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Datasheet for the decision of 30 May 2007

Case Number: T 1118/05 - 3.2.01

Application Number: 95903550.2

Publication Number: 0793579

IPC: B60C 23/00

Language of the proceedings: EN

Title of invention:
Remote tire pressure monitoring system

Patentee:
SCHRADER-BRIDGEPORT INTERNATIONAL, INC.

Opponent:
BERU AG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
G 0001/84, G 0003/98

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1118/05 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 30 May 2007

Appellant 1: (Patent Proprietor)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 24 June 2005 concerning maintenance of European patent No. 0793579 in amended form.**

Composition of the Board:

Chairman: S. Crane
Members: P. L. P. Weber
G. Weiss

Summary of Facts and Submissions

I. The appeal is directed against the interlocutory decision of the opposition division posted on 24 June 2005 that account being taken of the amendments according to the fifth auxiliary request made by the proprietor during the opposition procedure, the patent EP-B-0793579 and the invention to which it relates meet the requirements of the EPC.

The notice of appeal of the proprietor (appellant 1) was filed on 24 August 2005 and the appeal fee paid on the same day. The grounds of appeal were filed on 4 November 2005.

The notice of appeal of the opponent (appellant 2) was filed on 31 August 2005 and the appeal fee paid on the same day. The grounds of appeal were filed on 31 October 2005.

II. In the summons to the oral proceedings the board expressed the provisional opinion that the main request and each of the auxiliary requests, all comprising four independent claims (claims 1 to 4) from which three include a feature taken from the description of the patent as granted, were formally not admissible since according to the established jurisprudence of the boards of appeal the opposition procedure is not designed to be an extension of examination procedure, see in particular G 1/84, OJ EPO 1985, 299, point 9 of the reasons.

III. In its response in preparation of the oral proceedings the appellant 1 considered that the question of the admissibility of its requests addressed by the board was of significant legal importance, and should be referred to the Enlarged Board of Appeal.

IV. Oral proceedings were held on 30 May 2007.

The requests of the parties were as follows:

The appellant 1 requested that the decision under appeal be set aside and that the patent be maintained on the basis of the independent claims 1 to 4 and dependent claims 5 to 11 according to the main request filed with the statement of grounds of appeal. In the event that any of these independent claims 2 to 4 should not be allowed, then their respective alternative versions according to auxiliary requests 1 to 5 (claim 2), auxiliary requests 6 to 8 (claim 3) and auxiliary requests 9 to 11 (claim 4, filed on 22 May 2006) should be taken into consideration. If no version of one or several of the independent claims was held allowable, then this or these claim(s) should be deleted from the set of claims.

The appellant 2 requested that the decision under appeal be set aside and that the patent be revoked.

V. The independent claims according to the main request and the first to the eleventh auxiliary requests read as follows:

MAIN REQUEST

1. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and
a control circuit (100), connected to said pressure sensor (120) and said radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle;
wherein, in response to said first stale of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterised in that:
the remote tire pressure monitoring system further comprises a tilt switch (150), connected to said control circuit (100) and having at least first and second states, for monitoring an angle at which said

tire is mounted, wherein, in response to one of said first and second states of said tilt switch, said control circuit (100) causes said radio transmitter (170) to output an alarm indicative of an unsatisfactory mounting state of said tire.

2. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and
a control circuit (100), connected to said pressure sensor (120) and said radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said
pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle;
wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:

the system is adapted to monitor the sensed pressure and, upon
detecting a pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, to transmit immediately the tire pressure measurement.

3. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second slates, for monitoring a state of motion of said vehicle;
wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:

the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, the pressure sensor is adapted to re-sample the pressure to verify the pressure change and then immediately to transmit the new information.

4. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and
a control circuit (100), connected to said pressure sensor (120) and said radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said
pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle;
wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio

transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
when the vehicle is stationary, pressure sampling and RF transmissions still occur.

FIRST AUXILIARY REQUEST

2. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;

characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, to transmit immediately the tire pressure measurement to a receiver of the vehicle.

