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**Datasheet for the decision  
of 21 April 2020**

**Case Number:** T 1376/15 - 3.5.04

**Application Number:** 09735547.3

**Publication Number:** 2274904

**IPC:** H04N3/15

**Language of the proceedings:** EN

**Title of invention:**  
IR DETECTOR SYSTEM AND METHOD

**Applicant:**  
LEONARDO MW LTD

**Headword:**

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

**Keyword:**  
Clarity - main request and auxiliary request (no)  
Extension beyond the content of the application as filed -  
auxiliary request (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 1376/15 - 3.5.04

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.04**  
**of 21 April 2020**

**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  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 12 February  
2015 refusing European patent application  
No. 09735547.3 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chairman** C. Kunzelmann  
**Members:** B. Le Guen  
G. Decker

## Summary of Facts and Submissions

- I. The appeal is against the decision of the examining division to refuse European patent application No. 09 735 547.3, published as international application WO 2009/130275 A1 and European patent application EP 2 274 904 A1.
- II. The European patent application at issue was refused in a decision "according to the state of the file" referring to the reasons given in the annex to a communication of the examining division dated 6 August 2014.
- III. The documents referred to in this annex included the following:  
  
D1: Olivier Cocle et al., "*QWIP compact thermal imager: Catherine-XP and its evolutions*", Proc. SPIE 6542, Infrared Technology and Applications XXXIII, 654234, 14 May 2007, XP040239598.
- IV. The reasons given in the annex were, *inter alia*, that claims 1 and 5 of the sole request then on file lacked clarity (Article 84 EPC) and contained subject-matter which extended beyond the content of the application as filed (Article 123(2) EPC), and that their subject-matter lacked inventive step (Article 56 EPC) in view of the disclosure of D1 combined with the common general knowledge of a person skilled in the art.
- V. The applicant (appellant) filed notice of appeal. With the statement of grounds of appeal, it requested that the decision under appeal be set aside and that a

patent be granted on the basis of the claims of the request underlying the impugned decision (main request), or, in the alternative, on the basis of the claims of an auxiliary request filed with the statement of grounds of appeal. The appellant also re-filed the claims of the main request, and provided arguments as to why the claims of both requests met the requirements of Articles 56, 84 and 123(2) EPC.

VI. The board issued a summons to oral proceedings. In a communication under Article 15(1) RPBA 2020 (Rules of Procedure of the Boards of Appeal, OJ EPO 2019, A63), annexed to the summons, the board gave its provisional opinion that claim 1 of the main request and claim 1 of the auxiliary request were not clear (Article 84 EPC), and that claim 5 of the main request and claims 1 and 6 of the auxiliary request contained subject-matter which extended beyond the content of the application as filed (Article 123(2) EPC).

VII. With its reply dated 25 March 2020, the appellant indicated that it "*shall not be attending the oral proceedings*" and requested that "*the decision from the proceedings is on the file*". The appellant did not comment on the objections raised by the board in its communication.

VIII. In a communication dated 16 April 2020, the appellant was informed that the oral proceedings before the board were cancelled.

IX. Claim 1 of the main request reads as follows:

"An infra red detector system for detecting a target comprising a dual waveband LW and MW detector, the LW channel and the MW channel of the detector having the

same pixel size, the detector further having an aperture of a predetermined size, whereby the size of the aperture imposes a LW diffraction limit on the LW channel of the detector, characterised in that the MW channel is scanned, such that an image of the target is moved by portion of a pixel pitch in sequence, said scanning resulting in an increase in the sampling density of the MW channel thereby ensuring that the MW diffraction limit of the aperture is fully utilised by the MW channel in the detector such that more resolved pixels are placed on the target, thereby improving the image of the target."

X. Claim 1 of the auxiliary request reads as follows:

"An infra red detector system comprising: a dual waveband detector having a medium wave (MW) channel, a long wave (LW) channel, and an aperture of a predetermined size, wherein the LW channel and the MW channel have the same pixel size and the size of the aperture imposes an LW diffraction limit on the LW channel of the detector, the dual waveband detector being configured to scan the MW channel such that an image of a target is moved by a portion of a pixel pitch in sequence, said scanning providing an increase in sampling density of the MW channel to ensure that the MW diffraction limit of the aperture is fully utilised by the MW channel in the detector such that more resolved pixels are placed on the target characterized in that the said scanning is configured for continuous operation and that the dual waveband detector is configured to sample the image in the LW channel at a rate close to a Nyquist limit of the image and under-sample the image in the MW channel."

- XI. The arguments submitted by the appellant in the statement of grounds of appeal, as far as relevant for the present decision, may be summarised as follows:
- a person skilled in the art would understand what the expression "*the MW diffraction limit of the aperture is fully utilised by the MW channel*" meant. Even if the skilled person did not understand this expression, the claim went on to state how this affected the image and thereby clarified, if needed, exactly what was meant by it (see points 17 and 18 of the statement of grounds of appeal);
  - the expression "*the dual waveband detector is configured to sample the image in the LW channel at a rate close to a Nyquist limit of the image and under-sample the image in the MW channel*", present in claim 1 of the auxiliary request, is disclosed on description page 5, lines 12 to 19, of the application as filed (see point 8 of the statement of grounds of appeal).

## **Reasons for the Decision**

1. The appeal is admissible.
  - 1.1 The board interprets the appellant's request in its reply dated 25 March 2020 as a request for a decision "according to the state of the file", i.e. a request that the board take its decision on the appeal on the basis of the facts and submissions on file when the request was filed.

