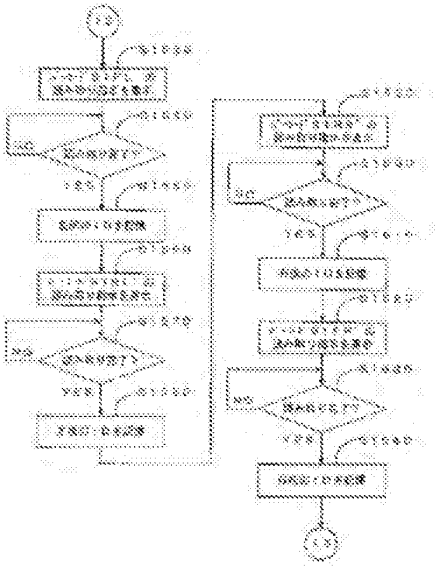
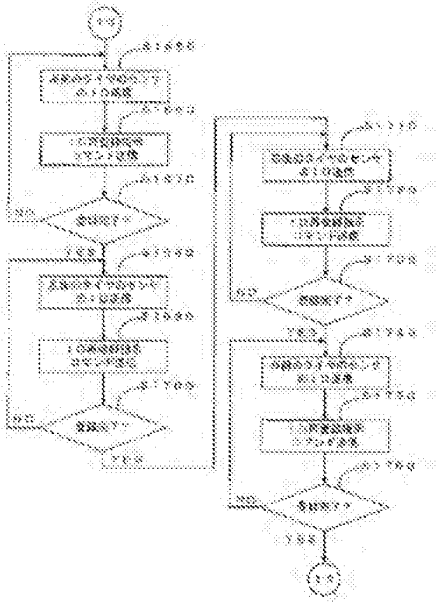
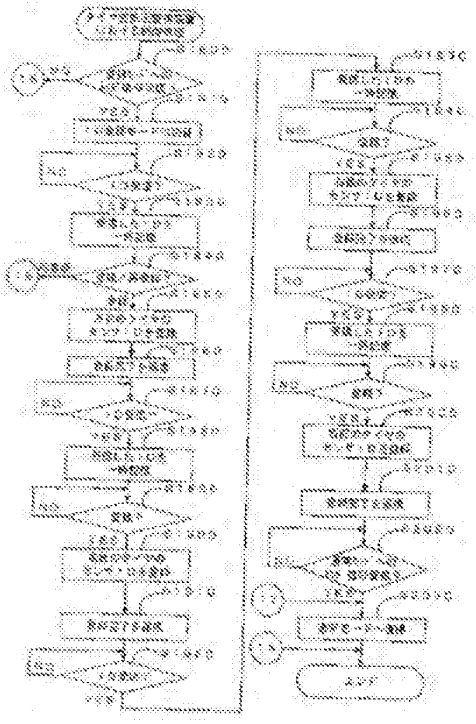
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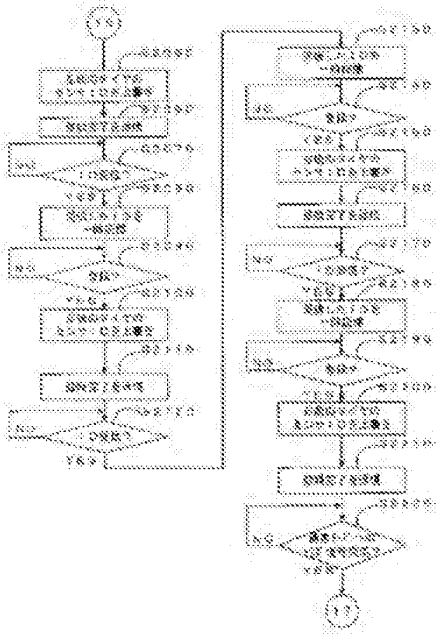
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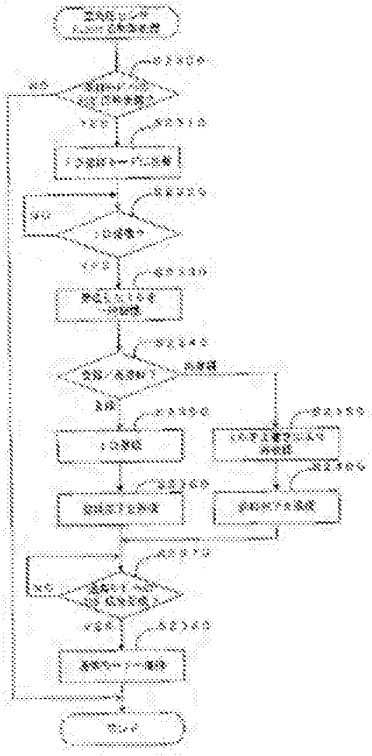
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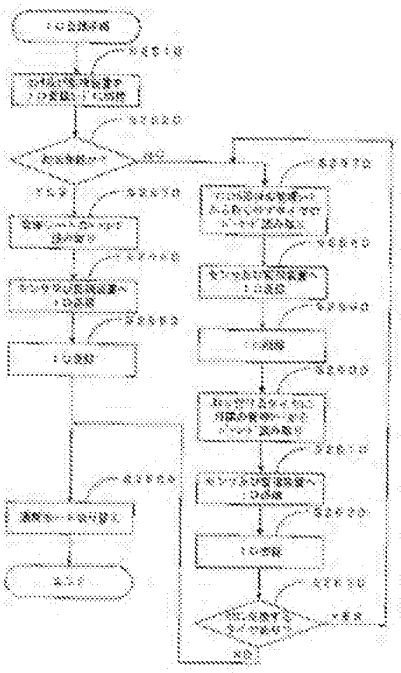
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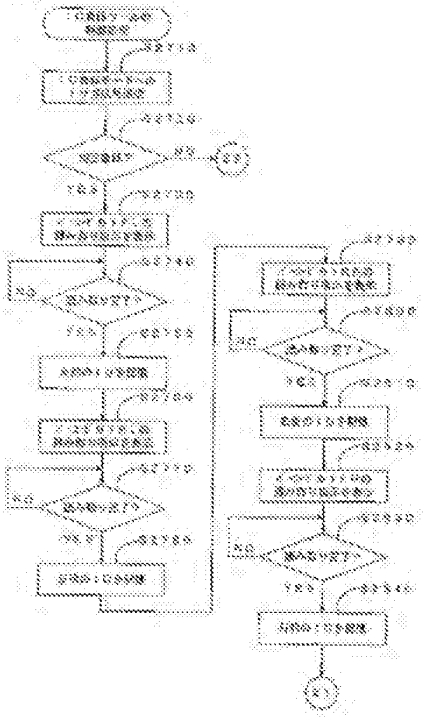
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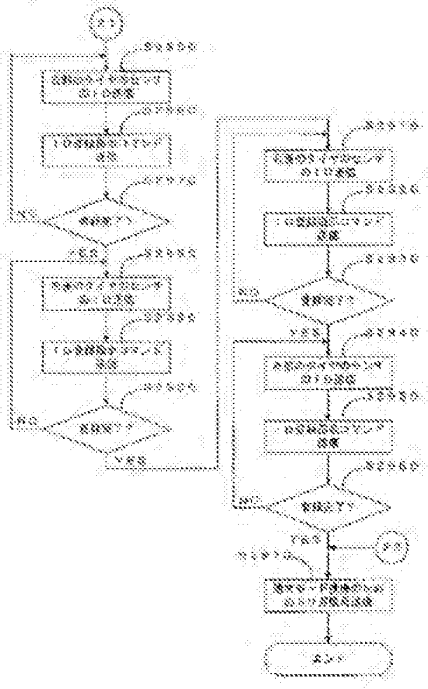
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【図２１】

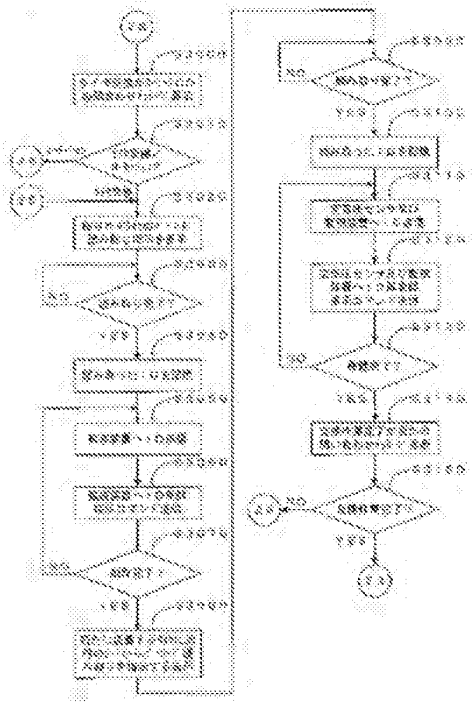


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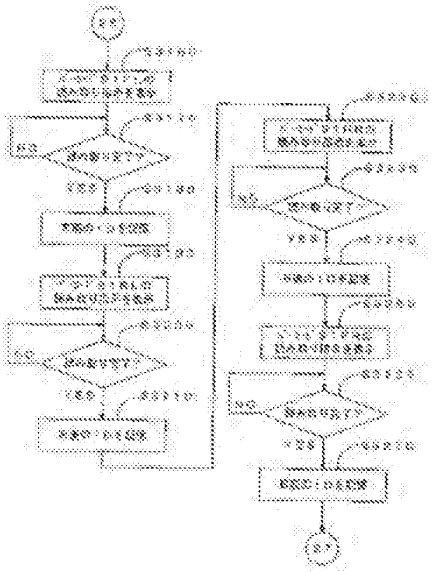


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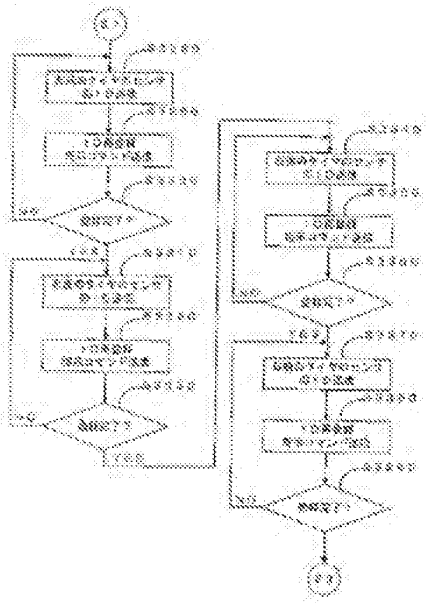
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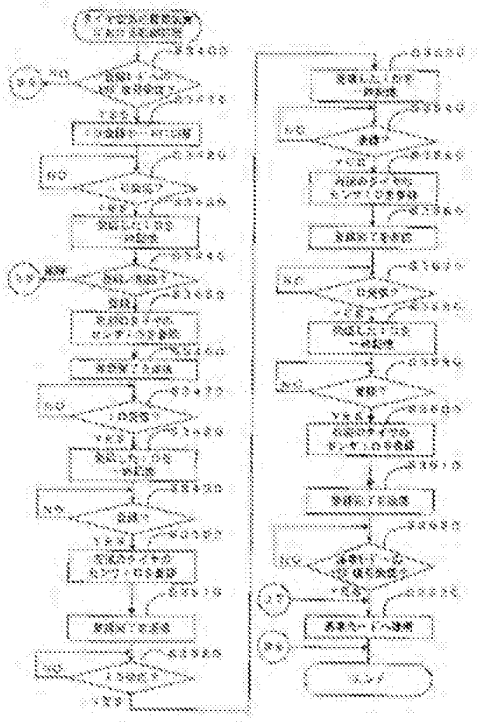
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【図２５】

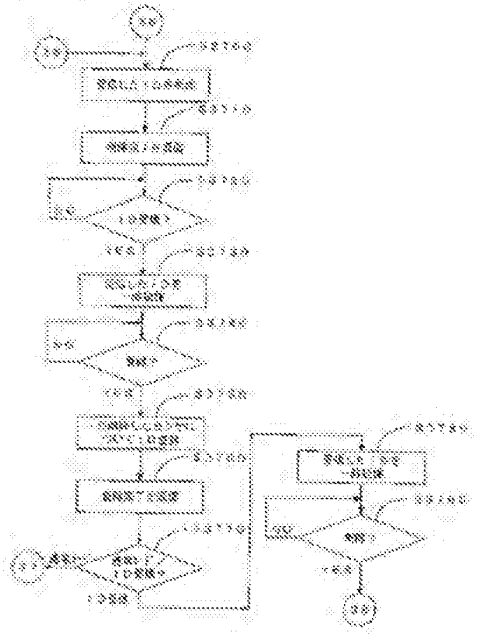


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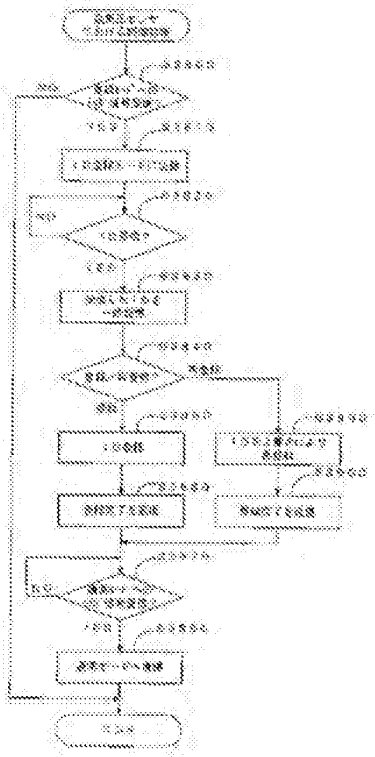


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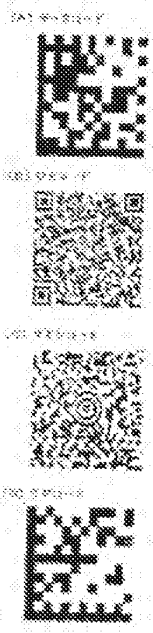
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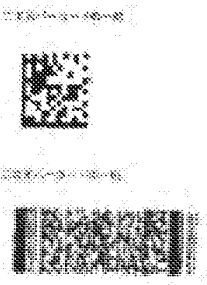
【図２８】



【図２９】

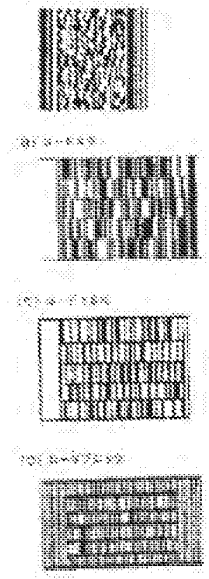


【図３０】



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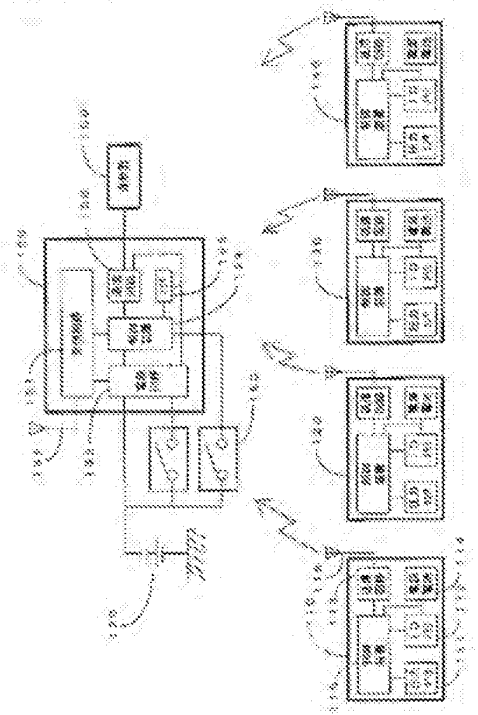
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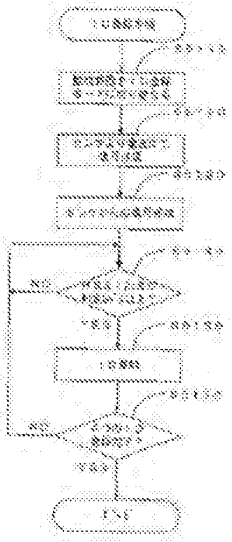
【図２】



【図３】



【図４】



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Bibliographic data: JP2004017909 (A) — 2004-01-22

ID REGISTRATION METHOD AND ITS DEVICE OF TIRE PNEUMATIC PRESSURE SENSOR, IDENTIFICATION REGISTRATION TOOL FOR TIRE PNEUMATIC PRESSURE MONITORING SYSTEM

Inventor(s): ITO SHINTARO ± (ITO SHINTARO)

Applicant(s): DENSO CORP ± (DENSO CORP)

Classification: - **International:** ***B60C23/02; G01L17/00; G08B21/00; G08C17/02; G08C19/00; G08C25/04;*** (IPC1-7): B60C23/02; G01L17/00; G08B21/00; G08C17/02; G08C19/00; G08C25/04

- **European:**

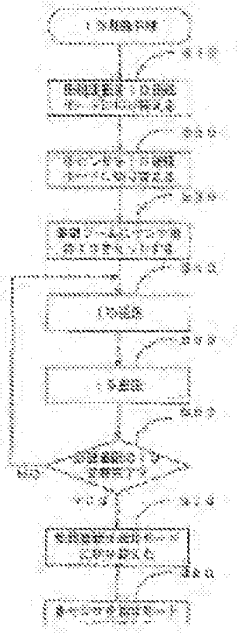
Application number: JP20020179149 20020619

Priority number(s): JP20020179149 20020619

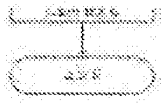
Also published as: JP3982341 (B2)

Abstract of JP2004017909 (A)

PROBLEM TO BE SOLVED: To prevent miss registration of the identification due to radio interference or the like with a tire pneumatic pressure monitoring system. ; SOLUTION: Identification (ID) registration method of the tire pneumatic pressure sensor includes the following process. A monitoring device 50 and each sensor 10, 20, 30, 40 are switched (S10, S20) to the ID registration mode. The ID of each sensor is set to a registration tool 60 and the ID is transmitted (S30, S40) to a monitoring device 50 and the each sensor 10, 20, 30, 40. All of four IDs of the sensors are transmitted to the monitoring device 50, and the ID to be registered to each sensor is transmitted to the each sensor 10, 20, 30, 40. In the monitoring device 50 and the each sensor 10, 20, 30, 40 which receive



the ID, the ID registrations are performed (S50) respectively.; After the ID registrations to the monitoring device 50 and the sensors 10, 20, 30, 40 are completed (S60: YES), the monitoring device 50 is switched (S70) to the normal mode, the each sensor 10, 20, 30, 40 is also switched (S80) to the normal mode, and the registration work of the ID is completed. ; COPYRIGHT: (C)2004,JPO



Last updated: 04.12.2012 Worldwide Database 5.7.44.8; 92p

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IPR2024-00744

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2004-17909
(P2004-17909A)
(43)公開日　平成16年1月22日(2004.1.22)

(51)Int.Cl.[7]	F I		テーマコード（参考）
B60C 23/02	B60C 23/02	B	2F055
G01L 17/00	G01L 17/00	301P	2F073
G08B 21/00	G08B 21/00	L	5C086
G08C 17/02	G08C 19/00	J	
G08C 19/00	G08C 25/04		

審査請求 未請求　請求項の数 20　OL　（全 45 頁）　最終頁に続く

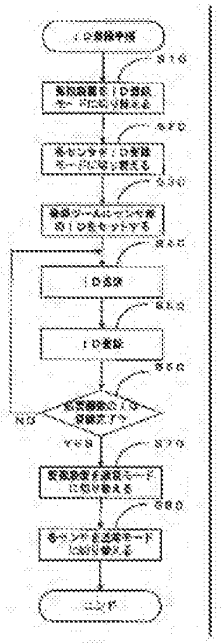
(21)出願番号　特願2002-179149(P2002-179149)
(22)出願日　平成14年6月19日(2002.6.19)

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Ｆターム(参考)　2F055 AA12 BB03 CC50 DD20 EE40 FF34 HH19
2F073 AA03 AA38 AB01 BB02 BB04 BC01 BC02 CC01 CC08 CC12 DD02 EE01 FF02 GG01 GG05
5C086 AA44 BA22 CA16 CB20 DA01 DA40 EA41

(54)【発明の名称】タイヤ空気圧センサのＩＤ登録方法、ＩＤ登録装置、タイヤ空気圧監視システム用ＩＤ登録ツール、タイヤ空気圧センサ、空気圧センサ付きタイヤ及びタイヤ空気圧監視装置

(57)【要約】
【課題】タイヤ空気圧監視システムで、混信等によるＩＤの誤登録を防止する。
【解決手段】監視装置５０及び各センサ１０，２０，３０，４０をＩＤ登録モードに切り替える（Ｓ１０，Ｓ２０）。登録ツール６０にセンサ毎のＩＤをセットして監視装置５０及び各センサ１０，２０，３０，４０にＩＤを送信する（Ｓ３０，Ｓ４０）。ここで、監視装置５０には、４つのセンサの全てのＩＤを送信し、各センサ１０，２０，３０，４０へは、それぞれのセンサに登録すべきＩＤを送信する。このＩＤを受信した監視装置５０及び各センサ１０，２０，３０，４０では、それぞれＩＤ登録を実行する（Ｓ５０）。そして、監視装置５０及びセンサ１０，２０，３０，４０へのＩＤ登録が完了したら（Ｓ６０：ＹＥＳ）、監視装置５０を通常モードに切り替えると共に（Ｓ７０）、各センサ１０，３０，３０，４０も通常モードに切り替えて（Ｓ８０）、ＩＤ登録作業を終了する。
【選択図】　図３



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【特許請求の範囲】
【請求項1】
車両に装着されている各タイヤの空気圧センサから各センサのＩＤと共に送信される空気圧信号を車両本体に備えられているタイヤ空気圧監視装置で受信し、当該車両に装着されている各タイヤの空気圧を監視する様にしたタイヤ空気圧監視システムにおけるタイヤ空気圧センサのＩＤ登録方法において、
前記各センサ及び前記タイヤ空気圧監視装置を共にＩＤ登録モードにしておき、前記各センサに対してＩＤを送信してこれを記憶させると共に、これと同じＩＤを前記タイヤ空気圧監視装置にも送信して記憶させる様にしたことを特徴とするタイヤ空気圧センサのＩＤ登録方法。
【請求項2】
車両に装着されている各タイヤの空気圧センサから各センサのＩＤと共に送信される空気圧信号を車両本体に備えられているタイヤ空気圧監視装置で受信し、当該車両に装着されている各タイヤの空気圧を監視する様にしたタイヤ空気圧監視システムにおけるタイヤ空気圧センサのＩＤ登録方法において、
前記各センサ及び前記タイヤ空気圧監視装置をＩＤ登録モードにしておき、ＩＤ登録ツールを用いて、当該ＩＤ登録ツールから登録用ＩＤを送信することにより、前記各空気圧センサに対してそれぞれが受信した前記登録用ＩＤを記憶させると共に、前記ＩＤ登録ツールから送信される前記登録用ＩＤを、前記タイヤ空気圧監視装置にも記憶させる様にしたことを特徴とするタイヤ空気圧センサのＩＤ登録方法。
【請求項3】
請求項２記載のタイヤ空気圧センサのＩＤ登録方法において、前記各空気圧センサ及び前記タイヤ空気圧監視装置にＩＤを記憶させる際に、該各空気圧センサ及び前記タイヤ空気圧監視装置と前記ＩＤ登録ツールとを信号線で接続し、該ＩＤ登録ツールから前記各空気圧センサ及び前記タイヤ空気圧監視装置に対して前記信号線を介して前記登録用ＩＤを送信する様にしたこと
を特徴とするタイヤ空気圧センサのＩＤ登録方法。
【請求項4】
請求項１～請求項３のいずれか記載のタイヤ空気圧センサのＩＤ登録方法において、
車体番号、車両製造番号等の生産管理上の固有の車両情報に基づいて、前記ＩＤを設定し、このＩＤを前記各空気圧センサ及び前記タイヤ空気圧監視装置に記憶させる様にしたこと
を特徴とするタイヤ空気圧センサのＩＤ登録方法。
【請求項5】
請求項１～請求項４のいずれか記載のタイヤ空気圧センサのＩＤ登録方法において、
乱数に基づいて前記ＩＤを設定し、このＩＤを前記各空気圧センサ及び前記タイヤ空気圧監視装置に記憶させる様にしたこと
を特徴とするタイヤ空気圧センサのＩＤ登録方法。
【請求項6】
請求項１～請求項５のいずれか記載のタイヤ空気圧センサのＩＤ登録方法において、
前記登録用のＩＤは、タイヤの位置毎に固有のＩＤとなる様にしたこと
を特徴とするタイヤ空気圧センサのＩＤ登録方法。
【請求項7】
車両に装着されている各タイヤの空気圧センサから各センサのＩＤと共に送信される空気圧信号を車両本体に備えられているタイヤ空気圧監視装置で受信し、当該車両に装着されている各タイヤの空気圧を監視する様にしたタイヤ空気圧監視システムにおけるタイヤ空気圧センサのＩＤ登録装置において、
前記タイヤ空気圧監視装置をＩＤ登録モードに切り替える受信機モード切替装置と、
前記各空気圧センサをＩＤ登録モードに切り替える送信機モード切替装置と、前記各空気

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圧センサに記憶させるべき登録用ＩＤを設定するＩＤ設定部と、前記送信機モード切替装置によってＩＤ登録モードに切り替えられた前記各空気圧センサに対して前記設定した登録用ＩＤを送信すると共に、前記受信機モード切替装置によってＩＤ登録モードに切り替えられた前記タイヤ空気圧監視装置に対しても前記設定した登録用ＩＤを送信するＩＤ送信部とを備えているＩＤ登録ツールと
を備えていることを特徴とするタイヤ空気圧センサのＩＤ登録装置。
【請求項8】
請求項７記載のタイヤ空気圧センサのＩＤ登録装置において、前記ＩＤ登録ツールは、前記各空気圧センサ及び前記タイヤ空気圧監視装置との間を信号線で連結し、前記各空気圧センサ及び前記タイヤ空気圧監視装置に記憶させるべき登録用ＩＤを該信号線を介して送信する様に構成されていること
を特徴とするタイヤ空気圧センサのＩＤ登録装置。
【請求項9】
請求項７又は請求項８記載のタイヤ空気圧センサのＩＤ登録装置において、
前記ＩＤ登録ツールは、生産管理用のコンピュータと接続可能に構成されており、前記ＩＤ設定部は、この生産管理用コンピュータから与えられる車体番号、車両製造番号等の各車両に固有の生産管理情報に基づいてＩＤを設定する様に構成されていること
車体番号、車両製造番号等の生産管理上の固有の車両情報に基づいて、前記Ｉ
を特徴とするタイヤ空気圧センサのＩＤ登録装置。
【請求項10】
車両に装着されている各タイヤの空気圧センサから各センサのＩＤと共に送信される空気圧信号を車両本体に備えられているタイヤ空気圧監視装置で受信し、当該車両に装着されている各タイヤの空気圧を監視する様にしたタイヤ空気圧監視システムにおいて、前記各空気圧センサのＩＤを前記タイヤ空気圧監視装置に登録するためのタイヤ空気圧監視システム用ＩＤ登録ツールであって、
車両に装着される前記各空気圧センサに記憶させるべき登録用ＩＤを設定するＩＤ設定部と、
該ＩＤ設定部で設定した登録用ＩＤを、前記各空気圧センサに対して送信すると共に、前記タイヤ空気圧監視装置にも送信するＩＤ送信部と
を備えていることを特徴とするタイヤ空気圧監視システム用ＩＤ登録ツール。
【請求項11】
請求項１０記載のタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、
当該ＩＤ登録ツールは、前記各空気圧センサ及び前記タイヤ空気圧監視装置との間を連結するための信号線自体又は当該信号線を接続するためのコネクタを備えていること
を特徴とするタイヤ空気圧監視システム用ＩＤ登録ツール。
【請求項12】
請求項１０又は請求項１１記載のタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、
当該ＩＤ登録ツールは、前記各空気圧センサ及び前記タイヤ空気圧監視装置に対して、それぞれをＩＤ登録モードとするためのトリガ信号を送信するトリガ信号送信部を備えていること
を特徴とするタイヤ空気圧監視システム用ＩＤ登録ツール。
【請求項13】
請求項１０～請求項１２のいずれか記載のタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、
前記ＩＤ設定部は、車体番号、車両製造番号等の生産管理上の固有の車両情報に基づいて、各センサに固有のＩＤを生成するセンサ固有ＩＤ生成部を備えていること
を特徴とするタイヤ空気圧監視システム用ＩＤ登録ツール。
【請求項14】
請求項１０～請求項１３のいずれか記載のタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、

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前記ＩＤ設定部は、乱数を生成する乱数生成部と、該乱数生成部で生成した乱数に基づいて、各センサに固有のＩＤを生成するセンサ固有ＩＤ生成部とを備えていること
を特徴とするタイヤ空気圧監視システム用ＩＤ登録ツール。
【請求項15】
請求項１０～請求項１４のいずれか記載のタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、
当該ＩＤ登録ツールは、生産管理用のコンピュータと接続可能に構成されており、前記ＩＤ設定部は、この生産管理用コンピュータから与えられる車体番号、車両製造番号等の各車両に固有の生産管理情報の一部又は全部を含むＩＤを設定する様に構成されていることを特徴とするタイヤ空気圧監視システム用ＩＤ登録ツール。
【請求項16】
車両の各タイヤに装着され、タイヤの空気圧を検出して自己のＩＤと共に送信するための空気圧検出部と、ＩＤ記憶部と、送信回路とを備えているタイヤ空気圧センサにおいて、さらに受信回路をも備え、該受信回路を介して前記ＩＤ記憶部に記憶しておくべきＩＤを受信したら、当該ＩＤを自己のＩＤとして前記ＩＤ記憶部に記憶する様に構成されていること
を特徴とするタイヤ空気センサ。
【請求項17】
請求項１６記載のタイヤ空気圧センサにおいて、
前記受信回路は、有線による信号受信を行える様な回路構成とされていること
を特徴とするタイヤ空気センサ。
【請求項18】
請求項１６又は請求項１７記載のタイヤ空気圧センサにおいて、
前記ＩＤ記憶部は、上書きによって書き換えが可能な記憶素子によって構成されていること
を特徴とするタイヤ空気センサ。
【請求項19】
請求項１６～請求項１８のいずれか記載のタイヤ空気圧センサを装着された空気圧センサ付きタイヤ。
【請求項20】
車両に装着されている各タイヤの空気圧センサのＩＤをメモリに登録しておき、前記各センサから、ＩＤと共に送信されてくる空気圧信号をアンテナで受信し、この受信結果に基づいて前記各タイヤの空気圧を監視するタイヤ空気圧監視装置において、
所定のＩＤ登録ツールとの間を信号線で接続するための信号線接続部と、
ＩＤ登録モードを起動するＩＤ登録モード起動部と、
該ＩＤ登録モードが起動された状態で、前記信号線を介して受信した登録用ＩＤデータからタイヤ位置を判定するタイヤ位置判定部と、
該タイヤ位置判定部の判定結果に基づいて、前記各空気圧センサのＩＤをタイヤ位置を特定できる様に登録するＩＤ登録部と、
前記ＩＤ登録ツールから受信したコマンドに基づいて、今回が再登録か否かを判定する再登録判定部と、
該再登録判定部により再登録であると判定された場合には、前記タイヤ位置判定部の判定結果に基づいて、対象となるタイヤ位置の空気圧センサに対する既登録ＩＤと事実上置き換える様に、前記メモリに当該空気圧センサのＩＤを再登録する再登録部と
を備えていることを特徴とするタイヤ空気圧監視装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】
本発明は、タイヤ空気圧センサのＩＤ登録方法に係り、さらにこの方法を実施するためのＩＤ登録装置、タイヤ空気圧監視システム用ＩＤ登録ツール、空気圧センサ付きタイヤ及びタイヤ空気圧監視装置に関するものである。

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【０００２】
【従来の技術】
従来、タイヤ空気圧監視システムとして、特許第３２１２３１１号が知られている。
【０００３】
この種の従来のタイヤ空気圧監視システムでは、各タイヤに送信機付きの空気圧センサを装着しておき、この空気圧センサから各センサのＩＤと共に空気圧検出信号を送信し、車両本体側に備えられているタイヤ空気圧監視装置で受信し、少なくとも空気圧の異常なタイヤがあるときはインジケータに表示して警告する様に構成されている。
【０００４】
ここで、各センサのＩＤは、タイヤ空気圧監視装置にも登録されており、このＩＤをチェックすることにより、自車両のタイヤの空気圧センサからの信号であるのか否かを判断できる様になっている。
【０００５】
このセンサＩＤは、従来のシステムにおいては、センサメーカーからセンサが出荷される段階で各センサに付与されており、これを自動車メーカーで車両を組み立てる際に、車両本体のタイヤ空気圧監視装置をＩＤ登録モードにして、各センサから送信されてくるＩＤを受信してタイヤ空気圧監視装置に登録する様に構成されている。
【０００６】
より具体的には、図１７のブロック図に示す様に、従来のタイヤ空気圧監視システムは、各タイヤに装着される空気圧センサ１１０，１２０，１３０，１４０と、車両本体に備えられるタイヤ空気圧監視装置１５０とから構成されている。空気圧センサ１１０には、タイヤ内の空気圧を検出するための圧力センサ１１１と、予めセンサＩＤを記憶してあるＩＤメモリ１１２と、送信回路１１３と、電源電池１１４と、制御装置１１５と、送信用のアンテナ１１６とが備えられている。他の空気圧センサ１２０，１３０，１４０も同様の構造となっている。一方、タイヤ空気圧監視装置１５０は、受信回路１５１と、受信用のアンテナ１５２と、電源回路１５３と、制御装置１５４と、メモリ１５５と、インジケータやＬＥＤ等の表示器１６０へ表示データを送信するための通信回路１５６とが備えられている。また、このタイヤ空気圧監視装置１５０への電源は、車載バッテリ１７０から供給される様になっており、各種スイッチ類として、特に、制御装置１５４に対して通常の動作モードとＩＤ登録モードとで切り替えるためのモード切替スイッチ１８０が接続されている。
【０００７】
車両製造ライン等においてＩＤ登録を行う場合には、図１８のフローチャートに示す様な手順で処理が実行される。まず最初に、タイヤ空気圧監視装置１５０をＩＤ登録モードに切り替える（Ｓ７１１０）。続いて、各空気圧センサ１１０等を作動させてＩＤメモリ１１２等に記憶されている各空気圧センサ１１０等のセンサＩＤとを送信させる（Ｓ７１２０），すると，タイヤ空気圧監視装置１５０は，受信用アンテナ１５２を介して電波を受信する（Ｓ７１３０）。そして，タイヤ空気圧監視装置１５０の制御装置１５４は、受信した信号レベルが判定レベル以上か否かを判定し（Ｓ７１４０）、信号レベルが判定レベル以上の場合には（Ｓ７１４０：ＹＥＳ）、受信した信号中に含まれているセンサＩＤをタイヤ空気圧監視装置１５０内のメモリ１５５に登録する（Ｓ７１５０），そして、制御装置１５４は，４つのセンサ１１０，１２０，１３０，１４０のＩＤを全て登録したか否かを判定し（Ｓ７１６０）、４つのセンサ１１０，１２０，１３０，１４０のＩＤ登録が完了している場合には（Ｓ７１６０：ＹＥＳ）、モード切替スイッチ１８０を動作モードに切り替えて本処理を終了する（Ｓ７１７０）。
【０００８】
この様にして、従来のシステムでは，車両の各タイヤに実際に装着されている空気圧センサのＩＤを監視装置側に登録し、動作モードにおいて受信アンテナ１５２を介して受信する信号中に含まれているＩＤがメモリ１５５に登録してあるＩＤと一致するか否かを判別し、一致する場合には、このＩＤと共に受信した圧力信号に基づいてタイヤの空気圧の状

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態を判定し、判定結果に基づいて表示器１６０への表示を実行する様になっているのである。そして、ＩＤを登録しておくことで、近くを走行する車両のタイヤの空気圧センサからの信号に基づいた誤った表示を行わない様になっているのである。

【０００９】

【発明が解決しようとする課題】

しかし、車両の組立工程では、何台もの車両がラインを流れている状態でこの空気圧センサのＩＤ登録作業が行われるため、他の車両の空気圧センサからのＩＤ信号を受信して誤った登録をしてしまうといった混信の問題が生じ得る。これは車両の組立段階だけでなく、修理工場などにおいてセンサＩＤを再登録しようとする場合にも同様である。

【００１０】

そこで、本発明は、タイヤ空気圧監視システムにおいて、ＩＤの誤登録を防止することを目的とする。

【００１１】

【課題を解決するための手段及び発明の効果】

上記目的を達成しようとしてなされた本発明のタイヤ空気圧センサのＩＤ登録方法は、各センサ及びタイヤ空気圧監視装置を共にＩＤ登録モードにしておき、前記各センサに対してＩＤを送信してこれを記憶させると共に、これと同じＩＤを前記タイヤ空気圧監視装置にも送信して記憶させる様にしたことを特徴とする。

【００１２】

即ち、センサ側に予め記憶されていたＩＤをタイヤ空気圧監視装置に記憶させるのではなく、センサにＩＤを初回登録又は再登録をするときに、タイヤ空気圧監視装置にも、当該車両に装着される各タイヤの各空気圧センサに固有のＩＤを初回登録又は再登録するのである。そのために、本発明方法の一例として後述するより具体的な方法ではＩＤ登録ツールを使用するようにしている。

