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**Datasheet for the decision  
of 20 November 2018**

**Case Number:** T 0125/16 - 3.2.01

**Application Number:** 03726296.1

**Publication Number:** 1494877

**IPC:** B60C23/04

**Language of the proceedings:** EN

**Title of invention:**

DETERMINATION OF WHEEL SENSOR POSITION USING ACCELERATION  
SIGNALS

**Patent Proprietor:**

Schrader Bridgeport International, Inc.

**Opponents:**

Infineon Technologies AG  
BorgWarner Ludwigsburg GmbH

**Headword:**

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

Inventive step - (no) - all requests

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
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Case Number: T 0125/16 - 3.2.01

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.01**  
**of 20 November 2018**

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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
20 November 2015 concerning maintenance of the  
European Patent No. 1494877 in amended form.**

**Composition of the Board:**

**Chairman**            G. Pricolo  
**Members:**            H. Geuss  
                             P. de Heij

## **Summary of Facts and Submissions**

- I. The appeals are directed against the interlocutory decision of the Opposition Division of the European Patent Office posted on 20 November 2015 concerning maintenance of the European Patent No. 1494877 in amended form.
- II. The opposition division held that the subject-matter of claim 1 of the main request lacked novelty but the subject-matter of claim 1 of auxiliary request 1 was novel and involved an inventive step having regard to the following documents:
- D3** (EP 1 172 656 A1) and  
**D10** (DE 198 56 861 A1).
- III. The patent proprietor and both opponents appealed against this decision.
- IV. Oral proceedings were held on 20 November 2018.

The patent proprietor (appellant) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the set of claims of the main request, filed with the letter of 11 September 2015, or, alternatively, that the appeals of the opponents be dismissed or that the patent be maintained on the basis of the set of claims of auxiliary request 2, filed with the letter of 12 October 2018. The patent proprietor furthermore requested to hold document D3 to be inadmissible.

The opponents (appellants) requested that the decision under appeal be set aside and that the patent be

revoked.

V. Claim 1 according to the main request reads as follows (the numbering of features added by the Board corresponds to the numbering adopted by the patent proprietor in its statement of grounds of appeal, page 4) :

1. A tire monitor method comprising:
2. at a tire monitor,
3. determining first acceleration along a first axis and
4. second acceleration along a second axis;
5. based on the first acceleration and the second acceleration, determining position information about position of the tire monitor on a vehicle, and
6. transmitting radio signals to communicate data representative of the position information; characterised by
7. determining a received amount of the radio signals; and based on the received amount,
8. determining additional position information about the position of the tire monitor on the vehicle.

VI. Claim 1 of the auxiliary request 1 (which was considered allowable according to the interlocutory decision) reads as follows (the numbering of features added by the Board corresponds to the numbering adopted by the patent proprietor in its reply, see pages 2 and 3) :

1. A tire monitor method comprising:
2. at a tire monitor,
3. determining first acceleration along a first axis

and

4. second acceleration along a second axis;
5. based on the first acceleration and the second acceleration, determining position information about position of the tire monitor on a vehicle,
6. transmitting radio signals to communicate data representative of the position information;
7. determining a received amount of the radio signals;

and

8. based on the received amount, determining additional position information about the position of the tire monitor on the vehicle,
9. wherein the position information comprises right/left position information and
10. the additional position information comprises front/rear position information,  
the method further comprising:
  11. producing a first acceleration signal based on the first acceleration and a second acceleration signal based on the second acceleration;
  12. determining a lag/lead relationship of the first acceleration signal and the second acceleration signal;
- and
13. determining a rotational direction of the tire monitor on the wheel based on the lag/lead relationship.

VII. Claim 1 of the auxiliary request 2 reads as follows  
( the text in bold represents the difference over claim 1 of auxiliary request 1 ):

A tire monitor method comprising:  
at a tire monitor, determining first acceleration along a first axis and second acceleration along a second axis;  
based on the first acceleration and the second

acceleration, determining position information about position of the tire monitor on a vehicle, transmitting radio signals to communicate data representative of the position information;  
determining a received amount of the radio signals; and based on the received amount, determining additional position information about the position of the tire monitor on the vehicle;  
wherein the position information comprises right/left position information and the additional position information comprises front/rear position information;  
the method further comprising:  
producing a first acceleration signal based on the first acceleration and a second acceleration signal based on the second acceleration;  
determining a lag/lead relationship of the first acceleration signal and the second acceleration signal;  
determining a rotational direction of the tire monitor on the wheel based on the lag/lead relationship; and  
**determining the position information based on the rotational direction.**

VIII. The patent proprietor's (appellant) submissions as relevant to the present decision may be summarized as follows:

The subject-matter of claim 1 of the main request is novel over D10.

