into the proceedings and expressed the preliminary view that neither auxiliary request fulfilled the requirements of Articles 84 and 123(2) EPC.

IV. The appellant did not reply to the Board's communication.

V. Oral proceedings were held on 22 October 2018 in the absence of the appellant. At the end of the oral proceedings, the chairman pronounced the Board's decision.

VI. Claim 1 of the main request reads as follows:  
"An Infra Red (IR) detector system comprising a Focal Plane Array (FPA), and an [sic] Successive Approximation Register (SAR) Analogue to Digital Convertor [sic] (ADC), the SAR ADC comprising a Digital

to Analogue Converter (DAC), a first comparator ( $A_1, A_2$ ) and a second comparator ( $A_3$ ), in which the output of the DAC forms the input signals ( $V_A$ ) of the comparators ( $A_1, A_2, A_3$ ), characterised in that the second comparator ( $A_3$ ) has a higher gain than the first comparator ( $A_1, A_2$ ) and in which input signals ( $V_A$ ) of the first comparator ( $A_1, A_2$ ) are compared to a predetermined signal range ( $\pm V_{REF}$ ), an output ( $V_1$ ) of the first comparator ( $A_1, A_2$ ) being generated if the input signal ( $V_A$ ) is outside the predetermined range ( $\pm V_{REF}$ ), and an output ( $V_2$ ) of the first comparator ( $A_1, A_2$ ) being generated if the input signal ( $V_A$ ) is within the predetermined range ( $\pm V_{REF}$ ), in which the output ( $V_2$ ) of the first comparator ( $A_1, A_2$ ) causes the second comparator ( $A_3$ ) to be powered on, the second comparator ( $A_3$ ) being operational only when the input signal ( $V_A$ ) dynamics require high gain to enable resolution of the output signal of the DAC, thereby reducing the operational time of the second comparator ( $A_3$ ) and reducing the overall power consumption of the system."

VII. Claim 1 of the first and second auxiliary requests reads as follows:

"An Infra Red (IR) detector system comprising: at least one first comparator ( $A_1, A_2$ ); a second comparator having a higher gain than the at least first comparator; and a Focal Plane Array (FPA) detector in which the at least one first comparator is configured for use in Successive Approximation Register (SAR) Analogue to Digital Convertors [sic] (ADC), characterized in that the at least one first comparator ( $A_1, A_2$ ) is a window comparator that compares an output of a respective SARADC to a range of voltages, and the second comparator ( $A_3$ ) is connected to be controlled

via a signal received from the at least one first comparator ( $A_1$ ,  $A_2$ ) to use a half bit conversion period to compare an output of the respective SARADC to a second voltage, the second comparator ( $A_3$ ) being operational only when the input signal requires high gain to resolve the output signal, thereby reducing the operational time of the second comparator and reducing overall power consumption of the system."

### **Reasons for the Decision**

1. The appeal complies with the provisions referred to in Rule 101 EPC and is therefore admissible.
2. The appellant, although duly summoned, did not attend the oral proceedings. The board decided to continue the proceedings in its absence in accordance with Rule 115(2) EPC. Pursuant to Article 15(3) RPBA, the appellant was treated as relying on its written case.
3. Considering that the appellant did not reply to the communication under Article 15(1) RPBA, which included the Board's interpretation of the requests on file (see sections II. to IV. above), the appellant's requests are taken to be, in accordance with that interpretation, that the decision under appeal be set aside and that a patent be granted on the basis of the main request or, in the alternative, on the basis of the first or second auxiliary request.
4. *The invention*
  - 4.1 The invention concerns an infra-red (IR) detector system comprising a focal plane array (FPA) detector and a low-power comparator optimised for use in

successive approximation register (SAR) analogue-to-digital converters (ADCs) (see page 1, first and fourth paragraphs of the international publication).

- 4.2 According to the description, conventional approaches to achieving high-performance SAR charge-share ADCs require high-gain comparators in order to achieve satisfactory settling performance and high resolution. The high power consumption of such comparators makes those approaches disadvantageous for FPA detectors, which have to be cooled to cryogenic temperatures. Many such ADCs are used on an FPA detector (i.e. up to one ADC per column of the imaging array) to digitise image data for the whole array at standard frame rates (page 1, second paragraph).
- 4.3 The application describes a typical SAR ADC as consisting of a digital-to-analogue converter (DAC), a comparator and a digital SAR. Capacitors of the DAC are selected or deselected by the SAR logic depending on the comparator output, resulting in a digital representation of the input analogue signal. As the comparator input voltage approaches a reference voltage level, higher comparator gain is required to resolve a comparator output signal (page 2, last two paragraphs, Figure 1).
- 4.4 To solve the problem of high power consumption by the comparators, the invention relies on a revised SAR ADC architecture using low-gain and high-gain comparators and control logic (page 2, second paragraph, Figure 3). It uses a two-stage comparison approach as described in the paragraph bridging pages 3 and 4 with reference to Figure 3. In the first quarter of the bit comparison period, a fast low-power window comparator ( $A_1$ ,  $A_2$ ) compares the DAC output to a narrow voltage range (e.g.



