

1) Family number: 33893161 (US2006267750A)

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Title: TIRE ABNORMAL STATE MONITORING SYSTEM FOR AN AUTOMOTIVE VEHICLE
Priority: US20050138000 20050526
Family:

Publication number	Publication date	Application number	Application date
US2006267750 AA	20061130	US20050138000	20050526

Probable Assignee: FORD GLOBAL TECHNOLOGIES LLC
Assignee(s):(std): FORD GLOBAL TECH LLC
Assignee(s): FORD GLOBAL TECHNOLOGIES LLC ; FORD MOTOR CO
Inventor(s):(std): MEYERS JOSEPH ; LU JIANBO
Agent(s): ARTZ AND ARTZ PC
International class (IPC 8-9): B60Q1/00 (Advanced/Invention); B60Q1/00 (Core/Invention)
CPC: B60C23/061 B60C23/062 B60G2800/984 B60T2240/06 B60T2240/07 B60T2240/08
European class: B60C23/06A B60C23/06A1 L60G800/984 L60T240/06 L60T240/07 L60T240/08
US class: 280/5.502 280/5.502S 340/440 340/440P

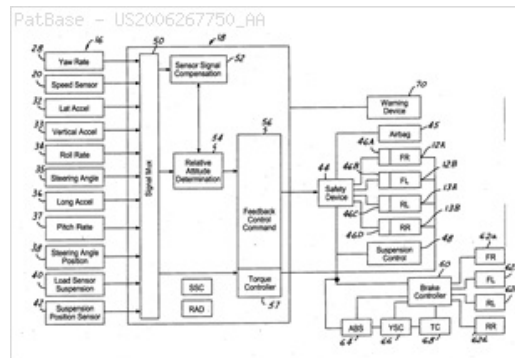
[Classification Explorer](#)

Cited documents: US7069134 BB, US7031816 BB, US7020552 BB, US6834543 BB, US6759952 BB, US6733036 BB, US6725136 BB, US6714848 BB, US6702717 BB, US6604025 BB, US6556908 BA, US6330496 BA, US6292759 BA, US6290019 BA, US6081761 A, US5995897 A, US5852788 A, US5826207 A, US5753809 A, US5721528 A, US5604307 A, US5218862 A, US4224597 A, US2005080543 AA, US2005033549 AA, US2005029754 AA, US2004254707 AA, US2004162654 AA,

Forward Citations: WO10076594, WO08113377, US9983097, US9921134, US9889844, US9694631, US9650053, US9552679, US9550486, US9079487, US8825267, US8583327, US8457832, US8311707, US8170755, US8160766, US8111147, US8103409, US7925395, US7778741, US7469975, US7422087, US2019066405, US2016297262, US2016033367, US2015112540, US2013035838, US2012316731, US2012053792, US2011231051, US2010198448, US2010131147, US2010070142, US2009284360, US2009254250, US2009118892, US2008243335, US2008001478, US2006027412, US10583844, US10417837, US10266181, GB2441423, EP3109107, EP3109107, DE112009003587, DE102010006178, DE102010006178, CN107539310, CN107433947, CN107433947,

Abstract:

A control system for controlling an automotive vehicle (10) is set forth. Various tire parameters such as a rolling radius, a vertical spring rate, and a tire rotational spring rate may be used to determine a tire abnormal state. The vehicle (10) is controlled in response to the tire abnormal state. To control the vehicle various dynamic control systems such as anti-lock brakes, traction control, various sensors existing in the vehicle such as a yaw signal, roll signal and pitch signal may be used to determine a tire parameter.