In particular, D10 does not disclose features 5), 6) and 8) of the claim in suit (cf. point V above).

D10 discloses clearly that a tangential acceleration (Bahnbeschleunigung) is determined, and that the sign of the tangential acceleration value allows a distinction between wheels on the left side and wheels



on the right side of the vehicle, cf. D10, column 2, lines 59 et seq. It is further stated therein that the sign is determined already in the tire monitor and transmitted to the central unit. From this passage it is clear that the transmission with respect to feature 6) concerns only the sign and not the position information as claimed since before transmission the sign information has not been evaluated in a manner that it constitutes position information. In the central unit the transmitted sign information is then allocated to the respective side information. However, it is acknowledged that no further information is necessary to transform the sign information into a position information.

Since D10 does not disclose the transmission of position information (feature 6)), the method of D10 is further not able to determine additional position information from the radio signals. It is anyhow not disclosed in D10 that the determination of additional position information is made on the basis of the radio signals communicating the position information. Thus, also feature 8) is not present in D10.

The subject-matter of claim 1 according to the auxiliary request 1 is based on inventive step.

The method of claim 1 differs from the tire monitor according to D10 by the features 12) and 13) (see point VI above). D10 does not disclose a lag/lead relationship. In view of these distinguishing features 12) and 13) the problem to be solved is to provide a tire monitor which allows position detection not only in an acceleration phase of the vehicle but also at a constant speed.

It is correct that D3 discloses a wheel monitor for detecting the rotational orientation by using a lag/lead relationship similar to features 12 and 13 of claim 1 in suit. However, D3 would not be taken into account, since D10 would not prompt the skilled person to look for an alternative to the algorithm disclosed therein; the issue that a position determination can only be carried out in acceleration phases is not mentioned in the state of the art.

The supplementary feature in claim 1 of auxiliary request 2 is merely a clarification and does not substantially modify the claimed subject-matter.

It is agreed that "relevance" is a proper criterion to evaluate whether or not a late filed document should be admitted into the proceedings, however D3 lacks prima facie relevance. In particular, D3 does not disclose a tire monitor system for vehicles that provides position information but merely a system to detect rotational orientation of a wheel. Moreover, this feature is present in several dependent claims of the patent as granted and therefore D3 should have been substantiated within the 9-month opposition period. Accordingly, D3 should not have been admitted into the proceedings by the opposition division.

IX. The rebuttals of opponents 01 and 02 (appellants) were essentially the following:

The subject-matter of claim 1 according to the main request lacks novelty over D10.

In particular, features 5) and 6) are disclosed in D10. Column 2, lines 59 et seq. discloses that the tangential acceleration (Bahnbeschleunigung) is

detected by a sensor system and that the sign of the value of the tangential acceleration allows a distinction between left side wheels and right side wheels. Thus the sign is an unambiguous indicator for the wheel side. Inside the tire monitor system the information "left" or "right" is stored in a variable, which takes two states. The fact that only the label for the variable is different - "+" or "-" in D10 versus "left" or "right" in the opposed patent- cannot render the respective feature novel.

For the same reasons feature 8) is disclosed in D10. Column 5, lines 2 et seq. explains that the signal strength of the radio signal is taken to evaluate the position of the tire monitor in terms of "front" and "rear".

The subject-matter of claim 1 of the auxiliary request 1 is not based on inventive step.

D10 discloses all features of the contested claim except features 12) and 13) which relate to the lag/lead relationship.

The problem to be solved by these features is to provide an alternative solution for the method according to D10. The skilled person would take into account that document D3 divulges a method for determining the rotational orientation of a wheel by gravity modulation. In terms of general properties and the obtained result the method according to D3 is equivalent to the method of D10, so the skilled person would consider implementing the method according to D3 into the tire monitor method of D10 in order to solve the above-mentioned problem.