【００１３】

このＩＤ登録ツールは、後で詳述する様に、基本的な構成としては、ＩＤ設定部とＩＤ送信部とを備えたものを使用するのが望ましい。このＩＤ設定部としては、キー入力の様な方法によって現場作業者がその都度、作業指示書に従ってＩＤを入力して設定する様にすることができる。他の形態としては、車両の車体番号等を光学的読み取り装置等を用いて読み取り、これに基づいて各タイヤに装着される空気圧センサのＩＤを自動生成して設定する様にしてもよい。また、車両製造のための生産管理データ（車体番号、車両製造番号等）をＩＤ登録ツールに入力し、この生産管理データに基づいて各車両の各タイヤの空気圧センサのセンサＩＤを自動入力あるいは自動生成して設定する様にしてもよい。また、ツール内でランダムにコードを発生させ、このコードに基づいてセンサＩＤを設定する様に構成することもできる。いずれにしても、ＩＤ登録ツールで設定したセンサＩＤを、１台の車両の各センサ及びタイヤ空気圧監視装置にＩＤ登録ツールから送信して記憶させる様にすることで、他の車両のタイヤの空気圧センサのＩＤを誤登録するといった問題を解決することができるのである。

【００１４】

なお、本発明の方法でＩＤ登録を行う場合、車両製造段階を考えると、タイヤ空気圧センサとしては、ＩＤ記憶部には当初何も記憶されていないかあるいは無意味なコードを記憶させたものを用いることになるであろうから、製造ラインにおいてＩＤ登録を行っている車両の次に流れてくる車両に備えられているタイヤ空気圧センサが定期的に送信する信号と混信して、センサＩＤを誤って登録するといった問題は、そもそも解消することができるであろう。

【００１５】

本発明の方法は、一見容易に見えるかも知れない。しかし、これは従来の様にセンサ側に予め登録されていたＩＤをセンサから無線で送信させ、これを監視装置側で受信して登録するといったものではなく、ＩＤ登録の際に、センサにも監視装置にも予め設定したＩＤを登録することにより、従来の方法で起こり得た問題を一気に解決するものであり、極め

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て顕著な効果を奏する。そして、一例として、この登録には専用のＩＤ登録ツールを用いることを提案するものである。

【００１６】

また、この場合、ＩＤ登録ツールと各センサ及び監視装置とを信号線で接続し、この信号線を介してＩＤ登録を行う様にしてやると、混信の問題は全くなくなる。さらに、電波を用いる従来の方法では、例えば航空無線の様な他の電波の方が強くて、ＩＤ登録のためのセンサからの電波を受信できなくてＩＤ登録不能となる場合も考えられたが、この様な問題も信号線でツールとセンサ及び監視装置を接続してＩＤ登録を行うことによって一挙に解決する。そして、信号線を正しく接続しておけば、例えば４輪車においては、単に４輪のＩＤを監視装置側に登録するだけでなく、その位置も特定した形でのＩＤ登録が可能である。これは、有線でなくて無線でＩＤ登録を行う場合も、各タイヤの空気圧センサにＩＤを登録する際に電波の指向性を高めてやるなどの工夫で十分に達成可能である。なお、無線でＩＤ登録を行う際の情報伝達媒体としては、電波以外にも、赤外線や超音波などを用いる様にしても構わない。

【００１７】

ここで、現在実用化されている車両において、監視装置側の受信アンテナを４個にして４輪それぞれの近くに備えておくことにより、タイヤ位置を特定した形でのＩＤ登録及びタイヤ空気圧の監視を可能にしたものがある。これに対し、本発明方法を用いれば、上述の様に、４輪のいずれであるかを特定した形でのＩＤ登録が監視装置側の受信アンテナの数を増加することなく可能であり、かつ、各タイヤの空気圧センサは固有のＩＤを持つことになるから、空気圧を監視する際には、受信アンテナが１箇所にあるだけでも、どのタイヤの空気圧がどの様な状態であるかを容易に判別することができる。よって、本発明方法によれば、タイヤ位置をも特定した形での空気圧の監視を、現在実用化されているシステムよりも簡単な装置構成で達成することができるという効果も発揮される。

【００１８】

また、本発明方法によれば、次の様な効果も発揮される。例えば、いずれかのタイヤの空気圧センサの送信部が壊れてしまったとする。この様な場合、ディーラーや修理工場では、当該タイヤの空気圧センサを新しいものと取り換える。このとき、この新しい空気圧センサに対して、ＩＤ登録ツールを用いて車両本体側のタイヤ空気圧監視装置に登録してある当該タイヤ位置の空気圧センサのＩＤを読み出し、これを設定値として新しく取り換えた空気圧センサに送信して記憶させることができる。なお、どのセンサが壊れているかを判別する方法としては、車両運転中に一定期間以上空気圧検出信号を受信できなかったセンサＩＤをタイヤ空気圧監視装置側のソフトウェアなどによって特定できる様にすることができる。従って、本発明方法によれば、壊れた空気圧センサへのＩＤ登録だけで足りるので、作業性が大幅に向上する。この様な効果に価値があるのは、従来の方法では、いずれかのタイヤの空気圧センサを取り換えた場合、再度、ＩＤ登録モードにしてタイヤ空気圧監視装置側のＩＤ登録内容をリセットし、全てのタイヤの空気圧センサから送信されてくるＩＤを再度受信して監視装置側に登録をしなければならなかったからである。なお、こうしたセンサ取り換え時におけるＩＤ登録では、ＩＤ登録の条件を、車体番号、製造番号等といった車両に固有の何らかのコード情報に基づいて決定するといったルールにしておけば、車両本体のタイヤ空気圧監視装置側の記憶内容を読み出さなくても、車体番号等をＩＤ登録ツールにキー入力するかあるいは光学的読み取り装置等を利用した自動読み取り入力とすることによって容易にセンサＩＤの設定をすることができ、より一層、作業性が向上する。

【００１９】

また、いずれかのセンサが壊れてこれを取り換えた場合や、タイヤがパンクしてタイヤごと取り換えることによりセンサが変わるといったケースにおいて、本発明方法によれば、修理工場で、ＩＤ登録ツールを用いて、全てのタイヤの空気圧センサ及び車両本体側のタイヤ空気圧監視装置へのＩＤ再登録を実行する様にすることもできる。この場合、再登録時には、これが再登録である旨の情報を含んだＩＤ登録を行う様にすれば、後に、当該車

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両においてセンサ故障やタイヤのパンクによるセンサ又はタイヤの交換があったか否かを容易に判断することができ、車両のタイヤの履歴管理に利用することもできる。上述した様なセンサの故障の場合ではなく、タイヤのパンクの場合にこれを利用して、パンクによって交換することとなったタイヤについては、その旨をＩＤ登録ツールに入力することで、ＩＤの再登録時に、交換履歴情報を含んだ形でこれを登録する様にしておくときらに効果的である。これにより、タイヤの使用履歴管理といったことも、タイヤ空気圧監視装置や空気圧センサに登録されているＩＤを読み出すことによって可能となるからである。

【００２０】

また、従来の方法では、ＩＤ登録をする際には、車両本体のタイヤ空気圧監視装置をＩＤ登録モードにしておき、各タイヤの空気圧センサから定期的（例えば、１０分おき）に送信されて来るＩＤ信号を受信して、これをセンサＩＤとして登録するものであったので工程に時間がかかっていた。しかし、本発明の方法によれば、ＩＤ登録は、ＩＤ登録ツールからの積極的なＩＤ送信によってなされるので、ＩＤ登録に要する時間を大幅に短縮することができる。即ち、従来は、センサから送信されてくるＩＤ信号を受信するのを待って、これを登録していたのであるが、本発明方法によれば、ＩＤ登録モードにおいては、ＩＤ登録ツールが積極的に送信するセンサＩＤを各センサ及び監視装置に登録するだけなので、ＩＤ登録工程に要する時間を大幅に短縮することができるという効果も発揮される。

【００２１】

なお、上述したような各種の効果は、車両の製造工程においてだけでなく、ディーラーや修理工場での車両の修理の際にも発揮される。

【００２２】

以上の様な顕著な効果を発揮する本発明の方法は、次の様なタイヤ空気圧センサのＩＤ登録装置を用いることにより達成される。このタイヤ空気圧センサのＩＤ登録装置は、車両本体に備えられているタイヤ空気圧監視装置をＩＤ登録モードに切り替える受信機モード切替装置と、車両に装着される各タイヤの空気圧センサをＩＤ登録モードに切り替える送信機モード切替装置と、前記各空気圧センサに記憶させるべき登録用ＩＤを設定するＩＤ設定部と、前記送信機モード切替装置によってＩＤ登録モードに切り替えられた前記各空気圧センサに対して前記設定した登録用ＩＤを送信すると共に、前記受信機モード切替装置によってＩＤ登録モードに切り替えられた前記タイヤ空気圧監視装置に対しても前記設定した登録用ＩＤを送信するＩＤ送信部とを備えているＩＤ登録ツールとから構成されていることを特徴とする。かかる装置を用いることにより、本発明の方法を容易に実現することができる。

【００２３】

ここで、本発明のタイヤ空気圧センサのＩＤ登録装置においては、前記ＩＤ登録ツールは、各タイヤの空気圧センサ及びタイヤ空気圧監視装置との間を信号線で連結し、各空気圧センサ及びタイヤ空気圧監視装置に記憶させるべきＩＤを該信号線を介して送信する様に構成しておくことができる。この様に有線での信号送受信が可能とすることによる効果は、上述した通りである。

【００２４】

また、本発明のタイヤ空気圧センサのＩＤ登録装置において、前記ＩＤ登録ツールは、生産管理用のコンピュータと接続可能に構成しておき、前記ＩＤ設定部を、この生産管理用コンピュータから与えられる車体番号、車両製造番号等の各車両に固有の生産管理情報に基づいてＩＤを設定する様に構成しておくこともできる。この様に構成することで、車両毎に固有の生産管理上の情報に基づいてセンサＩＤを登録することが可能になる。

【００２５】

また、本発明の方法を実施するに当たっては、次の様なタイヤ空気圧監視システム用ＩＤ登録ツールを用いることができる。このタイヤ空気圧監視システム用ＩＤ登録ツールは、車両に装着される各タイヤの空気圧センサに記憶させるべき固有のＩＤを設定するＩＤ設定部と、該ＩＤ設定部で設定したＩＤを、個々のタイヤの空気圧センサに対して送信すると共に、前記タイヤ空気圧監視装置にも送信するＩＤ送信部とを備えていることを特徴と

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する。かかるＩＤ登録ツールを用いることにより、本発明の方法を容易に実現することができる。

【００２６】

ここで、本発明のタイヤ空気圧監視システム用ＩＤ登録ツールにおいては、当該ＩＤ登録ツールは、各タイヤの空気圧センサ及びタイヤ空気圧監視装置との間を連結するための信号線自体又は当該信号線を接続するためのコネクタを備えたものとすることができる。この様に有線での信号送受信が可能とすることによる効果は、上述した通りである。

【００２７】

また、これらのタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、当該ＩＤ登録ツールは、前記各空気圧センサ及び前記タイヤ空気圧監視装置に対して、それぞれをＩＤ登録モードとするためのトリガ信号を送信するトリガ信号送信部を備えているものとすることができる。この様に構成することで、ＩＤ登録の際には、ＩＤ登録用ツールからのトリガ信号で、各空気圧センサ及びタイヤ空気圧監視装置をＩＤ登録モードとすることができる。よって、かかる構成のＩＤ登録ツールによれば、ＩＤ登録時に各空気圧センサ及びタイヤ空気圧監視装置のスイッチ操作といった作業を不要にすることができ、作業性を向上することができる。

【００２８】

さらに、これらのタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、前記ＩＤ設定部を、車体番号、車両製造番号等の生産管理上の固有の車両情報に基づいて、各センサに固有のＩＤを生成するセンサ固有ＩＤ生成部を備えているものとすることができる。あるいは、本発明のタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、前記ＩＤ設定部を、乱数を生成する乱数生成部と、該乱数生成部で生成した乱数に基づいて、各センサに固有のＩＤを生成するセンサ固有ＩＤ生成部とを備えているものとすることもできる。さらに、本発明のタイヤ空気圧監視システム用ＩＤ登録ツールにおいて、当該ＩＤ登録ツールを、生産管理用のコンピュータと接続可能に構成し、前記ＩＤ設定部を、この生産管理用コンピュータから与えられる車体番号、車両製造番号等の各車両に固有の生産管理情報の一部又は全部を含むＩＤを設定する様に構成することができる。

【００２９】

また、本発明方法を実施するに当たっては、次の様なタイヤ空気センサを用いることができる。このタイヤ空気圧センサは、空気圧検出部、ＩＤ記憶部及び送信回路に加えて、さらに受信回路を備え、該受信回路を介して前記ＩＤ記憶部に記憶しておくべきＩＤを受信したら、前記ＩＤ記憶部に記憶する様に構成されていることを特徴とする。即ち、従来のタイヤ空気圧センサでは受信回路といったものは不要であったため備えられていなかったが、本発明方法を実現する上では受信回路が不可欠であり、これを備えた新規なタイヤ空気圧センサをも本願発明者は発明したのである。なお、受信回路は、単独の回路としてではなく、送信回路と一体化した送受信回路として備えるようにしても構わない。

【００３０】

ここで、本発明のタイヤ空気圧センサにおいては、前記受信回路は、有線による信号受信を行える様な回路構成としておくことができる。この様に有線での信号送受信が可能とすることによる効果は、上述した通りである。

【００３１】

また、本発明のタイヤ空気センサにおいては、前記ＩＤ記憶部は、上書きによって書き換えが可能な記憶素子によって構成しておくことができる。これにより、修理工場でのセンサＩＤの再登録や、製造ラインにおいて無線でＩＤ登録を行う場合に、ライン上の次の車両に前の車両のセンサＩＤを登録してしまった様なときに当該次の車両のＩＤ登録時に、正規のセンサＩＤの登録を容易に実施できるからである。

【００３２】

そして、本発明の方法を実現する上では、上述した様な本発明のタイヤ空気圧センサを装着された空気圧センサ付きタイヤを使用すればよい。

【００３３】

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また、本発明のタイヤ空気圧監視装置は、所定のＩＤ登録ツールとの間を信号線で接続するための信号線接続部と、ＩＤ登録モードを起動するＩＤ登録モード起動部と、該ＩＤ登録モードが起動された状態で、前記信号線を介して受信した登録用ＩＤデータからタイヤ位置を判定するタイヤ位置判定部と、該タイヤ位置判定部の判定結果に基づいて、前記各空気圧センサのＩＤをタイヤ位置を特定できる様に登録するＩＤ登録部と、前記ＩＤ登録ツールから受信したコマンドに基づいて、今回が再登録か否かを判定する再登録判定部と、該再登録判定部により再登録であると判定された場合には、前記タイヤ位置判定部の判定結果に基づいて、対象となるタイヤ位置の空気圧センサに対する既登録ＩＤと事実上置き換える様に、メモリに当該空気圧センサのＩＤを再登録する再登録部とを備えていることを特徴とする。

【００３４】

この本発明のタイヤ空気圧監視装置によれば、センサＩＤは、信号線接続部を介してＩＤ登録用ツールから受信した登録用ＩＤデータに基づくものであるから、混信等による誤登録を防止することができる。また、ＩＤ登録時には、タイヤ位置判定手段が、登録用ＩＤデータからタイヤ位置を判定し、この判定結果に基づいて、ＩＤ登録部が、センサＩＤをタイヤ位置を特定できる様に登録する。従って、タイヤ位置を特定したタイヤ空気圧の監視を容易に実行することができ、そのためにアンテナの数を増やしたりする必要がないという作用・効果が発揮される。また、再登録判定部により再登録であると判定された場合には、ＩＤ再登録部が、対象となるタイヤ位置の空気圧センサに対する既登録ＩＤと事実上置き換える様に、メモリに当該空気圧センサのＩＤを再登録する。従って、例えば、一部のタイヤ又はセンサだけを交換した様なときは、交換したセンサのみについての再登録作業だけで済むという効果がある。なお、ここで、事実上置き換えるとしては、例えば、▲１▼対象となる既登録ＩＤに新たに受信した登録用ＩＤを上書きする。▲２▼フラグ等を使用して対象となる既登録ＩＤを無効にし、新たに受信した登録用ＩＤを別途登録するなどの登録方法を採用することができる。また、タイヤ位置判定部は、初回登録やローテーションの場合には、受信したデータの履歴によってタイヤ位置を判定する様にしてもよい。

【００３５】

【発明の実施の形態】

次に、本発明の実施の形態を図面と共に説明する。図１は、本実施の形態のタイヤ空気圧センサＩＤ登録システムの概略構成を表すブロック図である。図示の様に、本システムは、各タイヤに装着される空気圧センサ１０、２０、３０、４０と、車両本体に備えられるタイヤ空気圧監視装置５０と、ＩＤ登録ツール６０とから構成されている。空気圧センサ１０には、タイヤ内の空気圧を検出するための圧力センサ１１と、予めセンサＩＤを記憶してあるＩＤメモリ１２と、送受信回路１３と、電源電池１４と、制御装置１５と、送受信用のアンテナ１６とが備えられている。他の空気圧センサ２０、３０、４０も同様の構造となっている。なお、図４７に示した従来の空気圧センサ１１０との相違点は、従来のものでは送信のみを行うことの出来る送信回路１１３を備えていたのに対し、本実施の形態では、送信に加えて受信もできる送受信回路１３，２３，３３，４３を備えた点にある。また、これに伴い、アンテナ１６，２６，３６，４６も送信だけでなく受信が可能なものとなっている。なお、このアンテナ１６、２６、３６、４６は、タイヤに空気を注入するためのバルブの口金を兼ねている。そして、ＩＤメモリ１２，２２，３２，４２としては、ＥＥＰＲＯＭ等の不揮発性で、かつ、上書きによるデータの書き換えが可能な記憶素子を用いている。

【００３６】

一方、タイヤ空気圧監視装置５０は、受信回路５１と、受信用のアンテナ５２と、電源回路５３と、制御装置５４と、メモリ５５と、インジケータやＬＥＤ等の表示器８１へ表示データを送信するための通信回路５６とを備えている。この通信回路５６は、表示器８１からの表示状態を示す信号を受信することもできる様に構成されている。また、このタイヤ空気圧監視装置５０への電源は、車載バッテリ８２から供給される様になっている。

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【００３７】
ＩＤ登録ツール６０は、図２に示す様に、車両に装着される各空気圧センサ１０，２０，３０，４０に記憶させるべき登録用ＩＤを設定するＩＤ設定部６１と、ＩＤ設定部６１で設定した登録用ＩＤを、各空気圧センサ１０，２０，３０，４０に対して送信すると共に、タイヤ空気圧監視装置５０にも送信するＩＤ送信部６２とを備えている。また、ＩＤ登録ツール６０は、各空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０との間を導通するための信号線６３，６３ａ～６３ｄを接続するためのコネクタ６４，６４ａ～６４ｄを備えている。なお、信号線６３，６３ａ～６３ｄは、先端をワニ口クリップとされており、このワニ口クリップにて、空気圧センサ１０，２０，３０，４０のアンテナ１６，２６，３６，４６及びタイヤ空気圧監視装置５０の通信回路５６から表示器８１へ伸びる信号線５７に接続できる様になっている。
【００３８】
また、ＩＤ登録ツール６０には、制御装置６５、メモリ６６、電源電池６７，操作パネル６８及びディスプレイ６９も備えられている。制御装置６５は、このＩＤ登録ツール６０を用いて実行する各種処理のための制御を行う部分で、ＣＰＵ，ＲＯＭ，ＲＡＭ等を有するマイクロコンピュータによって構成されている。メモリ６６は、書き換えが可能なＥＥＰＲＯＭやフラッシュメモリ、ＤＲＡＭなどで構成されている。電源電池６７としては、乾電池、ボタン電池等が使用される。操作パネル６８は、このＩＤ登録ツール６０を用いて実行する処理の内容を指示したりするための操作キーを備えたものである。ディスプレイ６９は、ＩＤ設定部６１で設定したＩＤを表示したり、このＩＤ登録ツール６０の操作モードを表示したりするためのもので、例えば、ＬＣＤによって構成される。
【００３９】
次に、本実施の形態において、空気圧センサ１０，２０，３０，４０のＩＤを、タイヤ空気圧監視装置５０に登録する方法について説明する。この方法を実施するに当たっては、ＩＤ登録ツール６０の信号線６３，６３ａ，６３ｂ，６３ｃ，６３ｄをコネクタ６４，６４ａ，６４ｂ，６４ｃ，６４ｄに接続すると共に、信号線６３，６３ａ，６３ｂ，６３ｃ，６３ｄの先端のワニ口クリップをタイヤ空気圧監視装置５０の通信回路５６から表示器８１へ伸びる信号線５７及び各空気圧センサ１０，２０，３０，４０のアンテナ１６，２６，３６，４６に接続する。そして、以下に説明する様な手順で登録作業を実行する。
【００４０】
登録作業では、図３のフローチャートに示す様に、まず最初に、監視装置５０をＩＤ登録モードに切り替える（Ｓ１０）。また、各センサ１０，２０，３０，４０もＩＤ登録モードに切り替える（Ｓ２０）。そして、登録ツール６０にセンサ毎のＩＤをセットする（Ｓ３０）。そして、監視装置５０及び各センサ１０，２０，３０，４０にＩＤを送信する（Ｓ４０）。ここで、監視装置５０には、４つのセンサの全てのＩＤを送信し、各センサ１０，２０，３０，４０へは、それぞれのセンサに登録すべきＩＤを送信する。このＩＤを受信した監視装置５０及び各センサ１０，２０，３０，４０では、それぞれＩＤ登録を実行する（Ｓ５０）。そして、監視装置５０及びセンサ１０，２０，３０，４０へのＩＤ登録が完了したか否かを判断する（Ｓ６０）。ＩＤ登録が完了していない場合は（Ｓ６０：ＮＯ）、Ｓ４０以下の手順を繰り返し実行する。ＩＤ登録が完了した場合は（Ｓ６０：ＹＥＳ）、監視装置５０を通常モードに切り替えると共に（Ｓ７０）、各センサ１０，２０，３０，４０も通常モードに切り替えて（Ｓ８０）、ＩＤ登録作業を終了する。
【００４１】
次に、以上の様な登録作業を実行するためにＩＤ登録ツール６０にインストールされているプログラムの内容を図４～図６のフローチャートに従って説明する。ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下すると以下のプログラムが開始される。このプログラムでは、図４に示す様に、まず最初に、タイヤ空気圧監視装置５０及び各センサ１０，２０，３０，４０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ１１０，Ｓ１２０）。
【００４２】

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次に、ディスプレイ６９に、車両の左前のタイヤのＩＤを入力すべき旨の指示メッセージを表示する（Ｓ１３０）。そして、操作パネル６８からの入力が完了したか否かを判定する（Ｓ１４０）。入力が完了したと判定された場合は（Ｓ１４０：ＹＥＳ）、入力結果をメモリ６６内に、タイヤの位置（左前）と対応づけて記憶する（Ｓ１５０）。次に、左後のタイヤのＩＤ入力指示メッセージを表示する（Ｓ１６０）。そして、入力が完了したか否かを判定する（Ｓ１７０）。入力が完了したと判定された場合は（Ｓ１７０：ＹＥＳ）、入力結果をメモリ６６内に、タイヤの位置（左後）と対応づけて記憶する（Ｓ１８０）。次に、右後のタイヤのＩＤ入力指示メッセージを表示する（Ｓ１９０）。そして、入力が完了したか否かを判定する（Ｓ２００）。入力が完了したと判定された場合は（Ｓ２００：ＹＥＳ）、入力結果をメモリ６６内に、タイヤの位置（右後）と対応づけて記憶する（Ｓ２１０）。次に、右前のタイヤのＩＤ入力指示メッセージを表示する（Ｓ２２０）。そして、入力が完了したか否かを判定する（Ｓ２３０）。入力が完了したと判定された場合は（Ｓ２３０：ＹＥＳ）、入力結果をメモリ６６内に、タイヤの位置（右前）と対応づけて記憶する（Ｓ２４０）。

【００４３】

次に、図５に示す様に、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ３１０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ登録を指示するコマンドを送信する（Ｓ３２０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ３３０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ３３０：ＮＯ）、Ｓ３１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ３３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれをこれをタイヤ空気圧監視装置５０に送信する（Ｓ３４０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ３５０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ３６０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ３６０：ＮＯ）、Ｓ３４０へ戻る。一方、登録完了の返信が来た場合には（Ｓ３６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ３７０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ３８０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ３９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ３９０：ＮＯ）、Ｓ３７０へ戻る。一方、登録完了の返信が来た場合には（Ｓ３９０：ＹＥＳ）、次に、メモリ６６から、右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ４００）。続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ４１０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ４２０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ４２０：ＮＯ）、Ｓ４００へ戻る。一方、登録完了の返信が来た場合には（Ｓ４２０：ＹＥＳ）、タイヤ空気圧監視装置５０に対して、通常モードへの復帰を指示するトリガ信号を出力する（Ｓ４３０）。

【００４４】

次に、図６に示す様に、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれを当該空気圧センサ１０に送信する（Ｓ５１０）。続いて、空気圧センサ１０に対してＩＤ登録を指示するコマンドを送信する（Ｓ５２０）。そして、空気圧センサ１０から登録完了の返信が来たか否かを判定する（Ｓ５３０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５３０：ＮＯ）、Ｓ５１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ５３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれを当該空気圧センサ２０に送信する（Ｓ５４０）。続いて、空気圧センサ２０に対してＩＤ登録の指示コマンドを送信する（Ｓ５５０）。そして、空気圧センサ２０から登録完了の返信が来たか否かを判定する（Ｓ５６０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５６０：ＮＯ）、Ｓ５４０へ戻

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る。一方，登録完了の返信が来た場合には（Ｓ５６０：ＹＥＳ），次に，メモリ６６から，右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれを当該空気圧センサ３０に送信する（Ｓ５７０）。続いて，空気圧センサ３０に対してＩＤ登録の指示コマンドを送信する（Ｓ５８０）。そして，空気圧センサ３０から登録完了の返信が来たか否かを判定する（Ｓ５９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５９０：ＮＯ），Ｓ５７０へ戻る。一方，登録完了の返信が来た場合には（Ｓ５９０：ＹＥＳ），次に，メモリ６６から，右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれを当該空気圧センサ４０に送信する（Ｓ６００）。続いて，空気圧センサ４０に対してＩＤ登録の指示コマンドを送信する（Ｓ６１０）。そして，空気圧センサ４０から登録完了の返信が来たか否かを判定する（Ｓ６２０），所定時間以上待ってもこの返信が来ない場合は（Ｓ６２０：ＮＯ），Ｓ６００へ戻る。一方，登録完了の返信が来た場合には（Ｓ６２０：ＹＥＳ），空気圧センサ１０，２０，３０，４０に対して，通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ６３０）。

【００４５】

次に，タイヤ空気圧監視装置５０において実行される制御処理の内容について説明する。この制御処理では，図７に示す様に，まず最初に，ＩＤ登録モードへの切替を指示するトリガ信号を受信したか否かを判定する（Ｓ７００）。ＩＤ登録モードへの切替を指示するトリガ信号を受信した場合には（Ｓ７００：ＹＥＳ），ＩＤ登録モードに切り替え（Ｓ７１０），ＩＤを受信したか否かを判定する（Ｓ７２０）。ＩＤを受信した場合は（Ｓ７２０：ＹＥＳ），このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ７３０）。そして，ＩＤ登録の指示を受信したか否かを判定する（Ｓ７４０）。ＩＤ登録の指示を受信した場合は（Ｓ７４０：ＹＥＳ），Ｓ７３０で一時記憶したＩＤを，メモリ５５内へ，左前のタイヤの空気圧センサのＩＤとして登録する（Ｓ７５０）。そして，ＩＤ登録完了の返信を実行する（Ｓ７６０）。続いて，ＩＤを受信したか否かを判定する（Ｓ７７０）。ＩＤを受信した場合は（Ｓ７７０：ＹＥＳ），このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ７８０）。そして，ＩＤ登録の指示を受信したか否かを判定する（Ｓ７９０）。ＩＤ登録の指示を受信した場合は（Ｓ７９０：ＹＥＳ），Ｓ７８０で一時記憶したＩＤを，メモリ５５内へ，左後のタイヤの空気圧センサのＩＤとして登録する（Ｓ８００）。そして，ＩＤ登録完了の返信を実行する（Ｓ８１０），続いて，ＩＤを受信したか否かを判定する（Ｓ８２０）。ＩＤを受信した場合は（Ｓ８２０：ＹＥＳ），このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ８３０）。そして，ＩＤ登録の指示を受信したか否かを判定する（Ｓ８４０）。ＩＤ登録の指示を受信した場合は（Ｓ８４０：ＹＥＳ），Ｓ８３０で一時記憶したＩＤを，メモリ５５内へ，右後のタイヤの空気圧センサのＩＤとして登録する（Ｓ８５０）。そして，ＩＤ登録完了の返信を実行する（Ｓ８６０）。続いて，ＩＤを受信したか否かを判定する（Ｓ８７０）。ＩＤを受信した場合は（Ｓ８７０：ＹＥＳ），このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ８８０）。そして，ＩＤ登録の指示を受信したか否かを判定する（Ｓ８９０）。ＩＤ登録の指示を受信した場合は（Ｓ８９０：ＹＥＳ），Ｓ８８０で一時記憶したＩＤを，メモリ５５内へ，右後のタイヤの空気圧センサのＩＤとして登録する（Ｓ９００）。そして，ＩＤ登録完了の返信を実行する（Ｓ９１０），その後，モードを通常モードへ切り替えるべき旨のトリガ信号を受信したか否かを判定する（Ｓ９２０）。通常モードへの切替を指示するトリガ信号を受信したら（Ｓ９２０：ＹＥＳ），通常モードに切り替えて処理を終了する（Ｓ９３０）。

【００４６】

次に，空気圧センサ１０，２０，３０，４０において実行される制御処理の内容について説明する。この制御処理では，図８に示す様に，まず最初に，ＩＤ登録モードへの切替を指示するトリガ信号を受信したか否かを判定する（Ｓ１０００）。ＩＤ登録モードへの切替を指示するトリガ信号を受信した場合には（Ｓ１０００：ＹＥＳ），ＩＤ登録モードに切り替え（Ｓ１０１０），ＩＤを受信したか否かを判定する（Ｓ１０２０），ＩＤを受信した場合は（Ｓ１０２０：ＹＥＳ），このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ１０３０），そして，ＩＤ登録の指示を受信したか否かを判定する（Ｓ１０４０），Ｉ

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Ｄ登録の指示を受信した場合は（Ｓ１０４０：ＹＥＳ），Ｓ１０３０で一時記憶したＩＤを，ＩＤメモリ１２，２２，３２，４２内へ登録する（Ｓ１０５０）。そして、ＩＤ登録完了の返信を実行する（Ｓ１０６０）。その後，モードを通常モードへ切り替えるべき旨のトリガ信号を受信したか否かを判定する（Ｓ１０７０）。通常モードへの切替を指示するトリガ信号を受信したら（Ｓ１０７０：ＹＥＳ），通常モードに切り替えて処理を終了する（Ｓ１０８０）。

【００４７】

ここで、Ｓ７５０、Ｓ８００、Ｓ８５０及びＳ９００においては、既にメモリ５５にＩＤが登録されている場合は、これに上書きする様にしてＩＤ登録を実行する。また、Ｓ１０５０においても、既にセンサ１０，２０，３０，４０のＩＤメモリ１２，２２，３２，４２にＩＤが登録されている場合は、これに上書きする様にしてＩＤ登録を実行する。よって，タイヤ交換やローテーションを行う場合に，修理工場やディーラーにおいて新たに設定したＩＤを，各センサ１０，２０，３０，４０及び監視装置５０に対して再登録することができる。

【００４８】

上述したような制御処理が、ＩＤ登録ツール６０、タイヤ空気圧監視装置５０及び各空気圧センサ１０，２０，３０，４０において実行される結果，左前，左後，右後，右前と，タイヤの位置と対応付けて空気圧センサのＩＤを登録することができる。そして、このとき、従来技術のような混信による誤登録や，他の電波による登録不能状態を招くといったことがない。また，タイヤ交換あるいはタイヤのローテーションの際には，上述の強制制御処理により，交換後のタイヤの位置と対応付けてセンサＩＤを登録することができる。また、ローテーションの場合も，位置の変更を要求したＩＤの再登録が可能である。そして，この再登録作業の際にも，混信による誤登録の問題をなくすことができる。

【００４９】

次に、第２の実施の形態について説明する。第２の実施の形態におけるＩＤ登録の手順は第１の実施の形態と同様である。第２の実施の形態のＩＤ登録ツール６０にインストールされているプログラムの内容を図９～図１１のフローチャートに従って説明する。ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下すると以下のプログラムが開始される。このプログラムでは、図９に示す様に，まず最初に，タイヤ空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ１１１０，Ｓ１１２０）。

【００５０】

次に、ディスプレイ６９に，車体番号を入力すべき旨の指示メッセージを表示する（Ｓ１１３０）。そして，車体番号が入力読み込みされたか否かを判定する（Ｓ１１４０）。車体番号が入力されたと判定した場合は（Ｓ１１４０：ＹＥＳ），入力された車体番号の下位ビットとして、さらに，”００”，”０１”，”１０”，”１１”をそれぞれ付加した４つのコードデータを自動的に生成し（Ｓ１１５０），メモリ６６内に，下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして，下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして，下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして，下位ビットとして”１１”を付加したデータを右前のタイヤ用ＩＤとして，それぞれ記憶する（Ｓ１１６０，Ｓ１１７０，Ｓ１１８０，Ｓ１１９０）。

【００５１】

次に，図１０に示す様に，メモリ６６から，まず左前のタイヤの空気圧センサに対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０へと送信する（Ｓ１２１０）。続いて，タイヤ空気圧監視装置５０に対してＩＤ登録を指示するコマンドを送信する（Ｓ１２２０）。そして，タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ１２３０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１２３０：ＮＯ），Ｓ１２１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ１２３０：ＹＥＳ），次に，メモリ６６から，左後のタイヤの空気圧センサに対応するＩＤを読み出してこれを監視装

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置５０へと送信する（Ｓ１２４０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ１２５０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ１２６０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１２６０：ＮＯ）、Ｓ１２４０へ戻る。一方、登録完了の返信が来た場合には（Ｓ１２６０：ＹＥＳ）。次に、メモリ６６から、右後のタイヤの空気圧センサに対応するＩＤを読み出してこれを監視装置５０へと送信する（Ｓ１２７０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ１２８０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ１２９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１２９０：ＮＯ）、Ｓ１２７０へ戻る。一方、登録完了の返信が来た場合には（Ｓ１２９０：ＹＥＳ）。次に、メモリ６６から、右前のタイヤの空気圧センサに対応するＩＤを読み出してこれを監視装置５０へと送信する（Ｓ１３００）。続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ１３１０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ１３２０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１３２０：ＮＯ）。Ｓ１３００へ戻る。一方、登録完了の返信が来た場合には（Ｓ１３２０：ＹＥＳ）、タイヤ空気圧監視装置５０に対して、通常モードへの復帰を指示するトリガ信号を出力する（Ｓ１３３０）。

【００５２】

次に、図１１に示す様に、メモリ６６から、まず左前のタイヤの空気圧センサに対応するＩＤを読み出してこれを左前のタイヤの空気圧センサ１０へと送信する（Ｓ１４１０）。続いて、空気圧センサ１０に対してＩＤ登録を指示するコマンドを送信する（Ｓ１４２０）。そして、空気圧センサ１０から登録完了の返信が来たか否かを判定する（Ｓ１４３０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１４３０：ＮＯ）、Ｓ１４１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ１４３０：ＹＥＳ）。次に、メモリ６６から、左後のタイヤの空気圧センサに対応するＩＤを読み出してこれを左後のタイヤの空気圧センサ２０へと送信する（Ｓ１４４０）。続いて、空気圧センサ２０に対してＩＤ登録の指示コマンドを送信する（Ｓ１４５０）。そして、空気圧センサ２０から登録完了の返信が来たか否かを判定する（Ｓ１４６０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１４６０：ＮＯ）、Ｓ１４４０へ戻る。一方、登録完了の返信が来た場合には（Ｓ１４６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサに対応するＩＤを読み出してこれを右後のタイヤの空気圧センサ３０へと送信する（Ｓ１４７０）。続いて、空気圧センサ３０に対してＩＤ登録の指示コマンドを送信する（Ｓ１４８０）。そして、空気圧センサ３０から登録完了の返信が来たか否かを判定する（Ｓ１４９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１４９０：ＮＯ）、Ｓ１４７０へ戻る。一方、登録完了の返信が来た場合には（Ｓ１４９０：ＹＥＳ）。次に、メモリ６６から、右前のタイヤの空気圧センサに対応するＩＤを読み出してこれを右前のタイヤの空気圧センサ４０へと送信する（Ｓ１５００）。続いて、空気圧センサ４０に対してＩＤ登録の指示コマンドを送信する（Ｓ１５１０）。そして、空気圧センサ４０から登録完了の返信が来たか否かを判定する（Ｓ１５２０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ１５２０：ＮＯ）。Ｓ１５００へ戻る。一方、登録完了の返信が来た場合には（Ｓ１５２０：ＹＥＳ）、空気圧センサ１０，２０，３０，４０に対して、通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ１５３０）。