SECOND AUXILIARY REQUEST

2. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter

to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, to transmit immediately the tire pressure measurement to a dashboard receiver of the vehicle.

THIRD AUXILIARY REQUEST

2. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said

second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, to transmit immediately the latest tire pressure measurement of the vehicle to augment the periodic transmissions.

FOURTH AUXILIARY REQUEST

2. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch

(140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, to transmit immediately the latest tire pressure measurement to a receiver of the vehicle to augment the periodic transmissions.

FIFTH AUXILIARY REQUEST

2. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:

a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, to transmit immediately the latest tire pressure measurement to a dashboard receiver of the vehicle to augment the periodic transmissions.

SIXTH AUXILIARY REQUEST

3. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter,

including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, the pressure sensor is adapted to re-sample the pressure one second later to verify the pressure change and then immediately to transmit the new information.

SEVENTH AUXILIARY REQUEST

3. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power

supply (110); and a control circuit (100), connected to said pressure sensor (120) and said
radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, the pressure sensor is adapted to re-sample the pressure to verify the pressure change and then immediately to transmit the new information to augment the periodic transmissions.

EIGHTH AUXILIARY REQUEST

3. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure

sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and a control circuit (100), connected to said pressure sensor (120) and said radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle; wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;
characterized in that:
the system is adapted to monitor the sensed pressure and, upon
detecting a tire pressure change greater than I psi in 10 seconds in the course of the pressure measurements, the pressure sensor is adapted to re-sample the pressure one second later to verify the pressure change and then immediately to transmit the new information to augment the periodic transmissions.

NINTH AUXILIARY REQUEST

4. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and
a control circuit (100), connected to said pressure sensor (120) and said radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said
pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle;
wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;

characterized in that:
when the vehicle is stationary, pressure sampling and RF transmissions occur at the first periodicity.

TENTH AUXILIARY REQUEST

4. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and
a control circuit (100), connected to said pressure sensor (120) and said radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said
pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle;
wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is significantly more frequent than said first periodicity;

characterized in that:
when the vehicle is stationary, pressure sampling and RF transmissions occur at the first periodicity.

ELEVENTH AUXILIARY REQUEST

4. A remote tire pressure monitoring system for a vehicle having at least two wheels with tires mounted thereon, including for each of said tires a pressure sensor (120) for sensing a pressure of said tire, and providing tire pressure measurements accordingly, a radio transmitter (170) for transmitting said tire pressure measurements via radio transmissions, a power supply (110); and
a control circuit (100), connected to said pressure sensor (120) and said radio transmitter (170), for controlling operation of said pressure sensor and said radio transmitter, including control of a periodicity of operation of said
pressure sensor and said radio transmitter;
the remote tire pressure monitoring system comprising for each of said tires:
a roll switch (140), connected to said control circuit (100) and having at least first and second states, for monitoring a state of motion of said vehicle;
wherein, in response to said first state of said roll switch (140), said control circuit (100) causes said pressure sensor (120) and said radio transmitter (170) to operate at a first periodicity, and in response to said second state of said roll switch, said control circuit causes said pressure sensor and said radio transmitter to operate at a second periodicity that is more frequent than said first periodicity;

characterized in that:
the first state of the roll switch is assumed when the vehicle is stationary, whereby when the vehicle is

stationary, pressure sampling and RF transmissions occur at the first periodicity.

VI. The following documents have played a role in the appeal proceedings:

D1: WO-A-9214620
D2: DE-A-3703128
D5: US-A-4947151
D7: US-A-5285189
D8: DE-A-4303583.

VII. The arguments of the appellant 2 relating to the substance of the claims can be summarized as follows:

Claim 1 (main request):

The first part of the claim is known from D2. The addition of a tilt switch with an alarm function solves the objective problem of providing a deterrent for wheel thieves.