Like in the claimed method, the system of D10 is capable of detecting the respective side of a rotating wheel at a constant speed of the vehicle. The sign of the value of the tangential acceleration does not depend on an acceleration phase.

The same line of argument applies to claim 1 according to auxiliary request 2. The additional feature of this claim does not change the claimed subject-matter.

The opposition division stated that the disclosure of document D3 is relevant for the patent in suit. This decision is correct. It is further noted that D3 has not been late filed but already with the notice of opposition. Accordingly, there was no reason for disregarding D3.

## **Reasons for the Decision**

1. The Board agrees with the conclusion of the Opposition Division that the subject-matter of claim 1 according to the main request is not novel over document D10, Article 54 (1) (2) EPC.

The patent proprietor (appellant) contested that D10 discloses features 5, 6 and 8 of claim 1 (see point V above).

- 1.1 The patent proprietor's (appellant's) argument that features 5) and 6) of claim 1 are not disclosed in D10 is not convincing. The patent proprietor argues that despite the fact that the sign of the tangential acceleration is an unambiguous indicator for the rotational direction of the wheel and - as a consequence thereof - for the side of the vehicle on

which the wheel is mounted, the sign information (which is "+" or "-") must first be evaluated to acquire positional information, that is "left" or "right". However, there is no disclosure in D10 that this transformation is done in the tire monitor.

1.2 It is not disputed by the patent proprietor that no further information or operation is needed to transform the sign of the tangential acceleration (cf. Bahnbeschleunigung, column 2, lines 59 et seq.) to acquire the position information according to features 5) and 6) of claim 1. In both D10 and the patent in suit the transmitted data is the exactly the same with the only difference that in the case of D10 this data is labelled as "+" or "-" whereas in the patent in suit it is "left" and "right". It must therefore be held that position information is determined before transmitting the radio signals as required by claim 1, although the information is labelled differently. However a different denomination of the same data is not able to render the corresponding feature of claim 1 novel over D10.

1.3 Furthermore the patent proprietor argues that the wording of feature 5) "determining position information about position of the tire monitor" does not imply that the result of said "determining" step could only be "left" or "right".

In this respect the Board takes the view that for features 5) and 6) to be met it is sufficient that the transmitted information allows determining the position of the tire monitor (e.g. the side on which the wheel is positioned) even if further encoding steps would be necessary in the central unit of the vehicle.

1.4 With respect to feature 8) the patent proprietor argues that the radio signals which are the basis for determining the additional information are the same radio signals which transmit the position information according to features 5) and 6). Since features 5) and 6) are not shown in document D10, it is evident that feature 8) cannot be disclosed likewise.

However, as explained above, features 5) and 6) are disclosed in D10. D10 also discloses the step of deriving additional position information ("front", "rear") based on the received amount of the radio signals that already provide the left/right position information, see column 4, line 62 to column 5, line 15, according to which the signal strength of the radio signal of a specific tire monitor in relation to the position of the antenna is a distinct indicator of the position (front/rear) of that tire monitor.

2. The subject-matter of claim 1 of the first auxiliary request (on which the interlocutory decision is based) is not based on an inventive step, Article 56 EPC.

2.1 The subject-matter of claim 1 differs from the tire monitor method according to D10 by features 12) and 13) (see point VI above), namely

12) determining a lag/lead relationship of the first acceleration signal and the second acceleration signal; and

13) determining a rotational direction of the tire monitor on the wheel based on the lag/lead relationship.

The further additional features 9) and 10) of claim 1, as compared to claim 1 of the main request, are undisputedly disclosed in document D10.

2.2 The patent proprietor argues that in view of the distinguishing features the problem to be solved is to provide a tire monitor system which allows to identify the position of a wheel not only during acceleration of the vehicle but also at a constant speed.

2.3 The Board holds that the problem as formulated by the patent proprietor is not related to the distinguishing features as also the method of D10 would allow the identification of wheels at a constant speed.