【００５３】

なお、監視装置５０及びセンサ１０，２０，３０，４０にインストールされているプログラムは第１の実施の形態と同様である。

【００５４】

この第２の実施の形態によれば、各タイヤの空気圧センサのＩＤを、車体番号に基づいて自動生成してこれを設定する様にしたので、各センサに重複することなく固有のＩＤを登録することができ、しかも、ＩＤ設定作業が簡単になるという効果が発揮される。また、車体番号に基づいてタイヤ毎に異なるＩＤを自動的に生成しているので、第１の実施の

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形態と同様に、監視装置５０に対して、タイヤの位置と対応付けて空気圧センサのＩＤを登録することができるという効果も達成される。さらに、タイヤ交換あるいはタイヤのローテーションの際には、センサに対してだけＩＤの再登録を実行するだけで構わない。

【００５５】

次に、第３の実施の形態について説明する。第３の実施の形態のＩＤ登録手順も第１の実施の形態と同様である。この第３の実施の形態のＩＤ登録ツール６０にインストールされているプログラムの内容を図１２～図１４のフローチャートに従って説明する。ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下すると以下のプログラムが開始される。このプログラムでは、図１２に示す様に、まず最初に、タイヤ空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ１６１０，Ｓ１６２０）。

【００５６】

次に、ディスプレイ６９に、車体番号を入力すべき旨の指示メッセージを表示する（Ｓ１６３０）。そして、車体番号が入力読みされたか否かを判定する（Ｓ１６４０）。車体番号が入力されたと判定した場合は（Ｓ１６４０：ＹＥＳ）、乱数発生部によって第１～第４の４つの乱数を発生させる（Ｓ１６５０）。そして、メモリ６６内に、車体番号の下位ビットとして、第１の乱数を付加したデータを左前のタイヤ用ＩＤとして、第２の乱数を付加したデータを左後のタイヤ用ＩＤとして、第３の乱数を付加したデータを右後のタイヤ用ＩＤとして、第４の乱数を付加したデータを右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ１６６０，Ｓ１６７０，Ｓ１６８０，Ｓ１６９０）。

【００５７】

その後は、図１３，図１４に示す様に、第２の実施の形態のＳ１２１０以下と同様の処理を実行する（Ｓ１７１０～Ｓ１８３０，Ｓ１９１０～Ｓ２０３０）。

【００５８】

なお、監視装置５０及びセンサ１０，２０，３０，４０にインストールされているプログラムは第１の実施の形態と同様である。

【００５９】

この第３の実施の形態においても、各タイヤの空気圧センサのＩＤを、車体番号とツール６０の乱数発生部で発生させた４つの乱数とに基づいて自動生成してこれを設定する様にしたので、各センサには重複することなく固有のＩＤを登録することができ、しかも、ＩＤ設定作業が簡単になるという効果が発揮される。また、タイヤ毎に異なるＩＤを自動的に生成しているので、第１の実施の形態と同様に、監視装置５０に対して、タイヤの位置と対応付けて空気圧センサのＩＤを登録することができるという効果も達成される。

【００６０】

次に、第４の実施の形態について説明する。第４の実施の形態のＩＤ登録手順も第１の実施の形態と同様である。この第４の実施の形態のＩＤ登録ツール６０にインストールされているプログラムの内容を図１５～図１７のフローチャートに従って説明する。ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下すると以下のプログラムが開始される。このプログラムでは、図１５に示す様に、まず最初に、タイヤ空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ２１１０，Ｓ２１２０）。

【００６１】

次に、乱数発生部によって第１～第４の４つの乱数を発生させる（Ｓ２１５０）。そして、メモリ６６内に、第１の乱数を左前のタイヤ用ＩＤとして、第２の乱数を左後のタイヤ用ＩＤとして、第３の乱数を右後のタイヤ用ＩＤとして、第４の乱数を右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ２１６０，Ｓ２１７０，Ｓ２１８０，Ｓ２１９０）。

【００６２】

その後は、図１６，図１７に示す様に、第２の実施の形態のＳ１２１０以下と同様の処理を実行する（Ｓ２２１０～Ｓ２３３０，２４１０～２５３０）。

【００６３】

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なお、監視装置５０及びセンサ１０，２０，３０，４０にインストールされているプログラムは第１の実施の形態と同様である。

【００６４】

この第４の実施の形態においても、各タイヤの空気圧センサのＩＤを、ツール６０の乱数発生部で発生させた４つの乱数に基づいて自動生成してこれを設定する様にしたので、各センサには重複することなく固有のＩＤを登録することができ、しかも、ＩＤ設定作業が簡単になるという効果が発揮される。また、タイヤ毎に異なるＩＤを自動的に生成しているので、第１の実施の形態と同様に、監視装置５０に対して、タイヤの位置と対応付けて空気圧センサのＩＤを登録することができるという効果も達成される。

【００６５】

次に、第５の実施の形態を説明する。この第５の実施の形態のＩＤ登録ツール６０は、図１８に示す様に、各空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０に対して信号線６３，６３ａ，６３ｂ，６３ｃ，６３ｄを解して接続するためのコネクタ６４，６４ａ，６４ｂ，６４ｃ，６４ｄの他に、さらに、生産管理用コンピュータ９０と接続するための信号線７１を接続するためのコネクタ７２をも備えている。ＩＤ登録ツール６０は、この信号線７１を介して、生産管理用コンピュータ９０から与えられる生産管理情報に基づいて、ＩＤを設定する様に構成されている。

【００６６】

登録作業では、図１９のフローチャートに示す様に、まず最初に、生産管理用コンピュータ９０から生産管理情報を入力する（Ｓ２６１０）。そして、この生産管理情報に基づいてＩＤをセットする（Ｓ２６２０）。次に、監視装置５０をＩＤ登録モードに切り替えると共に（Ｓ２６３０）、各センサ１０，２０，３０，４０もＩＤ登録モードに切り替える（Ｓ２６４０）。そして、監視装置５０及び各センサ１０，２０，３０，４０にＩＤを送信する（Ｓ２６５０）。このＩＤを受信した監視装置５０及び各センサ１０，２０，３０，４０では、それぞれＩＤ登録を実行する（Ｓ２６６０）。そして、監視装置５０及びセンサ１０，２０，３０，４０へのＩＤ登録が完了したか否かを判断し（Ｓ２６７０）、ＩＤ登録が完了した場合は（Ｓ２６７０：ＹＥＳ）、監視装置５０を通常モードに切り替えると共に（Ｓ２６８０）、各センサ１０，２０，３０，４０も通常モードに切り替えて（Ｓ２６９０）、ＩＤ登録作業を終了する。

【００６７】

次に、以上の様な登録作業を実行するためにＩＤ登録ツール６０にインストールされているプログラムの内容を図２０～図２２のフローチャートに従って説明する。ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下すると以下のプログラムが開始される。このプログラムでは、図２０に示す様に、まず最初に、生産管理用コンピュータから生産管理情報を入力する（Ｓ２７１０）。ここで、生産管理情報としては、車両の製造番号、ロット番号、車種等の生産管理のための各種情報を入力する。次に、この生産管理情報に基づいて、車両を特定するための車両特定情報を生成する（Ｓ２７２０）。車両特定情報としては、例えば、車両の製造番号、ロット番号及び車種を組み合わせた車両固有のコードデータを生成する。次に、この車両固有のコードデータの下位ビットとして、さらに、”００”、”０１”、”１０”、”１１”をそれぞれ付加した４つのコードデータを自動的に生成し（Ｓ２７３０）、メモリ６６内に、下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして、下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして、下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして、下位ビットとして”１１”を付加したデータを右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ２７４０，Ｓ２７５０，Ｓ２７６０，Ｓ２７７０）。以上の様にして、ＩＤの設定が完了したら、次に、タイヤ空気圧監視装置５０及び各センサ１０，２０，３０，４０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ２７８０，Ｓ２７９０）。

【００６８】

その後は、図２１，図２２に示す様に、第２の実施の形態のＳ１２１０以下と同様の処理を実行する（Ｓ２８１０～Ｓ２９３０，３０１０～３１３０）。

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【００６９】
なお、監視装置５０及びセンサ１０，２０，３０，４０にインストールされているプログラムは第１の実施の形態と同様である。
【００７０】
この第５の実施の形態によれば、各タイヤの空気圧センサのＩＤを、生産管理用コンピュータ９０から与えられる生産管理情報に基づいて自動生成してこれを設定する様にしたので、各センサには重複することなく固有のＩＤを登録することができ、しかも、ＩＤ設定作業が簡単になるという効果が発揮される。また、タイヤ毎に異なるＩＤを自動的に生成しているので、第１の実施の形態と同様に、監視装置５０に対して、タイヤの位置と対応付けて空気圧センサのＩＤを登録することができるという効果も達成される。また、ＩＤにロット番号や車種を含ませておくことで、センサ故障の発生した車種及びロットの特定等がスムーズに実施できるという効果も期待できる。
【００７１】
次に、第６の実施の形態について説明する。第６の実施の形態のＩＤ登録ツール６０にインストールされているプログラムの内容を図２３，図２４のフローチャートに従って説明する。ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下すると以下のプログラムが開始される。このプログラムでは、図２３に示す様に、まず最初に、初回登録か再登録かを判断する（Ｓ３２１０），初回登録か再登録かは、操作パネル６８の中に初回登録ボタンと再登録ボタンとを設けることにより、本プログラムを起動するために初回登録ボタンを押下したか再登録ボタンを押下したかにより判断することができる。初回登録であると判断された場合は（Ｓ３２１０：初回登録）、タイヤ空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ３２２０）。
【００７２】
次に、ディスプレイ６９に、車体番号を入力すべき旨の指示メッセージを表示する（Ｓ３２３０）。そして、車体番号が入力読みされたか否かを判定する（Ｓ３２４０）。車体番号が入力されたと判定した場合は（Ｓ３２４０：ＹＥＳ）、当該車体番号をメモリ６６内に記憶する（Ｓ３２５０）。
【００７３】
次に、メモリ６６から車体番号を読み出してこれを全ての空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０へと送信する（Ｓ３２６０）。続いて、空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０に対してＩＤ登録を指示するコマンドを送信する（Ｓ３２７０）。そして、空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ３２８０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ３２８０：ＮＯ）、Ｓ３２６０へ戻る。一方、登録完了の返信が来た場合には（Ｓ３２８０：ＹＥＳ）、空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０に対して、通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ３２９０）。
【００７４】
一方、プログラム起動時に再登録であると判断された場合は（Ｓ３２１０：再登録）、図２４に進み、信号線６３ａに対してだけＩＤ登録モードにするためのトリガ信号を送信する（Ｓ３３１０）。次に、ディスプレイ６９に、車体番号を入力すべき旨の指示メッセージを表示し（Ｓ３３３０）、車体番号が入力されたか否かを判定し（Ｓ３３４０）、車体番号が入力されたと判定した場合は（Ｓ３３４０：ＹＥＳ）、当該車体番号をメモリ６６内に記憶する（Ｓ３３５０）。
【００７５】
次に、メモリ６６から車体番号を読み出してこれを信号線６３ａに対して送信する（Ｓ３３６０）。続いて、信号線６３ａに対してＩＤ登録を指示するコマンドを送信する（Ｓ３３７０）。そして、信号線６３ａから登録完了の返信が来たか否かを判定する（Ｓ３３８０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ３３８０：ＮＯ）、Ｓ３３６０

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へ戻る。一方、登録完了の返信が来た場合には（Ｓ３３８０：ＹＥＳ）、信号線６３ａに対して、通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ３３９０）。

【００７６】

なお、本実施の形態では、再登録の際には、再登録すべきタイヤの空気圧センサに対しては信号線６３ａを接続することとしている。

【００７７】

一方、タイヤ空気圧監視装置５０には、図２５に示す様なプログラムがインストールされている。即ち、ＩＤ登録モードへの切替を指示するトリガ信号を受信したか否かを判定し（Ｓ３４００）、ＩＤ登録モードへの切替を指示するトリガ信号を受信した場合には（Ｓ３４００：ＹＥＳ）、ＩＤ登録モードに切り替え（Ｓ３４１０）、ＩＤを受信したか否かを判定し（Ｓ３４２０）、ＩＤを受信した場合は（Ｓ３４２０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶し（Ｓ３４３０）、ＩＤ登録の指示を受信したか否かを判定し（Ｓ３４４０）、ＩＤ登録の指示を受信した場合は（Ｓ３４４０：ＹＥＳ）、Ｓ３４３０で一時記憶したＩＤを、メモリ５５内へ、空気圧センサのＩＤとして登録し（Ｓ３４５０）、ＩＤ登録完了の返信を実行する（Ｓ３４６０）。その後、モードを通常モードへ切り替えるべき旨のトリガ信号を受信したか否かを判定し（Ｓ３４７０）、通常モードへの切替を指示するトリガ信号を受信したら（Ｓ３４７０：ＹＥＳ）、通常モードに切り替えて処理を終了する（Ｓ３４８０）。

【００７８】

なお、各空気圧センサ１０、２０、３０、４０にインストールされているプログラムは第１の実施の形態と同様である。

【００７９】

この第６の実施の形態によれば、各空気圧センサ１０、２０、３０、４０及び監視装置５０には、車体番号をＩＤとして登録することになる。従って、他の車両の空気圧センサとは確実に区別をすることができる。なお、第１～第５の実施の形態の様に、監視しているタイヤの位置を識別することはできないが、いずれかのタイヤに空気圧の異常が生じているか否かは判別できるので、タイヤ空気圧監視システムとしての機能は十分に達成できる。そして、第１～第５の実施の形態と同様に、ＩＤ登録における通信による誤登録の問題は確実に回避することができる。また、車体番号に基づいてＩＤ登録を行うので、上述の様に、修理工場等におけるタイヤ交換の場合は、交換したタイヤに対するＩＤ登録作業だけでよく、タイヤ交換時のＩＤ登録作業の作業性を向上することができる。

【００８０】

次に、第７の実施の形態を図２６、図２７のフローチャートで説明する。この第７の実施の形態では、図２６に示す様に、まず最初に、初回登録か再登録かを判断する（Ｓ３５００）。初回登録の場合は（Ｓ３５００：初回登録）、監視装置５０をＩＤ登録モードに切り替え（Ｓ３５１０）、各センサ１０、２０、３０、４０もＩＤ登録モードに切り替える（Ｓ３５２０）。そして、登録ツール６０にセンサ毎のＩＤをセットする（Ｓ３５３０）。このとき、ＩＤは、車両に固有の車体番号、製造番号等とタイヤ位置との組合せ情報として設定する。そして、監視装置５０及び各センサ１０、２０、３０、４０にＩＤを送信する（Ｓ３５４０）。ここで、監視装置５０には、４つのセンサの全てのＩＤを送信し、各センサ１０、２０、３０、４０へは、それぞれのセンサに登録すべきＩＤを送信する。このＩＤを受信した監視装置５０及び各センサ１０、２０、３０、４０では、それぞれＩＤ登録を実行する（Ｓ３５５０）。そして、監視装置５０及びセンサ１０、２０、３０、４０へのＩＤ登録が完了したか否かを判断する（Ｓ３５６０）。ＩＤ登録が完了していない場合は（Ｓ３５６０：ＮＯ）、Ｓ３２４０以下の手順を繰り返し実行する。ＩＤ登録が完了した場合は（Ｓ３５６０：ＹＥＳ）、監視装置５０を通常モードに切り替えると共に（Ｓ３５７０）、各センサ１０、２０、３０、４０も通常モードに切り替えて（Ｓ３５８０）、ＩＤ登録作業を終了する。

【００８１】

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一方、再登録の場合は（Ｓ３５００：再登録）、図２７に示す様に、さらに、タイヤ交換かローテーションかを判断する（Ｓ３６１０）。ローテーションの場合は（Ｓ３６１０：ローテーション）、各センサ１０，２０，３０，４０をＩＤ登録モードに切り替える（Ｓ３６２０）。そして、登録ツール６０にセンサ毎のＩＤをセットする（Ｓ３６３０）。このときセットするＩＤは、Ｓ３５３０でセットしたＩＤと同じものになる様にする。そして、各センサ１０，２０，３０，４０にそれぞれのＩＤを送信する（Ｓ３６４０）。このＩＤを受信した各センサ１０，２０，３０，４０では、それぞれＩＤの再登録を実行する（Ｓ３６５０）。即ち、各センサ１０，２０，３０，４０は、既登録のＩＤに対して、上書きにより新たに受信したＩＤを再登録する。続いて、各センサ１０，２０，３０，４０へのＩＤ登録が完了したか否かを判断する（Ｓ３６６０）。ＩＤ登録が完了していない場合は（Ｓ３６６０：ＮＯ）、Ｓ３５４０以下の手順を繰り返し実行する。ＩＤ登録が完了した場合は（Ｓ３６６０：ＹＥＳ）、各センサ１０，２０，３０，４０を通常モードに切り替えて（Ｓ３６７０）、ＩＤ登録作業を終了する。

【００８２】

再登録がタイヤ交換の場合は（Ｓ３６１０：タイヤ交換）、新たに取り付けるタイヤのセンサをＩＤ登録モードに切り替える（Ｓ３７２０）。そして、登録ツール６０に当該センサのＩＤをセットする（Ｓ３７３０）。このときセットするＩＤは、Ｓ３５３０でセットしたＩＤと同じものになる様にする。そして、Ｓ３７２０でＩＤ登録モードにしたセンサに当該センサ用のＩＤを送信する（Ｓ３７４０）。このＩＤを受信したセンサはＩＤ登録を実行する（Ｓ３７５０）。続いて、センサへのＩＤ登録が完了したか否かを判断する（Ｓ３７６０）。ＩＤ登録が完了していない場合は（Ｓ３７６０：ＮＯ）、Ｓ３７４０以下の手順を繰り返し実行する。ＩＤ登録が完了した場合は（Ｓ３７６０：ＹＥＳ）、ＩＤ登録モードにしたセンサを通常モードに切り替えて（Ｓ３７８０）、ＩＤ登録作業を終了する。

【００８３】

次に、以上の様な登録作業を実行するためにＩＤ登録ツール６０にインストールされているプログラムの内容を図２８～図３４のフローチャートに従って説明する。ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下すると以下のプログラムが開始される。このプログラムでは、まず最初に、図２８に示す様に、初回登録か再登録かを判断する（Ｓ３８００）。初回登録か再登録かは、操作パネル６８の中に初回登録ボタンと再登録ボタンとを設けることにより、本プログラムを起動するために初回登録ボタンを押下したか再登録ボタンを押下したかにより判断することができる。初回登録であると判断された場合は（Ｓ３８００：初回登録）、タイヤ空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０のそれぞれに信号線６３，６３ａ～６３ｄを接続すべき旨の指示メッセージをディスプレイ６９に表示し（Ｓ３８０２）、接続完了のパネル操作を待つ（Ｓ３８０４）。接続が完了したら（Ｓ３８０４：ＹＥＳ）、タイヤ空気圧センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ３８１０，Ｓ３８２０）。

【００８４】

次に、ディスプレイ６９に、車体番号を入力すべき旨の指示メッセージを表示する（Ｓ３８３０）。そして、操作パネル６８からの入力が完了したか否かを判定する（Ｓ３８４０）。入力が完了したと判定された場合は（Ｓ３８４０：ＹＥＳ）、入力された車体番号の下位ビットとして、さらに、”００”、”０１”、”１０”、”１１”をそれぞれ付加した４つのコードデータを自動的に生成し（Ｓ３８５０）、メモリ６６内に、下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして、下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして、下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして、下位ビットとして”１１”を付加したデータを右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ３８６０，Ｓ３８７０，Ｓ３８８０，Ｓ３８９０）。

【００８５】

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次に、図２９に示す様に、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ３９１０）、続いて、タイヤ空気圧監視装置５０に対してＩＤ登録を指示するコマンドを送信する（Ｓ３９２０）、そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ３９３０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ３９３０：ＮＯ）、Ｓ３９１０へ戻る、一方、登録完了の返信が来た場合には（Ｓ３９３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれをこれをタイヤ空気圧監視装置５０に送信する（Ｓ３９４０）、続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ３９５０）、そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ３９６０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ３９６０：ＮＯ）、Ｓ３９４０へ戻る、一方、登録完了の返信が来た場合には（Ｓ３９６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ３９７０）、続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ３９８０）、そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ３９９０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ３９９０：ＮＯ）、Ｓ３９７０へ戻る、一方、登録完了の返信が来た場合には（Ｓ３９９０：ＹＥＳ）、次に、メモリ６６から、右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ４０００）、続いて、タイヤ空気圧監視装置５０に対してＩＤ登録の指示コマンドを送信する（Ｓ４０１０）、そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ４０２０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ４０２０：ＮＯ）、Ｓ４０００へ戻る、一方、登録完了の返信が来た場合には（Ｓ４０２０：ＹＥＳ）、タイヤ空気圧監視装置５０に対して、通常モードへの復帰を指示するトリガ信号を出力する（Ｓ４０３０）。

【００８６】

次に、図３０に示す様に、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれを当該空気圧センサ１０に送信する（Ｓ４１１０）、続いて、空気圧センサ１０に対してＩＤ登録を指示するコマンドを送信する（Ｓ４１２０）、そして、空気圧センサ１０から登録完了の返信が来たか否かを判定する（Ｓ４１３０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ４１３０：ＮＯ）、Ｓ４１１０へ戻る、一方、登録完了の返信が来た場合には（Ｓ４１３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれを当該空気圧センサ２０に送信する（Ｓ４１４０）、続いて、空気圧センサ２０に対してＩＤ登録の指示コマンドを送信する（Ｓ４１５０）、そして、空気圧センサ２０から登録完了の返信が来たか否かを判定する（Ｓ４１６０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ４１６０：ＮＯ）、Ｓ４１４０へ戻る、一方、登録完了の返信が来た場合には（Ｓ４１６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれを当該空気圧センサ３０に送信する（Ｓ４１７０）、続いて、空気圧センサ３０に対してＩＤ登録の指示コマンドを送信する（Ｓ４１８０）、そして、空気圧センサ３０から登録完了の返信が来たか否かを判定する（Ｓ４１９０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ４１９０：ＮＯ）、Ｓ４１７０へ戻る、一方、登録完了の返信が来た場合には（Ｓ４１９０：ＹＥＳ）、次に、メモリ６６から、右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれを当該空気圧センサ４０に送信する（Ｓ４２００）、続いて、空気圧センサ４０に対してＩＤ登録の指示コマンドを送信する（Ｓ４２１０）、そして、空気圧センサ４０から登録完了の返信が来たか否かを判定する（Ｓ４２２０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ４２２０：ＮＯ）、Ｓ４２００へ戻る、一方、登録完了の返信が来た場合には（Ｓ４２２０：ＹＥＳ）、空気圧センサ１０、２０、３０、４０に対して、通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ４２３０）。

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【００８７】
一方、再登録ボタンの押下により再登録であると判断された場合は（Ｓ３８００：再登録）、図３１に示す様に、再登録の種類、即ち、ローテーションかタイヤ交換かの入力指示メッセージをディスプレイ６９に表示し（Ｓ４３００）、パネル操作を待つ（Ｓ４３１０）。ローテーションである旨のパネル操作があったときは（Ｓ４３１０：ローテーション）、各センサ１０，２０，３０，４０に対して信号線６３ａ～６３ｄを接続すべき旨の指示メッセージをディスプレイ６９に表示する（Ｓ４３１２）。そして、接続完了のパネル操作を待ち（Ｓ４０１４）、接続完了のパネル操作があったら（Ｓ４３１４：ＹＥＳ）、各タイヤ空気圧センサ１０，２０，３０，４０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ４３２０）。
【００８８】
次に、ディスプレイ６９に、車体番号を入力すべき旨の指示メッセージを表示する（Ｓ４３３０）。そして、操作パネル６８からの入力が完了したか否かを判定する（Ｓ４３４０）。入力が完了したと判定された場合は（Ｓ４３４０：ＹＥＳ）、入力された車体番号の下位ビットとして、さらに、”００”、”０１”、”１０”、”１１”をそれぞれ付加した４つのコードデータを自動的に生成し（Ｓ４３５０）、メモリ６６内に、下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして、下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして、下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして、下位ビットとして”１１”を付加したデータを右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ４３６０，Ｓ４３７０，Ｓ４３８０，Ｓ４３９０）。
【００８９】
次に、図３２に示す様に、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれを当該空気圧センサ１０に送信する（Ｓ４４１０）。続いて、空気圧センサ１０に対してＩＤ登録を指示するコマンドを送信する（Ｓ４４２０）。そして、空気圧センサ１０から登録完了の返信が来たか否かを判定する（Ｓ４４３０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ４４３０：ＮＯ）、Ｓ４４１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ４４３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれを当該空気圧センサ２０に送信する（Ｓ４４４０）。続いて、空気圧センサ２０に対してＩＤ登録の指示コマンドを送信する（Ｓ４４５０）。そして、空気圧センサ２０から登録完了の返信が来たか否かを判定する（Ｓ４４６０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ４４６０：ＮＯ）、Ｓ４４４０へ戻る。一方、登録完了の返信が来た場合には（Ｓ４４６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれを当該空気圧センサ３０に送信する（Ｓ４４７０）。続いて、空気圧センサ３０に対してＩＤ登録の指示コマンドを送信する（Ｓ４４８０）。そして、空気圧センサ３０から登録完了の返信が来たか否かを判定する（Ｓ４４９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ４４９０：ＮＯ）、Ｓ４４７０へ戻る。一方、登録完了の返信が来た場合には（Ｓ４４９０：ＹＥＳ）、次に、メモリ６６から、右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれを当該空気圧センサ４０に送信する（Ｓ４５００）。続いて、空気圧センサ４０に対してＩＤ登録の指示コマンドを送信する（Ｓ４５１０）。そして、空気圧センサ４０から登録完了の返信が来たか否かを判定する（Ｓ４５２０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ４５２０：ＮＯ）、Ｓ４５００へ戻る。一方、登録完了の返信が来た場合には（Ｓ４５２０：ＹＥＳ）、空気圧センサ１０，２０，３０，４０に対して、通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ４５３０）。
【００９０】
また、再登録再登録ボタンが押下され（Ｓ３８００：再登録）、さらに、タイヤ交換が指定された場合は（Ｓ４３１０：タイヤ交換）、図３３に進み、新たに取り付けるセンサに対してセンサ用の信号線を接続すべき旨の指示メッセージをディスプレイ６９に表示して

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（Ｓ４６０２）。接続完了のパネル操作を待つ（Ｓ４３０４）。接続完了のパネル操作があったら（Ｓ４６０４：ＹＥＳ）、次に、センサ用の信号線６３ａ～６３ｄに対して接続確認のためのリクエスト信号を送信し（Ｓ４６０６）、このリクエスト信号への応答を待つ（Ｓ４６０８）。応答があったら（Ｓ４６０８：ＹＥＳ）、応答があったセンサ用の信号線だけをアクティブ状態に設定する（Ｓ４６１０）。そして、このアクティブ状態に設定した信号線に対してだけタイヤ空気圧センサをＩＤ登録モードにするためのトリガ信号を送信する（Ｓ４６２０）。

【００９１】

次に、ディスプレイ６９に、車体番号を入力すべき旨の指示メッセージを表示する（Ｓ４６３０）。そして、操作パネル６８からの入力が完了したか否かを判定する（Ｓ４６４０）。入力が完了したと判定された場合は（Ｓ４６４０：ＹＥＳ）、入力された車体番号の下位ビットとして、さらに、”００”、”０１”、”１０”、”１１”をそれぞれ付加した４つのコードデータを自動的に生成し（Ｓ４６５０）、メモリ６６内に、下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして、下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして、下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして、下位ビットとして”１１”を付加したデータを右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ４６６０、Ｓ４６７０、Ｓ４６８０、Ｓ４６９０）。

【００９２】

次に、図３４に進み、Ｓ４６１０でアクティブ状態に設定した信号線の内の一つを特定し（Ｓ４７００）、この信号線に対応するタイヤ位置のＩＤ設定値をメモリ６６から読み出し（Ｓ４７１０）、このＩＤ設定値を当該信号線に送信する（Ｓ４７２０）。続いて、ＩＤを送信した信号線に対してＩＤ登録を指示するコマンドを送信する（Ｓ４７３０）。そして、この信号線を介して空気圧センサから登録完了の返信が来たか否かを判定する（Ｓ４７４０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ４７４０：ＮＯ）、Ｓ４７１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ４７４０：ＹＥＳ）、次に、この信号線に対して空気圧センサを通常モードへ復帰させるためのトリガ信号を出力すると共に（Ｓ４７５０）、当該信号線をアクティブ状態からノンアクティブ状態に設定変更する（Ｓ４７６０）。そして、Ｓ４６１０でアクティブ状態に設定した信号線がまだ残っているか否かを判定する（Ｓ４７７０）。まだ残っているときは（Ｓ４７７０：ＹＥＳ）、その内の一つの信号線を特定し（Ｓ４７８０）、Ｓ４７１０へ戻る。一方、アクティブ状態に設定した信号線が残っていない場合は（Ｓ４７７０：ＮＯ）、処理を終了する。

【００９３】

タイヤ空気圧監視装置５０において実行される制御処理の内容は、第１の実施の形態と同様である。一方、空気圧センサには、以下に説明する様な制御処理プログラムがインストールされている。この制御処理では、図３５に示す様に、まず最初に、接続確認のリクエスト信号を受信したか否かを判定する（Ｓ４８００）。接続確認のリクエスト信号を受信したら、応答信号を返信し（Ｓ４８０５）、さらに、ＩＤ登録モードへの切替を指示するトリガ信号を受信したか否かを判定する（Ｓ４８１０）。ＩＤ登録モードへの切替を指示するトリガ信号を受信した場合には（Ｓ４８１０：ＹＥＳ）、ＩＤ登録モードに切り替え（Ｓ４８２０）、ＩＤを受信したか否かを判定する（Ｓ４８３０）。ＩＤを受信した場合は（Ｓ４８３０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ４８４０）。そして、ＩＤ登録の指示を受信したか否かを判定する（Ｓ４８５０）。ＩＤ登録の指示を受信した場合は（Ｓ４８５０：ＹＥＳ）、Ｓ４８４０で一時記憶したＩＤを、ＩＤメモリ内へ登録する（Ｓ４８６０）。そして、ＩＤ登録完了の返信を実行する（Ｓ４８７０）。その後、モードを通常モードへ切り替えるべき旨のトリガ信号を受信したか否かを判定する（Ｓ４８８０）。通常モードへの切替を指示するトリガ信号を受信したら（Ｓ４８８０：ＹＥＳ）、通常モードに切り替えて処理を終了する（Ｓ４８９０）。なお、接続確認のためのリクエスト信号を受信しない場合は（Ｓ４８００：ＮＯ）、Ｓ４８０５をパスしてＳ４８１０へ進む。

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【００９４】
ここで、Ｓ４８６０においては、既にセンサのＩＤメモリにＩＤが登録されている場合は、これに上書きする様にしてＩＤ登録を実行する。よって、タイヤ交換やローテーションを行う場合に、修理工場やディーラーにおいて新たに設定したＩＤを、各センサ１０、２０、３０、４０に対してタイヤ位置に応じて再登録することができる。なお、タイヤ空気圧監視装置５０には、初回登録によりタイヤ位置と関連付けてセンサＩＤが登録されているので、ローテーションやタイヤ交換の際の再登録の必要はない。
【００９５】
この第７の実施の形態によれば、タイヤ交換による再登録は、新たに取り付けるタイヤのセンサに対してだけ実行すればよいので、ＩＤ登録作業を必要最小限とすることができる。
【００９６】
次に、第８の実施の形態を説明する。この第８の実施の形態の作業手順は第７の実施の形態と同様である。第８の実施の形態では、ＩＤ登録ツール６０には図３６～図４３のフローチャートに示すようなプログラムがインストールされており、ＩＤ登録ツール６０の操作パネル６８の所定のボタンを押下するとこのプログラムが開始される。このプログラムでは、図３６に示す様に、まず最初に、初回登録か再登録かを判断し（Ｓ４９００）、初回登録であると判断された場合は（Ｓ４９００：初回登録）、タイヤ空気圧センサ１０、２０、３０、４０及びタイヤ空気圧監視装置５０のそれぞれに信号線６３、６３ａ～６３ｄを接続すべき旨の指示メッセージをディスプレイ６９に表示し（Ｓ４９０２）、接続完了のパネル操作を待つ（Ｓ４９０４）。接続が完了したら（Ｓ４９０４：ＹＥＳ）、タイヤ空気圧センサ１０、２０、３０、４０及びタイヤ空気圧監視装置５０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ４９１０、Ｓ４９２０）。
【００９７】
次に、乱数発生器を作動させて乱数を発生させる（Ｓ４９３０）。続いて、この乱数の下位ビットとして、”００”、”０１”、”１０”、”１１”をそれぞれ付加した４つのコードデータを自動的に生成し（Ｓ４９５０）、メモリ６６内に、下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして、下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして、下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして、下位ビットとして”１１”を付加したデータを右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ４９６０、Ｓ４９７０、Ｓ４９８０、Ｓ４９９０）。
【００９８】
次に、図３７に進み、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ５０１０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ初回登録を指示するコマンドを送信する（Ｓ５０２０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５０３０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５０３０：ＮＯ）、Ｓ５０１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ５０３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれをこれをタイヤ空気圧監視装置５０に送信する（Ｓ５０４０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ初回登録の指示コマンドを送信する（Ｓ５０５０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５０６０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５０６０：ＮＯ）、Ｓ５０４０へ戻る。一方、登録完了の返信が来た場合には（Ｓ５０６０：ＹＥＳ）。次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ５０７０）。続いて、タイヤ空気圧監視装置５０に対してＩＤ初回登録の指示コマンドを送信する（Ｓ５０８０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５０９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５０９０：ＮＯ）、Ｓ５０７０へ戻る。一方、登録完了の返信が来た場合には（Ｓ５０９０：ＹＥＳ）。次に、メモリ６６から、右前のタイヤの空気圧センサ４

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０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ５１００）。続いて、タイヤ空気圧監視装置５０に対してＩＤ初回登録の指示コマンドを送信する（Ｓ５１１０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５１２０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５１２０：ＮＯ）、Ｓ５１００へ戻る。一方、登録完了の返信が来た場合には（Ｓ５１２０：ＹＥＳ）、タイヤ空気圧監視装置５０に対して、通常モードへの復帰を指示するトリガ信号を出力する（Ｓ５１３０）。

【００９９】

次に、図３８に進み、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれを当該空気圧センサ１０に送信する（Ｓ５２１０）。続いて、空気圧センサ１０に対してＩＤ初回登録を指示するコマンドを送信する（Ｓ５２２０）。そして、空気圧センサ１０から登録完了の返信が来たか否かを判定する（Ｓ５２３０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５２３０：ＮＯ）、Ｓ５２１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ５２３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれを当該空気圧センサ２０に送信する（Ｓ５２４０）。続いて、空気圧センサ２０に対してＩＤ初回登録の指示コマンドを送信する（Ｓ５２５０）。そして、空気圧センサ２０から登録完了の返信が来たか否かを判定する（Ｓ５２６０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５２６０：ＮＯ）、Ｓ５２４０へ戻る。一方、登録完了の返信が来た場合には（Ｓ５２６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれを当該空気圧センサ３０に送信する（Ｓ５２７０）。続いて、空気圧センサ３０に対してＩＤ初回登録の指示コマンドを送信する（Ｓ５２８０）。そして、空気圧センサ３０から登録完了の返信が来たか否かを判定する（Ｓ５２９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５２９０：ＮＯ）、Ｓ５２７０へ戻る。一方、登録完了の返信が来た場合には（Ｓ５２９０：ＹＥＳ）、次に、メモリ６６から、右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれを当該空気圧センサ４０に送信する（Ｓ５３００）。続いて、空気圧センサ４０に対してＩＤ初回登録の指示コマンドを送信する（Ｓ５３１０）。そして、空気圧センサ４０から登録完了の返信が来たか否かを判定する（Ｓ５３２０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ５３２０：ＮＯ）、Ｓ５３００へ戻る。一方、登録完了の返信が来た場合には（Ｓ５３２０：ＹＥＳ）、空気圧センサ１０，２０，３０，４０に対して、通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ５３３０）。

【０１００】

一方、再登録再登録ボタンの押下により再登録であると判断された場合は（Ｓ４９００：再登録）、図３９に進み、再登録の種類、即ち、ローテーションかタイヤ交換かの入力指示メッセージをディスプレイ６９に表示し（Ｓ５４００）、パネル操作を待つ（Ｓ５４１０）、ローテーションである旨のパネル操作があったときは（Ｓ５４１０：ローテーション）、各センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０に対して信号線６３ａ～６３ｄを接続すべき旨の指示メッセージをディスプレイ６９に表示する（Ｓ５４１２）。そして、接続完了のパネル操作を待ち（Ｓ５４１４）、接続完了のパネル操作があったら（Ｓ５４１４：ＹＥＳ）、各タイヤ空気圧センサ１０、２０、３０、４０及びタイヤ空気圧監視装置５０をＩＤ登録モードにするためのトリガ信号を送信する（Ｓ５４１０，Ｓ５４２０）。

【０１０１】

次に、乱数発生部を作動させて乱数を発生させる（Ｓ５４３０）。続いて、この乱数の下位ビットとして、”００”、”０１”、”１０”、”１１”をそれぞれ付加した４つのコードデータを自動的に生成し（Ｓ５４４０）、メモリ６６内に、下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして、下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして、下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして、下位ビットとして”１１”を付加したデータを右前のタイヤ用Ｉ

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Dとして、それぞれ記憶する（Ｓ５４６０，Ｓ５４７０，Ｓ５４８０，Ｓ５４９０）。