2) Family number: 50738524 (US2012048014A)

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Title: SMART-PHONE BRACKET FOR CAR AND TRUCK NAVIGATION
Priority: US20100868604 20100825 US20110118801 20110531 US20130850185 20130325
Family:

Publication number	Publication date	Application number	Application date
US2012048014 AA	20120301	US20110118801	20110531
US2012053834 AA	20120301	US20100868604	20100825
US2013220010 AA	20130829	US20130850185	20130325
US8406996 BB	20130326	US20100868604	20100825
US8467967 BB	20130618	US20110118801	20110531
US8893548 BB	20141125	US20130850185	20130325

Probable Assignee: TRIMBLE NAVIGATION LTD
Assignee(s):(std): LOOMIS PETER VAN WYCK ; TRIMBLE NAVIGATION LTD ; ULMAN MORRISON
Assignee(s): TRIMBLE NAVIGATION LIMITED
Inventor(s):(std): LOOMIS PETER VAN WYCK ; ULMAN MORRISON

Agent(s): NUPAT LLC ; MORRISON

International class (IPC 8-9): B60R11/00 B60R11/02 G01C21/00 G01C21/12 G01C21/16 G01C21/26 G01L7/20 G01L9/00 G01P15/00 G01S19/47 G06F19/00 (Advanced/Invention)

CPC: G01S19/47 B60R11/0258 G01C21/26 G01C21/165 B60R11/0241 G01C21/265

European class: B60R11/02G G01C21/16A G01S19/47

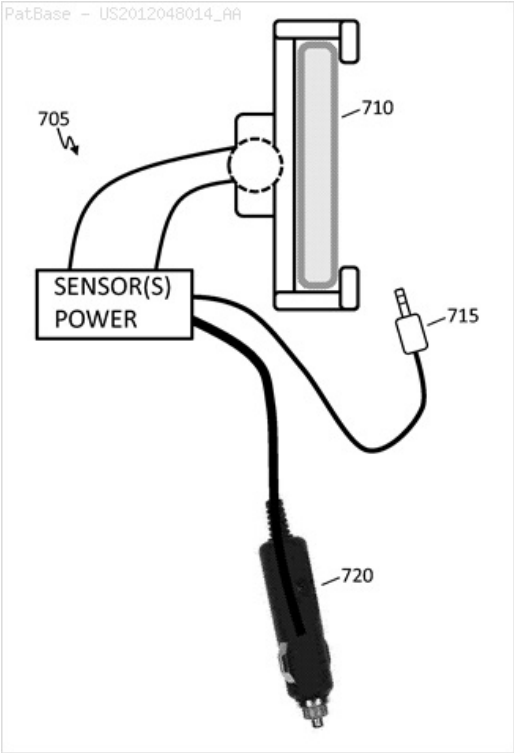
US class: 224/545 224/545S 342/357.2 342/357.21 342/357.3 342/357.300S 342/357.32 701/4 701/408 701/494 701/500 701/501 701/503 701/504 701/505 701/510 701/510P 701/532 701/536 701/8 702/138 702/138S 702/141 702/141S 702/150 702/150S 73/178R 73/384 73/384P

[Classification Explorer](#)

Cited documents: US8150651 BB, US8088042 BB, US7982767 BB, US7856336 BB, US7711483 BB, US7650252 BB, US7603255 BB, US7583184 BB, US7579939 BB, US7010409 BB, US6690268 BB, US6154692 A, US5777580 A, US5629810 A, US5504482 A, US3362229 A, US2012048014 AA, US2011169689 AA, US2010109944 AA, US2009312975 AA, US2009309793 AA, US2009295633 AA, US2009121932 AA, US2009030605 AA, US2008119970 AA, US2007282565 AA, US2007067137 AA, US2006212182 AA, US2006155440 AA, US2005197769 AA, US2003187555 AA,

Forward Citations: USD731973, US9683849, US9638529, US9134339, US8978948, US8965687, US8893548, US2015369614, US2014054918, US2013220010, US2013018578, US10564297, US10290225, US10077982, US10067237, TWI564546, JP2016218015, EP3264036, CN107560612, CN106197471, CN106197471, CN104181573, CN102903162, CN102903162, CN102621570,

Abstract:
Inertial navigation systems for wheeled vehicles with constrained motion degrees of freedom are described. Various parts of the navigation systems may be implemented in a smart-phone.