D5 discloses a tire pressure monitoring system which additionally to the pressure control system comprises a motion sensor placed in the tire to keep it safe from potential theft. Also in this device an alarm is transmitted to a receiver when the tire is moved.

The man skilled in the art would thus find a solution to the objective problem in D5 and come to the claimed system without any inventive step.

The alleged additional advantage of a tilt switch that it would detect a false mounting of a wheel seems unrealistic as the wheel would be tilted by 30°.

Claim 4 (main request and auxiliary requests 9, 10, 11)

The characterising feature of claim 4, main request has been taken from the specific embodiment of the description. The generalisation of the feature as in claim 4 is thus not allowable.

Although in the claims 4 according to the auxiliary requests 9, 10, 11 additional elements have been taken into the claim, all the claims still represent an unallowable generalisation of what was originally disclosed.

Additionally all claims do not fulfil the requirements of Article 84 EPC since only one periodicity is mentioned for each of the two states of the roll switch whereas in the embodiment described in the description two periodicities are used for each of the states.

Claims 2 and 3 (main request and auxiliary requests 1, 2, 3, 5, 6)

In all these requests the features taken from the description are taken out of the context of the specific example in which they were mentioned. In particular the passage at the beginning of the page 3 of the description talks about transmitting the pressure changes whereas all versions of claim 2 mention the transmission of the pressure measurement. The specific example described on page 9, line 21 to

page 10, line 4 cannot serve as a basis for the amendments either for the same reason that some features cannot be isolated from the other features of the specific embodiment without making an undue generalisation.

Additionally the subject-matter of claim 3 according to the sixth auxiliary request is not inventive.

Starting from D2 or D8 the concept of transmitting an alarm when an important pressure drop occurs is known, see D8 column 7, lines 54 to 60 or D2 column 3, lines 57 to 64. From D1, see page 38, lines 4 to 10 it is known to increase the number of transmissions when a pressure change above a predetermined limit is detected, which amounts to checking or re-sampling the pressure. Thus the skilled man comes to the subject-matter according to claim 3 (sixth auxiliary request) without requiring an inventive step.

VIII. The arguments of the appellant 1 as to the substance of the claims can be summarized as follows:

Claim 1 (main request)

With a tilt switch it is possible not only to prevent wheel theft but also to detect unsatisfactory mounting of the wheel. Furthermore such a switch can remain operative when the vehicle is moving. This is an additional advantage over a simple motion detector which must be switched off as is the case of the one disclosed in D5.

For this reason even if the skilled man adopted the motion sensor of D5, he would still not come to the claimed subject-matter.

Claim 4 (main request and auxiliary requests 9, 10, 11):

Concerning the main request it is important to note that a sampling operation has to be periodic anyway so that any additional reference to a periodicity is not needed. The particular frequency of sampling and transmission used when the vehicle was stationary was not significant, what was important was that the operation was performed at all.

The further restrictions introduced in the auxiliary requests are only in case the board finds the main request formally unallowable but are also not considered necessary since the skilled man would not consider them essential for the invention. The amendments are based on the original description page 3, lines 11 to 14 and page 10, lines 6 to 14.

Claims 2 and 3 (main request and auxiliary requests 1, 2, 3, 5, 6)

The different versions of claim 2 are based on the general description page 3, lines 1 to 6 or on the specific embodiment described on pages 9 and 10 of the original description while the different versions of claim 3 are only based on the specific embodiment.

It is however considered that the feature of the receiver being in a vehicle or the feature of the receiver being a dashboard receiver are not essential

for the invention and therefore not necessary in the claim.

That re-sampling takes place one second after the pressure change has been detected as claimed in claim 3 according to the sixth auxiliary request is not essential either, the main teaching being that before an information is transmitted to the driver it is first checked so that the driver is not confronted with false alarms.

Concerning the question of whether the subject-matter of claim 3 (sixth auxiliary request) involves an inventive step, it should be noted that none of the documents D1, D2, D8 disclose a re-sampling step as a condition before an additional transmission is carried out. In none of the prior art documents has it been recognised that this condition will avoid the driver getting false alarms.