The sign of the tangential acceleration value is a clear indicator for the rotation direction of a wheel and thus for the side on which the wheel is mounted on the vehicle, cf. D10, column 2, lines 58 et seq. and above, point 1. However, the acceleration in tangential direction sensed by the accelerometer according to D10 is not only the tangential acceleration due to a variation of the rotational speed of the wheel, but it is the result of the latter and of the gravitational acceleration, as both are acting on the accelerometer. Even in the absence of a tangential acceleration due to a variation of the rotational speed of the wheel, i.e. at constant speed, the accelerometer will still output a signal due to the gravitational acceleration which has a sign when the sensor goes up and another sign when it goes down during a rotating cycle of the wheel. Thus, even at constant speed, the acceleration detected in tangential direction would allow for differentiating between the side of the wheels in the sense of D10.

In any case, claim 1 under consideration does not

specify that the identification of the position of the wheel is done at constant speed.

Accordingly, the effect of the distinguishing features can only be seen in providing a tire monitor system which allows identifying the position of a wheel. This effect is already achieved by the method of D10.

2.4 For this reason, the Board agrees with the opponent's 01 view, according to which the objective problem to be solved in the light of the effect of features 12) and 13) is to provide an alternative algorithm for detecting the side of the vehicle on which the respective wheel is mounted.

2.5 It is accepted by the patent proprietor that D3 discloses features 12) and 13) and that the method of D3 determines the direction of rotation of a wheel. Nevertheless, it was contested that the skilled person - starting from D10 - would take document D3 into account.

In the Board's view, when looking for an alternative for detecting the side of the vehicle on which a wheel is mounted, the skilled person, knowing that in D10 this is done by determining the rotation direction of the wheels (see above point 2.3), would look for alternative ways of determining the rotation direction of a wheel, and would thus inevitably consider the solution presented in D3, which requires the above-mentioned features 12) and 13). Accordingly, the skilled person would consider integrating these features into the method of D10, thereby arriving at the subject-matter of claim 1 in an obvious manner.



3. The subject-matter of claim 1 of auxiliary request 2 is not based on inventive step for the same reasons as claim 1 of auxiliary request 1, Article 56 EPC.

The patent proprietor did not dispute that the additional feature of claim 1 of auxiliary request 2, namely "determining the position information based on the rotational direction", is merely a clarification and does not add anything substantial to the subject-matter of claim 1 of auxiliary request 1. In fact, this feature is taken into consideration in the above reasoning regarding inventiveness of the subject-matter of claim 1 of auxiliary request 1, which therefore also applies to claim 1 of auxiliary request 2.

4. As regards the issue of the admissibility of document D3, it is undisputed that this document was cited in the notice of opposition of Opponent 1, but was not used therein to substantiate any lines of attack based on lack of novelty or inventive step. Submissions based on D3 (namely, lack of inventive step starting from D10 and in combination with D3) were only substantiated after expiry of the 9-month opposition period, and were admitted by the Opposition Division using the criterion of *prima facie* relevance (see point 6.4 of the decision under appeal).

The patent proprietor's argues that D3 should not be admitted into the proceedings as it is not *prima facie* relevant. This corresponds to requesting the Board to overturn the discretionary decision of the Opposition Division to admit the submissions based on D3.

- 4.1 According to decision G 7/93 it is not the function of a Board of Appeal to review all the facts and circumstances of the case as if it were in the place of

the department of first instance, in order to decide whether or not it would have exercised its discretion in the same way as the department of first instance. If a department of first instance is required under the EPC to exercise its discretion in certain circumstances, it should have a certain degree of freedom when doing so, without interference from the Boards of Appeal. A Board should only overrule the way in which a department of first instance has exercised its discretion if it comes to the conclusion either that the department has not exercised its discretion in accordance with the proper principles, or that it has done so in an unreasonable way, and has thus exceeded the proper limits of its discretion.

- 4.2 In the underlying case, the opposition division exercised its discretion based on the criterion of *prima facie* relevance which is a well-established principle according to the case-law. This was not challenged by the patent proprietor. It was further not alleged that the opposition division applied the criterion of relevance in an unreasonable way.
- 4.3 Thus the Board has no reason to question the conclusion of the opposition division with respect to the admissibility of D3.

**Order**

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

The decision under appeal is set aside.

The patent is revoked.

The Registrar:

The Chairman:



S. Sánchez Chiquero

G. Pricolo

Decision electronically authenticated