3) Family number: 28181751 (US2002036567A) © PatBase

Title: METHOD AND APPARATUS FOR WHEEL CONDITION AND LOAD POSITION SENSING

Priority: US20000634166 20000809 WO2001US24160 20010801 US20010948085 20010906

Family:

Publication number	Publication date	Application number	Application date
AU2001292550 AA	20020218	AU20010292550	20010801
CA2419004 AA	20030207	CA20012419004	20010801
EP1318924 A2	20030618	EP20010972919	20010801
EP1318924 A4	20040804	EP20010972919	20010801
MXPA03001217 A1	20030819	MX2003PA01217	20010801
US2002036567 AA	20020328	US20010948085	20010906
US6313742 BA	20011106	US20000634166	20000809
US6426694 BA	20020730	US20010948085	20010906
WO0212003 A2	20020214	WO2001US24160	20010801
WO0212003 A3	20020613	WO2001US24160	20010801

Probable Assignee: INT TRUCK INTELLECTUAL PROPERTY CO LLC

Assignee(s):(std): INT TRUCK INTELLECTUAL PR ; INT TRUCK INTELLECTUAL PROP CO ; INTERNATIONAL TRUCK INTELLECTUAL PROPERTY COMPANY ; INTERNAT TRUCK AND ENGINE CORP ; INTERNAT TRUCK INTELLECTUAL PR

Assignee(s): INTERNATIONAL TRUCK AND ENGINE CORP ; INTIONAL TRUCK INTELLECTUAL PROPERTY CO ; JPMORGAN CHASE BANK NA COLLATERAL AGENT AS ; LARSON GERALD L ; INTERNATIONAL TRUCK INTELLECTUAL PROPERTY COMPANY LLC ; INTERNATIONAL TRUCK INTELLECTUAL PROPERTY COMPANY L L C ; OCC TECHNOLOGIES LLC ; NAVISTAR INC ; NAVISTAR INT CORP ; INT TRUCK INTELLECTUAL PROPERTY CO ; INT TRUCK INTELLECTUAL PROPERTY CO LLC ; INT ENGINE INTELLECTUAL PROPERTY CO LLC ; INT TRUCK AND ENGINE (FKA NAVISTAR INT TRANSPORTATION CORP) CORP ; INT TRUCK AND ENGINE CORP ; INT TRUCK AND ENGINE FKA NAVISTAR INT TRANSPORTAT ; INT TRUCK AND ENGINE FKA NAVISTAR INT TRANSPORTATI ; INT TRUCK AND ENGINE FKA NAVISTAR INT

TRANSPORTATION CORP CORP

Inventor(s):(std): LARSON GERALD L

Inventor(s): GERALD L LARSON

Agent(s): FINLAYSON AND SINGLEHURST; DENNIS KELLY SULLIVAN; JEFFREY CALFA; NEIL POWELL GILBERTO HERNANDEZ

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NL NO NZ PL PT RO RU SD SE SG SI SK SL SN SZ TD TG TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

International class (IPC 8-9): B60C23/06 (Advanced/Invention); B60C23/06 (Core/Invention)

International class (IPC 1-7): B60C2/302 B60C23/00 B60C23/02 B60C23/06 B60Q1/00 B60T8/32

CPC: B60C23/061

European class: B60C23/06A

US class: 340/438 340/441 340/442 340/442P 340/444 340/444S 701/29 701/29.4 701/30 701/32.4 701/34.4

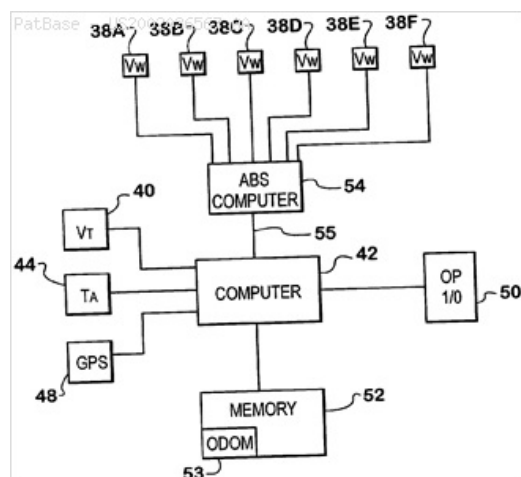
[Classification Explorer](#)

Cited documents: US6232767 BA, US6222444 BA, US6064936 A, US6002327 A, US5968105 A, US5964511 A, US5922949 A, US5847645 A, US5828975 A, US5783991 A, US5771480 A, US5760682 A, US5631836 A, US5587698 A, US5583797 A, US5569848 A, US5557552 A, US5498072 A, US4773011 A, DE4405093 A1, DE3236520 A1,