In addition the numerical values of the pressure change and of the re-sampling interval defined in the claim allow the driver to get an indication of the existence of a pressure drop within only 11 s which is much earlier than in the prior art systems.

The combination of features according to claim 3 (sixth auxiliary request) is thus not suggested by the prior art.

Reasons for the Decision

1. The appeals are admissible.

2. The main request of the appellant 1 was introduced at the opposition stage and comprises four independent claims of which one is a combination of granted claim 1 and 3, and the other three are a combination of granted claim 1 with a respective different feature taken from the description.

This set of claims was found formally admissible by the opposition division.

The present board questioned the formal admissibility of such a request at the opposition stage in the annex to the summons to the oral proceedings in particular as the opposition procedure should not be a continuation of the examination procedure (G 1/84, point 9 of the reasons).

Before considering the request of the appellant 1 for a referral of a corresponding question to the Enlarged Board of Appeal in case a set of claims with several independent claims as mentioned above would not be considered admissible by the board, it is however necessary to check the relevance of the question for the outcome of the case (G 3/98, OJ EPO 2001, 62, point 1.2.3 of the reasons).

This is the reason why the present board had to first examine the patentability of the independent claims of the requests as submitted by the appellant 1 in order to establish whether a set of claims comprising several independent claims would be allowable, so that the question became relevant for the form in which the patent would be maintainable. The order in which the

claims are within the analysis below corresponds to the order in which they were considered at the oral proceedings, at the suggestion of the parties.

3. *Claim 1*

3.1 Novelty was not disputed.

3.2 Inventive step

3.2.1 It is undisputed that granted claim 1 is anticipated by D2. Claim 1 is a combination of the granted claim 1 and of the feature of granted claim 3 that the remote tire pressure monitoring system comprises a tilt switch, connected to said control circuit and having at least first and second states, for monitoring an angle at which said tire is mounted, wherein, in response to one of said first and second states of said tilt switch, said control circuit causes said radio transmitter to output an alarm indicative of an unsatisfactory mounting state of said tire.

As mentioned in the patent in suit in paragraph [0036] this tilt switch can detect a wheel that is tilted at a certain angle, typically 30° from the normal vertical position, so that it can detect removal from the vehicle as for instance in case of wheel theft. This alarm can thus provide a deterrent against wheel thieves.

The objective problem can thus be seen to provide a better protection against wheel theft.

D5 deals with the same problem in the same kind of system. A motion detector is mounted inside the tire to be invisible from the outside and to be able to detect movement of the wheel as for example in case of theft of a wheel when the vehicle is stationary in order to launch an alarm.

The skilled man locking for a solution to the objective problem mentioned above would thus find it in D5 which teaches him to put a motion detecting sensor inside the wheel. The kind of detector not being precisely mentioned in D5, the skilled man would choose one according to the circumstances. In the present case the choice of a tilt switch cannot be considered inventive since it is one of the obvious possibilities once the skilled man has chosen to build a motion sensor inside the tire for being able to detect wheel theft.

3.2.2 The proprietor argued that the use of a tilt switch additionally had the advantage of giving the possibility of detecting a false mounting of the wheel while the car is driven.

In the opinion of the board while it is accepted that each category of movement detecting sensors presents respective advantages or drawbacks it remains within the normal activities of the skilled man to chose among the possible sensors the one which is most adapted to the specific intended use and there is no surprising effect in the fact that a tilt switch presents its own known advantages.

Additionally it seems hardly conceivable that a wheel mounted tilted at 30° from the normal vertical position

would not be noticed by the driver, so that the main function of the tilt switch can only be to detect theft.

3.2.3 The appellant 1 further argued that it would go against the teaching of D2, which teaches to save as much energy as possible, to integrate additional sensors consuming more such energy.

The board does not share this view as such a switch would only consume energy when it is closed, i.e. when the wheel is effectively tilted. This consumption would thus be minimal.