【０１０２】

次に、図４０に進み、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれを当該空気圧センサ１０に送信する（Ｓ５５１０）、続いて、空気圧センサ１０に対してローテーション時ＩＤ再登録を指示するコマンドを送信する（Ｓ５５２０）、そして、空気圧センサ１０から登録完了の返信が来たか否かを判定する（Ｓ５５３０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５５３０：ＮＯ）、Ｓ５５１０へ戻る、一方、登録完了の返信が来た場合には（Ｓ５５３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれを当該空気圧センサ２０に送信する（Ｓ５５４０）、続いて、空気圧センサ２０に対してローテーション時ＩＤ再登録の指示コマンドを送信する（Ｓ５５５０）、そして、空気圧センサ２０から登録完了の返信が来たか否かを判定する（Ｓ５５６０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５５６０：ＮＯ）、Ｓ５５４０へ戻る、一方、登録完了の返信が来た場合には（Ｓ５５６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれを当該空気圧センサ３０に送信する（Ｓ５５７０）、続いて、空気圧センサ３０に対してローテーション時ＩＤ再登録の指示コマンドを送信する（Ｓ５５８０）、そして、空気圧センサ３０から登録完了の返信が来たか否かを判定する（Ｓ５５９０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５５９０：ＮＯ）、Ｓ５５７０へ戻る、一方、登録完了の返信が来た場合には（Ｓ５５９０：ＹＥＳ）、次に、メモリ６６から、右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれを当該空気圧センサ４０に送信する（Ｓ５６００）、続いて、空気圧センサ４０に対してローテーション時ＩＤ再登録の指示コマンドを送信する（Ｓ５６１０）、そして、空気圧センサ４０から登録完了の返信が来たか否かを判定する（Ｓ５６２０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５６２０：ＮＯ）、Ｓ５３１０へ戻る、一方、登録完了の返信が来た場合には（Ｓ５６２０：ＹＥＳ）、空気圧センサ１０、２０、３０、４０に対して、通常モードへの復帰を指示するトリガ信号を出力する（Ｓ５６３０）。

【０１０３】

次に、図４１に進み、メモリ６６から、まず左前のタイヤの空気圧センサ１０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ５７１０）、続いて、監視装置５０に対してローテーション時ＩＤ再登録を指示するコマンドを送信する（Ｓ５７２０）、そして、監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５７３０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５７３０：ＮＯ）、Ｓ５７１０へ戻る、一方、登録完了の返信が来た場合には（Ｓ５７３０：ＹＥＳ）、次に、メモリ６６から、左後のタイヤの空気圧センサ２０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ５７４０）、続いて、監視装置５０に対してローテーション時ＩＤ再登録の指示コマンドを送信する（Ｓ５７５０）、そして、監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５７６０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５７６０：ＮＯ）、Ｓ５７４０へ戻る、一方、登録完了の返信が来た場合には（Ｓ５７６０：ＹＥＳ）、次に、メモリ６６から、右後のタイヤの空気圧センサ３０に対応するＩＤを読み出してこれをタイヤ空気圧監視装置５０に送信する（Ｓ５７７０）、続いて、監視装置５０に対してローテーション時ＩＤ再登録の指示コマンドを送信する（Ｓ５７８０）、そして、監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５７９０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５７９０：ＮＯ）、Ｓ５７７０へ戻る、一方、登録完了の返信が来た場合には（Ｓ５７９０：ＹＥＳ）、次に、メモリ６６から、右前のタイヤの空気圧センサ４０に対応するＩＤを読み出してこれを監視装置５０に送信する（Ｓ５８００）、続いて、監視装置５０に対してローテーション時ＩＤ再登録の指示コマンドを送信する（Ｓ５８１０）、そして、監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ５８２０）、所定時間以上待ってもこの返信が来ない場合は（Ｓ５８２０：ＮＯ）、Ｓ５８００へ戻る、一方、登録完了の返信が来た場合に

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は（Ｓ５８２０：ＹＥＳ）、監視装置５０に対して、通常モードへの復帰を指示するトリガ信号を出力して処理を終了する（Ｓ５８３０）。

【０１０４】

また、再登録再登録ボタンが押下され（Ｓ４９００：再登録）、さらに、タイヤ交換が指定された場合は（Ｓ５４１０：タイヤ交換）、図４２に示す様に、新たに取り付けるセンサ及びタイヤ空気圧監視装置５０に対して信号線を接続すべき旨の指示メッセージをディスプレイ６９に表示して（Ｓ５９０２）、接続完了のパネル操作を待つ（Ｓ５９０４）、接続完了のパネル操作があったら（Ｓ５９０４：ＹＥＳ）、次に、センサ用の信号線６３ａ～６３ｄに対して接続確認のためのリクエスト信号を送信し（Ｓ５９０６）、このリクエスト信号への応答を待つ（Ｓ５９０８）、応答があったら（Ｓ５９０８：ＹＥＳ）、応答があったセンサ用の信号線だけをアクティブ状態に設定する（Ｓ５９１０）、そして、このアクティブ状態に設定した信号線に対してだけタイヤ空気圧センサをＩＤ登録モードにするためのトリガ信号を送信する（Ｓ５９２０）。

【０１０５】

次に、乱数発生部を作動させて乱数を発生させる（Ｓ５９３０）。続いて、この乱数の下位ビットとして、”００”、”０１”、”１０”、”１１”をそれぞれ付加した4つのコードデータを自動的に生成し（Ｓ５９４０）、メモリ６６内に、下位ビットとして”００”を付加したデータを左前のタイヤ用ＩＤとして、下位ビットとして”０１”を付加したデータを左後のタイヤ用ＩＤとして、下位ビットとして”１０”を付加したデータを右後のタイヤ用ＩＤとして、下位ビットとして”１１”を付加したデータを右前のタイヤ用ＩＤとして、それぞれ記憶する（Ｓ５９６０、Ｓ５９７０、Ｓ５９８０、Ｓ５９９０）。

【０１０６】

次に、図４３に示す様に、アクティブ状態に設定した信号線の内の一つを特定し（Ｓ６０００）、この信号線に対応するタイヤ位置のＩＤ設定値をメモリ６６から読み出し（Ｓ６０１０）、このＩＤ設定値を当該信号線に送信する（Ｓ６０２０）。続いて、ＩＤを送信した信号線に対してタイヤ交換時ＩＤ再登録を指示するコマンドを送信する（Ｓ６０３０）。そして、この信号線を介して空気圧センサから登録完了の返信が来たか否かを判定する（Ｓ６０４０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ６０４０：ＮＯ）、Ｓ６０１０へ戻る。一方、登録完了の返信が来た場合には（Ｓ６０４０：ＹＥＳ）、次に、この信号線に対して空気圧センサを通常モードへ復帰させるためのトリガ信号を出力すると共に（Ｓ６０５０）、当該信号線をアクティブ状態からノンアクティブ状態に設定変更する（Ｓ６０６０）。次に、Ｓ６０１０で読み出したＩＤ設定値を、タイヤ位置情報と共にタイヤ空気圧監視装置５０へと送信する（Ｓ６０７０）。続いて、タイヤ空気圧監視装置５０に対してタイヤ交換時ＩＤ再登録を指示するコマンドを送信する（Ｓ６０８０）。そして、タイヤ空気圧監視装置５０から登録完了の返信が来たか否かを判定する（Ｓ６０９０）。所定時間以上待ってもこの返信が来ない場合は（Ｓ６０９０：ＮＯ）、Ｓ６０７０へ戻る。一方、登録完了の返信が来た場合には（Ｓ６０９０：ＹＥＳ）、Ｓ６０１０でアクティブ状態に設定した信号線がまだ残っているか否かを判定する（Ｓ６１００）。まだ残っているときは（Ｓ６１００：ＹＥＳ）、その内の1の信号線を特定し（Ｓ６１１０）、Ｓ６０１０へ戻る。一方、アクティブ状態に設定した信号線が残っていない場合は（Ｓ６１１０：ＮＯ）、タイヤ空気圧監視装置５０を通常モードへ復帰させるためのトリガ信号を出力して（Ｓ６１２０）、処理を終了する。

【０１０７】

次に、タイヤ空気圧監視装置５０において実行される制御処理の内容について図４４～図４６に基づいて説明する。この制御処理では、図４４に示す様に、まず最初に、ＩＤ登録モードへの切替を指示するトリガ信号を受信したか否かを判定する（Ｓ６２００）。ＩＤ登録モードへの切替を指示するトリガ信号を受信した場合には（Ｓ６２００：ＹＥＳ）、ＩＤ登録モードに切り替え（Ｓ６２１０）、ＩＤを受信したか否かを判定する（Ｓ６２２０）。ＩＤを受信した場合は（Ｓ６２２０：ＹＥＳ）、このＩＤをタイヤ位置情報と共にＲＡＭのワークエリアに一時記憶する（Ｓ６２３０）。そして、ＩＤ初回登録、ローテー

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ション時ＩＤ再登録又はタイヤ交換時ＩＤ再登録のいずれの指示を受信したか否かを判定する（Ｓ６２４０）。ＩＤ初回登録の指示を受信した場合は（Ｓ６２４０：初回登録）、Ｓ６２３０で一時記憶したＩＤを、メモリ５５内へ、左前のタイヤの空気圧センサのＩＤとして登録する（Ｓ６２５０）。そして、ＩＤ登録完了の返信を実行する（Ｓ６２６０）。続いて、ＩＤを受信したか否かを判定する（Ｓ６２７０）。ＩＤを受信した場合は（Ｓ６２７０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ６２８０）。そして、ＩＤ初回登録の指示を受信したか否かを判定する（Ｓ６２９０）。ＩＤ初回登録の指示を受信した場合は（Ｓ６２９０：ＹＥＳ）、Ｓ６２８０で一時記憶したＩＤを、メモリ５５内へ、左後のタイヤの空気圧センサのＩＤとして登録する（Ｓ６３００）。そして、ＩＤ登録完了の返信を実行する（Ｓ６３１０）。続いて、ＩＤを受信したか否かを判定する（Ｓ６３２０）。ＩＤを受信した場合は（Ｓ６３２０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ６３９０）。そして、ＩＤ初回登録の指示を受信したか否かを判定する（Ｓ６３４０）。ＩＤ初回登録の指示を受信した場合は（Ｓ６３４０：ＹＥＳ）、Ｓ６３３０で一時記憶したＩＤを、メモリ５５内へ、右後のタイヤの空気圧センサのＩＤとして登録する（Ｓ６３５０）。そして、ＩＤ登録完了の返信を実行する（Ｓ６３６０）。続いて、ＩＤを受信したか否かを判定する（Ｓ６３７０）。ＩＤを受信した場合は（Ｓ６３７０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ６３８０）。そして、ＩＤ初回登録の指示を受信したか否かを判定する（Ｓ６３９０）。ＩＤ初回登録の指示を受信した場合は（Ｓ６３９０：ＹＥＳ）、Ｓ６３８０で一時記憶したＩＤを、メモリ５５内へ、右後のタイヤの空気圧センサのＩＤとして登録する（Ｓ６４００）。そして、ＩＤ登録完了の返信を実行する（Ｓ６４１０）。その後、モードを通常モードへ切り替えるべき旨のトリガ信号を受信したか否かを判定する（Ｓ６４２０）。通常モードへの切替を指示するトリガ信号を受信したら（Ｓ６４２０：ＹＥＳ）、通常モードに切り替えて処理を終了する（Ｓ６４３０）。

【０１０８】

また、Ｓ６２４０において、ローテーション時ＩＤ再登録の指示を受信した場合は（Ｓ６２４０：ローテーション）、図４５に示す様に、Ｓ６２３０で一時記憶したＩＤを、メモリ５５内へ、左前のタイヤの空気圧センサのＩＤとして上書きによる再登録を実行する（Ｓ６５５０）。そして、ＩＤ登録完了の返信を実行する（Ｓ６５６０）。続いて、ＩＤを受信したか否かを判定する（Ｓ６５７０）。ＩＤを受信した場合は（Ｓ６５７０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ６５８０）。そして、ＩＤ初回登録の指示を受信したか否かを判定する（Ｓ６５９０）。ＩＤ初回登録の指示を受信した場合は（Ｓ６５９０：ＹＥＳ）、Ｓ６５８０で一時記憶したＩＤを、メモリ５５内へ、左後のタイヤの空気圧センサのＩＤとして上書きによる再登録を実行する（Ｓ６６００）。そして、ＩＤ登録完了の返信を実行する（Ｓ６６１０）。続いて、ＩＤを受信したか否かを判定する（Ｓ６６２０）。ＩＤを受信した場合は（Ｓ６６２０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ６６３０）。そして、ＩＤ初回登録の指示を受信したか否かを判定する（Ｓ６６４０）。ＩＤ初回登録の指示を受信した場合は（Ｓ６６４０：ＹＥＳ）、Ｓ６６３０で一時記憶したＩＤを、メモリ５５内へ、右後のタイヤの空気圧センサのＩＤとして上書きによる再登録を実行する（Ｓ６６５０）。そして、ＩＤ登録完了の返信を実行する（Ｓ６６６０）。続いて、ＩＤを受信したか否かを判定する（Ｓ６６７０）。ＩＤを受信した場合は（Ｓ６６７０：ＹＥＳ）、このＩＤをＲＡＭのワークエリアに一時記憶する（Ｓ６６８０）。そして、ＩＤ初回登録の指示を受信したか否かを判定する（Ｓ６６９０）。ＩＤ初回登録の指示を受信した場合は（Ｓ６６９０：ＹＥＳ）、Ｓ６６８０で一時記憶したＩＤを、メモリ５５内へ、右後のタイヤの空気圧センサのＩＤとして上書きによる再登録を実行する（Ｓ６７００）。そして、ＩＤ登録完了の返信を実行する（Ｓ６７１０）。その後、モードを通常モードへ切り替えるべき旨のトリガ信号を受信したか否かを判定する（Ｓ６７２０）。通常モードへの切替を指示するトリガ信号を受信したら（Ｓ６７２０：ＹＥＳ）、通常モードに切り替えて処理を終了する（Ｓ６７３０）。

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【０１０９】
また、Ｓ６２４０において、タイヤ交換時ＩＤ再登録の指示を受信した場合は（Ｓ６２４０：タイヤ交換）、図４６に示す様に、Ｓ６２３０で一時記憶したＩＤを読み出すと共に、Ｓ６２３０で受信したタイヤ位置の情報に基づいて、メモリ５５内の該当するタイヤ位置の空気圧センサのＩＤとして上書きによる登録を実行する（Ｓ６８１０）。そして、ＩＤ登録完了の返信を実行する（Ｓ６８２０）。続いて、ＩＤを受信したか否かを判定する（Ｓ６８３０）。ＩＤを受信した場合は（Ｓ６８３０：ＹＥＳ）、このＩＤをタイヤ位置情報と共にＲＡＭ内に一時記憶した上で（Ｓ６８４０）、タイヤ交換時ＩＤ再登録の指示を受信したか否かを判定する（Ｓ６８５０）。そして、タイヤ交換時ＩＤ再登録の指示を受信した場合は（Ｓ６８５０：ＹＥＳ）、Ｓ６８１０に戻る。一方、ＩＤを受信しない場合は（Ｓ６８３０：ＮＯ）、モードを通常モードへ切り替えるべき旨のトリガ信号を受信したか否かを判定する（Ｓ６８６０）。通常モードへの切替を指示するトリガ信号を受信したら（Ｓ６８６０：ＹＥＳ）、通常モードに切り替えて処理を終了する（Ｓ６８７０）。

【０１１０】
なお、空気圧センサにおいて実行される制御処理の内容は、第７の実施の形態と同様である。

【０１１１】
この第８の実施の形態においても、タイヤ交換による再登録は、新たに取り付けるタイヤのセンサに対してだけ実行すればよいので、タイヤ交換時のＩＤ登録作業の工数を軽減することができる。また、ツールの乱数発生機能を利用してセンサＩＤを設定するので、初回登録及び再登録のいずれにおいても、作業者の負担を軽減することができる。

【０１１２】
以上、本発明の実施の形態について説明したが、本発明はこの実施の形態に限られるものではなく、その要旨を逸脱しない範囲内においてさらに種々の形態を採用することができることはもちろんである。

【０１１３】
各実施の形態としては、有線でツールからセンサ１０、２０、３０、４０及びタイヤ空気圧監視装置５０へとＩＤを送信して登録を行うものを説明したが、ツールから設定したＩＤを無線で電波により送信する様にしても構わない。この場合、例えば、センサ１０，２０，３０，４０及びタイヤ空気圧監視装置５０の受信回路を、ＩＤ登録モードにするためのトリガ信号を受信したら、通常の圧力検出信号とは異なる特定の周波数帯の信号のみを受信し得る状態になる様に特定のバンドパスフィルタを機能させる様にしておき、ツール６０からはこの特定の周波数帯の信号としてＩＤ設定値を送信する様にしたり、ツール６０からの電波の指向性を高めて混信を防止したり、あるいは、指向性の高い情報伝送媒体（例えば超音波など）をＩＤ登録に採用するなどといった構成をとっても構わない。

【０１１４】
また、例えば、乱数によりＩＤを設定する場合、偶然の一致を避けるために、さらに、日時やＬＦの情報などを組み合わせてＩＤを生成する様にしてもよい。ツールにＩＤを手入力で設定する場合も、入力値だけではなく、日時やＩＤ登録場所、あるいは作業者コードなどを組み合わせる様にすれば、偶然の一致を避けることができる。

【０１１５】
さらに、第８の実施の形態ではローテーションやタイヤ交換による再登録時にはタイヤ空気圧監視装置５０へは上書きによりＩＤを再登録することとしたが、上書きではなく、以前のＩＤを登録したままで新たなＩＤを登録する様にしても構わない。これは、センサ側のＩＤが初回登録時とは変更されることで、圧力検出信号は再登録後のＩＤと共にしか送信されて来ないので、初回登録時のＩＤが監視装置５０内に残っていても機能上差し支えないからである。

【０１１６】
加えて、ローテーションやタイヤ交換による再登録時にはタイヤ空気圧監視装置５０内に

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は、再登録である旨や、さらに再登録の回数をＩＤに付随させた情報として記憶する様にしておくと、ローテーション履歴やタイヤ交換頻度を監視装置５０のＩＤ登録情報から把握することが可能になるという効果も期待できる。

【図面の簡単な説明】

【図１】実施の形態のタイヤ空気圧監視システムの構成を示すブロック図である。

【図２】実施の形態におけるＩＤ登録のための装置構成を示す模式図である。

【図３】実施の形態におけるＩＤ登録手順を示すフローチャートである。

【図４】図３に示したＩＤ登録手順を実現するためのＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図５】図３に示したＩＤ登録手順を実現するためのＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図６】図３に示したＩＤ登録手順を実現するためのＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図７】図３に示したＩＤ登録手順を実現するためのタイヤ空気圧監視装置における制御処理の内容を示すフローチャートである。

【図８】図３に示したＩＤ登録手順を実現するためのタイヤ空気圧センサにおける制御処理の内容を示すフローチャートである。

【図９】第２の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１０】第２の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１１】第２の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１２】第３の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１３】第３の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１４】第３の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１５】第４の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１６】第４の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１７】第４の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図１８】第５の実施の形態におけるＩＤ登録のための装置構成を示す模式図である。

【図１９】第５の実施の形態におけるＩＤ登録手順を示すフローチャートである。

【図２０】第５の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図２１】第５の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図２２】第５の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図２３】第６の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図２４】第６の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。

【図２５】第６の実施の形態におけるタイヤ空気圧監視装置における制御処理の内容を示すフローチャートである。

【図２６】第７の実施の形態におけるＩＤ登録手順を示すフローチャートである。

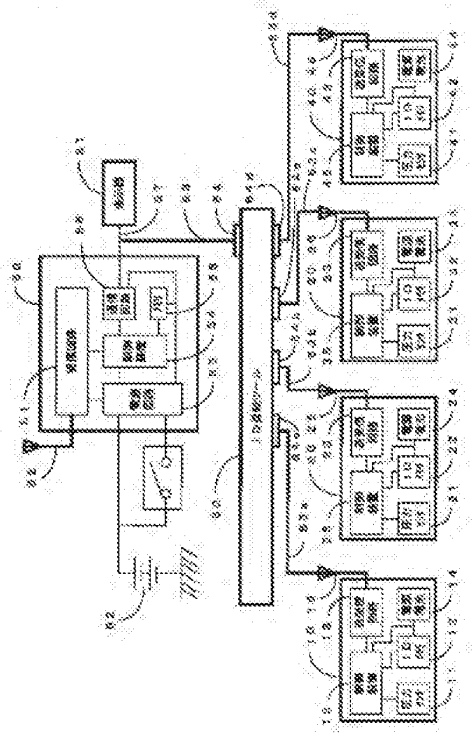
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【図２７】第７の実施の形態におけるＩＤ登録手順を示すフローチャートである。
【図２８】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図２９】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３０】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３１】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３２】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３３】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３４】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３５】第７の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３６】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３７】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３８】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図３９】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図４０】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図４１】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図４２】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図４３】第８の実施の形態におけるＩＤ登録ツールの制御処理の内容を示すフローチャートである。
【図４４】第８の実施の形態におけるタイヤ空気圧監視装置の制御処理の内容を示すフローチャートである。
【図４５】第８の実施の形態におけるタイヤ空気圧監視装置の制御処理の内容を示すフローチャートである。
【図４６】第８の実施の形態におけるタイヤ空気圧監視装置の制御処理の内容を示すフローチャートである。
【図４７】従来例のタイヤ空気圧監視システムの構成を示すブロック図である。
【図４８】例におけるＩＤ登録手順の内容を示すフローチャートである。
【符号の説明】
１０，２０，３０，４０・・・空気圧センサ
１１，２１，３１，４１・・・圧力センサ
１２，２２，３２，４２・・・ＩＤメモリ
１３，２３，３３，４３・・・送信回路
１３ａ，２３ａ，３３ａ，４３ａ・・・送受信回路
１４，２４，３４，４４・・・電源電池
１５，２５，３５，４５・・・制御装置
１６，２６，３６，４６・・・アンテナ

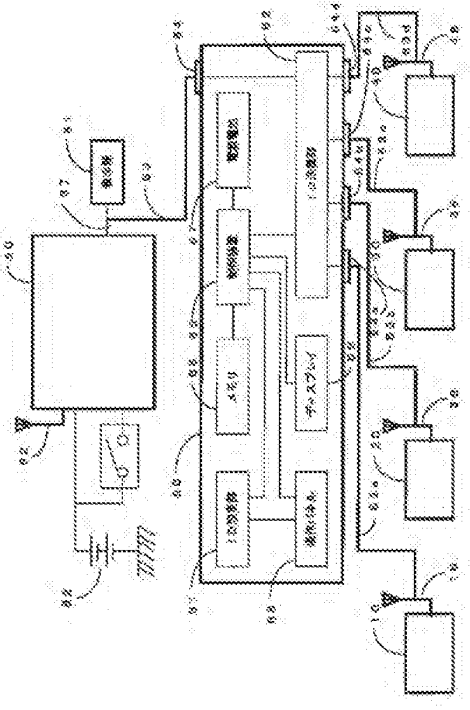
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５０・・・タイヤ空気圧監視装置
５１・・・受信回路
５２・・・アンテナ
５３・・・電源回路
５４・・・制御装置
５５・・・メモリ
５６・・・通信回路
５７・・・信号線
６０・・・ＩＤ登録ツール
６１・・・ＩＤ設定部
６２・・・ＩＤ送信部
６３，６３ａ，６３ｂ，６３ｃ，６３ｄ・・・信号線
６４，６４ａ，６４ｂ，６４ｃ，６４ｄ・・・コネクタ
６５・・・制御装置
６６・・・メモリ
６７・・・電源電池
６８・・・操作パネル
６９・・・ディスプレイ
７１・・・信号線
７２・・・コネクタ
８１・・・表示器
８２・・・車載バッテリ
９０・・・生産管理用コンピュータ

【図１】

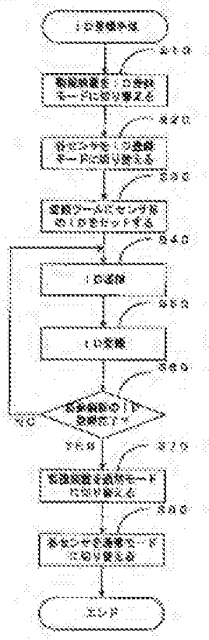


【図２】

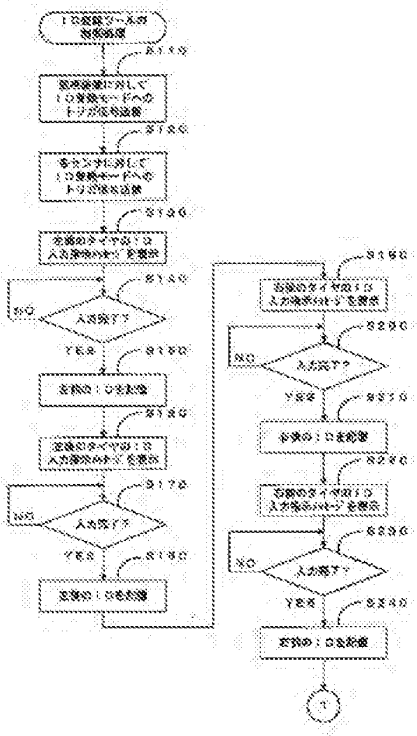


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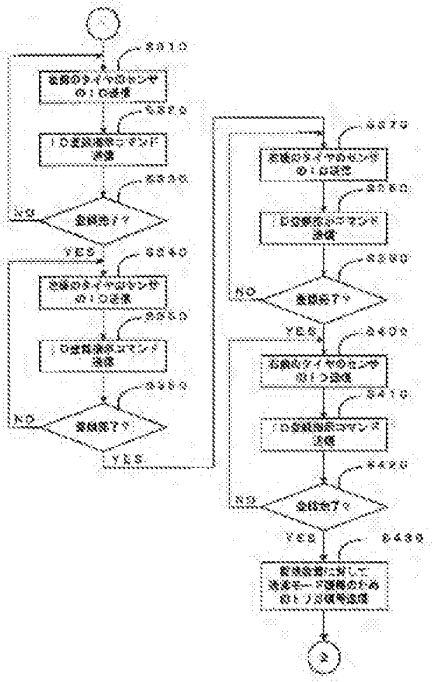
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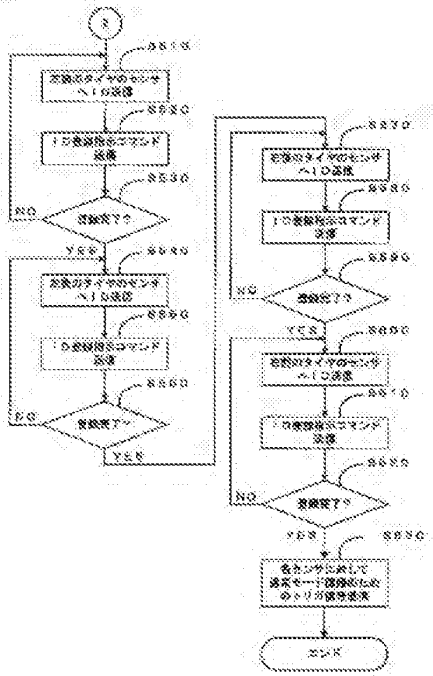
【図4】



【図5】



【図6】



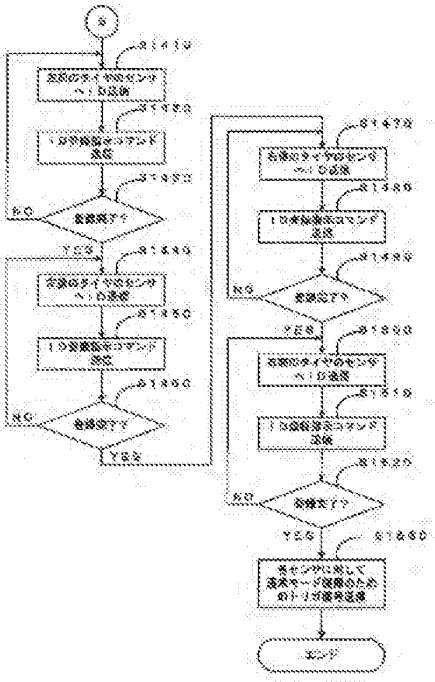
【図18】

【図19】

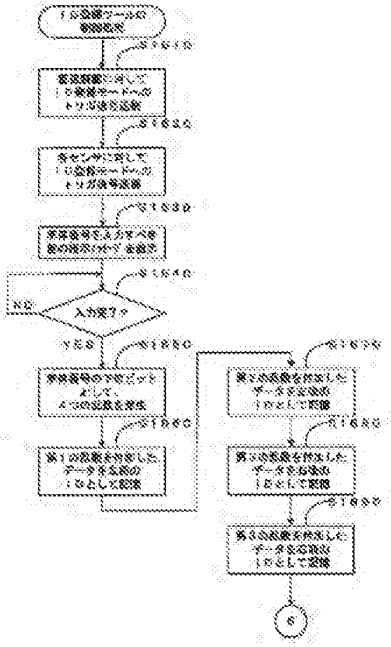
【図17】

【図20】

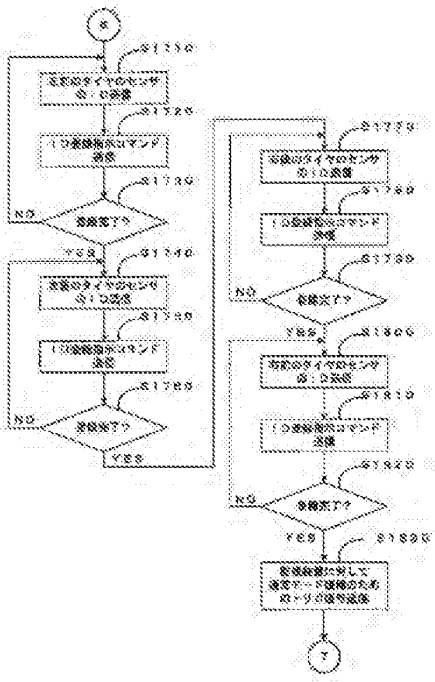
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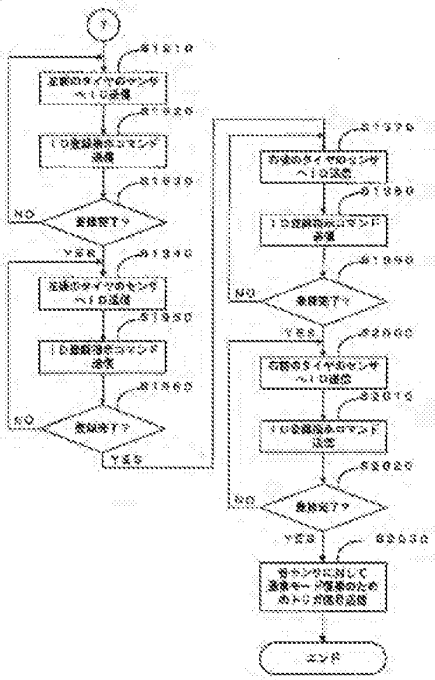
【図12】



【図13】

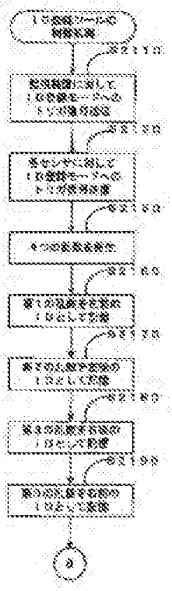


【図14】

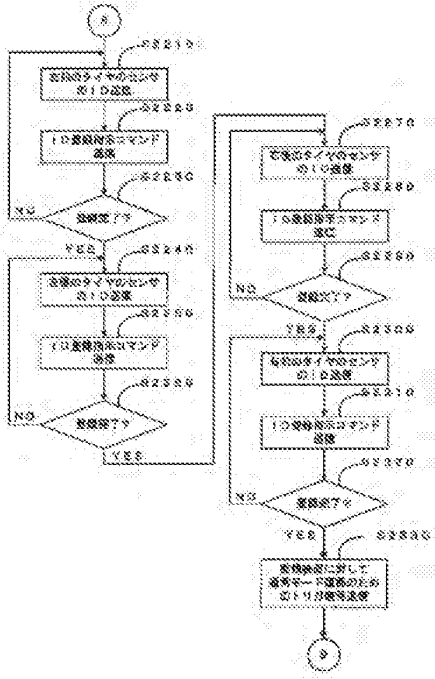


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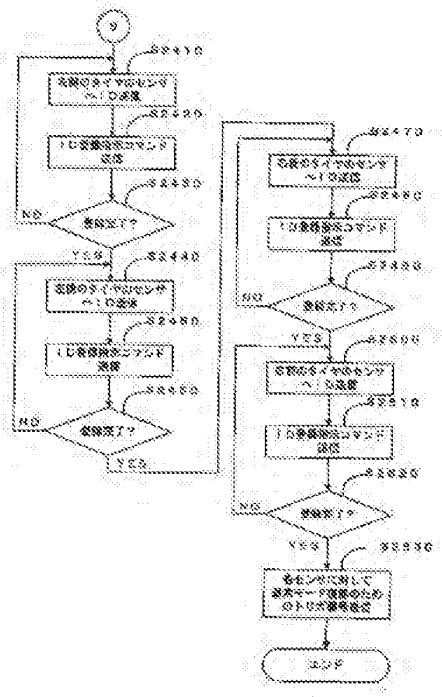
【図15】



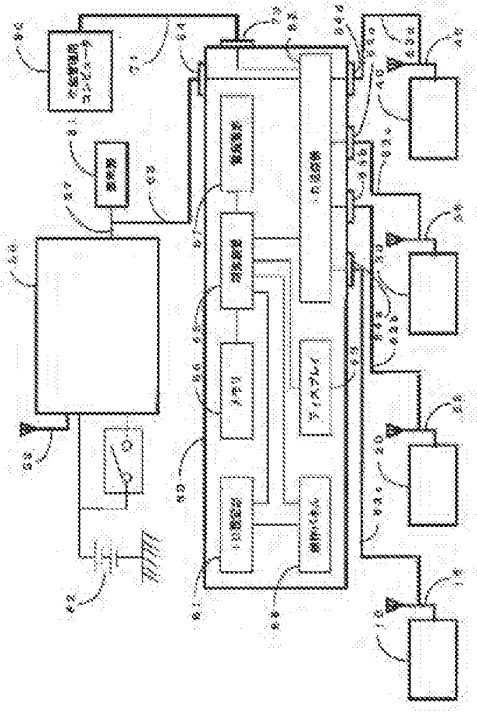
【図16】



【図17】

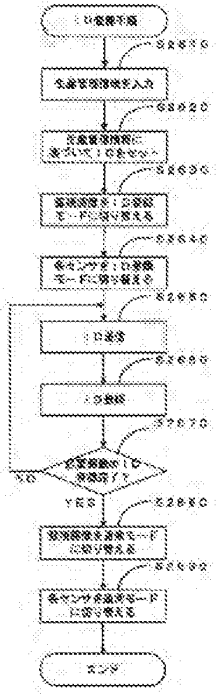


【図18】

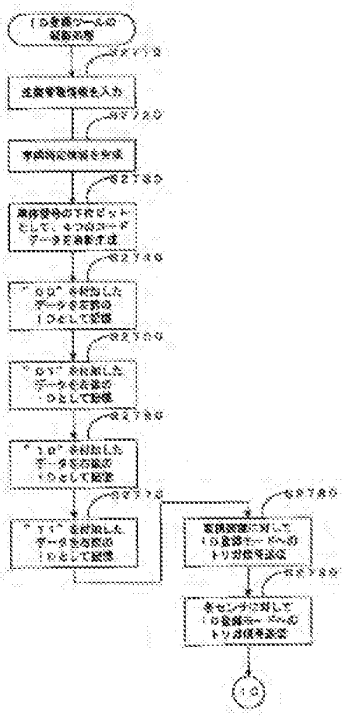


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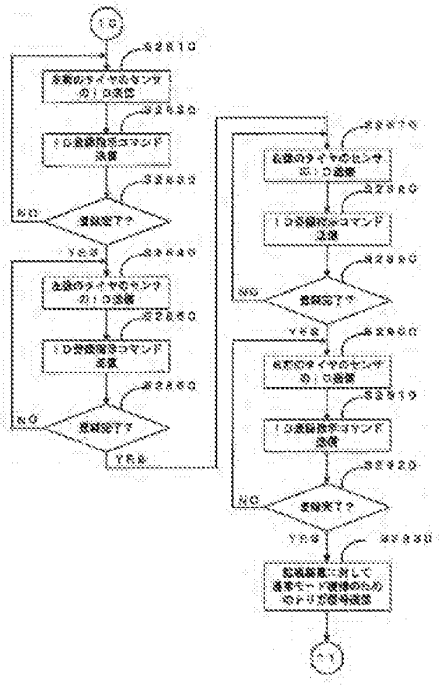
【図19】