Forward Citations: WO19199739, WO14053322, WO07027988, WO04049123, WO04049123, US9847021, US9719886, US9669664, US9604606, US9597950, US9387734, US9189454, US9172477, US9129460, US9117246, US9067565, US9045142, US9008903, US8963702, US8892341, US8890717, US8890673, US8874345, US8825277, US8825267, US8818618, US8768617, US8688180, US8666590, US8645016, US8630768, US8612066, US8589025, US8577703, US8493200, US8424371, US8350688, US8346502, US8340881, US8319621, US8306710, US8290662, US8275509, US8239083, US8201666, US8188887, US8150613, US8150576, US8041490, US8024118, US8010276, US7999670, US7996127, US7953526, US7946394, US7899610, US7876205, US7859392, US7843320, US7831346, US7782183, US7699408, US7589471, US7574292, US7567171, US7551992, US7522032, US7512467, US7484599, US7464796, US7416059, US7408455, US7395177, US7338201, US7306020, US7302979, US7191042, US7187273, US7174241, US7173524, US7127369, US6934659, US6929333, US6876300, US6865456, US6834222, US6807466, US6725136, US6671609, US6526336, US2018208004, US2017369083, US2017023441, US2015186690, US2013268172, US2011276242, US2011231051, US2011210841, US2011023589, US2010250028, US2010238007, US2010191413, US2010170752, US2010114428, US2010070153, US2010070127, US2010060443, US2010030512, US2009271061, US2009248221, US2009228166, US2009224899, US2009207012, US2009150118, US2009150031, US2009138191, US2009120735, US2008309154, US2008275599, US2008255719, US2008185966, US2008001728, US2007200427, US2007200426, US2007198159, US2007100529, US2007034000, US2006265112, US2006231184, US2006207705, US2006193368, US2006178853, US2006058977, US2005269873, US2005248449, US2005228570, US2005134503, US2005113992, US2005065681, US2005065664, US2005030170, US2004225423, US2004172181, US2004133400, US2004111198, US2004100373, US2004084252, US2003074966, US10522033, US10464419, US10384537, RU2679271, EP2867036, EP2755876, EP2641819, EP2641819, EP2065688, EP1777083, EP1777083, EP1584928, EP1547828, EP1547828, EP1323605, EP1323605, DE112004000648, DE10205815, DE102012217901, DE102006028584, DE102004020927, CN108674101, CN107539215, CN104417565, CN104417565, CN101973192,

Abstract:

A system and a method for detecting compromised vehicle wheel and tire operating characteristics includes detection for out of round new tires, under pressure tires, poor front wheel alignment and off center line loads. The instantaneous rotational velocity signal generated for each wheel by an existing antilock braking system (ABS) provides data for the basic comparison of wheel speed is against an instantaneous indication of vehicle speed. Once calibrated, the system provides operational monitoring of the wheels includes initializing the trip odometer, collecting wheel speeds, and sampling vehicle speed. Tire radius and tolerance data as a function of estimated wear and tire temperature. Tire temperature is in turn a function of ambient temperature and trip distance. The rotational velocities for the wheels are estimated as functions of vehicle speed and the updated tire radius data. Wheels rotational velocity is compared to estimated velocity and the difference is compared to the allowed, updated tolerances. A possible pressurization error is indicated if one wheel departs outside of the updated tolerances from estimated rotational velocity.



4) Family number: 28332838 (US2003039173A)

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Title:	METHODS FOR REDUCING RINGING OF ULTRASONIC TRANSDUCERS					
Priority:	US19820389947	19820618	US19920878571	19920505	US19920878517	19920505
	US19930040978	19930331	US19930239978	19930331	DE19944448039	19940330
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Family:

Publication number	Publication date	Application number	Application date
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Probable Assignee: AMERICAN VEHICULAR SCIENCES LLC