3.2.4 The board thus considers that the subject-matter of claim 1 is obvious for the man skilled in the art and accordingly lacks inventive step (Article 56 EPC).

4. *Claim 4 (main request)*

4.1 This claim is a combination of granted claim 1 with the feature taken from the description that when the vehicle is stationary, pressure sampling and RF transmission still occur.

In the description as originally filed (see published version) it is explained on page 10, line 14 onwards that in the stationary mode either the control circuit will stop monitoring the tire pressure completely or it will continue to sample the pressure and to make the RF transmission but at considerably lower frequency. The other sampling and transmission frequency in the system is higher and used when the vehicle is driven as is explained on pages 6 and 7 of the published original description.

Nowhere in the original description is it mentioned that the sampling or the transmissions could occur at a third frequency. In other words, when the vehicle is stationary and sampling and transmissions occur, this has originally only been disclosed as occurring at the lower of two periodicities used.

The present wording of the characterising portion however allows for any periodicity to be used when the vehicle is stationary.

Claim 4 according to the main request thus does not fulfil the requirements of Article 123(2) EPC.

4.2 The comment of the appellant 1 considering that since a sampling operation is inherently periodic it is implicit in the claim that a periodicity is present does not address the question of whether there is any original disclosure of what is now claimed.

5. *Claim 4 (9th auxiliary request)*

5.1 In this request it is clear that the pressure sampling and the RF transmissions occur at the first periodicity so that according to the board this request is allowable under Article 123(2) EPC.

The appellant 2 considered that this still was an undue generalisation compared to the only described embodiment, and that it was not clear which one of the two frequencies used according to the description when the vehicle was stationary, is now being claimed.

In the board's view it is now clear in the claim that the first periodicity meant is the one used when the vehicle is stationary as explained on page 10 of the description and there is no need to take over all the details of the particular embodiment since the skilled man would consider them as being specific to a particular embodiment but not essential for the functioning of the system. The important teaching here is that when the vehicle is stationary a pressure monitoring still occurs but at a lower periodicity.

Claim 4 (9th auxiliary request) thus fulfils the requirements of Article 123(2) EPC.

5.2 Concerning the fact mentioned by the appellant 2 that each time one periodicity is mentioned in the claim two are used in the particular embodiment described in the description, this is not a new problem introduced with the amendment made to claim 4. It was already present in the granted claims, so that it is not open for discussion, since it had not been raised before and the proprietor did not give any agreement to that matter being raised in the appeal procedure.

5.3 Novelty

5.3.1 The appellant 2 alleged that the subject-matter of claim 4 according to the ninth auxiliary request was not novel over D2.

Claim 3 of D2 requires that at least when used in a motor vehicle, in particular when the ignition was on, the receiver was constantly ("pausenlos") ready to receive signals. Claim 5 which was not dependent on

claim 3 requires that when the machine was stationary no transmission and no measuring took place. From the fact that claim 5 specifically does not mention motor vehicles when it required that no transmission occurred but that on the contrary claim 3 required the receiver to be constantly "on" the skilled man would understand that necessarily transmissions and measurements must occur when the motor vehicle was stationary.

The board cannot agree with this finding. Claim 5 is quite logically not dependent on claim 3 because claim 5 concerns the situation in which the machine is stationary ("im Stillstand") whereas claim 3 concerns the situation when the machine is running ("während des Betriebes"). Additionally what is said in the description confirms the statement of claim 5 since in column 4, lines 14 to 16 it is mentioned that when the machine is stationary the sensor and the transmitter do not consume any energy.

The subject-matter of claim 4 is thus novel over D2.

5.3.2 The appellant 1 further alleged that the subject-matter of the claim was not novel over D8 in particular since the term "measurements" used in the claim was not clear enough and not further defined and would also cover a difference of pressures. The feature that the system comprises a radio transmitter for transmitting the tire pressure measurements would thus be anticipated by the radio transmitter transmitting an alarm when a difference in pressures exceeds a predetermined value as in D8.