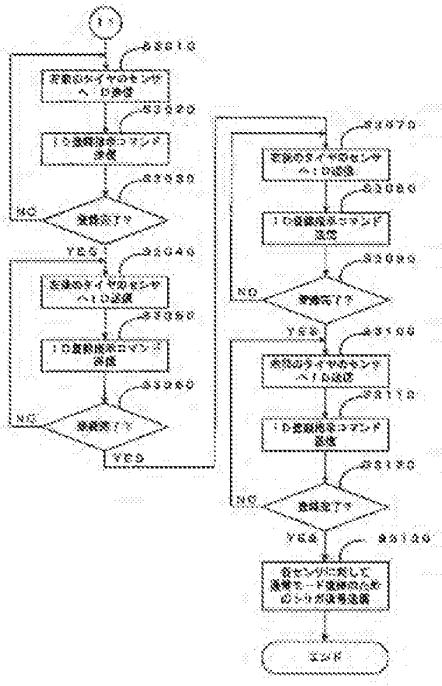
【図20】



【図21】

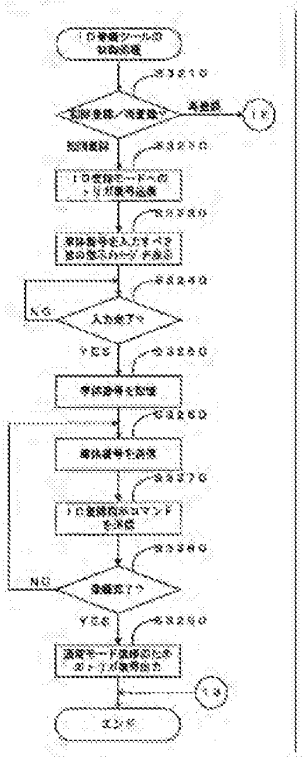


【図22】

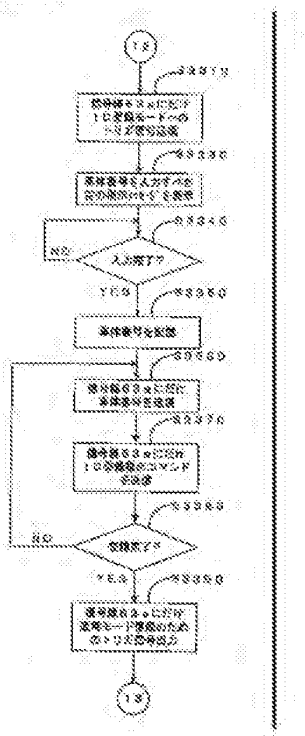


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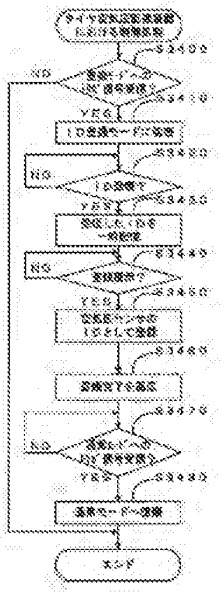
【図23】



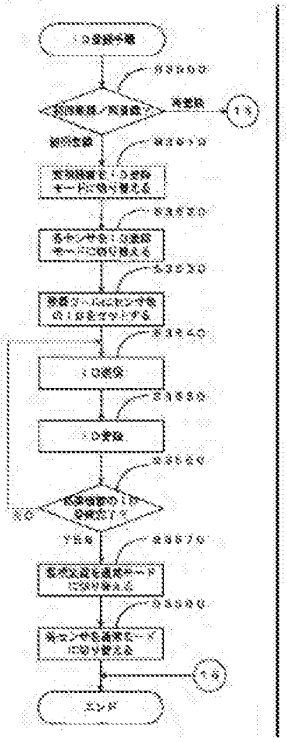
【図24】



【図25】

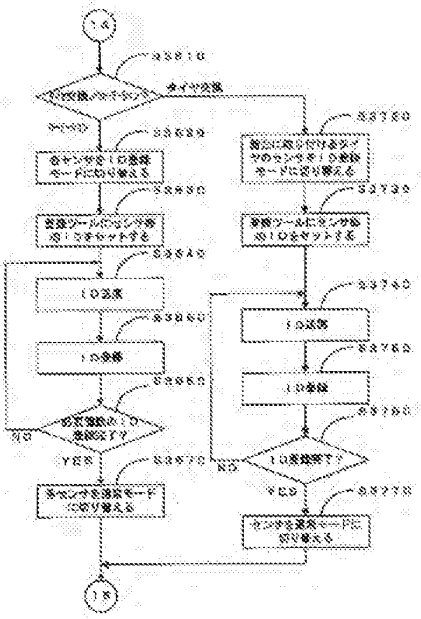


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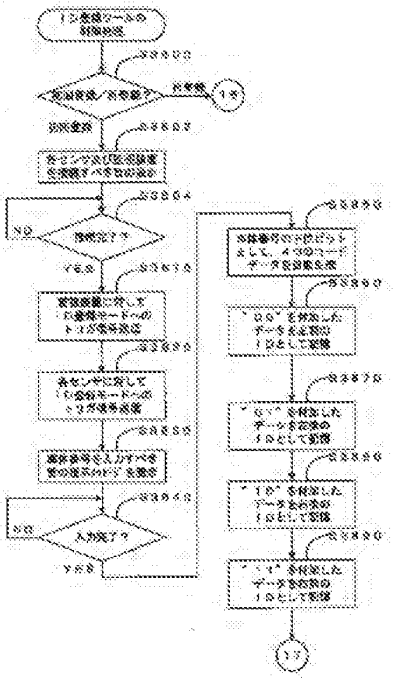


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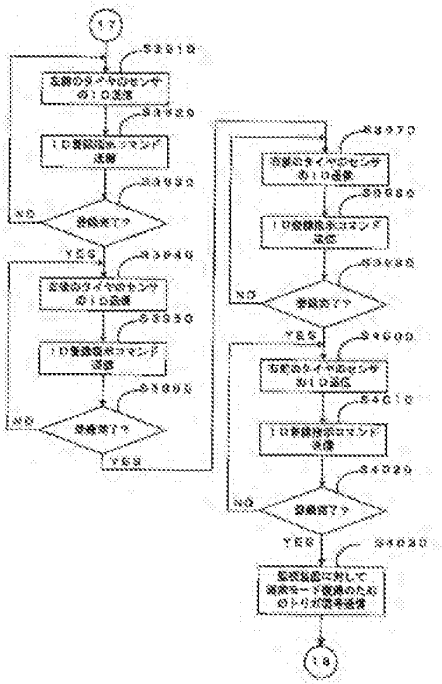
【図27】



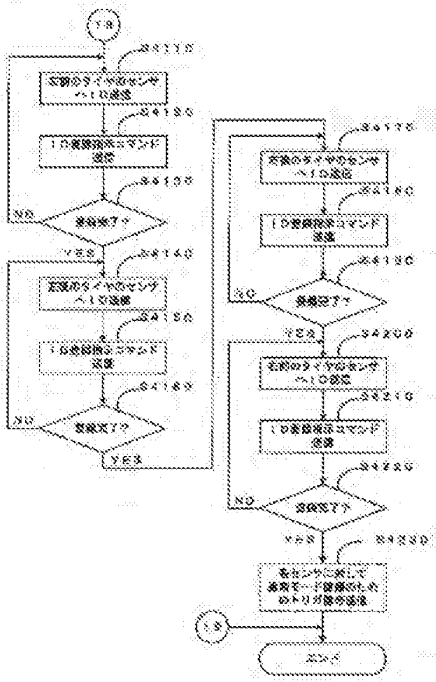
【図28】



【図29】

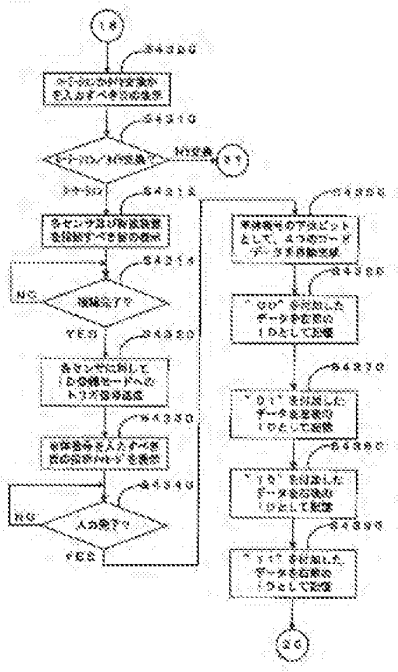


【図30】

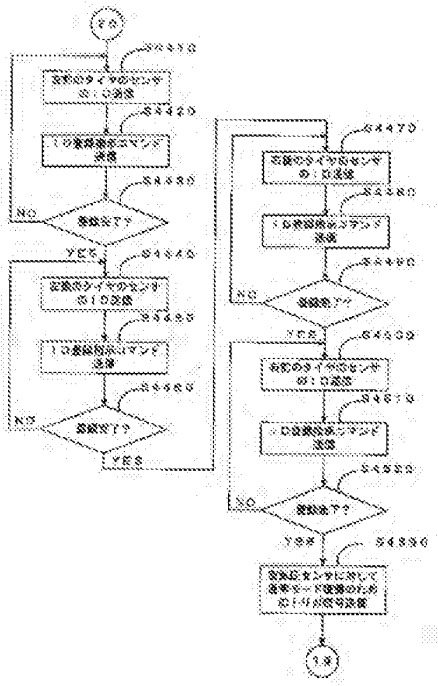


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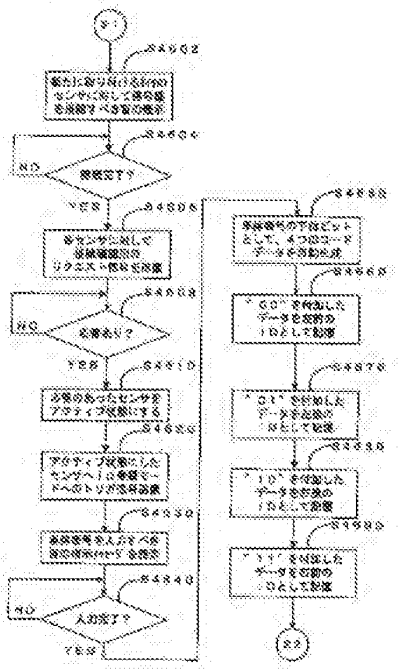
【図31】



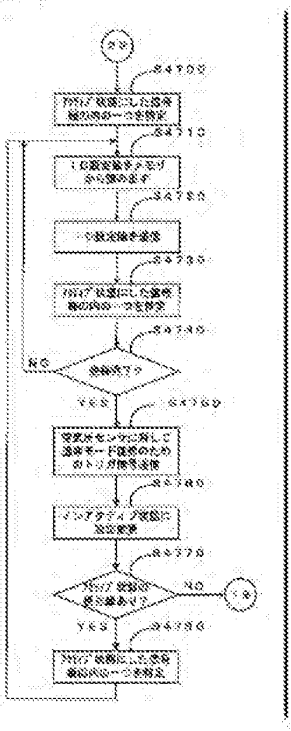
【図32】



【図33】

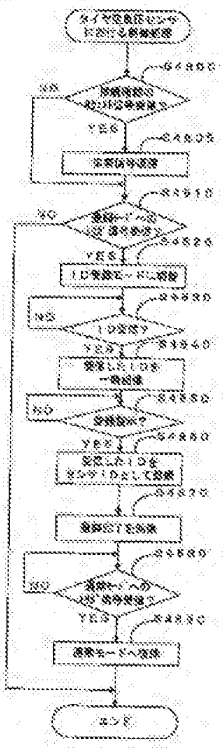


【図34】

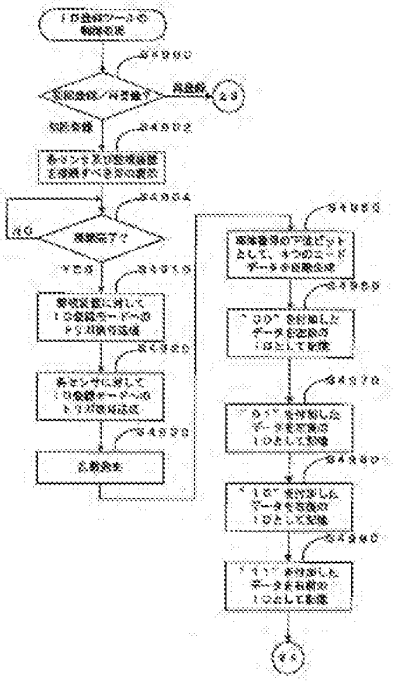


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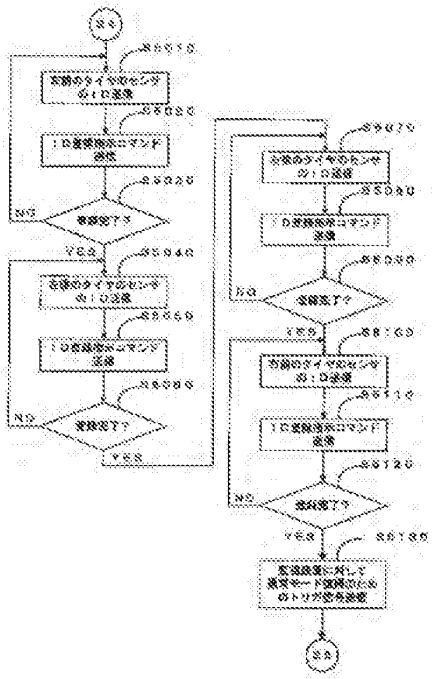
【図35】



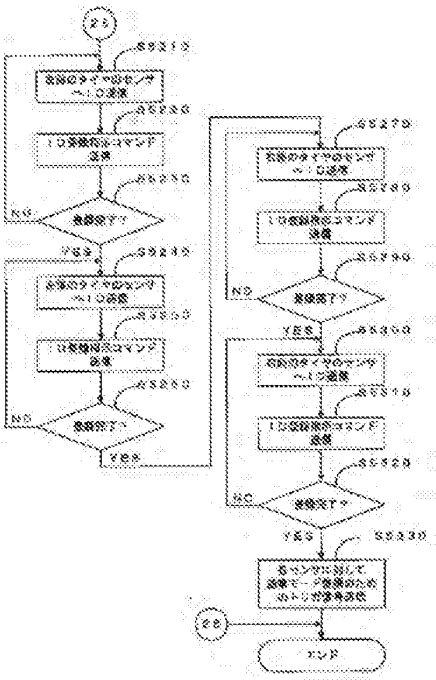
【図36】



【図37】

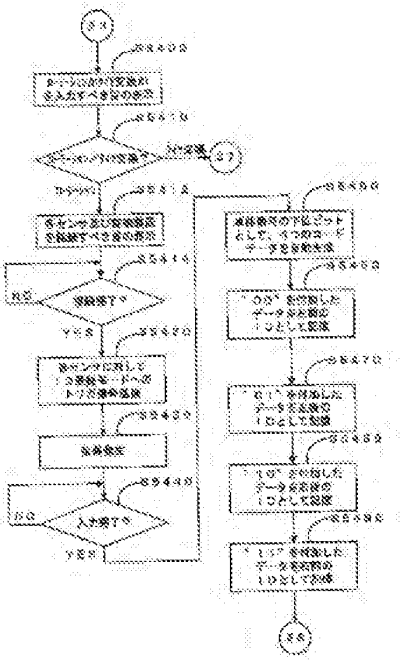


【図38】

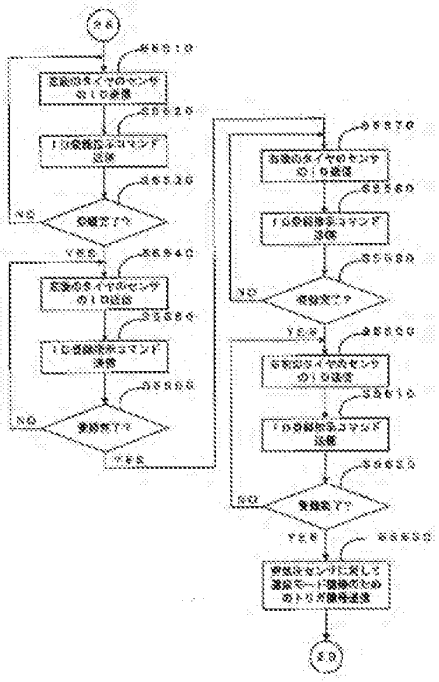


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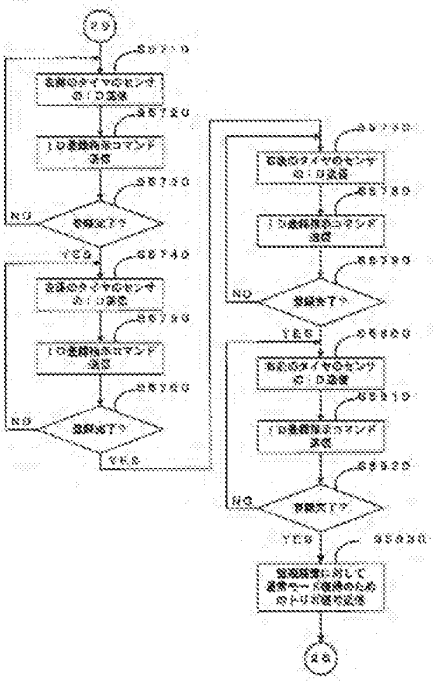
【図39】



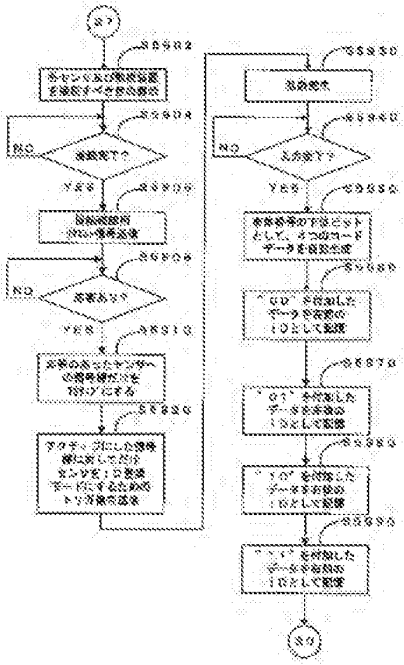
【図40】



【図41】

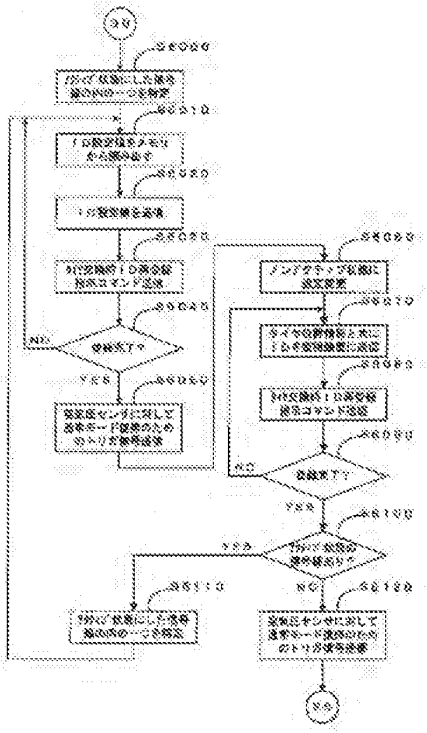


【図42】

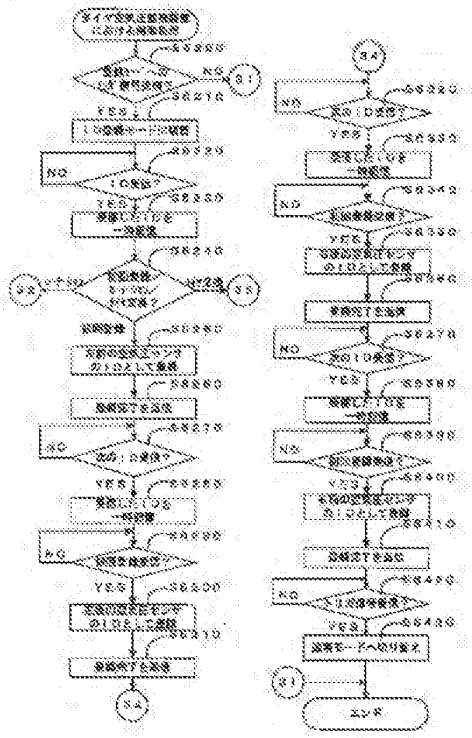


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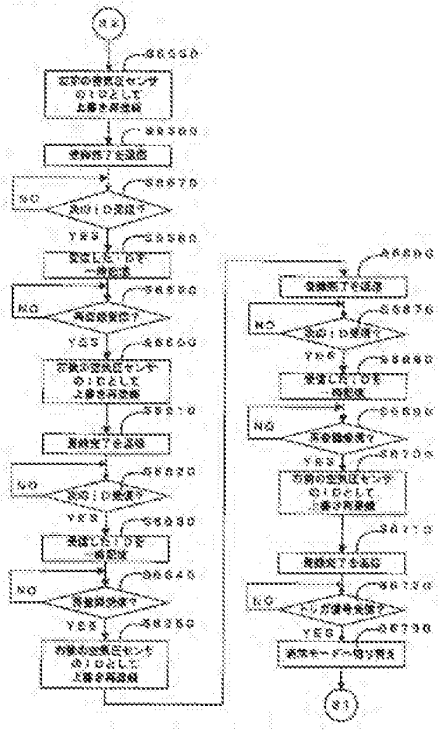
【図43】



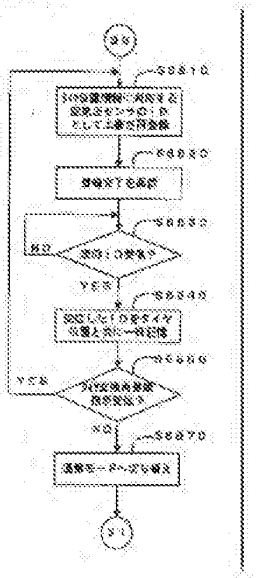
【図44】



【図45】

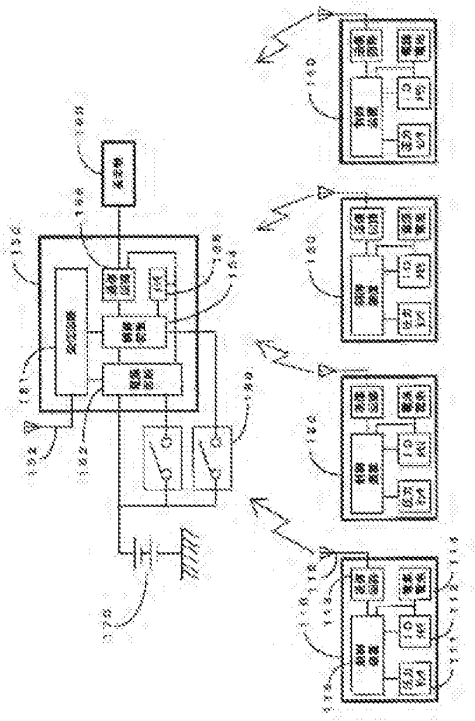


【図46】

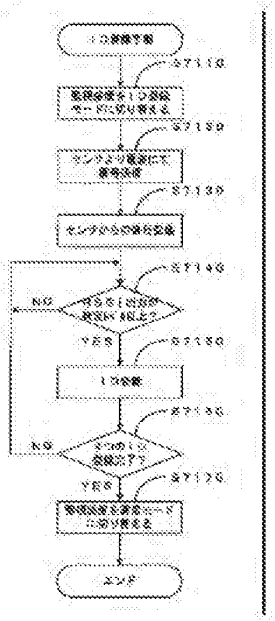


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【図47】



【図48】



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(51)Int.Cl.⁷	FI		テーマコード(参考)
G08C 25/04	G08C 17/09	B	

Orange Exhibit No. 2004
IPR2024-00744

Espacenet

Bibliographic data: TW201009311 (A) — 2010-03-01

Tire pressure detection apparatus capable of writing in serial number and setting method thereof

No documents available for this priority number.

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Classification: - international: *G01L17/00; G08B21/00*
- cooperative:

Application number: TW20080133154 20080829

Priority number(s): TW20080133154 20080829

Abstract of TW201009311 (A)

This invention relates to a tire pressure detection apparatus capable of writing in a serial number and an input method thereof, wherein the tire pressure detection apparatus capable of writing in a serial number comprises a setter and a tire condition detector capable of writing in a serial number. When in use, the setter reads in the serial number of an old tire pressure detector to be replaced and transmits the serial number to the tire condition detector capable of writing in a serial number, where the serial number is set as the serial number of the tire condition detector capable of writing in a serial number, such that users can directly use the tire condition detector capable of writing in a serial number which has been assigned the serial number without having to repeatedly perform the setting action.

Last updated: 13.08.2013 Worldwide Database 5.8.11.1; 92p

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【19】中華民國　　【12】專利公報　（B）

【11】證書號數：I381155

【45】公告日：中華民國 102 (2013) 年 01 月 01 日

【51】Int. Cl.：　*G01L17/00　(2006.01)*　　*G08B21/00　(2006.01)*

發明　　全 5 頁

【54】名　稱：可寫入編號之胎壓偵測裝置及其設定方法

【21】申請案號：097133154　　【22】申請日：中華民國 97 (2008) 年 08 月 29 日

【11】公開編號：201009311　　【43】公開日期：中華民國 99 (2010) 年 03 月 01 日

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【56】參考文獻：

TW　M329770　　TW　200833526A

CN　1310674A　　US　6748797B2

審查人員：許哲睿

[57]申請專利範圍

1. 一種可寫入編號之胎壓偵測裝置，其包含：一可寫入編號的輪胎狀態偵測器，其包含一微處理控制模組以及分別與該微處理控制模組電性連接之一感應模組、一傳送模組、一電力模組以及一接收介面，其中：該感應模組係接受該微處理控制模組之控制，感測一胎壓值；該傳送模組接受該微處理模組之控制，將該感應模組之感測結果以一射頻訊號傳送；該微處理控制模組其包含一記憶單元，該記憶單元為一可讀寫之記憶單元；該接收介面接受該微處理控制模組之控制，接收外部之一編號設定訊號，再將所接收之編號訊號儲存於該記憶單元；以及該電力模組提供該可寫入編號的輪胎狀態偵測器操作所需的電力；以及一設定器，其包含一控制器以及分別與該控制器電性連接之一無線接收模組、一設定傳送模組以及一電源供應模組，其中：該無線接收模組接收一外部胎壓偵測器或該可寫入編號的輪胎狀態偵測器之傳送模組所傳送之一高頻無線訊號，並將該高頻無線訊號輸出至該控制器，其中，該高頻無線訊號包含該外部胎壓偵測器或該可寫入編號的輪胎狀態偵測器之一編號；該設定傳送模組係可接受該控制器之控制，輸出該編號設定訊號予該接收介面；以及該控制器讀取該無線接收模組所接收之高頻無線訊號之編號，再將該編號形成該編號設定訊號，透過該設定傳送模組傳送予另一可寫入編號的輪胎狀態偵測器之該接收介面。
2. 如申請專利範圍第 1 項所述之可寫入編號之胎壓偵測裝置，其中：該設定器包含與該控制器電性連接之一輸入介面，該輸入介面以光學判斷或觸發輸入以讀取或設定一編號，該控制器讀取該輸入介面所讀取或設定之編號，再將該編號形成該編號設定訊號。
3. 如申請專利範圍第 1 或 2 項所述之可寫入編號之胎壓偵測裝置，其中：該設定傳送模組可以無線方式傳送該編號設定訊號，其中，以無線方式所傳送之該編號設定訊號頻率相對低於該無線接收模組所可接收之高頻無線訊號；以及該接收介面則為可接受該設定傳送模組所無線傳送之編號設定訊號的無線接收介面。
4. 如申請專利範圍第 1 或 2 項所述之可寫入編號之胎壓偵測裝置，該設定傳送模組係與該接收介面電性連接並傳送該編號設定訊號予該接收介面。
5. 如申請專利範圍第 3 項所述之可寫入編號之胎壓偵測裝置，該感應模組係為一氣壓感測器、一個以上的加速度感測器、一溫度感測器或一磁場感測器。

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6. 如申請專利範圍第3項所述之可寫入編號之胎壓偵測裝置，該感應模組係包含一氣壓感測器、一個以上的加速度感測器及一溫度感測器。
7. 如申請專利範圍第4項所述之可寫入編號之胎壓偵測裝置，該感應模組係為一氣壓感測器、一個以上的加速度感測器、一溫度感測器或一磁場感測器。
8. 如申請專利範圍第4項所述之可寫入編號之胎壓偵測裝置，該感應模組係包含一氣壓感測器、一個以上的加速度感測器及一溫度感測器。
9. 如申請專利範圍第2項所述之可寫入編號之胎壓偵測裝置，該輸入介面包含一人機輸入介面或一條碼讀取機，其中，該人機輸入介面為一輸入鍵盤或一指撥開關。
10. 一種寫入胎壓偵測器之編號之輸入方法，其步驟包含：讀取一舊有胎壓偵測器之舊有編號；以及將舊有編號輸入另一可寫入編號之輪胎狀態偵測器，形成該可寫入編號之輪胎狀態偵測器之編號。
11. 如申請專利範圍第10項所述之寫入胎壓偵測器之編號之輸入方法，將舊有編號輸入另一可寫入編號之輪胎狀態偵測器步驟，係以無線傳輸方式將該舊有編號傳輸予該可寫入編號之輪胎狀態偵測器。

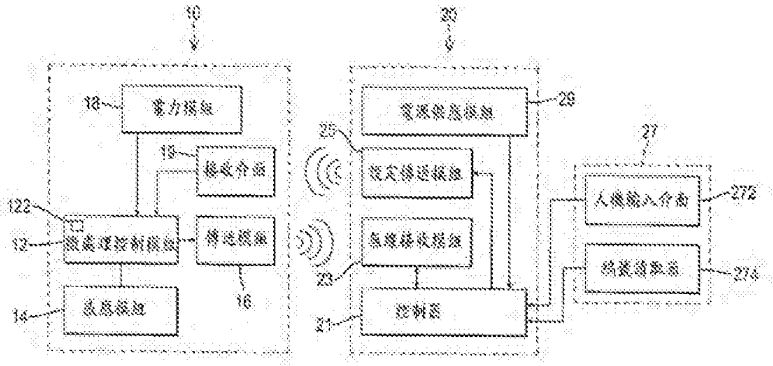
圖式簡單說明

第一圖為本發明較佳實施例之系統方塊圖。

第二圖為本發明之一可寫入編號的輪胎狀態偵測器之另一實施例方塊圖。

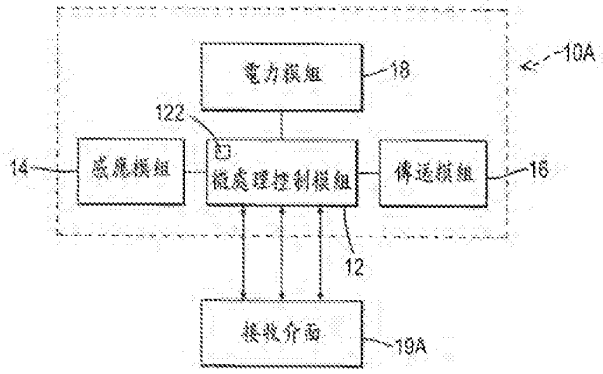
第三圖為本發明較佳實施例之流程圖。

第四圖為既有之一胎壓偵測系統之系統方塊圖。

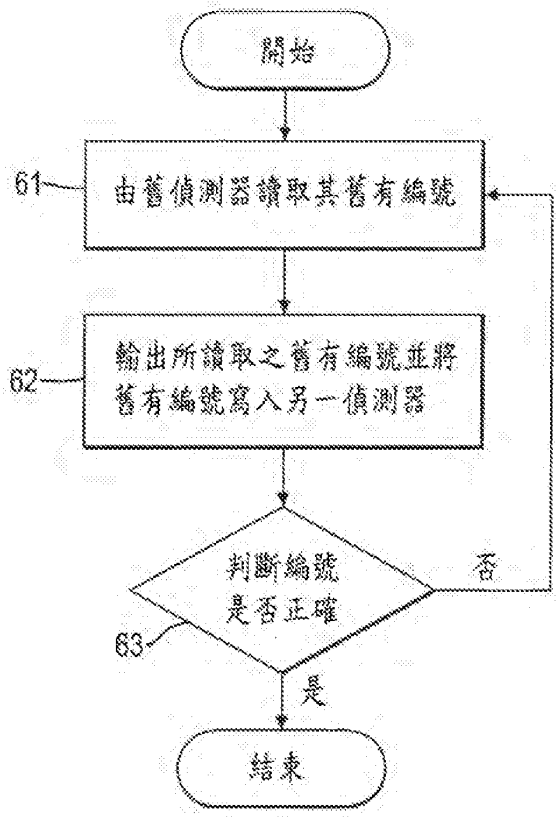


第 一 圖

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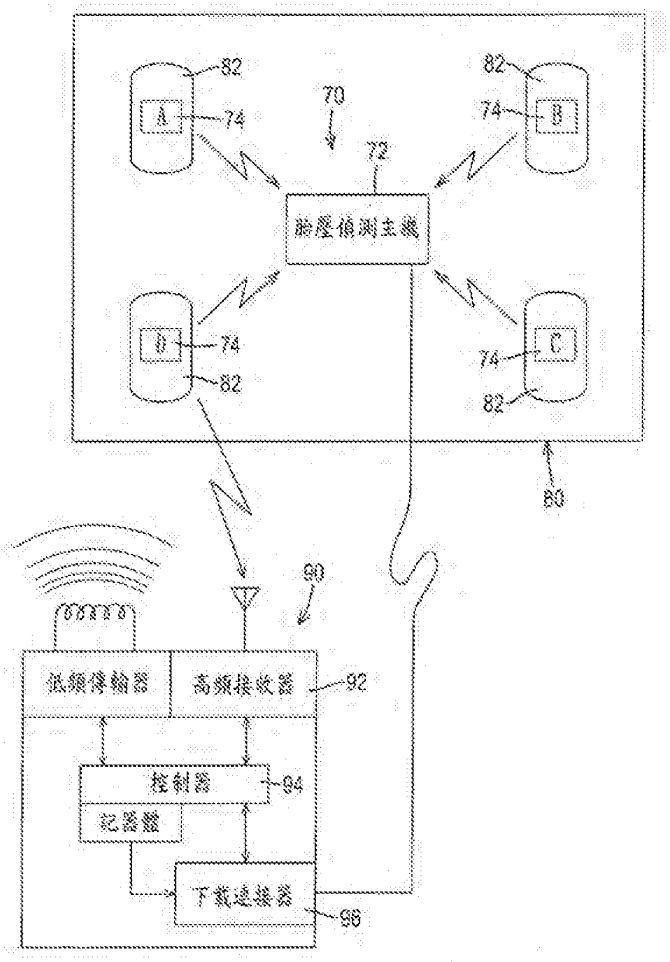


第 三 圖



第 三 圖

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第四圖

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IPR2024-00744

Espacenet

Bibliographic data: CN101881699 (A) — 2010-11-10

Tire pressure detection device with writable number and inputting method thereof

No documents available for this priority number.

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Applicant(s): ORANGE ELECTORNIC CO LTD ± (ORANGE ELECTORNIC CO., LTD)

Classification: - international: *G01M17/02*
- cooperative:

Application number: CN20091136437 20090508

Priority number(s): CN20091136437 20090508

Also published as: CN101881699 (B)

Abstract of CN101881699 (A)

The invention relates to a tire pressure detection device with a writable number and an inputting method thereof. The tire pressure detection device with the writable number comprises a tire condition detection device with a writable number and a setting device. When in use, the number of an old tire pressure detection device to be replaced is firstly read by the setting device; and then, the number is transmitted to the tire condition detection device with a writable number and is set as the number of the tire condition detection device with the writable number. Therefore, a user can directly use the tire condition detection device with the writable number after number write-in, thus dispensing with the repeated complex setting operation.