Assignee(s):(std): AUTOMOTIVE TECH INT ; BREED DAVID S ; DUVALL WILBUR E ; JOHNSON WENDELL C ; INTELLIGENT TECH INT INC

Assignee(s): YURCHENKO OLEKSANDR V ; AMERICAN VEHICULAR SCIENCES LLC ; INTELLIGENT TECHNOLOGIES INT INC ; INTELLIGENT TECHNOLOGIES INTERNATIONAL INC ; INTELLIGENT TECHNOLOGIES INT ; AUTOMOTIVE TECHNOLOGIES INT ; AUTOMOTIVE TECHNOLOGIES INT INC ; AUTOMOTIVE TECHNOLOGIES INTERNATIONAL INC ; AUTOMOTIVE TECHNOLOGIES INTIONAL

Inventor(s):(std): YURCHENKO OLEKSANDR V ; DUVALL WILBUR E ; JOHNSON WENDELL C ; PATEL RASHIK ; DU VALL WILBUR E ; CASTELLI VITTORIO ; PIIRAINEN RAY ; MORIN JEFFREY L ; BREED RYAN H ; DAVIS STUART D ; BREED DAVID S

Inventor(s): OLEKSANDR V YURCHENKO ; WILBUR E DUVALL ; WENDELL C JOHNSON ; DAVIS STUART ; BREED RYAN ; DUVALL WILBUR ; JOHNSON WENDELL ; BREED DAVID

Agent(s): BRIAN ROFFE ESQ; BRIAN; ROFFE BRIAN; BRIAN ROFFE

International class (IPC 8-9): B06B1/02 B60C23/00 B60C23/04 B60H1/00 B60H1/32 B60J10/00 B60K28/00 B60K28/02 B60N2/00 B60N2/015 B60N2/02 B60N2/06 B60N2/28 B60N2/427 B60N2/48 B60N2/66 B60Q1/00 B60Q1/14 B60R1/00 B60R16/02 B60R16/037 B60R21/00 B60R21/01 B60R21/013 B60R21/015 B60R21/02 B60R21/04 B60R21/16 B60R21/18 B60R21/32 B60R22/00 B60R22/20 E05F15/00 F24F11/00 F24F7/00 G01C3/08 G01F23/00 G01F23/20 G01F23/296 G01G19/10 G01G19/414 G01J1/34 G01M17/00 G01S15/04 G01S15/42 G01S15/87 G01S15/88 G01S17/88 G01S7/41 G01S7/48 G01S7/539 G06F15/00 G06F17/00 G06F19/00 G06F7/00 G06F7/70 G06G7/00 G06G7/76 G06K7/00 G06K9/00 G06K9/62 G08B1/08 G08B13/14 G08B29/00 G08B29/18 G08C19/00 G09G5/00 H01J40/14 H04B1/00 H04B1/02 H04B3/00 H04N7/18 H04Q5/22 H04R3/00 H04R5/02 (Advanced/Invention); B60R1/12 B60R21/00 B60R21/013 B60R21/0132 B60R21/0134 B60R21/015 B60R21/20 B60R21/203 B60R21/215 B60R21/231 B60R21/26 B60R21/276 B60R22/28 B60R22/46 B60R22/48 G01S13/04 G01S15/04 G01S15/06 G01S17/89 G06E1/00 G06F15/18 G06K9/36 (Advanced/Non-invention); B06B1/02 B60C23/00 B60C23/02 B60H1/00 B60J10/00 B60K28/00 B60N2/00 B60N2/005 B60N2/02 B60N2/06 B60N2/26 B60N2/42 B60N2/48 B60N2/64 B60Q1/00 B60Q1/14 B60R16/02 B60R16/037 B60R21/00 B60R21/01 B60R21/013 B60R21/015 B60R21/02 B60R21/04 B60R21/16 B60R22/00 B60R22/18 E05F15/00 F24F7/00 G01F23/00 G01F23/296 G01G19/08 G01G19/40 G01J1/10 G01M17/00 G01S15/00 G01S17/00 G01S7/02 G01S7/48 G01S7/539 G06F15/00 G06F17/00 G06F19/00 G06F7/00 G06F7/60 G06G7/00 G06K7/00 G06K9/00 G06K9/62 G08B1/00 G08B13/14 G08B29/00 G08C19/00 G09G5/00 H01J40/00 H04B1/00 H04N7/18 (Core/Invention); B60R1/12 B60R21/013 B60R21/0132 B60R21/0134 B60R21/015 B60R21/20 B60R21/23 B60R21/26 B60R22/00 B60R22/28 B60R22/46 G01S13/00 G06E1/00 G06F15/18 G06K9/36 (Core/Non-invention)