The board cannot share this view, since the wording used in the claim and in the description of the patent is coherent.

Nowhere in the patent description it is suggested that the term "measurements" used throughout the patent to effectively designate the result of the measuring of the pressure could also mean "alarm".

The subject-matter of the revision of claim 4 presently under consideration is thus novel over D8.

5.4 Inventive step

5.4.1 The board considers that the system according to D8 is the closest prior art since when the vehicle is stationary it already transmits signals at a different and lower periodicity to the one used when the vehicle is driven, see in particular column 8, lines 11 and 12 where it is stated that the periodical measurements are performed at substantially greater intervals when the vehicle is stationary.

5.4.2 D8 discloses a remote tire pressure monitoring system for a vehicle (see column 1, lines 1 to 8). The system includes for each of the tires a pressure sensor (23) for sensing a pressure of the tire, and providing tire pressure measurements accordingly, a radio transmitter (30) for transmitting the tire pressure data via radio transmissions, and a power supply (29).

The system further includes a control circuit (26), connected to the pressure sensor (23) and the radio transmitter (30) for controlling their operation,

including control of the periodicity of their operation see column 7, lines 34 to 65.

The remote tire pressure monitoring system further comprising for each of the tires a roll switch (24) in the form of an acceleration sensor, connected to the control circuit (26) and having at least first and second states, for monitoring a state of motion of the vehicle, see column 6, line 52 to column 7, line 9.

In response to the first state of the roll switch (24), when the vehicle is stationary, the control circuit (26) causes the pressure sensor (23) and the radio transmitter (30) to operate at a first periodicity (see column 8, lines 11 and 12) and in response to the second state of the roll switch, the control circuit causes the pressure sensor and the radio transmitter to operate at a second periodicity that is more frequent than said first periodicity (see column 7, lines 44 to 65).

5.4.3 The only difference between the state of the art system according to D8 and the system claimed in claim 4 is that in the system according to D8 an alarm signal is transmitted to the receiver when a predetermined fall in pressure is established by the control system whereas in the claimed system actual pressure measurements are transmitted to the receiver.

5.4.4 The board can however not accept that it involves an inventive step to transmit the sensed pressure value directly rather than an alarm signal when a predetermined pressure drop has occurred. It is common in the state of the art of tire pressure monitoring to

use the one or the other of these options as can for instance be seen from D7, in which in the embodiment according to figure 4 an abnormal tire indication is made whereas in the embodiment according to figure 5 a direct pressure measurement is read out to the vehicle operator (see column 5, lines 60 to 64). The same is true in D2, in which the system disclosed normally transmits pressure values (see column 2, lines 30 to 36) but transmits an alarm when the pressure falls under 75% of normal pressure (see column 3, lines 63 to 64).

The man skilled in the art would thus choose the one or the other of these freely available possibilities according to the particular requirements of the application as for instance the type of vehicle, the needs of the driver, etc..

Thus the subject-matter of claim 4 according to the ninth auxiliary request lacks inventive step.

6. *Claim 4 (10th auxiliary request)*

6.1 In this request the word "significantly" has been introduced to specify that the second periodicity is "significantly" more frequent than the first periodicity.

In the opinion of the board the introduction of this word introduces an unnecessary unclarity since it would not be clear what kind of difference of periodicities is meant by the term "significantly more frequent". It is also not clear what should be the difference of meaning between the term "more frequent" and "significantly more frequent".

The board thus judges that this request infringes Article 84 EPC.

6.2 In any case it would not change the above reasoning since also in the system according to D8 the normal frequency is every 4 seconds (see column 7, lines 44 to 48) and the frequency used when the vehicle is stationary is said to be "substantially" lower (see column 8, lines 11 and 12 - "in wesentlich grösseren Abständen").

7. *Claim 4 (11th auxiliary request)*

7.1 In this request the characterising portion requires that the first state of the roll switch is assumed when the vehicle is stationary, whereby when the vehicle is stationary, pressure sampling and RF transmissions occur at the first periodicity.