Last updated: 13.03.2013 Worldwide Database 5.8.11.1; 92p

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(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 101881699 A
(43)申请公布日 2010.11.10

(21)申请号 200910136137.7

(22)申请日 2009.05.08

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(51)Int.Cl.
G01M 17/02(2006.01)

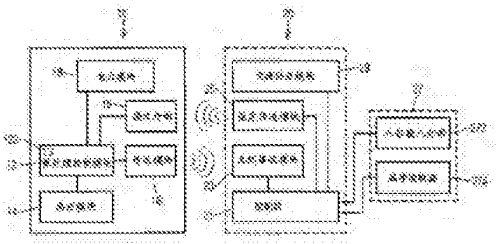
权利要求书 2 页 说明书 7 页 附图 4 页

(54)发明名称

可写入编号的胎压侦测装置及其输入方法

(57)摘要

本发明是有关于一种可写入编号的胎压侦测装置及其输入方法，其中，该可写入编号的胎压侦测装置包含一可写入编号的轮胎状态侦测器以及一设定器，使用时，该设定器先读取旧有待更换的胎压侦测器的编号后，将编号传输给该可写入编号的轮胎状态侦测器，设定该编号为该可写入编号的轮胎状态侦测器的编号，使用者仅需直接使用完成编号写入的该可写入编号的轮胎状态侦测器，即无须再进行繁复的重新设定动作。



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1. 一种可写入编号的胎压侦测装置，其特征在于其包括：

一可写入编号的轮胎状态侦测器，其包含一微处理控制模块以及分别与该微处理控制模块电性连接的一感应模块、一传送模块、一电力模块以及一接收介面，其中：

该感应模块接受该微处理控制模块的控制，感测一胎压值；

该传送模块接受该微处理模块的控制，将该感应模块的感测结果以一射频讯号传送；

该微处理控制模块其包含一记忆单元，该记忆单元为一可读写的记忆单元；

该接收介面接受该微处理控制模块的控制，接收外部的一编号设定讯号，再将所接收的编号讯号储存于该记忆单元；以及

该电力模块提供该可写入编号的轮胎状态侦测器操作所需的电力；以及

一设定器，其包含一控制器以及分别与该控制器电性连接的一无线接收模块、一设定传送模块以及一电源供应模块，其中：

该无线接收模块接收一外部胎压侦测器或该可写入编号的轮胎状态侦测器的传送模块所传送的一高频无线讯号，并将该高频无线讯号输出至该控制器，其中，该高频无线讯号包含该外部胎压侦测器或该可写入编号的轮胎状态侦测器的一编号；

该设定传送模块可接受该控制器的控制，输出该编号设定讯号予该接收介面；以及

该控制器读取该无线接收模块所接收的高频无线讯号的编号，再将该编号形成该编号设定讯号，透过该设定传送模块传送予另一可写入编号的轮胎状态侦测器的该接收介面。

2. 根据权利要求 1 所述的可写入编号的胎压侦测装置，其特征在于其中所述的设定器包含与该控制器电性连接的一输入介面，该输入介面以光学判断或触发输入以读取或设定一编号，该控制器读取该输入介面所读取或设定的编号，再将该编号形成该编号设定讯号。

3. 根据权利要求 1 或 2 所述的可写入编号的胎压侦测装置，其特征在于其中所述的设定传送模块可以无线方式传送该编号设定讯号，其中，以无线方式所传送的该编号设定讯号频率相对低于该无线接收模块所可接收的高频无线讯号；以及

该接收介面则为可接受该设定传送模块所无线传送的编号设定讯号的无线接收介面。

4. 根据权利要求 1 或 2 所述的可写入编号的胎压侦测装置，其特征在于其中所述的设定传送模块与该接收介面电性连接并传送该编号设定讯号予该接收介面。

5. 根据权利要求 3 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

6. 根据权利要求 3 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块包含一气压感测器、一个以上的加速度感测器及一温度感测器。

7. 根据权利要求 4 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

8. 根据权利要求 4 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块包含一气压感测器、一个以上的加速度感测器及一温度感测器。

9. 根据权利要求 2 所述的可写入编号的胎压侦测装置，其特征在于其中所述的输入介面包含一人机输入介面或一条码读取机，其中，该人机输入介面为一输入键盘或一指拨开关。

10. 一种写入胎压侦测器的编号的输入方法，其特征在于其包括以下步骤：

读取一旧有胎压侦测器的旧有编号；以及

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以无线传输方式将旧有编号输入另一可写入编号的轮胎状态侦测器，形成该可写入编号的轮胎状态侦测器的编号。

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可写入编号的胎压侦测装置及其输入方法

技术领域

[0001] 本发明涉及一种胎压侦测器，特别是涉及一种可写入编号的胎压侦测装置及其输入方法。

背景技术

[0002] 为了维护驾驶能够即时掌握汽车轮胎的状况，避免因突然爆胎或胎压不足，危害驾驶的行车安全，目前在美国大多数的汽车均已经配备胎压侦测系统，该胎压侦测系统读取分别装设于汽车四个轮胎内的胎压侦测器，每一胎压侦测器在一定时间内持续读取对应轮胎内的气压或其他的参数（例如胎内温度、轮胎运转速度...等）后，将读取结果传送给该胎压侦测系统。若任一胎压侦测器所感测的结果出现异常时，该胎压侦测系统产生一警报讯号以通知汽车的驾驶。

[0003] 为了避免经常更换胎压侦测器造成维持成本浪费及使用者麻烦，目前的胎压侦测器平均使用寿命可大于 5 年，但是当胎压侦测器毁损或需要更换时，由于各个汽车原厂所使用的胎压侦测器及其输入方法不尽然全部相同，致使使用者必须为了一个胎压侦测器，回到汽车原厂进行更换，造成使用者的不便。

[0004] 如图 4 所示，为一现有习用的胎压侦测系统 70，其包含一胎压侦测主机 72 以及复数个胎压侦测器 74，该胎压侦测主机 72 安装于一汽车本体 80 内，各胎压侦测器 74 则安装于该汽车本体 80 的复数个轮胎 82 内，为了辨识每一个胎压侦测器 74 的安装位置，每一胎压侦测器 74 包含独立的一辨识号码，而该胎压侦测主机 72 则必须先得知每一胎压侦测器 74 特有的辨识号码，才能够与各个胎压侦测器 74 产生讯号连结，及辨识各胎压侦测器 74 的感测结果。

[0005] 其中，该胎压侦测主机 72 是利用一辨识号码设定装置 90，设定各胎压侦测器 74 的辨识号码。该辨识号码设定装置 90 是利用其一高频接收器 92 先读取一新的胎压侦测器 74 其辨识号码后，该辨识号码设定装置 90 再将所读取的辨识号码经过一控制器 94 及一下载连接器 96 写入该胎压侦测主机 72。然而，由于不同汽车制造商的该辨识号码设定装置 90 无法彼此相容，单一辨识号码设定装置 90 仅能针对特定胎压侦测器 74 进行读取及设定，让使用者若欲进行更换胎压侦测器 74 时，必须回到配有该辨识号码设定装置 90 的维修厂，造成使用者不便。

[0006] 由此可见，上述现有的胎压侦测装置在结构与使用上，显然仍存在有不便与缺陷，而亟待加以进一步改进。为了解决上述存在的问题，相关厂商莫不费尽心思来谋求解决之道，但长久以来一直未见适用的设计被发展完成，而一般产品又没有适切结构能够解决上述问题，此显然是相关业者急欲解决的问题。因此如何能创设一种新型的可写入编号的胎压侦测装置及其输入方法，实属当前重要研发课题之一，亦成为当前业界极需改进的目标。

[0007] 有鉴于上述现有的胎压侦测装置存在的缺陷，本发明人基于从事此类产品设计制造多年丰富的实务经验及专业知识，并配合学理的运用，积极加以研究创新，以期创设一种新型的可写入编号的胎压侦测装置及其输入方法，能够改进一般现有的胎压侦测装置，使

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其更具有实用性。经过不断的研究、设计，并经过反复试作样品及改进后，终于创设出确具实用价值的本发明。

发明内容

[0008] 本发明的主要目的在于，克服现有的胎压侦测装置存在的缺陷，而提供一种新型的可写入编号的胎压侦测装置及其输入方法，所要解决的技术问题是使汽车的胎压侦测主机可以不必重新设定新的编号，让使用者不必回到特定的维修厂进行胎压侦测器更换而提升作业便利性，同时可以让多数的维修厂可以不必准备不同厂商特有的设定装置，而大量节省维持成本，非常适于实用。

[0009] 本发明的目的及解决其技术问题是采用以下技术方案来实现的。依据本发明提出的一种可写入编号的胎压侦测装置，其包括：一可写入编号的轮胎状态侦测器，其包含一微处理控制模块以及分别与该微处理控制模块电性连接的一感应模块、一传送模块、一电力模块以及一接收介面，其中：该感应模块接受该微处理控制模块的控制，感测一胎压值；该传送模块接受该微处理模块的控制，将该感应模块的感测结果以一射频讯号传送；该微处理控制模块其包含一记忆单元，该记忆单元为一可读写的记忆单元；该接收介面接受该微处理控制模块的控制，接收外部的一编号设定讯号，再将所接收的编号讯号储存于该记忆单元；以及该电力模块提供该可写入编号的轮胎状态侦测器操作所需的电力；以及一设定器，其包含一控制器以及分别与该控制器电性连接的一无线接收模块、一设定传送模块以及一电源供应模块，其中：该无线接收模块接收一外部胎压侦测器或该可写入编号的轮胎状态侦测器的传送模块所传送的一高频无线讯号，并将该高频无线讯号输出至该控制器，其中，该高频无线讯号包含该外部胎压侦测器或该可写入编号的轮胎状态侦测器的一编号；该设定传送模块可接受该控制器的控制，输出该编号设定讯号予该接收介面；以及该控制器读取该无线接收模块所接收的高频无线讯号的编号，再将该编号形成该编号设定讯号，透过该设定传送模块传送予另一可写入编号的轮胎状态侦测器的该接收介面。

[0010] 本发明的目的及解决其技术问题还可采用以下技术措施进一步实现。

[0011] 前述的可写入编号的胎压侦测装置，其中所述的设定器包含与该控制器电性连接的一输入介面，该输入介面以光学判断或触发输入以读取或设定一编号，该控制器读取该输入介面所读取或设定的编号，再将该编号形成该编号设定讯号。

[0012] 前述的可写入编号的胎压侦测装置，其中所述的设定传送模块可以无线方式传送该编号设定讯号，其中，以无线方式所传送的该编号设定讯号频率相对低于该无线接收模块所可接收的高频无线讯号；以及该接收介面则为可接受该设定传送模块所无线传送的编号设定讯号的无线接收介面。

[0013] 前述的可写入编号的胎压侦测装置，其中所述的设定传送模块与该接收介面电性连接并传送该编号设定讯号予该接收介面。

[0014] 前述的可写入编号的胎压侦测装置，其中所述的感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

[0015] 前述的可写入编号的胎压侦测装置，其中所述的感应模块包含一气压感测器、一个以上的加速度感测器及一温度感测器。

[0016] 前述的可写入编号的胎压侦测装置，其中所述的感应模块为一气压感测器、一个

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以上的加速度感测器、一温度感测器或一磁场感测器。

[0017] 前述的可写入编号的胎压侦测装置，其中所述的感应模块包含一气压感测器、一个以上的加速度感测器及一温度感测器。

[0018] 前述的可写入编号的胎压侦测装置，其中所述的输入介面包含一人机输入介面或一条码读取机，其中，该人机输入介面为一输入键盘或一指拨开关。

[0019] 本发明的目的及解决其技术问题还采用以下技术方案来实现。依据本发明提出的一种写入胎压侦测器的编号的输入方法，其包括以下步骤：读取一旧有胎压侦测器的旧有编号；以及以无线传输方式将旧有编号输入另一可写入编号的轮胎状态侦测器，形成该可写入编号的轮胎状态侦测器的编号。

[0020] 本发明与现有技术相比具有明显的优点和有益效果。为了解决目前的胎压侦测主机与胎压侦测器之间的设定过度繁琐，以及需要使用特殊的设定装置才可完成设定，造成使用者必须寻找配有特殊设定装置的维修厂才可进行胎压侦测器的更换，因而导致使用不便的问题，本发明提出一种可修改或写入编号的感测器，以取代旧有的胎压侦测器，使汽车的胎压侦测主机可以不必重新设定新的编号，让使用者不必回到特定的维修厂进行胎压侦测器更换而提升作业便利性，同时可以让多数的维修厂可以不必准备不同厂商特有的设定装置，而大量节省维持成本。

[0021] 配合前述的技术问题以及发明目的，本发明提供一种可写入编号的胎压侦测装置，其包含：

[0022] 一可写入编号的轮胎状态侦测器，其包含一微处理控制模块以及分别与该微处理控制模块电性连接的一感应模块、一传送模块、一电力模块以及一接收介面，其中：

[0023] 该感应模块接受该微处理控制模块的控制感测所处环境的气体压力；

[0024] 该传送模块接受该微处理模块的控制将该感应模块的感测结果以一射频讯号传送；

[0025] 该微处理控制模块其包含一记忆单元，该记忆单元为一可读写的记忆单元；

[0026] 该接收介面接受该微处理控制模块的控制接收外部的一编号设定讯号，再将所接收的编号讯号储存于该记忆单元；以及

[0027] 该电力模块提供该可写入编号的轮胎状态侦测器操作所需的电力；以及

[0028] 一设定器，其包含一控制器以及分别与该控制器电性连接的一无线接收模块、一设定传送模块以及一电源供应模块，其中：

[0029] 该无线接收模块接收一外部胎压侦测器或该可写入编号的轮胎状态侦测器的传送模块所传送的一高频无线讯号，并将该高频无线讯号输出至该控制器，其中，该高频无线讯号包含该外部胎压侦测器或该可写入编号的轮胎状态侦测器的一编号；

[0030] 该设定传送模块可接受该控制器的控制，输出该编号设定讯号予该接收介面；以及

[0031] 该控制器读取该无线接收模块所接收的高频无线讯号的编号，再将该编号形成该编号设定讯号透过该设定传送模块传送予另一可写入编号的轮胎状态侦测器的该接收介面。

[0032] 其中，该设定器包含与该控制器电性连接的一输入介面，该输入介面其可以光学判断或触发输入以读取或设定一编号，该控制器读取该输入介面所读取或设定的编号，再

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将该编号形成该编号设定讯号。

[0033] 其中，

[0034] 该设定传送模块可以无线方式传送该编号设定讯号，其中，以无线方式所传送的该编号设定讯号频率相对低于该无线接收模块所可接收的高频无线讯号；以及

[0035] 该接收介面则为可接受该设定传送模块所无线传送的编号设定讯号的无线接收介面。

[0036] 其中，该设定传送模块与该接收介面电性连接并传送该编号设定讯号予该接收介面。

[0037] 其中，该感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

[0038] 其中，该输入介面包含一人机输入介面或一条码读取机，其中，该人机输入介面为一输入键盘或一指拨开关。

[0039] 本发明提供一种写入胎压侦测器的编号的输入方法，其步骤包含：

[0040] 读取一旧有胎压侦测器的旧有编号；以及

[0041] 以无线传输方式将旧有编号输入另一可写入编号的轮胎状态侦测器，形成该可写入编号的轮胎状态侦测器的编号。

[0042] 借由上述技术方案，本发明可写入编号的胎压侦测装置及其输入方法至少具有下列优点及有益效果：当旧有的胎压侦测器需要更换时，一般具有该设定器的任一车厂即可将旧有胎压侦测器的编号复制于一个新的可写入编号的轮胎状态侦测器，直接取代旧有的胎压侦测器，无须再以其他装置，先读取新安装的胎压侦测器的编号再重新设定汽车内的胎压侦测系统，而可大量提升使用者的更换便利性以及节省一般车厂的维持成本。

[0043] 综上所述，本发明是有关于一种可写入编号的胎压侦测装置及其输入方法，其中，该可写入编号的胎压侦测装置包含一可写入编号的轮胎状态侦测器以及一设定器，使用时，该设定器先读取旧有待更换的胎压侦测器的编号后，将编号传输给该可写入编号的轮胎状态侦测器，设定该编号为该可写入编号的轮胎状态侦测器的编号，使用者仅需直接使用完成编号写入的该可写入编号的轮胎状态侦测器，即无须再进行繁复的重新设定动作。

[0044] 本发明在技术上有显著的进步，并具有明显的积极效果，诚为一新颖、进步、实用的新设计。

[0045] 上述说明仅是本发明技术方案的概述，为了能够更清楚了解本发明的技术手段，而可依照说明书的内容予以实施，并且为了让本发明的上述和其他目的、特征和优点能够更明显易懂，以下特举较佳实施例，并配合附图，详细说明如下。

附图说明

[0046] 图 1 为本发明较佳实施例的系统方框图。

[0047] 图 2 为本发明一可写入编号的轮胎状态侦测器的另一实施例的方框图。

[0048] 图 3 为本发明较佳实施例的流程图。

[0049] 图 4 为既有的一胎压侦测系统的系统方框图。

[0050] 10：可写入编号的轮胎状态侦测器

[0051] 12：微处理控制模块

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[0052] 122：记忆单元

[0053] 14：感应模块

[0054] 16：传送模块

[0055] 18：电力模块

[0056] 19、19A：接收介面

[0057] 20：设定器

[0058] 21：控制器

[0059] 23：无线接收模块

[0060] 25：设定传送模块

[0061] 27：输入介面

[0062] 272：人机输入介面

[0063] 274：编号读取器

[0064] 29：电源供应模块

具体实施方式

[0065] 为更进一步阐述本发明为达成预定发明目的所采取的技术手段及功效，以下结合附图及较佳实施例，对依据本发明提出的可写入编号的胎压侦测装置及其输入方法其具体实施方式、结构、特征及其功效，详细说明如后。

[0066] 有关本发明的前述及其他技术内容、特点及功效，在以下配合参考图式的较佳实施例的详细说明中将可清楚的呈现。为了方便说明，在以下的实施例中，相同的元件以相同的编号表示。

[0067] 请参阅图 1、图 2 所示，其为本发明的可写入编号的胎压侦测装置及其输入方法的较佳实施例，其中，该可写入编号的胎压侦测装置包含一可写入编号的轮胎状态侦测器 10 以及一设定器 20。

[0068] 该可写入编号的轮胎状态侦测器 10 在使用时固定安装于一汽车轮胎内，一般而言，该可写入编号的轮胎状态侦测器 10 固定结合于该汽车轮胎的一气嘴，该可写入编号的轮胎状态侦测器 10 包含一微处理控制模块 12 以及分别连接该微处理控制模块 12 的一感应模块 14、一传送模块 16、一电力模块 18 以及一接收介面 19、19A。

[0069] 该微处理控制模块 12 内部包含一记忆单元 122，该记忆单元 122 为一可读写的记忆单元，可以纪录一 8 位元或以上的编号，该编号对应于一外部胎压侦测器或该可写入编号的轮胎状态侦测器 10。当本较佳实施例的该可写入编号的轮胎状态侦测器 10 制造出厂时，可分配一内定且为独一的编号纪录于该记忆单元 122 内，或者，也可在出厂时，未纪录任何编号于该可写入编号的轮胎状态侦测器 10 内。

[0070] 该感应模块 14 可包含一气压感测器、一个以上的加速度感测器、一温度感测器以及一磁场感测器，该感应模块 14 接受该微处理控制模块 12 的控制，在该可写入编号的轮胎状态侦测器 10 安装于该汽车轮胎内时，感测该汽车轮胎内的轮胎气压、汽车轮胎的直线行进加速度、方向改变、温度及外部环境磁场 . . . 等，该感应模块 14 并同时将感测结果传送至该微处理控制模块 12。其中，当该感应模块 14 包含两个感应方向不同的加速度感测器时，即可在该汽车轮胎转向时，透过感测的加速度改变而测知转向的发生。

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[0071] 该传送模块 16 接受该微处理控制模块 12 的控制，无线传送该感应模块 14 的感测结果给安装于汽车内部的一侦测系统或该设定器 20。本较佳实施例的传送模块 16 为一射频传输器，其将感测结果以射频讯号（例如 315Mhz、433Mhz...等）传送给该侦测系统或该设定器 20。

[0072] 该电力模块 18 则提供该可写入编号的轮胎状态感测器 10 的内部其他功能模块操作所需的电力，其可为一电池。

[0073] 该接收介面 19，19A 为一可接受外部讯号线连接的连接器或为一低频无线接收器，例如 125kHz...等。如第一图所示，该接收介面 19 为低频无线接受器，可以接受该微处理控制模块 12 的控制，接受外部的一低频无线讯号，该低频无线讯号的频率相对低于该传送模块 16 的射频讯号。由于低频讯号的穿透率较差，故讯号接受距离受到限制，所以若欲以该接收介面 19 读取接收外部无线讯号，则必须将该接收介面 19 相当程度地接近外部无线讯号源，故在使用时，该可写入编号的轮胎状态侦测器 10 可利用该接收介面 19 接近不同的外部无线讯号源，而分别读取不同的外部无线讯号源。

[0074] 请参阅图 2 所示，该接收介面 19A 为如一接头、一 Pin 脚座...等可与外部讯号电路线连接的介面。

[0075] 该设定器 20 包含一控制器 21 以及分别与该控制器 21 电性连接的一无线接收模块 23、一设定传送模块 25、一输入介面 27 以及一电源供应模块 29。

[0076] 该无线接收模块 23 可接受一外部胎压侦测器所传送的无线讯号，及该可写入编号的轮胎状态侦测器 10 的该传送模块 16 所传送出的无线讯号，将所接受的讯号传递至该控制器 21。

[0077] 该设定传送模块 25 可接受该控制器 21 的控制，传送该低频无线讯号与该接收介面 19。

[0078] 该输入介面 27 可包含一人机输入介面 272 以及一编号读取器 274。该人机输入介面 272 可为一输入键盘、一指拨开关（dip switch）...等，其接受人为的触发或设定，输入一编号给该控制器 21。该编号读取器 274 可为一条码读取机，其可以光学讯号判断读取形成或贴附在一外部胎压侦测器或其他的可写入编号的轮胎状态侦测器 10 的条码，该条码对应于该外部胎压侦测器或其他可写入编号的轮胎状态侦测器 10 的编号，且该编号读取器 274 在读取条码后，将读取结果输出予该控制器 21。

[0079] 该电源供应模块 29 可为一电转换器或一电池，供应该设定器 20 操作所需的电力。

[0080] 请参阅图 3 所示，其为本较佳实施例的可写入胎压侦测器装置的输入方法，其步骤包含：由旧侦测器读取其旧有编号 61、将旧有编号写入另一侦测器 62 以及判断编号是否正确 63。

[0081] 该由旧侦测器读取其旧有编号 61 步骤，为使用者以该设定器 20 读取安装于一汽车轮胎内的胎压侦测器的编号。或者，亦可以将已知编号的胎压侦测器的编号直接透过该输入介面 27 读入该设定器 20 内，例如，欲更换的胎压侦测器表面可能直接写着编号，或者贴附一纪录编号的条码系，使用者可透过该人机输入介面 272 或该编号读取器 274，将该编号读入该设定器 20 内。

[0082] 该将旧有编号写入另一侦测器 62 步骤中，为该设定器 20 将所读取的旧有编号，透过其设定传送模块 25 传送给该接收介面 19，使该微处理控制模块 12 在该接收介面 19 接收

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讯号后，将旧有编号记录在该记忆单元 122 内。若该可写入编号的轮胎状态侦测器 10 的记忆单元 122 原先已经存在内建的编号，本步骤则将该旧有编号覆写并删除原先已经存在的编号，让该可写入编号的轮胎状态侦测器 10 的对应编号为旧有的编号。

[0083] 该判断编号是否正确 63 步骤中，该可写入编号的轮胎状态侦测器 10 在完成旧有编号的设定后，以传送模块 16 无线传输完成写入的旧有编号至设定器 20，该控制器 21 透过无线接收模块 23 接收该传送出来的编号，并判断该传送出来的编号与旧有编号是否相同，若判断结果为非，则重新进行步骤 61，反之，则代表写入旧有编号的过程顺利完成。

[0084] 以上所述，仅是本发明的较佳实施例而已，并非对本发明作任何形式上的限制，虽然本发明已以较佳实施例揭露如上，然而并非用以限定本发明，任何熟悉本专业的技术人员，在不脱离本发明技术方案范围内，当可利用上述揭示的技术内容作出些许更动或修饰为等同变化的等效实施例，但凡是未脱离本发明技术方案的内容，依据本发明的技术实质对以上实施例所作的任何简单修改，等同变化与修饰，均仍属于本发明技术方案的范围内。

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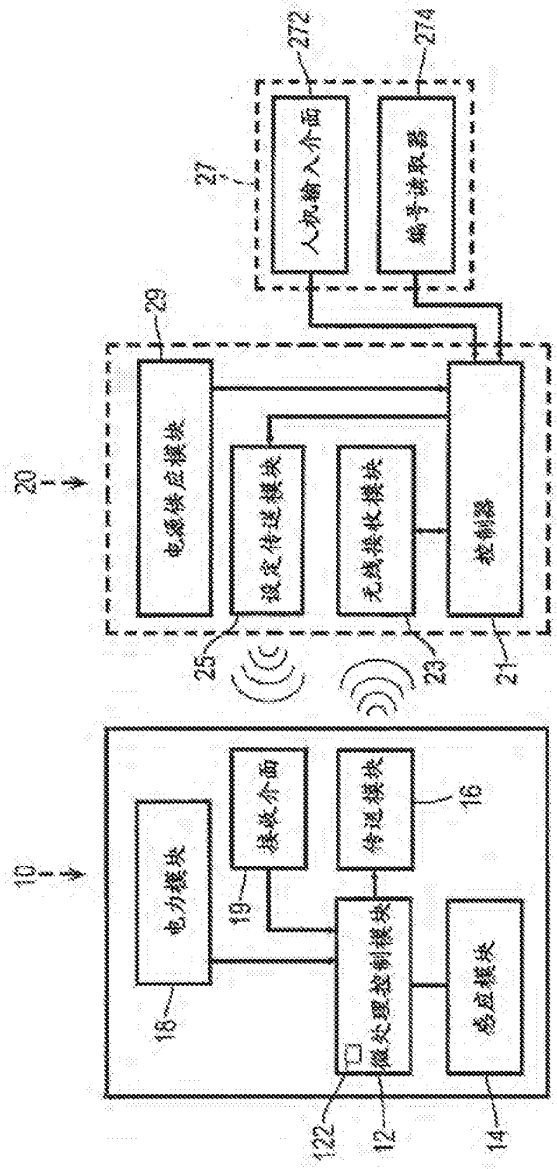


图 1

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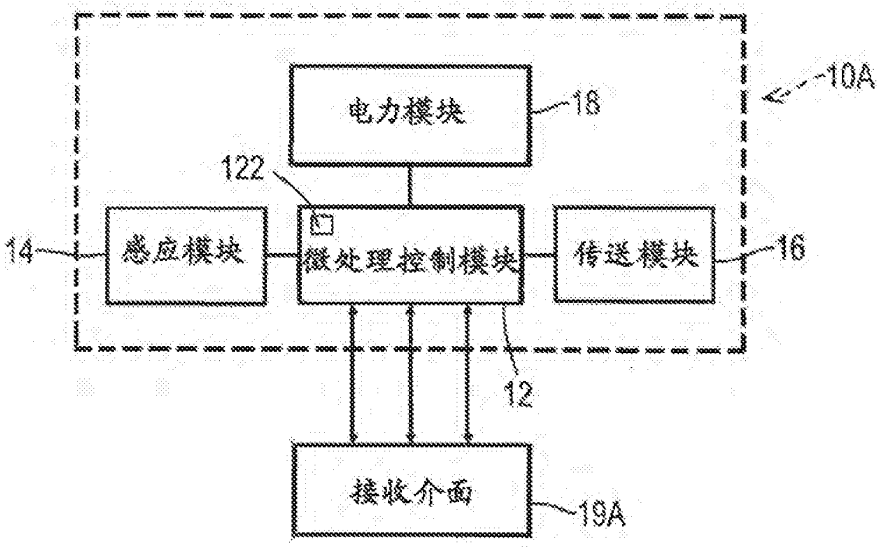


图 2

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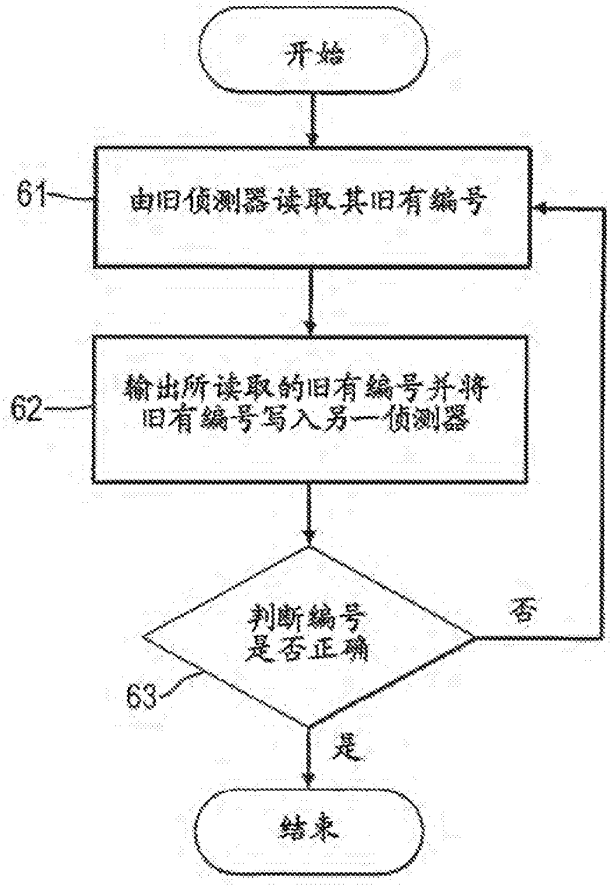


图 3

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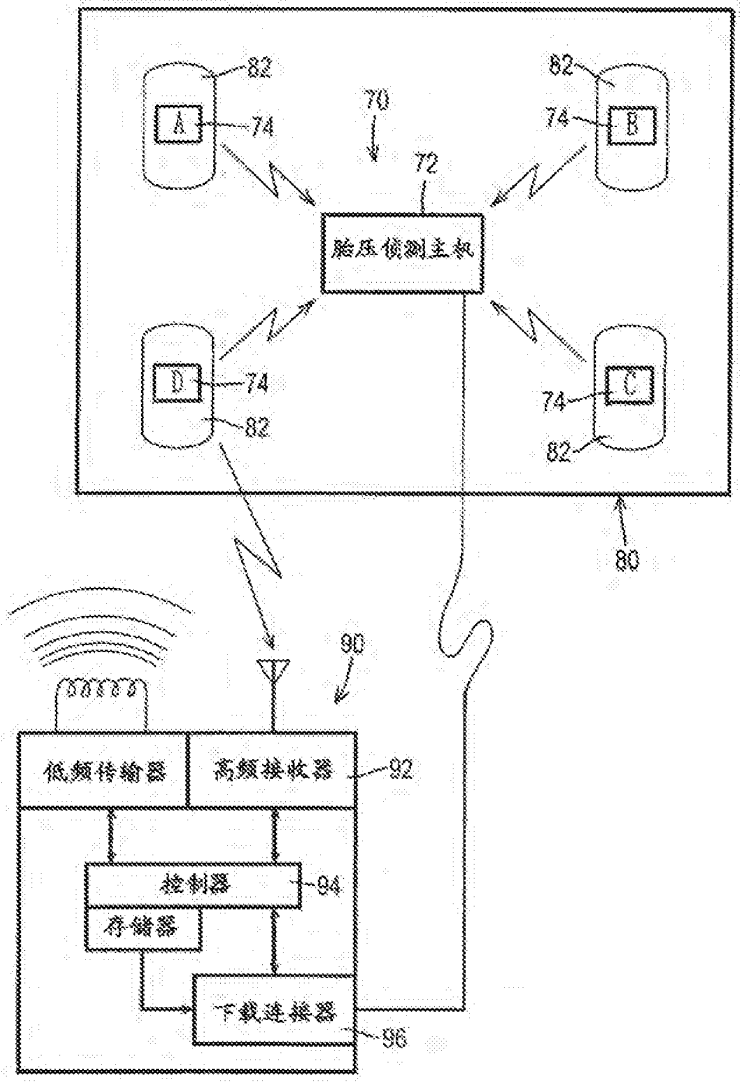


图 4

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Espacenet

Bibliographic data: CN101881699 (B) — 2013-07-10

Tire pressure detection device with writable number and inputting method thereof

No documents available for this priority number.

Inventor(s):	YOU HONGZHI
Applicant(s):	ORANGE ELECTORNIC CO., LTD
Classification:	**- international:** ***G01M17/02***
	- cooperative:
Application number:	CN20091136437 20090508
Priority number(s):	CN20091136437 20090508
Also published as:	CN101881699 (A)

Abstract of CN101881699 (A)

The invention relates to a tire pressure detection device with a writable number and an inputting method thereof. The tire pressure detection device with the writable number comprises a tire condition detection device with a writable number and a setting device. When in use, the number of an old tire pressure detection device to be replaced is firstly read by the setting device; and then, the number is transmitted to the tire condition detection device with a writable number and is set as the number of the tire condition detection device with the writable number. Therefore, a user can directly use the tire condition detection device with the writable number after number write-in, thus dispensing with the repeated complex setting operation.

Last updated: 13.03.2013 Worldwide Database 5.8.11.1; 92p

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IPR2024-00744

(19)中华人民共和国国家知识产权局

(12)发明专利

(10)授权公告号 CN 101881689 B
(45)授权公告日 2013.07.10

(21)申请号 200910136437.7
(22)申请日 2009.05.08
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代理人 寿宁 张华辉

(51)Int.Cl.
G01M 17/02(2006.01)

(56)对比文件
US 6941801 B2,2005.09.13,第2栏35-第4栏15行,权利要求1-10,图1-4.
CN 100341023 C,2007.10.03,全文.
CN 1440884 A,2003.09.10,全文.
CN 101115634 A,2008.01.30,全文.
CN 101189344 A,2008.04.30,全文.

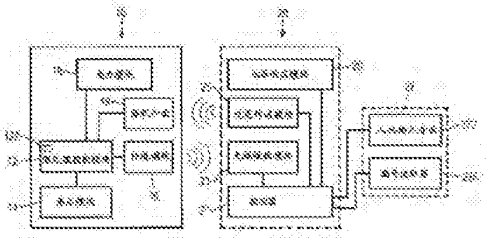
权利要求书1页 说明书6页 附图3页

(54)发明名称

可写入编号的胎压侦测装置

(57)摘要

本发明是有关于一种可写入编号的胎压侦测装置,其中,该可写入编号的胎压侦测装置包含一可写入编号的轮胎状态侦测器以及一设定器,使用时,该设定器先读取即有待更换的胎压侦测器的编号后,将编号传输给该可写入编号的轮胎状态侦测器,设定该编号为该可写入编号的轮胎状态侦测器的编号,使用者仅需直接使用完成编号写入的该可写入编号的轮胎状态侦测器,即无须再进行繁复的重新设定动作。



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1. 一种可写入编号的胎压侦测装置，其特征在于其包括：

一可写入编号的轮胎状态侦测器，其包含一微处理控制模块以及分别与该微处理控制模块电性连接的一感应模块、一传送模块、一电力模块以及一接收介面，其中：

该感应模块接受该微处理控制模块的控制，感测一胎压值；

该传送模块接受该微处理控制模块的控制，将该感应模块的感测结果以一射频讯号传送，或传送出一高频无线讯号，该高频无线讯号中包含该可写入编号的轮胎状态侦测器本身的一编号；

该微处理控制模块包含一记忆单元，该记忆单元为一可读写的记忆单元；

该接收介面接受该微处理控制模块的控制，以无线方式接收外部的一编号设定讯号，再将所接收的编号讯号储存于该记忆单元；以及

该电力模块提供该可写入编号的轮胎状态侦测器操作所需的电力；以及

一设定器，其包含一控制器以及分别与该控制器电性连接的一无线接收模块、一设定传送模块、一输入介面以及一电源供应模块，其中：

该无线接收模块接收一外部胎压侦测器或该可写入编号的轮胎状态侦测器的传送模块所传送的高频无线讯号，并将该高频无线讯号输出至该控制器，其中，该高频无线讯号包含该外部胎压侦测器或该可写入编号的轮胎状态侦测器的一编号；

该设定传送模块可接受该控制器的控制，以无线方式输出该编号设定讯号予该可写入编号的轮胎状态侦测器的接收介面，其中，该编号设定讯号的频率相对低于该无线接收模块接收到的高频无线讯号的频率；

该输入介面以光学判断方式输入以读取或设定一编号；以及

该控制器读取该无线接收模块所接收的高频无线讯号中所包含的编号，再将该编号形成该编号设定讯号，或，该控制器读取该输入介面所读取或设定的编号，再将该编号形成该编号设定讯号，透过该设定传送模块将编号设定讯号传送予另一新的可写入编号的轮胎状态侦测器的该接收介面，使新的可写入编号的轮胎状态侦测器将接收到的该编号写入到本身的记忆单元内。

2. 根据权利要求 1 所述的可写入编号的胎压侦测装置，其特征在于其中所述的设定传送模块与该接收介面电性连接并传送该编号设定讯号予该接收介面。

3. 根据权利要求 1 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

4. 根据权利要求 1 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块包含一气压感测器、一个以上的加速度感测器及一温度感测器。

5. 根据权利要求 2 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

6. 根据权利要求 2 所述的可写入编号的胎压侦测装置，其特征在于其中所述的感应模块包含一气压感测器、一个以上的加速度感测器及一温度感测器。

7. 根据权利要求 1 所述的可写入编号的胎压侦测装置，其特征在于其中所述的输入介面包含一条码读取机。

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可写入编号的胎压侦测装置

技术领域

[0001] 本发明涉及一种胎压侦测器，特别是涉及一种可写入编号的胎压侦测装置。

背景技术

[0002] 为了维护驾驶能够即时掌握汽车轮胎的状况，避免因突然爆胎或胎压不足，危害驾驶的行车安全，目前在美国大多数的汽车均已经配备胎压侦测系统，该胎压侦测系统读取分别装设于汽车四个轮胎内的胎压侦测器，每一胎压侦测器在一定时间内持续读取对应轮胎内的气压或其他的参数（例如胎内温度、轮胎运转速度...等）后，将读取结果传送给该胎压侦测系统。若任一胎压侦测器所感测的结果出现异常时，该胎压侦测系统产生一警报讯号以通知汽车的驾驶。

[0003] 为了避免经常更换胎压侦测器造成维持成本浪费及使用者麻烦，目前的胎压侦测器平均使用寿命可大于 5 年，但是当胎压侦测器毁损或需要更换时，由于各个汽车原厂所使用的胎压侦测器及其输入方法不尽然全部相同，致使使用者必须为了一个胎压侦测器，回到汽车原厂进行更换，造成使用者的不便。

[0004] 如图 4 所示，为一现有习用的胎压侦测系统 70，其包含一胎压侦测主机 72 以及复数个胎压侦测器 74，该胎压侦测主机 72 安装于一汽车本体 80 内，各胎压侦测器 74 则安装于该汽车本体 80 的复数个轮胎 82 内，为了辨识每一个胎压侦测器 74 的安装位置，每一胎压侦测器 74 包含独立的一辨识号码，而该胎压侦测主机 72 则必须先得知每一胎压侦测器 74 特有的辨识号码，才能够与各个胎压侦测器 74 产生讯号连结，及辨识各胎压侦测器 74 的感测结果。