2. *The invention*

2.1 The invention relates to an infrared detector system and an infrared detection method.

2.2 Two known infrared detection systems are scanning and staring systems. In scanning systems, the image is generated as a function of time row by row; in staring systems, the image is projected simultaneously onto all the pixels of a focal plane array. To achieve the resolution obtained by high-end scanning systems, staring systems can make use of an approach called "micro-scanning", wherein a same image is captured multiple times by moving it, faster than the frame rate, by multiple fractions of a pixel across the focal plane array, the multiple captures eventually being merged to create an image of increased resolution.

2.3 Infrared cameras conventionally operate in a medium wave (MW) band of infrared wavelengths (3 to 5 micrometers) or in a long wave (LW) band of infrared wavelengths (8 to 12 micrometers). The advantages and disadvantages of each band, for example in terms of angular resolution and sensitivity to external conditions, are well known to a person skilled in the art. To leverage the benefits of each waveband, so-called "dual waveband focal plane arrays" have been conceived which are capable of capturing infrared images in each of the MW and LW bands.

2.4 The description of the present application starts from the realisation that known dual waveband focal plane array systems require complex and expensive mechanisms to ensure that a high enough resolution is obtained in the MW band (page 2, line 16 to page 3, line 21). The present application instead proposes a low-cost



solution based on the use of micro-scanning for the MW channel (see the passage of the description from page 3, penultimate paragraph to page 5, first paragraph). A desired effect of this micro-scanning is that it ensures that the MW diffraction limit of the physical aperture is "*fully utilised*" by the MW channel (see claim 1 of both requests and description page 5, second full paragraph).

3. *Main and auxiliary requests - lack of clarity, Article 84 EPC*

3.1 According to Article 84 EPC, the claims "*shall be clear*".

This means, *inter alia*, that the independent claims must specify all the essential features of the invention (see Case Law of the Boards of Appeal of the European Patent Office, "Case Law", 9th edition 2019, II.A.3.2).

3.2 Claim 1 of the main request and claim 1 of the auxiliary request specify that a MW channel is scanned (i.e. micro-scanned) such that an image of a target is moved by a portion of a pixel pitch in sequence, this scanning providing an increase in sampling density of the MW channel, thereby ensuring that "*the MW diffraction limit of the aperture is fully utilised by the MW channel in the detector*" such that more resolved pixels are placed on the target.

3.3 In the statement of grounds of appeal, the appellant argued that a skilled person would understand what the quoted expression meant. The appellant also argued that, even if the skilled person did not understand this expression, the claim went on to state how this

affected the image and thereby clarified, if needed, exactly what was meant by it (see points 17 and 18 of the statement of grounds of appeal).

- 3.4 The board interprets the passage on page 5, lines 7 to 14, of the description as meaning that the blur caused by diffraction imposes a limit on the maximal spatial resolution achievable by a given optical system. Read in conjunction with page 2, first complete paragraph, the application makes clear that this limit is also present in state-of-the-art infrared detector systems and reflects a physical limit of optical systems known from the common general knowledge of a person skilled in the art. In light of this, the expression "*the MW diffraction limit of the aperture is fully utilised by the MW channel*" in claim 1 has, upon proper interpretation, the technical meaning that the maximal resolution allowed by the diffraction blur is achieved, for the MW channel, by the claimed infrared detector.
- 3.5 The extent of the optical diffraction blur depends on the physical properties of the optical system (for example, aperture size and pixel size). The desired result of a "full utilisation" of the MW diffraction limit, as specified in claim 1 of both requests, can therefore only be achieved if the parameters of the micro-scanning (for example, the number of sequential frames and the offset between those frames) are chosen based on those properties. Yet, the claim does not stipulate how the micro-scanning parameters are chosen based on the physical properties of the optical system. Hence, in the board's view, it does not specify all the essential features of the invention.
- 3.6 The board has therefore come to the conclusion that the main request and the auxiliary request do not comply

with the requirements of Article 84 EPC, because claim 1 of neither request is clear.

4. *Auxiliary request - added subject-matter, Article 123(2) EPC*

4.1 According to Article 123(2) EPC, a European patent application "*may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed*".

This means that any amendment can only be made within the limits of what a skilled person would derive, directly and unambiguously, using common general knowledge, and seen objectively and relative to the date of filing, from the whole disclosure of the European patent application as filed (see Case Law, II.E.1.1).

4.2 Claim 1 of the auxiliary request specifies that "*the dual waveband detector is configured to sample the image in the LW channel at a rate close to a Nyquist limit of the image and under-sample the image in the MW channel*".

4.3 In the statement of grounds of appeal, the appellant indicated lines 12 to 19 on page 5 as basis for this feature.

4.4 However, this passage relates to one of the problems encountered in the "*original approach*" (i.e. in the state of the art), namely that the MW channel is "*under-sampled*". The use of micro-scanning to increase the resolution of the MW channel, as taught by the application and claimed in claim 1, seeks to solve this problem (see also page 5, lines 15 to 21). The use of

the micro-scan is therefore incompatible with the obtention of an "*under-sampled*" MW image.

4.5 The board has therefore come to the conclusion that the auxiliary request does not comply with the requirement of Article 123(2) EPC, because claim 1 contains subject-matter which extends beyond the content of the application as filed.

5. Since none of the appellant's 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:



K. Boelicke

C. Kunzelmann

Decision electronically authenticated