International class (IPC 1-7): G01S15/00 H04B1/02

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G06F3/0233 G06F3/0237 G06F3/0238 G06K9/00362 G06K9/00624 G06K9/00832 G06K9/00838
G07C5/008 G07C5/0808 G08B13/1427 G08B21/0286 G08B29/181 H01Q1/3291

European class:

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G01S17/88 G01S7/41D G01S7/48A G01S7/539 G02B27/01 G02B27/01B G06K17/00 G06K7/00E
G06K7/10A1E G06K7/10A3C G06K9/00H G06K9/00H1 G06K9/00V7 G06Q10/06 G06Q20/203 G07C5/00T
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US class:

1/1 137/223S 137/224S 152/419S 165/203 165/237 177/136 177/144 177/208 180/197P 180/268
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280/735 280/735P 280/735S 280/751 280/751P 296/68.1 297/216.12 297/216.14 297/217.2
297/217.200P 307/10.1 307/9.1 307/91 340/10.1 340/12.51 340/13.24 340/13.240P 340/13.26
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341/111 342/457 345/156 345/156P 345/7 345/8 345/8S 356/10 356/445 356/5.03 356/5.09 356/614
367/138 367/138P 367/903 381/302 381/303 381/304 381/77 381/86 381/86P 381/92 382/100
382/100P 382/103 382/104 382/104P 382/104S 382/156 382/156S 382/295 385/14 385/2 385/33 385/8
62/244 701/1 701/29 701/29.2 701/29.200S 701/29.6 701/29P 701/31.4 701/31.400P 701/32.7 701/34
701/34.4 701/34S 701/36 701/39 701/44 701/45 701/45P 701/45S 701/49 701/49P 701/70 701/70P
702/173 705/22 73/146.2 73/146.8

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Cited documents:

WO9856606 A1, WO9830411 A1, WO9825112 A2, WO9704984 A1, WO9527635 A1, WO9423973 A1,
WO9422693 A1, WO9325400 A1, WO9213784 A1, WO9113784 A1, WO05035319 A1, WO0219195 A1,
WO0145080 A1, WO0144024 A1, WO0121450 A1, WO0113076 A1, WO0112473 A1, WO0029257 A2,
USRE40073 E, USRE37260 E, US8482399 BB, US8416075 BB, US8354927 BB, US8310363 BB,
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Forward Citations:

WO19123326, WO19072929, WO18229548, WO18208315, WO18185053, WO18176165, WO18136857, WO18106852, WO18005532, WO17219375, WO17195200, WO17144792, WO17141244, WO17129533, WO17123949, WO17123665, WO17121514, WO17076433, WO17070386, WO16164793, WO16126487, WO15160273, WO15112676, WO15102686, WO15060868, WO15032397, WO14198536, WO14169375, WO14143563, WO14127126, WO14099192, WO14068466, WO14068466, WO14056087, WO14039957, WO14012012, WO13188002, WO13173502, WO13168160, WO13134196, WO13103994, WO13103569, WO13101057, WO13072926, WO13072926, WO13045742, WO11159366, WO11132190, WO11132190, WO11128196, WO11128196, WO11019395, WO11011224, WO10131161, WO10102040, WO10088256, WO10083474, WO10083474, WO10079382, WO10034022, WO10011785, WO10006293, WO10006293, WO09117125, WO09042925, WO09036405, WO09032274, WO09025998, WO09011763, WO09002577, WO09002483, WO08153998, WO08152095, WO07149187, WO07115283, USRE43990, US9998892, US9998697, US9996167, US9994229, US9991751, US9990567, US9990182, US9990046, 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Abstract:

Methods for reducing ringing of dual-function ultrasonic air-coupled transducers in which at least one electrical passive circuit is applied to the transducer. The circuit may be either a linear circuit or a non-linear circuit. Different circuits can be applied to the transducer when the transducer is in a transmission mode than when the transducer is in a reception mode.