[0005] 其中，该胎压侦测主机 72 是利用一辨识号码设定装置 90，设定各胎压侦测器 74 的辨识号码。该辨识号码设定装置 90 是利用其一高频接收器 92 先读取一新的胎压侦测器 74 其辨识号码后，该辨识号码设定装置 90 再将所读取的辨识号码经过一控制器 94 及一下载连接器 96 写入该胎压侦测主机 72。然而，由于不同汽车制造商的该辨识号码设定装置 90 无法彼此相容，单一辨识号码设定装置 90 仅能针对特定胎压侦测器 74 进行读取及设定，让使用者若欲进行更换胎压侦测器 74 时，必须回到配有该辨识号码设定装置 90 的维修厂，造成使用者不便。

[0006] 由此可见，上述现有的胎压侦测装置在结构与使用上，显然仍存在有不便与缺陷，而亟待加以进一步改进。为了解决上述存在的问题，相关厂商莫不费尽心思来谋求解决之道，但长久以来一直未见适用的设计被发展完成，而一般产品又没有适切结构能够解决上述问题，此显然是相关业者急欲解决的问题。因此如何能创设一种新型的可写入编号的胎压侦测装置及其输入方法，实属当前重要研发课题之一，亦成为当前业界极需改进的目标。

[0007] 有鉴于上述现有的胎压侦测装置存在的缺陷，本发明人基于从事此类产品设计制造多年丰富的实务经验及专业知识，并配合学理的运用，积极加以研究创新，以期创设一种新型的可写入编号的胎压侦测装置及其输入方法，能够改进一般现有的胎压侦测装置，使其更具有实用性。经过不断的研究、设计，并经过反复试作样品及改进后，终于创设出确具

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实用价值的本发明。

发明内容

[0008] 本发明的主要目的在于，克服现有的胎压侦测装置存在的缺陷，而提供一种新型的可写入编号的胎压侦测装置及其输入方法，所要解决的技术问题是使汽车的胎压侦测主机可以不必重新设定新的编号，让使用者不必回到特定的维修厂进行胎压侦测器更换而提升作业便利性，同时可以让多数的维修厂可以不必准备不同厂商特有的设定装置，而大量节省维持成本，非常适于实用。

[0009] 本发明的目的及解决其技术问题是采用以下技术方案来实现的。依据本发明提出的一种可写入编号的胎压侦测装置，其包括：

[0010] 一可写入编号的轮胎状态侦测器，其包含一微处理控制模块以及分别与该微处理控制模块电性连接的一感应模块、一传送模块、一电力模块以及一接收介面，其中：该感应模块接受该微处理控制模块的控制，感测一胎压值；该传送模块接受该微处理模块的控制，将该感应模块的感测结果以一射频讯号传送，或传送出一高频无线讯号，该高频无线讯号中包含该可写入编号的轮胎状态侦测器本身的一编号；该微处理控制模块包含一记忆单元，该记忆单元为一可读写的记忆单元；该接收介面接受该微处理控制模块的控制，以无线方式接收外部的一编号设定讯号，再将所接收的编号讯号储存于该记忆单元；以及该电力模块提供该可写入编号的轮胎状态侦测器操作所需的电力；以及

[0011] 一设定器，其包含一控制器以及分别与该控制器电性连接的一无线接收模块、一设定传送模块、一输入介面以及一电源供应模块，其中：该无线接收模块接收一外部胎压侦测器或该可写入编号的轮胎状态侦测器的传送模块所传送的高频无线讯号，并将该高频无线讯号输出至该控制器，其中，该高频无线讯号包含该外部胎压侦测器或该可写入编号的轮胎状态侦测器的一编号；该设定传送模块可接受该控制器的控制，以无线方式输出该编号设定讯号予该可写入编号的轮胎状态侦测器的接收介面，其中，该编号设定讯号的频率相对低于该无线接收模块接收到的高频无线讯号的频率；该输入介面以光学判断方式输入以读取或设定一编号；以及该控制器读取该无线接收模块所接收的高频无线讯号中所包含的编号，再将该编号形成该编号设定讯号，透过该设定传送模块传送予另一新的可写入编号的轮胎状态侦测器的该接收介面，使新的可写入编号的轮胎状态侦测器将接收到的该编号写入到本身的记忆单元内。

[0012] 本发明的目的及解决其技术问题还可采用以下技术措施进一步实现。

[0013] 前述的可写入编号的胎压侦测装置，其中所述的设定传送模块与该接收介面电性连接并传送该编号设定讯号予该接收介面。

[0014] 前述的可写入编号的胎压侦测装置，其中所述的感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

[0015] 前述的可写入编号的胎压侦测装置，其中所述的感应模块包含一气压感测器、一个以上的加速度感测器及一温度感测器。

[0016] 前述的可写入编号的胎压侦测装置，其中所述的感应模块为一气压感测器、一个以上的加速度感测器、一温度感测器或一磁场感测器。

[0017] 前述的可写入编号的胎压侦测装置，其中所述的感应模块包含一气压感测器、一

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个以上的加速度感测器及一温度感测器。

[0018] 前述的可写入编号的胎压侦测装置，其中所述的输入介面包含一条码读取机。

[0019] 本发明与现有技术相比具有明显的优点和有益效果。为了解决目前的胎压侦测主机与胎压侦测器之间的设定过度繁琐，以及需要使用特殊的设定装置才可完成设定，造成使用者必须寻找配有特殊设定装置的维修厂才可进行胎压侦测器的更换，因而导致使用不便的问题，本发明提出一种可修改或写入编号的感测器，以取代旧有的胎压侦测器，使汽车的胎压侦测主机可以不必重新设定新的编号，让使用者不必回到特定的维修厂进行胎压侦测器更换而提升作业便利性，同时可以让多数的维修厂可以不必准备不同厂商特有的设定装置，而大量节省维持成本。

[0020] 借由上述技术方案，本发明可写入编号的胎压侦测装置至少具有下列优点及有益效果：当旧有的胎压侦测器需要更换时，一般具有该设定器的任一车厂即可将旧有胎压侦测器的编号复制于一个新的可写入编号的轮胎状态侦测器，直接取代旧有的胎压侦测器，无须再以其他装置，先读取新安装的胎压侦测器的编号再重新设定汽车内的胎压侦测系统，而可大量提升使用者的更换便利性以及节省一般车厂的维持成本。

[0021] 综上所述，本发明是有关于一种可写入编号的胎压侦测装置，其中，该可写入编号的胎压侦测装置包含一可写入编号的轮胎状态侦测器以及一设定器，使用时，该设定器先读取旧有待更换的胎压侦测器的编号后，将编号传输给该可写入编号的轮胎状态侦测器，设定该编号为该可写入编号的轮胎状态侦测器的编号，使用者仅需直接使用完成编号写入的该可写入编号的轮胎状态侦测器，即无须再进行繁复的重新设定动作。

[0022] 本发明在技术上有显著的进步，并具有明显的积极效果，诚为一新颖、进步、实用的新设计。

[0023] 上述说明仅是本发明技术方案的概述，为了能够更清楚了解本发明的技术手段，而可依照说明书的内容予以实施，并且为了让本发明的上述和其他目的、特征和优点能够更明显易懂，以下特举较佳实施例，并配合附图，详细说明如下。

附图说明

[0024] 图 1 为本发明较佳实施例的系统方框图。

[0025] 图 2 为本发明一可写入编号的轮胎状态侦测器的另一实施例的方框图。

[0026] 图 3 为本发明较佳实施例的流程图。

[0027] 图 4 为既有的一胎压侦测系统的系统方框图。

[0028] 10：可写入编号的轮胎状态侦测器

[0029] 12：微处理控制模块

[0030] 122：记忆单元

[0031] 14：感应模块

[0032] 16：传送模块

[0033] 18：电力模块

[0034] 19，19A：接收介面

[0035] 20：设定器

[0036] 21：控制器

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[0037] 23：无线接收模块

[0038] 25：设定传送模块

[0039] 27：输入介面

[0040] 272：人机输入介面

[0041] 274：编号读取器

[0042] 29：电源供应模块

具体实施方式

[0043] 为更进一步阐述本发明为达成预定发明目的所采取的技术手段及功效，以下结合附图及较佳实施例，对依据本发明提出的可写入编号的胎压侦测装置其具体实施方式、结构、特征及其功效，详细说明如后。

[0044] 有关本发明的前述及其他技术内容、特点及功效，在以下配合参考图式的较佳实施例的详细说明中将可清楚的呈现。为了方便说明，在以下的实施例中，相同的元件以相同的编号表示。

[0045] 请参阅图 1、图 2 所示，其为本发明的可写入编号的胎压侦测装置及其输入方法的较佳实施例，其中，该可写入编号的胎压侦测装置包含一可写入编号的轮胎状态侦测器 10 以及一设定器 20。

[0046] 该可写入编号的轮胎状态侦测器 10 在使用时固定安装于一汽车轮胎内，一般而言，该可写入编号的轮胎状态侦测器 10 固定结合于该汽车轮胎的一气嘴，该可写入编号的轮胎状态侦测器 10 包含一微处理控制模块 12 以及分别连接该微处理控制模块 12 的一感应模块 14、一传送模块 16、一电力模块 18 以及一接收介面 19，19A。

[0047] 该微处理控制模块 12 内部包含一记忆单元 122，该记忆单元 122 为一可读写的记忆单元，可以纪录一 8 位元或以上的编号，该编号对应于一外部胎压侦测器或该可写入编号的轮胎状态侦测器 10。当本较佳实施例的该可写入编号的轮胎状态侦测器 10 制造出厂时，可分配一内定且为独一的编号纪录于该记忆单元 122 内，或者，也可在出厂时，未纪录任何编号于该可写入编号的轮胎状态侦测器 10 内。

[0048] 该感应模块 14 可包含一气压感测器、一个以上的加速度感测器、一温度感测器以及一磁场感测器，该感应模块 14 接受该微处理控制模块 12 的控制，在该可写入编号的轮胎状态侦测器 10 安装于该汽车轮胎内时，感测该汽车轮胎内的轮胎气压、汽车轮胎的直线行走加速度、方向改变、温度及外部环境磁场 . . . 等，该感应模块 14 并同时将感测结果传送至该微处理控制模块 12。其中，当该感应模块 14 包含两个感应方向不同的加速度感测器时，即可在该汽车轮胎转向时，透过感测的加速度改变而测知转向的发生。

[0049] 该传送模块 16 接受该微处理控制模块 12 的控制，无线传送该感应模块 14 的感测结果给安装于汽车内部的一侦测系统或该设定器 20。本较佳实施例的传送模块 16 为一射频传输器，其将感测结果以射频讯号（例如 315Mhz、433Mhz . . . 等）传送给该侦测系统或该设定器 20。

[0050] 该电力模块 18 则提供该可写入编号的轮胎状态感测器 10 的内部其他功能模块操作所需的电力，其可为一电池。

[0051] 该接收介面 19，19A 为一可接受外部讯号线连接的连接器或为一低频无线接收

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器，例如 125kHz、、、等。如第一图所示，该接收介面 19 为低频无线接受器，可以接受该微处理控制模块 12 的控制，接受外部的一低频无线讯号，该低频无线讯号的频率相对低于该传送模块 16 的射频讯号。由于低频讯号的穿透率较差，故讯号接受距离受到限制，所以若欲以该接收介面 19 读取接收外部无线讯号，则必须将该接收介面 19 相当程度地接近外部无线讯号源，故在使用时，该可写入编号的轮胎状态侦测器 10 可利用该接收介面 19 接近不同的外部无线讯号源，而分别读取不同的外部无线讯号源。

[0052] 请参阅图 2 所示，该接收介面 19A 为如一接头、一 Pin 脚座、、、等可与外部讯号电路线连接的介面。

[0053] 该设定器 20 包含一控制器 21 以及分别与该控制器 21 电性连接的一无线接收模块 23、一设定传送模块 25、一输入介面 27 以及一电源供应模块 29。

[0054] 该无线接收模块 23 可接受一外部胎压侦测器所传送的无线讯号，及该可写入编号的轮胎状态侦测器 10 的该传送模块 16 所传送出的无线讯号，将所接受的讯号传递至该控制器 21。

[0055] 该设定传送模块 25 可接受该控制器 21 的控制，传送该低频无线讯号与该接收介面 19。

[0056] 该输入介面 27 可包含一人机输入介面 272 以及一编号读取器 274。该人机输入介面 272 可为一输入键盘、一指拨开关 (dip switch)、、、等，其接受人为的触发或设定，输入一编号给该控制器 21。该编号读取器 274 可为一条码读取机，其可以光学讯号判断读取形成或贴附在一外部胎压侦测器或其他的可写入编号的轮胎状态侦测器 10 的条码，该条码对应于该外部胎压侦测器或其他可写入编号的轮胎状态侦测器 10 的编号，且该编号读取器 274 在读取条码后，将读取结果输出于该控制器 21。

[0057] 该电源供应模块 29 可为一电转换器或一电池，供应该设定器 20 操作所需的电力。

[0058] 请参阅图 3 所示，其为本较佳实施例的可写入胎压侦测器装置的输入方法，其步骤包含：由旧侦测器读取其旧有编号 61、将旧有编号写入另一侦测器 62 以及判断编号是否正确 63。

[0059] 该由旧侦测器读取其旧有编号 61 步骤，为使用者以该设定器 20 读取安装于一汽车轮胎内的胎压侦测器的编号。或者，亦可以将已知编号的胎压侦测器的编号直接透过该输入介面 27 读入该设定器 20 内，例如，欲更换的胎压侦测器表面可能直接写着编号，或者贴附一纪录编号的条码系，使用者可透过该人机输入介面 272 或该编号读取器 274，将该编号读入该设定器 20 内。

[0060] 该将旧有编号写入另一侦测器 62 步骤中，为该设定器 20 将所读取的旧有编号，透过其设定传送模块 25 传送给该接收介面 19，使该微处理控制模块 12 在该接收介面 19 接收讯号后，将旧有编号记录在该记忆单元 122 内。若该可写入编号的轮胎状态侦测器 10 的记忆单元 122 原先已经存在内建的编号，本步骤则将该旧有编号覆写并删除原先已经存在的编号，让该可写入编号的轮胎状态侦测器 10 的对应编号为旧有的编号。

[0061] 该判断编号是否正确 63 步骤中，该可写入编号的轮胎状态侦测器 10 在完成旧有编号的设定后，以传送模块 16 无线传输完成写入的旧有编号至设定器 20，该控制器 21 透过无线接收模块 23 接收该传送出来的编号，并判断该传送出来的编号与旧有编号是否相同，若判断结果为非，则重新进行步骤 61，反之，则代表写入旧有编号的过程顺利完成。

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[0062] 以上所述，仅是本发明的较佳实施例而已，并非对本发明作任何形式上的限制，虽然本发明已以较佳实施例揭露如上，然而并非用以限定本发明，任何熟悉本专业的技术人员，在不脱离本发明技术方案范围内，当可利用上述揭示的技术内容作出些许更动或修饰为等同变化的等效实施例，但凡是未脱离本发明技术方案的内容，依据本发明的技术实质对以上实施例所作的任何简单修改、等同变化与修饰，均仍属于本发明技术方案的范围内。

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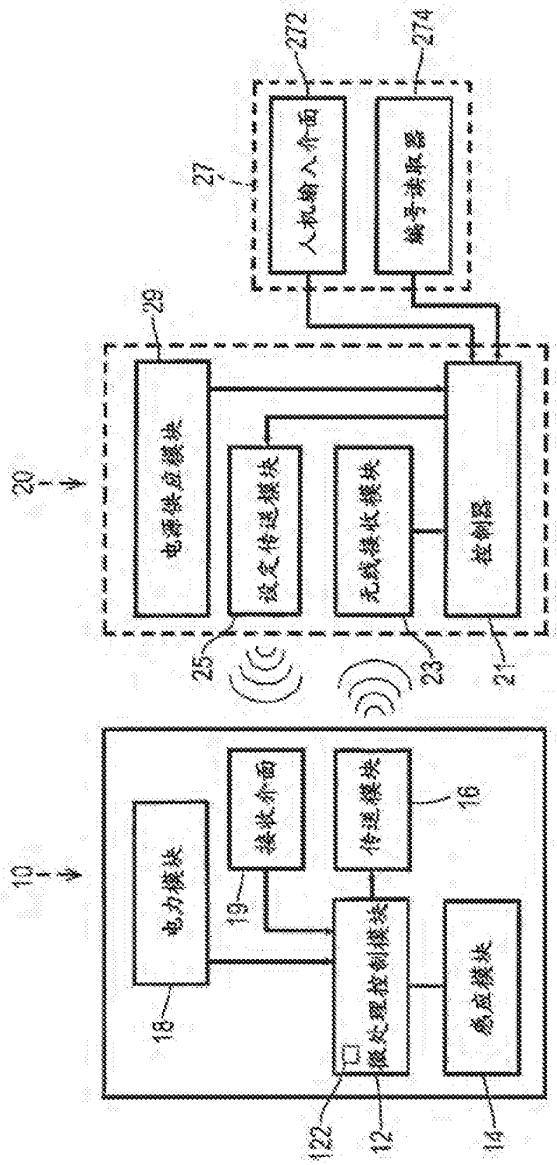


图 1

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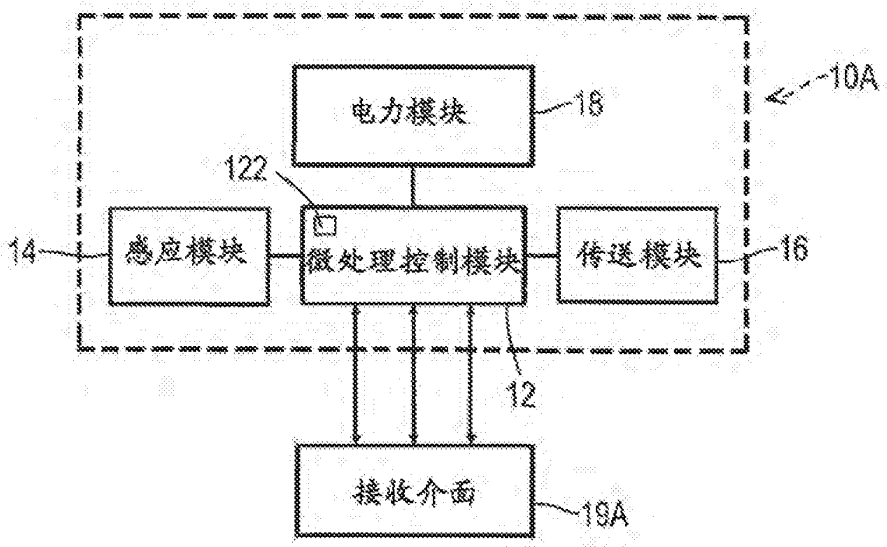


图 2

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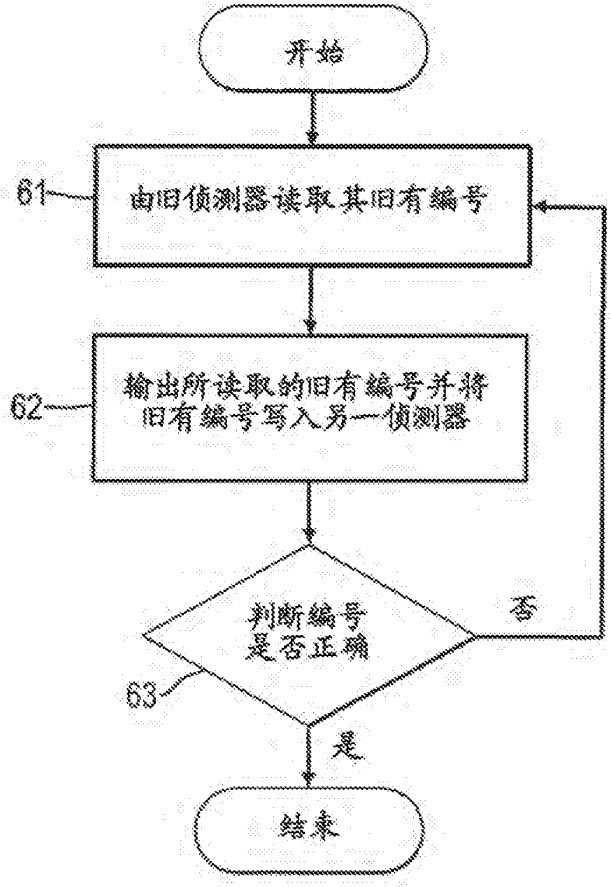


图 3

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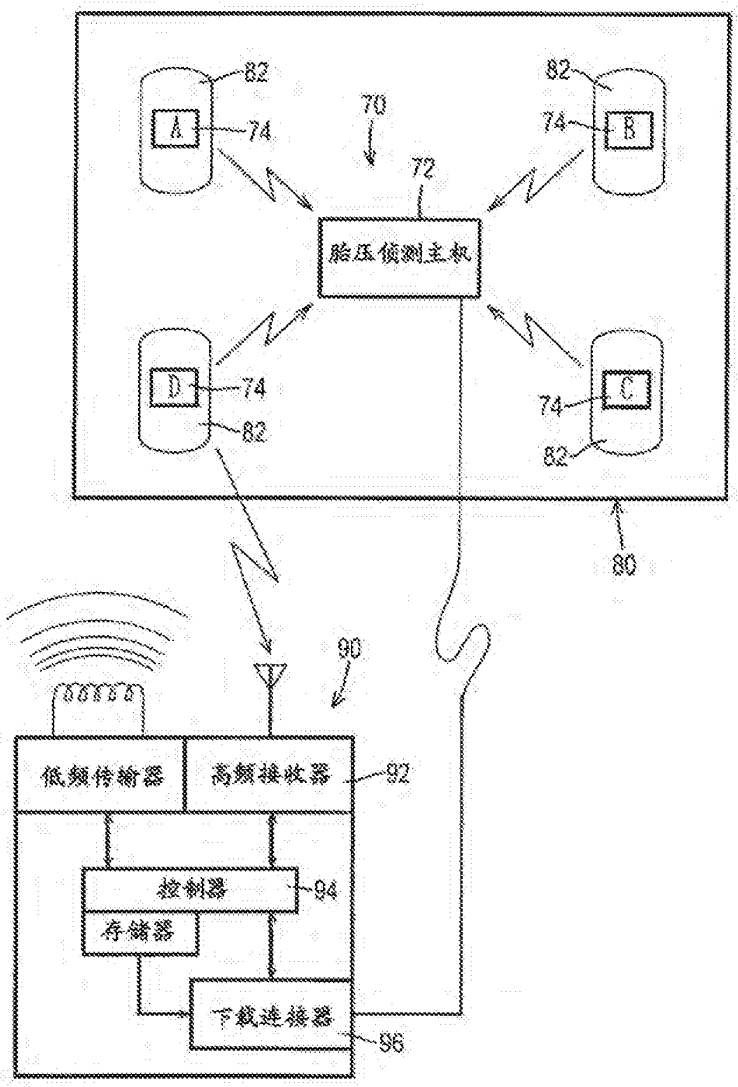


图 4

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Bibliographic data: JP2011031759 (A) — 2011-02-17

TIRE PRESSURE MEASURING SYSTEM

No documents available for this priority number

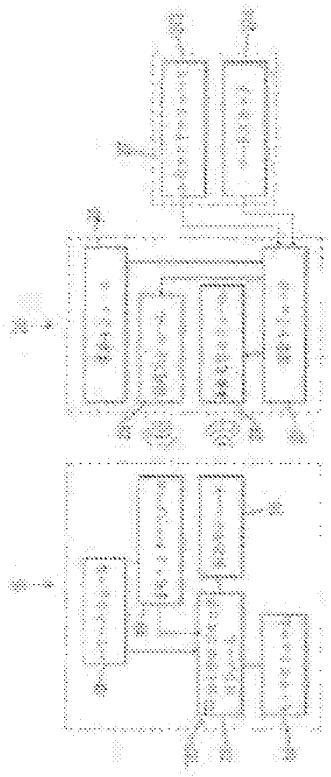
Inventor(s):	YU HUNG-CHIH ± (YU HUNG-CHIH)
Applicant(s):	ORANGE ELECTRONIC CO LTD ± (ORANGE ELECTRONIC CO LTD)
Classification:	**- International:** ***B60C23/04; G01L17/00*** **- cooperative:**
Application number:	JP20090180453 20090803
Priority number(s):	JP20090180453 20090803

Abstract of JP2011031759 (A)

PROBLEM TO BE SOLVED: To provide a tire pressure measuring system including a tire pressure measuring device, which performs the re-setting by inputting the code. ; SOLUTION: The tire pressure measuring system includes a tire pressure measuring device 10 inputting the code, and a receiver 20 to perform communication with the tire pressure measuring device 10. The tire pressure measuring device 10 includes a micro process module 12 having a memory unit installed on the vent valve of a tire, and inputting the predetermined code and recording it, a sensor module 14, and a transmission module 16. The receiver 20 reads the predetermined code of the broken tire pressure measuring device, and inputs the read predetermined code in the memory unit by the tire pressure measuring device. ; COPYRIGHT: (C)2011,JPO&INPIT

Last updated: 15.03.2013 Worldwide Database 5.8.11.1; 93p

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IPR2024-00744

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2011-31759
(P2011-31759A)
(43)公開日　平成23年2月17日(2011.2.17)

(51)Int.Cl.		F I			テーマコード（参考）
B60C 23/04	(2006.01)	B60C	23/04	N	2F055
G01L 17/00	(2006.01)	G01L	17/00	301P	

審査請求 有　請求項の数 3　OL　（全 8 頁）

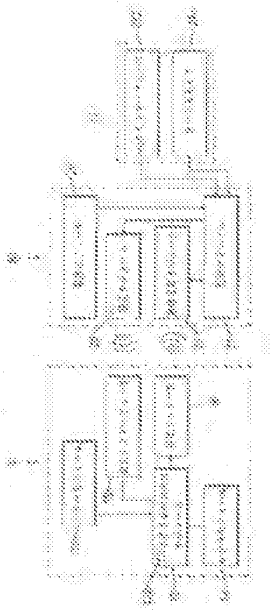
(21)出願番号　特願2009-180453(P2009-180453)
(22)出願日　平成21年8月3日(2009.8.3)

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Fターム(参考)　2F055 AA12　BB29　CC60　DD20　EE40
FF15　GG49

(54)【発明の名称】タイヤ圧力測定システム

(57)【要約】　（修正有）
【課題】コードを入力して再設定できるタイヤ圧力測定装置を備えるタイヤ圧力測定システムを提供する。
【解決手段】コードを入力できるタイヤ圧力測定装置10と、タイヤ圧力測定装置10と通信する受信装置20とを有する。タイヤ圧力測定装置10は、タイヤの通気弁に設置され、既定のコードを入力して記録することができるメモリーユニットを備えるマイクロプロセスモジュール12と、センサモジュール14と、伝送モジュール16と、を有するものである。受信装置20は、壊れたタイヤ圧力測定装置の既定のコードを読み取り、読み取った既定のコードをタイヤ圧力測定装置により、メモリーユニットに入力することができることを特徴とする。
【選択図】図1



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【特許請求の範囲】
【請求項１】
コードを入力できるタイヤ圧力測定装置と、該タイヤ圧力測定装置と通信する受信装置とを有し、
前記タイヤ圧力測定装置は、
既定のコードを入力して記録することができるメモリーユニットを備えるマイクロプロセスモジュールと、
タイヤの圧力を測定し、測定データを前記マイクロプロセスモジュールに伝送する圧力測定ユニットを有すると共に、該マイクロプロセスモジュールと電気接続されるセンサモジュールと、
前記マイクロプロセスモジュールに制御され、前記測定データと既定のコードとを含む無線周波信号を伝送する伝送モジュールと、
前記マイクロプロセスモジュールと電気接続されると共に、前記タイヤ圧力測定装置に電力を供給するパワーモジュールと、
前記メモリーユニットにおいて前記既定のコードにオーバーライトされる外部コードを含む外部信号を受信し、前記外部信号を前記マイクロプロセスモジュールに送信すると共に、前記マイクロプロセスモジュールと電気接続される受信インターフェースとを有し、
前記受信装置は、
制御モジュールと、
前記制御モジュールと電気接続され、前記コードを入力できるタイヤ圧力測定装置またはタイヤ圧力測定装置から前記既定のコードを含む無線周波信号を受信し、前記無線周波信号を前記制御モジュールに送信する受信モジュールと、
前記受信モジュールから受信した、無線周波信号の既定のコードを有すると共に、前記制御モジュールにより発生した前記外部信号を前記受信インタフェースに送信するために、前記制御モジュールにより制御される出力設定モジュールと、
前記制御モジュールと電気接続され、前記受信装置に電力を供給する電源モジュールとを有することを特徴とするタイヤ圧力測定システム。
【請求項２】
前記受信装置は、さらに前記制御モジュールと電気接続されると共に、打鍵またはスキャンにより入力される前記既定のコードを受信する入力モジュールを備えることを特徴とする請求項１に記載のタイヤ圧力測定システム。
【請求項３】
前記前記センサモジュールは、さらに少なくとも１つ加速センサと温度センサを有することを特徴とする請求項１乃至２の何れか１項に記載のタイヤ圧力測定システム。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は，特にコード入力できるタイヤ圧力測定装置を備えるタイヤ圧力測定システムに関するものである。
【背景技術】
【０００２】
従来のタイヤ圧力測定システムは、車のタイヤがパンクしそうな時や、タイヤの圧力が足りない時などの異常な状態を防止するため、タイヤの圧力を測定するものである。例えば、従来のタイヤ圧力測定システムは、自動車の４つのタイヤに夫々設置されるタイヤ圧力測定装置と、車体に設置され、前記タイヤ圧力測定装置の測定データを読み取る受信装置とを有し、前記受信装置により、４つのタイヤ圧力測定装置の測定データを順次読み取って、その信号を運転手に伝えることにより，自動車のタイヤを常に正常な状態に維持するものである。
また、一般のタイヤ圧力測定システムの平均寿命は５年であると共に、従来のタイヤ圧力測定システムは、各メーカー独自の方法により設定され、尚且つ、異なるメーカーのタ

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イヤ圧力測定装置のコードは、互いに互換性がないものであるので、１つのタイヤ圧力測定装置が故障してしまうと、同じメーカーの新品のタイヤ圧力測定装置と交換し、同じメーカーの方法より該新品を設定しなくてはならないので、使用上、非常に不便であった。

【０００３】

図４に示すように、従来のタイヤ圧力測定システム（７０）は、測定装置（７２）と、４つのタイヤ圧力測定装置（７４）とを有し、その内、測定装置（７２）は、無線信号を受信するために車体（８０）に設置されると共に、該４つのタイヤ圧力測定装置（７４）は夫々、車体（８０）の４つのタイヤ（８２）に設置され、夫々予め設定された既定のコードを有する無線信号を伝送するものである。

【発明の概要】

【発明が解決しようとする課題】

【０００４】

しかしながら、前記測定装置（７２）は、タイヤ圧力測定装置（７４）のコードを夫々無線信号により入力設定し、タイヤ圧力測定装置（７４）のデータを読み取るものであるが、該タイヤ圧力測定装置（７４）が故障してしまうと、同じメーカーの新品のタイヤ圧力測定装置と交換した後、前記測定装置（７２）に新品のタイヤ圧力測定装置の既定のコードを再設定しなくてはならなかった。

また、上記従来のタイヤ圧力測定システム（７０）のコードの設定は、タイヤ圧力測定システム（７０）のメーカー独自の設定装置（９０）でしか行うことができない。

尚、前記設定装置（９０）は、新品のタイヤ圧力測定装置（７４）のコードを読み取る低周波伝送モジュール（９２）と、読み取ったコードを信号に変換して測定装置（７２）に伝送する制御器（９４）及びダウンロードモジュール（９５）とを備え、前記測定装置（７２）において、該新品のタイヤ圧力測定装置（７４）のコードを再設定するためのものであるが、前記タイヤ圧力測定装置（７４）が故障した場合には、元のメーカーにより新品のタイヤ圧力測定装置（７４）のコードを再設定してもらわなければならなかったので、非常に不便であった。

【０００５】

そこで、出願されたのが本発明であって、コードを入力できるタイヤ圧力測定装置を備えたタイヤ圧力測定システムを提供することを目的としている。

【課題を解決するための手段】

【０００６】

本願の請求項１の発明は、コードを入力できるタイヤ圧力測定装置と、該タイヤ圧力測定装置と通信する受信装置とを有し、

前記タイヤ圧力測定装置は、

既定のコードを入力して記録することができるメモリーユニットを備えるマイクロプロセスモジュールと、

タイヤの圧力を測定し、測定データを前記マイクロプロセスモジュールに伝送する圧力測定ユニットを有すると共に、該マイクロプロセスモジュールと電気接続されるセンサモジュールと、

前記マイクロプロセスモジュールに制御され、前記測定データと既定のコードとを含む無線周波信号を伝送する伝送モジュールと、

前記マイクロプロセスモジュールと電気接続されると共に、前記タイヤ圧力測定装置に電力を供給するパワーモジュールと、

前記メモリーユニットにおいて前記既定のコードにオーバーライトされる外部コードを含む外部信号を受信し、前記外部信号を前記マイクロプロセスモジュールに送信すると共に、前記マイクロプロセスモジュールと電気接続される受信インターフェースとを有し、

前記受信装置は、

制御モジュールと、

前記制御モジュールと電気接続され、前記コードを入力できるタイヤ圧力測定装置またはタイヤ圧力測定装置から前記既定のコードを含む無線周波信号を受信し、前記無線周波

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信号を前記制御モジュールに送信する受信モジュールと、
前記受信モジュールから受信した、無線周波信号の既定のコードを有すると共に、前記制御モジュールにより発生した前記外部信号を前記受信インタフェースに送信するために、前記制御モジュールにより制御される出力設定モジュールと、
前記制御モジュールと電気接続され、前記受信装置に電力を供給する電源モジュールとを有することを特徴とするタイヤ圧力測定システム、を提供する。
【０００７】
本願の請求項２の発明は、前記受信装置は、さらに前記制御モジュールと電気接続されると共に、打鍵またはスキャンにより入力される前記既定のコードを受信する入力モジュールを備えることを特徴とする請求項１に記載のタイヤ圧力測定システム、を提供する。
【０００８】
本願の請求項３の発明は、前記前記センサモジュールは、さらに少なくとも１つ加速センサと温度センサを有することを特徴とする請求項１乃至２の何れか１項に記載のタイヤ圧力測定システム、を提供する。
【発明の効果】
【０００９】
本発明に係るタイヤ圧力測定システムは、上記の課題を解決するものであり、コードを入力可能なタイヤ圧力測定装置を備えるので、元のメーカーのタイヤ圧力測定装置と交換しなくても、簡単にタイヤ圧力測定装置のコードを入力して再設定することができる。
【図面の簡単な説明】
【００１０】
【図１】本発明に係るタイヤ圧力測定システムのブロック図である。
【図２】図１のタイヤ圧力測定システムにおけるタイヤ圧力測定装置のブロック図である。
【図３】本発明に係るタイヤ圧力測定装置によりコードを入力する方法の流れ図である。
【図４】従来のタイヤ圧力測定システムのブロック図である。
【発明を実施するための形態】
【００１１】
以下、添付図面を参照して本発明の好適な実施の形態を詳細に説明する。
【００１２】
図１は本発明に係るタイヤ圧力測定システムのブロック図であり、図２は図１のタイヤ圧力測定システムにおけるタイヤ圧力測定装置のブロック図であり、図３は本発明に係るタイヤ圧力測定装置によりコードを入力する方法の流れ図である。
【００１３】
図１及び図２に示すように、本発明に係るタイヤ圧力測定システムは、コードを入力可能なタイヤ圧力測定装置（１０、１０Ａ）と、該タイヤ圧力測定装置（１０、１０Ａ）と通信する受信装置（２０）とを有する。
【００１４】
前記タイヤ圧力測定装置（１０、１０Ａ）は、タイヤの通気弁に設置され、マイクロプロセスモジュール（１２）と、センサモジュール（１４）と、伝送モジュール（１６）と、パワーモジュール（１８）と、受信インターフェース（１９、１９Ａ）とを有する。
【００１５】
前記マイクロプロセスモジュール（１２）は、メモリーユニット（１２２）を備え、該メモリーユニット（１２２）は、既定のコードを記録可能なメモリからなり、該コードの入力は、前記タイヤ圧力測定装置（１０、１０Ａ）の製造工程において行ってもよい。また、前記コードは、８ビットの整数型であってもよい。さらに、前記メモリーユニット（１２２）は、コードの無記入の状態、又は、既定のコードがすでに記入された状態の何れか一方の状態になるものである。
【００１６】
前記センサモジュール（１４）は、前記マイクロプロセスモジュール（１２）と電気接

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続されると共に、圧力センサと、少なくとも１つの加速センサと、温度センサとを備えるものである。

前記圧力センサは、タイヤの圧力を測定すると共に、測定データを前記マイクロプロセスモジュール（１２）に伝送するものである。

前記少なくとも１つの加速センサは、タイヤの加速を測定すると共に、測定された加速データを前記マイクロプロセスモジュール（１２）に伝送するものである。さらに、前記加速センサは、２つ以上が配置されてもよい。また、前記加速センサは、２つ以上を別の方向へ設置することにより、方向変換などを判断するものである。

前記温度センサは、タイヤの温度を測定すると共に、測定温度データを前記マイクロプロセスモジュール（１２）に伝送するものである。

【００１７】

前記伝送モジュール（１６）は、前記マイクロプロセスモジュール（１２）により制御し、前記測定データと既定のコードとを含む無線周波信号（例えば、３１５ＭＨｚ又は４３３ＭＨｚなどの無線周波信号）を伝送するものである。