This wording offends Article 123(2) EPC, since from page 10, line 5 onwards it is clear that the vehicle is considered to be stationary only once both conditions that the roll switch is open and a predetermined period has lapsed are satisfied. This means that the first state of the roll switch is assumed before the vehicle is stationary and not when the vehicle is stationary as required by the present claim.

8. *Claim 2 (main request)*

8.1 The first part of claim 2 corresponds to granted claim 1.

The characterising portion of this claim requires the system to be adapted to monitor the sensed pressure and, upon detecting a pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, to transmit immediately the tire pressure measurement.

The appellant 1 considers this feature to be disclosed on page 3, lines 1 to 4 of the original description.

This passage reads: "Rapid tire pressure changes (e.g. greater than 1 psi in 10 seconds) are detected in the course of the pressure measurements, and are reported immediately to the dashboard receiver via an RF transmission."

Hence this paragraph of the description requires that when rapid pressure changes are detected, they are reported immediately. In other words, this paragraph is about transmitting pressure changes and not pressure measurements as required by the wording of present claim 2.

8.2 Hence claim 2 according to the main request does not fulfil the requirements of Article 123(2) EPC.

9. This applies as well to claim 2 according to the first, second, third, fourth and fifth auxiliary requests, since in all of them it is mentioned that the pressure measurement is transmitted.

The appellant 1 considered that these requests were also supported by page 9, line 21 to page 10, line 4.

The board can however not share this opinion, since in this paragraph a specific embodiment is described comprising in particular a pressure re-sampling step when a pressure change of more than 1 psi in 10 seconds is detected. Already the absence of this re-sampling step in claim 2 according to the requests mentioned above is detrimental to the fulfilment of the requirements of Article 123(2) EPC since the claims according to these requests constitute an undue generalisation of the specific embodiment.

10. *Claim 3 (main request)*

10.1 In this claim the first part corresponds to claim 1 as granted and the characterising portion requires that the system is adapted to monitor the sensed pressure and, upon detecting a tire pressure change greater than 1 psi in 10 seconds in the course of the pressure measurements, the pressure sensor is adapted to re-sample the pressure to verify the pressure change and then immediately to transmit the new information.

This characterising part is said to be based on the specific embodiment described on page 9, line 21 to page 10, line 4 of the original description.

However in this specific embodiment it is mentioned in relation with the re-sampling step that it occurs one second after the pressure change of 1 psi in 10 seconds has been detected (see page 9, lines 30 to 32).

10.2 The appellant 1 submitted that the feature "of the re-sampling occurring one second after the detecting of the pressure change" is not essential for the invention and that it is therefore not necessary to take it into the claim.

The board cannot agree with the appellant 1 since this feature gives the skilled man an indication about the relationship between the frequency of the normal checking (10 seconds) and the frequency of the re-sampling (1 second).

In addition the specific embodiment only discloses this combination of frequencies, so that it is an undue generalisation to give in the claim the indication that the pressure change of 1 psi has to occur within 10 seconds and to leave it open when the re-sampling has to occur.

Thus claim 3 according to the main request does not fulfil the requirements of Article 123(2) EPC.

11. Since the respective claim 3 according to the first, second, third, fourth, and fifth auxiliary requests also does not comprise this feature, these requests are similarly unallowable.

12. *Claim 3 (sixth auxiliary request)*

12.1 In this auxiliary request the characterising portion includes the feature that the re-sampling of the pressure occurs one second after the detection of a pressure fall of 1 psi in 10 seconds.

This request is thus allowable under Article 123(2) EPC.

The first part of claim 3 corresponds to granted claim 1. The characterising feature thus limiting the scope of granted claim 1, claim 3 also fulfils the requirements of Article 123(3) EPC.

12.2 The novelty of the subject-matter of claim 3 has not been disputed.

12.3 Inventive step

12.3.1 As already explained above under points 5.4.2 and 5.4.3 the only difference between the first part of claim 3 (which corresponds to the first part of claim 4) and the disclosure of D8 is that in the pressure monitoring system according D8 alarms are transmitted to the receiver whereas in the system according to claim 3 the actual pressure measurement is transmitted to the receiver.

