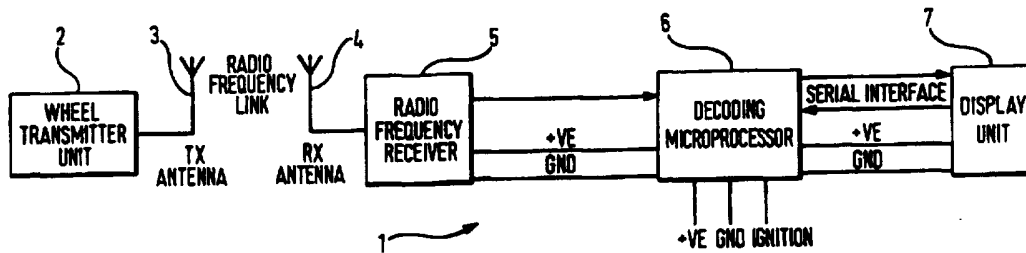




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : B60C 23/04</p>	<p>A3</p>	<p>(11) International Publication Number: WO 96/06747 (43) International Publication Date: 7 March 1996 (07.03.96)</p>
<p>(21) International Application Number: PCT/GB95/02060 (22) International Filing Date: 31 August 1995 (31.08.95) (30) Priority Data: 9417519.7 31 August 1994 (31.08.94) GB 9505016.7 13 March 1995 (13.03.95) GB 9511182.9 2 June 1995 (02.06.95) GB (71) Applicant (for all designated States except US): OTTER CONTROLS LIMITED [GB/GB]; Hardwick Square South, Buxton, Derbyshire SK17 6LA (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): DERBYSHIRE, Andrew, John [GB/GB]; 12 Poplar Avenue, New Mills, Stockport, Cheshire SK12 4HR (GB). SIDDON, Jeremy, Francis [GB/GB]; 70 Nunsfield Road, Buxton, Derbyshire SK17 7BN (GB). RICHARDS, John, Kitto [GB/GB]; 3 Brierley Park, Buxworth, Whaley Bridge, Derbyshire SK12 7NW (GB). GIBSON, Edward, Charles [GB/GB]; 40 Almond Place, Brimington, Chesterfield S43 1AG (GB). DAVIES, Sean, Patrick [GB/GB]; Palace Court, Flat 3, 9 Scarsdale Place, Buxton, Derbyshire SK17 6EF (GB).</p>		<p>(74) Agent: WHITTEN, George, Alan; R.G.C. Jenkins & Co., 26 Caxton Street, London SW1H 0RJ (GB). (81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published <i>With international search report.</i> (88) Date of publication of the international search report: 20 June 1996 (20.06.96)</p>

(54) Title: A TYRE CONDITION MONITORING SYSTEM



(57) Abstract

A tyre condition monitoring system (1) comprises a wheel transmitter unit (2) for each wheel of a vehicle. The transmitter unit is mountable in the wheel and has sensors (9, 10) for sensing pressure and temperature in and rotation of the wheel. Signals from the sensors are processed by a processor (9) to produce data which is transmitted via a radio frequency transmitter (23). The data is transmitted with data representing a unit identity code. Transmitted data is received by a receiver unit (5, 6, 7) where it is analysed to determine the condition of the tyre. The receiver unit includes a user operable input for setting threshold limits for the temperature and/or pressure such that if a threshold is passed an alarm is sounded. Each wheel transmitter unit includes a power supply and is arranged so that power is only applied during the sensing and transmission of data. Intervals between transmissions of data can be varied depending on whether rotation of the wheel has been sensed.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 95/02060

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B60C23/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B60C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,34 13 209 (BOSCH GMBH ROBERT) 17 October 1985 see claim 1; figures ---	1,2,4-6, 10
X	EP,A,0 610 737 (GENERALE DES ETABLISSEMENTS M) 17 August 1994 see column 5, line 27 - line 33; figure ---	1
X	DE,A,43 03 583 (ACHTERHOLT RAINER) 11 August 1994 see column 5, line 32 - line 65; figure ---	1
X	GB,A,2 251 947 (WESTLAND AEROSTRUCTURES LTD) 22 July 1992 see page 4, paragraph 2; figures ---	1-7,10, 26-29
	-/--	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

2

Date of the actual completion of the international search

3 January 1996

Date of mailing of the international search report

0 2. 04. 96

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INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/GB 95/02060

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	EP,A,0 656 268 (SUMITOMO ELECTRIC INDUSTRIES) 7 June 1995 see page 14, line 26 - page 15, line 4; figures	1
X	& WO,A,94 06641 (SUMITOMO ELECTRIC INDUSTRIES) 31 March 1994 ---	1
A	WO,A,94 06640 (OTTER CONTROL LIMITED ;BANN JOHN RICHARD (GB); RANK NICHOLAS RAMON) 31 March 1994 cited in the application see page 15, line 13 - page 20, line 19 see page 21, line 11 - page 23, line 4; figures -----	1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB95/02060

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

SEE SHEET B

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

CLAIMS 1-10, 26-29

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

THERE ARE FIVE INVENTIONS MENTIONED IN THE CLAIMS, NAMELY:

CLAIMS 1-10, 26-29	PROBLEM: PIEZORESISTIVE SENSORS ARE TEMPERATURE DEPENDANT SOLUTION: CALIBRATION MODE IN THE SENSOR
CLAIMS 11-25	PROBLEM: HIGH POWER CONSUMPTION SOLUTION: BATTERY POWER CONSERVATION MODE
CLAIMS 30-35	PROBLEM: HANDLING DATA SOLUTION: RECEIVING UNIT
CLAIMS 36-45	PROBLEM: CALIBRATING A TRANSDUCER SOLUTION: USING A CALIBRATION CHAMBER
CLAIMS 46-70	PROBLEM: HIGH RELIABILITY OF THE TYRE CONDITIONING SYSTEM IS EXPENSIVE SOLUTION: USING A TRANSCEIVER-RECEIVER SYSTEM (TWO-WAY COMMUNICATION

THE FIVE ABOVE MENTIONED INVENTIONS PROPOSE DIFFERENT SOLUTIONS TO DIFFERENT PROBLEMS. THE FIVE GROUPS OF CLAIMS ARE THUS NOT LINKED SO AS TO FORM A SINGLE GENERAL INVENTIVE CONCEPT, AND NON-UNITY OF INVENTION A PRIORI THEREFORE EXISTS.

THE APPLICATION DOES NOT FULFIL THE REQUIREMENTS OF PCT RULE 13.1, AND A PARTIAL SEARCH REPORT FOR CLAIMS 1-10, 26-29 WAS PRODUCED ACCORDINGLY.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 95/02060

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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