+/- 10 mV) around the reference voltage  $V_{REF}$ . Window comparator logic generates, on the basis of the output of the window comparators ( $A_1$ ,  $A_2$ ), an output signal  $V_1$  if the DAC output is outside the range. The high-gain comparator  $A_3$  uses half of the bit conversion period to allow sufficient time for settling. If the DAC output is within the narrow window range, then the high-gain comparator  $A_3$  is powered on and is used as the final comparator output signal when the control signal 'Sample' is asserted. In this way, the high-gain comparator is switched on only when needed to resolve high-resolution DAC signals that are smaller than the threshold voltage, thereby saving power.

5. *Main request - admission into the appeal proceedings*

5.1 According to Article 12(2) RPBA, the statement of grounds of appeal shall contain a party's complete case. They shall set out clearly and concisely the reasons why it is requested that the decision under appeal be reversed, amended or upheld, and should specify expressly all the facts, arguments and evidence relied on.

Article 12(4) RPBA stipulates that everything presented by the parties with the grounds of appeal shall be taken into account by the Board if and to the extent it relates to the case under appeal and meets the requirements of Article 12(2) RPBA.

Under Article 12(4) RPBA, the Board has the power to hold inadmissible requests which could have been presented or were not admitted in the first-instance proceedings.

5.2 In the statement of grounds of appeal in the present case, the appellant did not provide any arguments against the contested decision's *prima facie* objections under Articles 84 and 123(2) EPC nor against the decision of the Examining Division not to admit into the proceedings the claims of the main request, which the appellant referred to as "late filed amendments". The appellant did not give any reasons why the main request should be admitted into the appeal proceedings.

Thus, the appellant did not present its case with regard to the main request, contrary to the requirements of Article 12(2) RPBA. This alone is a sufficient ground for not admitting the main request into the appeal proceedings (Article 12(4) RPBA).

5.3 In addition, under Article 12(4) RPBA, the Board also has to take into account the fact that the main request was not admitted into the proceedings by the Examining Division.

In decision G 7/93 (OJ EPO 1994, 775), the Enlarged Board of Appeal stated that a board of appeal should only overrule the way in which a first-instance department had exercised its discretion not to admit a request if it came to the conclusion either that the first-instance department had not exercised its discretion in accordance with the right principles or that it had exercised its discretion in an unreasonable way (reasons 2.6). Although in decision G 7/93 the context was that of reviewing the discretionary power of an examining division to not admit amendments filed at a very late stage, in that case, after a communication of the intention to grant a patent in accordance with Rule 51(6) EPC 1973 (as then in force), those criteria for overruling have been considered to

apply more generally to other situations (see, for example, Case Law of the Boards of Appeal of the EPO, 8th edition 2016, IV.E.4.3.3).

A number of decisions have ruled that in a situation in which a request had not been admitted into the first-instance proceedings, a board nevertheless has to exercise its discretion under Article 12(4) RPBA independently (see T 971/11 of 4 March 2016, reasons 1.2 and 1.3; T 2219/10 of 6 September 2016, reasons 3.1 and 3.2; T 1816/11 of 22 November 2016, reasons 2), giving due consideration to the appellant's additional submissions and to any changes in the circumstances. In doing so the board is not re-exercising the discretion of the department of first instance based on the case as it was presented then (T 971/11, reasons 1.2 and 1.3).

- 5.4 The main request was filed on the day scheduled for oral proceedings before the Examining Division. Although duly summoned, the applicant did not attend the oral proceedings. The decision under appeal gives detailed reasons for the *prima facie* objections under Articles 84 and 123(2) EPC in relation to the late-filed claims. The reasoning given in the contested decision for not admitting the main request, based on Rule 137(3) EPC and the *prima facie* non-allowability of a late-filed request, is in accordance with the right principles and no unreasonable exercise of the discretion by the Examining Division is apparent to the Board. In its statement of grounds of appeal the appellant did not contest the Examining Division's reasoning.

Furthermore, the Board was not presented in the statement of grounds of appeal with new facts or

submissions which it could consider when exercising its discretion of whether or not to take the main request into account in the appeal proceedings. Accordingly, there is no reason for the Board to exercise its discretion under Article 12(4) RPBA in a different way.

5.5 The appellant did not reply to the Board's preliminary opinion expressing the view that the main request should not be admitted.