In addition it is mentioned in D8, see column 7, lines 54 to 57, that in case of a predetermined leakage rate an immediate alarm is transmitted to the receiver.

12.3.2 The subject-matter of claim 3 thus differs from the prior art according to D8 in that:

(i) not an alarm signal but the actual pressure measurement is transmitted to the receiver,

(ii) the predetermined leakage rate for transmitting the information to the receiver is 1 psi in 10 seconds,

(iii) the transmission of the information is made only if this pressure change has been confirmed by a re-sampling 1 second after the measurement showing the change.

12.3.3 Feature (iii) has the effect that the driver is not confronted with false alarms in cases of a momentaneous pressure fall not due to a leakage.

Feature (ii) is a practical value of the leakage rate.

Feature (i) has to be considered as a simple alternative to transmitting an alarm.

In the board's opinion there is no synergetic or combinatory effect of the three features together. Quite obviously the transmission of a pressure value instead of an alarm signal has no influence whatsoever on the fact that the pressure is re-sampled before any transmission is carried out. The same is true for the practical value of the leakage rate.

12.3.4 The objective problem is thus essentially based on feature (iii) and can be considered to give a more reliable information to the driver of the car in cases of sudden pressure changes, i.e. pressure falls, the other two features being ways putting into practice the teaching of D8.

As already mentioned under paragraph 5.4.4 the choice of transmitting an actual pressure value or an alarm signal to the receiver cannot involve any inventive step.

The board does not see any inventive step either in the choice of the arithmetical values for the difference of pressure or the time interval used for launching an alarm, these parameters being determined by the skilled man on the basis of tests or on the basis of the desired accuracy, the type of vehicle, its potential maximal speed when putting into practice the teaching of D8, and no surprising effect being linked to the claimed values.

The board considers that feature (iii) is not inventive either. In the context of informing a driver of possible difficulties with the vehicle which may oblige him to stop his journey, as is the case when a high leakage rate is detected, it is evidently unacceptable that the driver may have to stop the vehicle without a true reason. On top of that such so-called false alarms may also have the consequence that the driver loses his confidence in the pressure monitoring system which possibly would lead him not to stop later on when a real pressure fall would justify it. Such a situation is not only dangerous but unacceptable for a system which is meant to increase safety.

At the very latest when such false alarms happen during use of the vehicle the man skilled in the art would recognise the problem and include a checking step by way of re-sampling to make sure that the driver of the vehicle cannot begin to panic for a reason which is not real and thereby possibly be a danger on the road.

12.3.5 The appellant 1 considered the numerical values claimed would guarantee a much quicker reaction time than with the prior art systems.

The man skilled in the art developing such tire pressure monitoring systems will of course have to make choices in accordance with the exact envisaged use of the system, the available components of the system as for instance battery lifetime, the expectations of the customers, etc... And as mentioned above the board considers that the choice of the numerical values belongs to such straight forward adaptation of the system to its specific use which does not involve any inventive step.

12.3.6 The subject-matter of claim 3 (sixth auxiliary request) thus does not fulfil the requirements of Article 56 EPC.

13. In the statement setting out the grounds of appeal the seventh and the eighth auxiliary requests were presented as additional fallback positions for correcting the formal deficiencies under Article 123(2) EPC or Article 84 EPC raised by the appellant 2 or the opposition division in case the board could not allow the sixth auxiliary request for these reasons (see pages 5 and 6).

They were thus not presented as subsequent requests for solving possible problems with inventive step, an argumentation on inventive step never having been presented. It is in any case evident that the differences in wording between these claims and that of the sixth auxiliary request are not such as could lead to a different conclusion on inventive step.

14. None of the requests of the appellant 1 being allowable, there is no need to consider the procedural issue addressed in points 2 and 3 above.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

A. Vottner S. Crane