5.6 Consequently, the main request is not admitted into the appeal proceedings under Article 12(4) RPBA.

6. *Auxiliary requests - admission into the appeal proceedings*

6.1 The auxiliary requests are amended versions of the claims dealt with by the Examining Division in its communication accompanying the summons to oral proceedings. Although those claims were withdrawn before the Examining Division could decide on them, in its statement of grounds of appeal, the appellant at least presented its case with respect to both requests. Since the Board can deal with the merits of the auxiliary requests without difficulty, it admits them into the appeal proceedings.

7. *Auxiliary requests - clarity*

7.1 Claim 1 of both auxiliary requests concerns an infra-red (IR) detector system comprising the following features itemised by the Board:

- (a) at least one first comparator ( $A_1$ ,  $A_2$ );
- (b) a second comparator having a higher gain than the at least first comparator; and
- (c) a focal plane array (FPA) detector

- (d) in which the at least one first comparator is configured for use in SARADCs, characterised in that
- (e) the at least one first comparator ( $A_1, A_2$ ) is a window comparator that compares an output of a respective SARADC to a range of voltages, and
- (f) the second comparator ( $A_3$ ) is connected to be controlled via a signal received from the at least one first comparator ( $A_1, A_2$ )
  - (f1) to use a half bit conversion period to compare an output of the respective SARADC to a second voltage,
- (g) the second comparator ( $A_3$ ) being operational only when the input signal requires high gain to resolve the output signal,
  - (g1) thereby reducing the operational time of the second comparator and
  - (g2) reducing overall power consumption of the system.

8. An independent claim should explicitly specify all the essential features needed to define the invention and define the matter for which protection is sought in such a manner that the meaning of the claim features would be clear for the skilled person from the wording of the claim alone (see also opinion G 1/04, OJ EPO, 334, reasons 6.2).

8.1 Claim 1 defines an IR detector system comprising two comparators (features a and b) and an FPA (feature c). Features e to g2 describe how the components of the IR detector system work.

Feature d of claim 1 explains that the first comparator is "configured for use in" SARADCs, without further specifying the SARADCs. That wording leaves open

whether the unspecified SARADCs are part of the claimed IR detector system and how they relate to the first and second comparators of the IR detector system, rendering the scope of the claim unclear.

In feature e, it is therefore also unclear what "respective" refers to in the phrase "the [...] first comparator [...] compares an output of a respective SARADC to a range of voltages". The same applies to "respective" in feature f1.

Even if the claim were to be interpreted as defining an IR detector system including SARADCs, the claim would still leave open how the comparators relate to the SARADCs, for instance whether each SARADC includes one first window comparator and one second comparator (as shown in Figure 3) or whether comparators are shared among SARADCs (and if so, how the invention works).

8.2 In the invention as described in the present application, the SARADC includes a DAC, whose output corresponds to the current content of the SAR (page 2, third and fifth paragraphs and Figure 3). The DAC output voltage (VA) is compared, by the first and second comparators, to a voltage range around a reference voltage and the reference voltage respectively (paragraph bridging pages 3 and 4, Figure 3). But features e and f1, defining the comparisons in claim 1, specify that "an output of a/ the respective SARADC" is compared to the range of voltages and a second voltage, respectively. It is clear that the current analogue DAC output VA is not the same as the digital SARADC output (see also Figure 3). Therefore, features e and f1 do not correctly define the comparisons, are not consistent with the description and are unclear.

8.3 Feature g specifies that the second comparator is operational only when the "input signal" requires high gain to resolve the output signal but leaves open what the "input signal" is. In addition, the claim does not clearly specify under which condition(s), nor how it is detected that, high gain is required.

According to the claim, the first comparator compares "an output of a respective SARADC" to a "range of voltages" (feature e), the second comparator is "connected to be controlled via a signal received from" the first comparator (feature f) "to compare an output of the respective SARADC to a second voltage" (feature f1). But the claim does not clearly define what the "range of voltages" and the "second voltage" in features e and f1 are, nor how feature g, and in particular "the input signal", relates to the range, the control via a signal from the first comparator and the second voltage (features e, f and f1). In the Board's opinion, those missing features are essential to the definition of the invention.

8.4 From the above, the Board concludes that claim 1 fails to define essential aspects of the system's architecture, such as how the comparators relate to the SARADCs and the presence of a DAC, incorrectly defines the comparisons and does not clearly describe how the second comparator is powered on depending on the result of the range comparison.

8.5 The appellant's reasoning in the statement of grounds of appeal relates only to objections raised by the Examining Division that differ from the Board's objections. Those arguments are not relevant for this

decision, and no further arguments were provided by the appellant in reply to the Board's preliminary opinion.

8.6 Consequently, the first and second auxiliary requests do not fulfil the requirements of Article 84 EPC.

9. *Conclusion*

Since the main request is not admitted into the proceedings and neither of the auxiliary requests is allowable, the appeal is to be dismissed.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:



I. Aperribay

R. de Man

Decision electronically authenticated