【００１８】

前記パワーモジュール（１８）は，前記マイクロプロセスモジュール（１２）と電気接続され、前記タイヤ測定装置（１０）に電力を供給するものである。

【００１９】

前記受信インターフェース（１９，１９Ａ）は、マイクロプロセスモジュール（１２）と電気接続され、前記メモリーユニット（１２２）において、前記既定のコードにオーバーライトされるコードを含む外部信号を受信し、該外部信号を前記マイクロプロセスモジュール（１２）に送信するものである。尚、前記受信インターフェース（１９，１９Ａ）は、連続インターフェースとして、または、低周波受信器として受信できるものであってもよい。また、前記低周波受信器の周波数は，前記無線周波信号より低いものであるが、良好な通信効果を得るために、前記受信装置（２０）により送信される外部信号は、例えば１２５ｋＨｚなど，キロヘルツの範囲の信号であることが好ましい。低周波信号は費運力が低いであるので，前記受信インターフェース（１９）は、無線低周波信号による通信方法を採用するが、受信される時に、誤受信を防止し、正確的に信号を受信するために、前記受信装置（２０）の近傍に位置しなければならない。

【００２０】

前記受信装置（２０）は、前記タイヤ圧力測定装置（１０）と通信するものであり、制御モジュール（２１）と、無線受信モジュール（２３）と、出力設定モジュール（２５）と、入力モジュール（２７）と、電源モジュール（２９）とを有する。

【００２１】

その内、前記無線受信モジュール（２３）は、前記制御モジュール（２１）により制御され、前記タイヤ圧力測定装置（１０）から既定のコードを含む無線周波信号を受信し、該無線周波信号を制御モジュール（２１）に送信するものである。

【００２２】

前記出力設定モジュール（２５）は、前記無線受信モジュール（２３）から受信した、無線周波信号の既定のコードを有すると共に、前記制御モジュール（２１）により発生した前記外部信号を前記受信インタフェース（１９、１９Ａ）に送信するように，前記制御モジュール（２１）により制御されることができる。

【００２３】

前記入力モジュール（２７）は、前記制御モジュール（２１）と電気接続され、入力インターフェース（２７２）と、コードスキャナ（２７４）とを有し、

該入力インターフェース（２７２）は、打鍵またはスキャナなどの入力手段により、壊れたタイヤ圧力測定装置（１０）の既定のコードを入力することができる。さらに、前記壊れたタイヤ圧力測定装置（１０）の既定のコードは通常、壊れたタイヤ圧力測定装置（１０）の表面に一連の数字またはバーコードにより示される。

前記コードスキャナ（２７４）は、バーコードリーダー、または車体の外部に配置され

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るタイヤ圧力測定装置（１０）に示されるバーコードを識別する光学スキャナなど、該バーコードから読み取った番号を前記制御モジュール（２１）に送信するものである。なお、前記バーコードは、タイヤ圧力測定装置（１０）の既定のコードと対応するものである。

【００２４】

前記電源モジュール（２９）は、前記制御モジュール（２１）と電気接続され、前記受信装置（２０）に電力を供給するものである。

【００２５】

図３に示すように、本発明のタイヤ圧力測定装置によりコードを入力する方法は、壊れたタイヤ圧力測定装置の既定のコードを読み取るステップ（６１）と、前記既定のコードを新品のタイヤ圧力測定装置に入力するステップ（６２）と、入力されたコードが正しいか否かを判断するステップ（６３）とを有する。

【００２６】

更に詳細に説明すると、前記ステップ１においては、ユーザーは、前記受信装置（２０）を利用し、タイヤに設置されるタイヤ圧力測定装置（１０）の既定のコードを読み取り、または、直接に入力モジュール（２７）を利用し、既定のコードを前記受信装置（２０）に入力する。尚、前記既定のコードは、壊れたタイヤ圧力測定装置（１０）の表面に一連の数字またはバーコードとして標示されるものであり、ユーザーは、入力インターフェース（２７２）、またはコードスキャナ（２７４）を利用し、コードを入力することができる。

【００２７】

前記ステップ２においては、受信装置（２０）の設定モジュール（２５）を利用し、既定のコードを前記タイヤ圧力測定装置（１０）の受信インターフェース（１９）に送信し、該受信インターフェース（１９）が受信した信号をマイクロプロセッサ（１２）のメモリーユニット（１２２）に記録させる。メモリーユニット（１２２）にはすでにコードが記録されると、前記記録されたコードをタイヤ圧力測定装置（１０）を既定のコードに書き直すことができる。

【００２８】

前記ステップ３においては、新品のタイヤ圧力測定装置（１０）に既定のコードを入力した後、伝送モジュール（２６）を利用し、既定のコードを無線周波信号により前記受信装置（２０）に発信し、該受信装置（２０）の出力設定モジュール（２５）を利用して信号を受信し、更に、前記既定のコードが制御モジュール（２１）に送信され、前記制御モジュール（２１）により、既定のコードが正しいか否かを判断する。そして、受信した既定のコードが正しくない場合には、ステップ１を繰り返し、再度入力し、一方、入力された既定のコードが正しい場合には、前記タイヤ圧力測定装置（１０）と受信装置（２０）とが通信可能となる。

【産業上の利用可能性】

【００２９】

本発明のタイヤ圧力測定システムは上記の構成を有するので、新品のタイヤ圧力測定装置と交換する時に、わざわざ元のメーカーにコードを設定してもらわなくても、簡単に既定のコードを入力設定することができる。

【符号の説明】

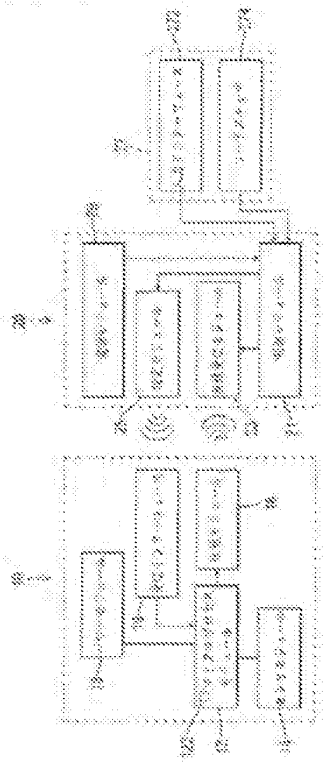
【００３０】

１０、１０Ａ タイヤ圧力測定装置
１２ マイクロプロセスモジュール
１２２ メモリーユニット
１４ センサモジュール
１６ 伝送モジュール
１８ パワーモジュール
１９、１９Ａ 受信インターフェース

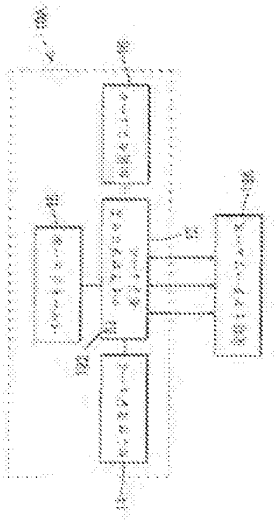
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２０　受信装置
２１　制御モジュール
２３　無線受信モジュール
２５　設定モジュール
２７　入力モジュール
２７２　入力インターフェース
２７４　コードスキャナ
２９　電源モジュール
６１　壊れたタイヤ圧力測定装置の既定のコードを読み取る
６２　既定のコードを新品のタイヤ圧力測定装置に入力する
６３　入力されたコードが正しいか否かを判断する。
７０　タイヤ圧力測定システム
７２　測定装置
７４　タイヤ圧力測定装置
８０　車体
８２　タイヤ
９０　設定装置
９２　低周波伝送モジュール
９４　制御器
９６　ダウンロードモジュール

【図１】

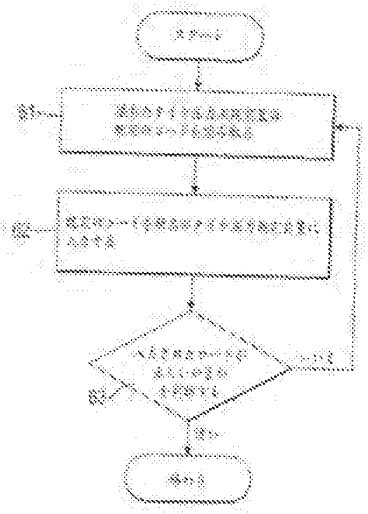


【図２】

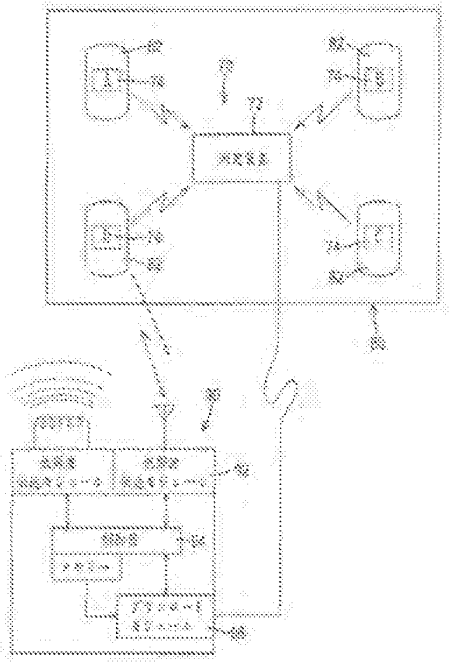


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【図３】



【図４】



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO.
90/012,430	08/10/2012	8031064	YUHQ3002RX/BEU	6170

99836 7590 09/04/2013

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ART UNIT	PAPER NUMBER
3692	

MAIL DATE	DELIVERY MODE
09/04/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

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EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/012,430*.

PATENT NO. *8031064*.

ART UNIT *3992*.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

PTOL-465 (Rev.07-04)

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***EX PARTE* REEXAMINATION -- Final Rejection**

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1.0 SUMMARY

This is an *ex* parte reexamination of U.S. Patent Number 8,031,064 (hereinafter '064 patent) issued October 4, 2011 to Yu. In the Order mailed September 04, 2012, at least one substantial new question (hereinafter "SNQ") of patentability was found to be raised as to claims 1-13 of the '064 patent. Patent Owner filed three responses amending claim 1; and adding new claims 14-23 on 03/25/2013, 05/24/2013 and 08/12/2013 in response to Non-final action mailed January 25, 2013. This Office Action addresses original claims 1-13 of the '114 patent with amendment to claim 1; and newly added claims 14-23.

2.0 HISTORY OF PROCEEDINGS

Date	Proceeding
08/10/2012	Request for Ex Parte Reexamination by Third Party
09/04/2012	Determination – Reexam Ordered for claims 1-13
01/25/2013	Non-Final Action rejecting claims 1-13
03/25/2013	Patent Owner ("PO") filed Amendment adding new claims 14-20
05/24/2013	PO filed supplemental amendment adding new claims 21-23
07/19/2013	Notice of defective paper – non-compliance with 37 CFR 1.530(d)-(j)
08/12/2013	PO filed claims again in compliance with 37 CFR 1.530(d)-(j)

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3.0 REFERENCES

3.1 Prior Art cited in the Request

The requester alleges that a substantial new question of patentability has been raised by at least the following prior art references:

1. U.S. Patent No. 6,927,679 to Taguchi et al. ("Taguchi").
2. Advertisement for CUB sensor model PUR-TPMS published in "Tire Rack Wholesale Update" publication dated 06/20/2008 to 07/19/2008. ("PUR-TPMS").
3. The User manual of PUR-TPMS sold by Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd. ("User Guide")[1].

3.2 Prior Art cited by the Examiner

The Examiner has cited the following prior art references:

1. U.S. Patent No. 6,920,785 to Toyofuku ("Toyofuku").
2. U.S. Patent No. 7,137,296 to Shida et al. ("Shida").
3. U.S. Patent No. 6,838,985 to Ghabra et al. ("Ghabra").

[1] User Guide only shows the publication year (2008) in the copyright notices at the bottom of each page. Although the requester has provided (i) explanation on pages 8-9 of the request; and (ii) other additional evidence to show an earlier publication date for the User Guide, they all lack the sufficient proof of when in the 2008 year the User Guide was published. Furthermore, it is possible that the User Guide is edited after it initially published. So it is unclear when the manual was made available to public in its "final" form. While Examiner notes the requester was attempted to relate some documents (i.e. (i) an invoice dated 02/26/2008, (ii) an export declaration dated 08/30/2008, and (iii) a certification of TPMS sensor dated 03/07/2008) with the User Guide, it is not the evidence of the publication date of the User Guide earlier than 09/17/2008 (the priority/filing date of the '064 patent). Hence, the User Guide is **not** considered as a prior art reference.

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4.0 CLAIM REJECTIONS – 35 USC § 305

Newly added claims 14-17, 19-21 and 23 are rejected under 35 U.S.C. 305 as enlarging the scope of the claim(s) of the patent being reexamined. In 35 U.S.C. 305, it is stated that "[n]o proposed amended or new claim enlarging the scope of a claim of the patent will be permitted in a reexamination proceeding... ." A claim presented in a reexamination "enlarges the scope" of the patent claim(s) where the claim is broader than any claim of the patent. A claim is broader in scope than the original claims if it contains within its scope any conceivable product or process which would not have infringed the original patent. A claim is broadened **if it is broader in any one respect**, even though it may be narrower in other respects.

MPEP § 2250 states in this regard,

> The test for when an amended or "new claim enlarges the scope of an original claim under 35 U.S.C. 305 is the same as that under the 2-year limitation for **reissue** applications adding enlarging claims under 35 U.S.C. 251, last paragraph." *In re Freeman*, 30 F.3d 1459, 1464, 31 USPQ2d 1444, 1447 (Fed. Cir. 1994).

(Emphasis added.)

MPEP § 2258 states,

> A claim presented in a reexamination proceeding "enlarges the scope" of the claims of the patent being reexamined where the claim is broader than each and every claim of the patent. See **MPEP § 1412.03** for guidance as to when the presented claim is considered to be a broadening claim as compared with the claims of the patent, i.e., what is broadening and what is not. If a claim is considered to be a broadening claim for purposes of **reissue**, it is likewise considered to be a broadening claim in reexamination.

(Emphasis added.)

MPEP § 1412.03 states in pertinent part,

> A claim in the reissue which includes subject matter not covered by the patent claims enlarges the scope of the patent claims. For example, **if any amended or newly added claim in the reissue contains within its scope any conceivable product or process which would not have infringed the patent**, then that reissue claim would be **broader** than the patent claims. *Tillotson, Ltd. v. Walbro Corp.*, 831 F.2d 1033, 1037 n.2,

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> 4 USPQ2d 1450, 1453 n.2 (Fed. Cir. 1987); *In re Ruth*, 278 F.2d 729, 730, 126 USPQ 155, 156 (CCPA 1960); *In re Rogoff*, 261 F.2d 601, 603, 120 USPQ 185, 186 (CCPA 1958). A claim which **reads on something which the original claims do not** is a **broadened** claim. A claim would be considered a broadening claim if the patent owner would be able to sue any party for infringement who previously could not have been sued for infringement.
>
> (Emphasis added.)

Even though independent claims 14 and 21 are narrower in one aspect (i.e. each of claims 14 and 21 has further steps of "reading an old identification ..."; and "wirelessly writing the old identification ..." in it), they are broader in other aspects (i.e. by not including components, in independent claims 14 and 21, limitations that are listed in the body of claims 18 and 22). Because newly added claims 14-17, 19-21, and 23 fail to include components of claim 1, they contain within their scope a product which would not have infringed claim 1. Hence, claims 14-17, 19-21 and 23 enlarges the scope of the (broadest) claim 1 of the patent being reexamined.

5.0 CLAIM REJECTIONS – 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

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5.1 Taguchi in view of PUR-TPMS (claims 1-2 and 4)

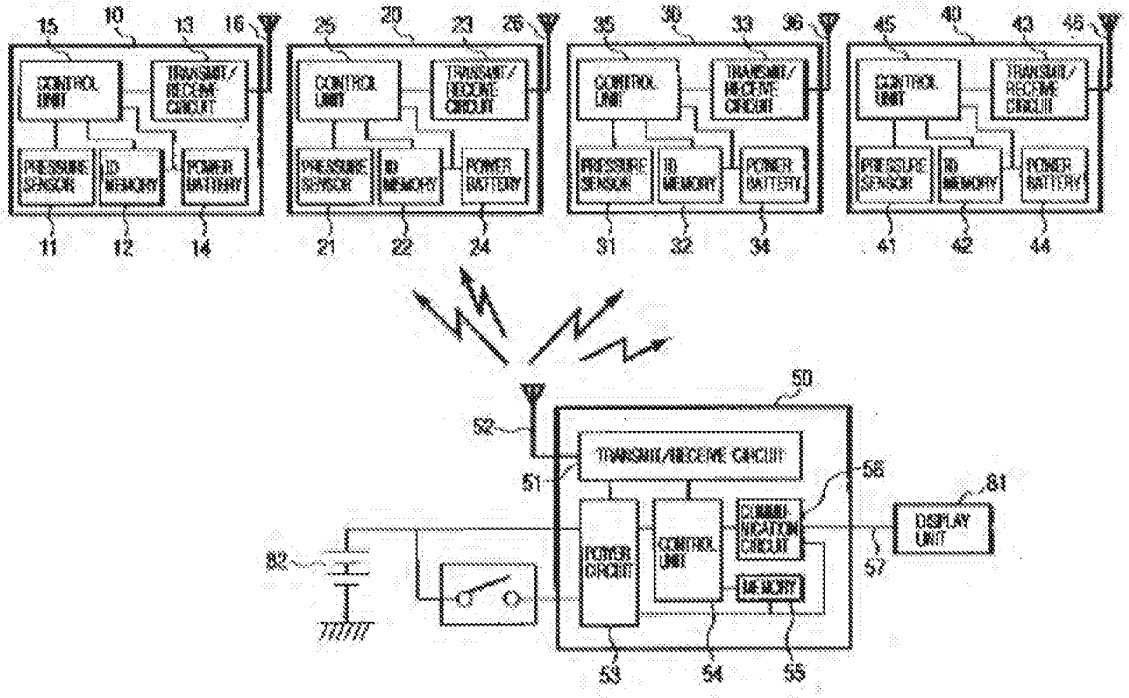
Claims 1-2 and 4 are unpatentable under 35 U.S.C. 103(a) over Taguchi in view of PUR-TPMS (Request pages 2-10).

This rejection was proposed by the third party requester in the request for reexamination, pages 2-10, which is herein incorporated by reference with additional clarifications provided by the examiner as follows:

As per claim 1, Taguchi teaches a tire pressure detecting apparatus (the combination of pressure sensors 10, 20, 30 and 40, and monitoring apparatus 50 as shown in Fig. 2 (reproduced below)) comprising:

- an identification rewritable tire pressure detector (The pressure sensors 10,

FIG. 2



20, 30 and 40; 10 (and similarly other sensors 20, 30 and 40) includes a rewritable ID memory 12, where a transmitter ID is written during a registration process; see abstract and Col. 11, lines 49-54) comprising:

- a micro-processing module (i.e. the combination of the control unit 15 and the ID memory 12 in Fig. 2) having a rewritable memory unit being capable of recording an identification (the ID memory 12 is capable of recording/storing ID; see Fig. 2 and Col. 10, line 65 - Col. 11, line 2);
- a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit (i.e. the pressure sensor 11; the pressure sensor 11 and ID memory 12 are electrically connected as shown in Fig. 2), the pressure-detecting unit detecting a tire pressure and sending a detection result to the micro-processing module (the pressure sensor 11 detects the tire pressure and sends the results to the control unit 15);
- a transmitting module (i.e. the combination of transmit/receive circuit 13 and the antenna 16 in Fig. 2) controlled by the micro-processing module to transmit a radio frequency (RF) signal comprising the detection result and an identification of the identification rewritable tire pressure detector (see Col. 11, lines 16-25, where it discloses about periodically transmitting the combination

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of detected pressure signal and the sensor ID in a signal with a predetermined frequency. See Col. 2, lines 56-59 and Col. 18, lines 4-9 where it teaches about radio (or wireless) signal transmit/receive operation);

- a power module electronically connected to the micro-processing module to provide electric power to the identification rewriteable tire pressure detector (i.e. the power battery 14 provides the power to the pressure sensor 10 as shown in Fig. 2); and
- a receiving interface (the transmit/receive circuit 13 in Fig. 2; and 64a-d in Fig. 10) electronically connected to the micro-processing module, to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit (see S140 in Fig. 4); and

- a setting apparatus (the tire pressure monitor 50 in Fig. 2) communicating with the identification rewriteable tire pressure detector (the tire pressure monitor 50 sends the receiver ID to the pressure sensors 10 (and similarly to 20, 30 and 40) for storage in the ID memory unit 12; see S130 in Fig. 4) and having a control module (the control unit 54 in Fig. 2);
  - a receiving module (the combination of the transmit/receive circuit 51 and the antenna 52 in Fig. 2) electronically

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connected to the control module, to receive the RF signal from the identification rewriteable tire pressure detector or a tire pressure detector and send the RF signal to the control module (See Col. 11, lines 25-35 and S21 in Fig. 3B, where it teaches about receiving the signal of predetermined frequency from one of the four pressure sensors 10, 20, 30 and 40);

- a setting output module (the combination of the transmit/receive circuit 51 and the antenna 52 in Fig. 2; and 64 in Fig. 10) controlled by the control module to send the external signal to the receiving interface, where the external signal is generated by the control module (i.e. sending a receiver ID from the monitoring apparatus to the pressure sensor 10 (and similarly to 20, 30 and 40); see S130 in Fig. 3 and Col. 11, lines 60-62); and
- a power source (the power circuit 53 as shown in Fig. 2 above) electronically connected to the control module (the control unit 54) to provide electrical power to the setting apparatus (the tire pressure monitor 50; see Fig. 2).

Taguchi failed to teach an input module, for an operator to manually input an ID to be written into the rewritable tire pressure [detector], as claimed. PUR-TPMS, however, discloses that "User can manually type in any ID code they choose" (see page 22, right column).

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Taguchi, at Col. 20, lines 29-42, further teaches that *any* identification (ID), and not just the receiver ID, could be registered in the pressure sensor 10 (and similarly in 20, 30 and 40). However, Taguchi failed to teach that the identification is provided by the input module or provided by the RF signal received from the receiving module, as claimed. In other words, Taguchi does not use a manually inputted ID or an ID received by the monitor as the registration ID to be sent to the pressure sensor. PUR-TPMS, on the other hand, discloses "User can manually type in any ID code they choose" (see page 22, right column).

Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to implement the teachings of PUR-TPMS by substituting a manually input ID for the "receiver ID" of Taguchi to enable replacement and monitoring of tire pressure sensors without previously storing the ID according to the teachings of, for example, in col. 3, lines 47-52 of the Taguchi patent (by enabling the user to visually observe the ID and manually input it into the programming/monitoring device).

As per claim 2, the combination of Taguchi and PUR-TPMS teaches the claimed tire pressure detecting apparatus as described above and furthermore, Taguchi teaches that the receiving interface is a connector (i.e. 64a-d in Fig. 10); and the setting output module is an outputting connector (i.e. 64 in Fig. 10) corresponding to and being electronically connected to the receiving interface that sends the external signal to the receiving interface (see Col. 14, lines 54-61).

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As per claim 4, the combination of Taguchi and PUR-TPMS teaches the claimed tire pressure detecting apparatus as described above. Although neither Taguchi nor PUR-TPMS specifically discloses that the input module is a dip switch, the use of dip switch as an input device was well-known and notoriously old at the time of the current invention was made. Examiner took Official Notice, in the previous Office Action, that the use of a dip switch is old and well known to input data manually. As such it would have been obvious to one of ordinary skill in the art, at the time of the invention, to use the dip switch as an input device because by using it in the apparatus taught by the combination of Taguchi and PUR-TPMS, the user can input data manually plus the dip switches are cheaper comparatively than the other input devices. The common knowledge or well-known in the art statement is taken to be admitted prior art because the Patent Owner failed to traverse the examiner's assertion of official notice made in the previous Office Action (see MPEP 2144.03 (C)).

5.2 Taguchi in view of PUR-TPMS and Ghabra et al. (claim 3)

Claim 3 is unpatentable under 35 U.S.C. 103(a) over Taguchi in view of PUR-TPMS and Ghabra.

As per claim 3, the combination of Taguchi and PUR-TPMS teaches the claimed tire pressure detecting apparatus as described above and furthermore, Taguchi teaches that the receiving interface (i.e. the transmit/receive circuit 13 in Fig. 2) is a receiver and receives the external signal wirelessly; and the setting output module (i.e. the transmit/receive circuit 51 in Fig. 2) is a wireless

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transmitting interface sending the external signal wirelessly to the receiving interface (see Fig. 2). Although Taguchi, at Col. 11, lines 21-27 and Col. 12, lines 26-28, only mentions a signal of "predetermined frequency", Taguchi does not specifically disclose the use of *low frequency* for transmitting and receiving data as claimed. However, since the data transmitted between the receiving interface and the setting output module is a small amount (i.e. the tire pressure is a single value, and the ID code is a four-bit value as disclosed at Col. 13, lines 36-39 of Taguchi), and since the data is transmitted only over a small distance (i.e. from the tires to the controller of the vehicle), a high-frequency transmission is not necessary. Furthermore, Ghabra clearly teaches a remote vehicle tire monitoring system (10 in Fig. 1), where the receiving interface (i.e. the receiver 32 at each tire 14 of the vehicle 12 in Fig. 1) is a low frequency receiver and wirelessly receives the external signal (i.e. the transmitter initiation signal 36), in the range of 125-135 kHz, transmitted by the setting output module (i.e. the initiator 34 at each tire 14) as claimed (see Col. 5, line 11 - Col. 6, line 43 and Fig. 1). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to use the low frequency receiver at the receiving interface as taught by Ghabra in the tire pressure detecting apparatus taught by the combination of Taguchi and PUR-TPMS so the power consumption at the battery powered receiving interface (19) of the tire pressure detector (10) can be lowered.

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5.3 Taguchi in view of PUR-TPMS and Shida (claims 5-7)

Claims 5-7 are unpatentable under 35 U.S.C. 103(a) over Taguchi in view of PUR-TPMS and Shida (Request page 10).

Although the Requester appears to rely on Shida at pages 10-11 of the Request, the Requester did not properly propose the rejection including Shida pursuant to 37 CFR 1.510(b)(1) and (2).

As per claims 5-7, the combination of Taguchi and PUR-TPMS teaches the claimed tire pressure detecting apparatus as described above, but failed to teach that the sensing module further has at least one acceleration-detecting unit and a temperature-detecting unit. Shida, however, teaches a sensing module (i.e. the tire air pressure sensor 10 in Fig. 4) having an acceleration-detecting unit (i.e. the acceleration sensor 10b in Fig. 4) and a temperature-detecting unit (i.e. the temperature sensor 10g in Fig. 4)(see Col. 5, lines 60-67 and Fig. 4). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to implement the acceleration sensor and the temperature sensor taught by Shida in the sensing module taught by the combination of Taguchi and PUR-TPMS so information about tire pressure as well as the tire temperature and the tire acceleration can be transmitted to the tire pressure monitor, so that, in addition to the above-mentioned action, more detailed conditions of the tire pressure can be grasped to improve the reliability of the tire pressure monitoring system.

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5.4 Taguchi n view of PUR-TPMS and Toyofuku (claim 9)

Claim 9 is unpatentable under 35 U.S.C. 103(a) over Taguchi in view of PUR-TPMS and Toyofuku (Request page 10).

Although the Requester appears to rely on Toyofuku at pages 10-11 of the Request, the Requester did not properly propose the rejection including Toyofuku pursuant to 37 CFR 1.510(b)(1) and (2).

As per claim 9, the combination of Taguchi and PUR-TPMS teaches the claimed tire pressure detecting apparatus as described above, but failed to teach that the input module is a keyboard. Toyofuku, however, teaches the input module is a keyboard (i.e. the keyboard 41 in Fig. 3, which is used to manually input the data). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to use a keyboard as an input module as taught by Toyofuku in the tire pressure detecting apparatus taught by the combination of Taguchi and PUR-TPMS so the data can be manually written into the sensor unit body 10 to program it (see Col. 5, lines 26-32 of Toyofuku).

6.0 ALLOWABLE SUBJECT MATTER

- Claims 8, 10-12 and 13 are confirmed.
- Claims 18 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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6.1 Statement of Reasons for Patentability and/or Confirmation

The following is an examiner's statement of reasons for patentability and/or confirmation of the claims found patentable in this reexamination proceeding:

The Requester failed to provide prior art showing the feature/limitation "the input module is a code scanner" as recited in claim 8. The requester, on page 11 of the request, states:

> "Claim 8 recites that the input module is a code scanner. This feature was alleged by the examiner to be illustrated in Fig. 3 of the Toyofuku patent, which characterization was also not disputed by the patent owner." (Request: 1st paragraph of page 11).

However, nowhere in the Fig. 3 or the specification of the Toyofuku patent, the code scanner is shown, discussed or even mentioned as claimed. Hence, claim 8 is confirmed.

The User Guide only shows the publication year (2008) in the copyright notices at the bottom of each page. Although the requester has provided (i) explanation on pages 8-9 of the request; and (ii) other additional evidence to show an earlier publication date for the User Guide, they all lack the sufficient proof of when in the 2008 year the User Guide was published. Furthermore, it is possible that the User Guide is edited after it initially published. So it is unclear when the manual was made available to the public in its "final" form. While Examiner notes the requester attempted to relate some documents (i.e. (i) an invoice dated 02/26/2008, (ii) an export declaration dated 08/30/2008, and (iii) a certification of TPMS sensor dated 03/07/2008) with the User Guide, it is not evidence of the publication date of the User Guide earlier than 09/17/2008 (the priority/filing date of the '064 patent). Hence, the User Guide is not

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considered as prior art. None of Toyofuku, Shida, Ghabra, Taguchi and PUR-TPMS teach at least the "reading" limitation of claim 10. Hence, claims 10-13 are also confirmed.

Any comments considered necessary by PATENT OWNER regarding the above statement must be submitted promptly to avoid processing delays. Such submission by the patent owner should be labeled: "Comments on Statement of Reasons for Patentability and/or Confirmation" and will be placed in the reexamination file.

7.0 RESPONSE TO ARGUMENTS

As to the remarks, the Patent Owner alleges,

(a) The transmit/receive circuit 51 and the antenna 52 of Taguchi '679 cannot be used to read on both (1) the receiving module and (2) the setting output module of base claim 1. Moreover, nowhere in Taguchi '679, including col. 11, ll. 25-35, and FIG. 3B, is there any disclosure that the transmit/receive circuit 51 and the antenna 52 of Taguchi '679 perform the recited functions of (1) the receiving module and (2) the setting output module of base claim 1 of the '064 patent. Contrary to the Examiner's assertion, the transmit/receive circuit 51 and the antenna 52 of Taguchi '679 are included in a tire pressure monitor apparatus 50 equipped in a vehicle body to monitor the air pressure of a corresponding tire, via respective pressure sensors 10, 20, 30, and 40. In contrast to the tire pressure monitor apparatus 50 of Taguchi '679, (1) the receiving module and (2) the setting output module of base claim 1 are included in a setting

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apparatus to read or input an identification to be written into the rewritable tire pressure detector, as recited in base claim 1 of the '064 patent. (pp. 10-11 of Remarks filed 03/25/2013)

(b) The mere suggestion that "User can manually type in any ID code they choose" as stated on page 22 of PUR-TPMS does not enable one skilled in the art to create "an input module electronically connected to the control module to enable an operator to input an identification to be **written** into the identification rewriteable tire pressure [detector]", especially "where the external signal is generated by the control module and comprises the identification that provided by the input module" as recited in base claim 1 of the '064 patent. (Emphasis in original). (p. 11 of Remarks filed 03/25/2013)

Examiner respectfully traverses PO's remarks for following reasons:

With respect to (a), Examiner would like to point out to PO that the transmit/receive circuit 51 and the antenna 52 of Taguchi does read on both (1) the receiving module and (2) the setting output module of base claim 1. Nowhere in the claim 1 (or any of its dependent claims 2-13) there is any language/limitation, which prevents equating the same component(s) (i.e. the transmit/receive circuit 51 and the antenna 52) of Taguchi with both (1) the receiving module and (2) the setting output module of claim 1. Taguchi, as described below, does teach the recited functions of the receiving module and the setting output module of claim 1:

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Taguchi teaches a receiving module (the combination of the transmit/receive circuit 51 and the antenna 52 in Fig. 2) electronically connected to the control module (i.e. connected to the control unit 54 as shown in Fig. 2), to receive the RF signal from the identification rewriteable tire pressure detector or a tire pressure detector (i.e. pressure sensors 10, 20, 30 and 40) and send the RF signal to the control module (See Col. 11, lines 25-35 and S21 in Fig. 3B, where it teaches about receiving the signal of predetermined frequency from one or more of the four pressure sensors 10, 20, 30 and 40; and sends it to the control unit 54 so the control unit 54 can extract the sensor ID in order to compare it with a collation ID registered beforehand in the memory 55). Taguchi also teaches a setting output module (the combination of the transmit/receive circuit 51 and the antenna 52 in Fig. 2; and 64 in Fig. 10) controlled by the control module to send the external signal to the receiving interface, where the external signal is generated by the control module (i.e. sending a receiver ID from the monitoring apparatus to the pressure sensor 10 (and similarly to 20, 30 and 40); see S130 in Fig. 3 and Col. 11, lines 60-62).

The base claim 1 does not recite that (1) the receiving module and (2) the setting output module of the setting apparatus reads or inputs an identification to be written into the rewritable tire pressure detector.

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With respect to (b), as stated above in the rejection of claim 1, although Taguchi teaches a setting apparatus (the tire pressure monitor 50 in Fig. 2) having a control module (the control unit 54 in Fig. 2), Taguchi does not teach an input module, electronically connected to the control module to enable an operator to input an identification to be written into the identification rewritable tire pressure detector, as recited in claim 1. PUR-TPMS teaches an input module (the PUR-TPMS scan tool shown on page 22, right column) which when used in conjunction (and integrated) with the tire pressure detecting apparatus (the combination of pressure sensors 10, 20, 30 and 40, and monitoring apparatus 50 as shown in Fig. 2 (reproduced above) of Taguchi), it (i.e. the PUR-TPMS scan tool shown on page 22, right column) is considered as electronically connected to the control module (see description below about integrating the input functionality of the PUR-TPMS scan tool and integrate that into the monitoring apparatus 50 of Taguchi). Examiner also would like to point out that even if the PUR-TPMS scan tool of PUR-TPMS is wirelessly connected to the control unit 54 and one or more of pressure sensors 10, 20, 30 and 40 of Taguchi, it is considered as they are electronically connected to each other because in order to connect two devices wirelessly, it does require at least one electronic component (receiver or transmitter) at each device. According to Merriam-Webster Dictionary, the term "electronic" means "of, relating to, or utilizing devices constructed or working by the methods or principles of electronics <electronic fuel injection>". Therefore, Examiner's consideration of claimed

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"electronically connected" as "wirelessly connected" as taught by prior art(s) is proper and consistent with dictionary meaning. PUR-TPMS also teaches that the PUR-TPMS scan tool enables an operator to input an identification to be written into the identification rewritable tire pressure detector (by disclosing "User can manually type in any ID code they choose [to PUR-TPMS Sensor]"; see page 22, right column).

Examiner further would like to point out to PO that the claim 1 recites that the external signal is generated by the control module and comprises the identification that provided by the input module OR provided by the RF signal received from the receiving module. Taguchi teaches that the external signal is generated by the control module and provided by the RF signal received from the receiving module (i.e. sending a receiver ID from the monitoring apparatus to the pressure sensor 10 (and similarly to 20, 30 and 40); see S130 in Fig. 3 and Col. 11, lines 60-62).

MPEP § 2141.03 states in this regard,

> "A person of ordinary skill in the art is also a person of ordinary creativity, not an automaton." KSR International Co. v. Teleflex Inc., 550 U.S. ____, ____, 82 USPQ2d 1385, 1397 (2007). "[I]n many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." Id. Office personnel may also take into account "the inferences and creative steps that a person of ordinary skill in the art would employ." Id. at ____, 82 USPQ2d at 1396.

In this case, a person of ordinary creativity would take the input functionality of the PUR-TPMS scan tool and integrate that into the monitoring apparatus 50 of Taguchi so (i) the number of devices get reduced; and (ii) less electronic circuitry required (for example, one transmit/receive circuit instead of two in two different/separate devices).

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8.0 CONCLUSION

THIS ACTION IS MADE FINAL. See MPEP § 706.07(a).

A shortened statutory period for response to this action is set to expire 2 months from the mailing date of this action.

Extensions of time under 37 CFR 1.136(a) do not apply in reexamination proceedings. The provisions of 37 CFR 1.136 apply only to "an applicant" and not to parties in a reexamination proceeding. Further, in 35 U.S.C. 305 and in 37 CFR 1.550(a), it is required that reexamination proceedings "will be conducted with special dispatch within the Office."

Extensions of time in reexamination proceedings are provided for in 37 CFR 1.550(c). A request for extension of time must be filed on or before the day on which a response to this action is due, and it must be accompanied by the petition fee set forth in 37 CFR 1.17(g). The mere filing of a request will not effect any extension of time. An extension of time will be granted only for sufficient cause, and for a reasonable time specified.

The filing of a timely first response to this final rejection will be construed as including a request to extend the shortened statutory period for an additional month, which will be granted even if previous extensions have been granted. In no event, however, will the statutory period for response expire later than SIX MONTHS from the mailing date of the final action. See MPEP § 2265.

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8.1 Correspondence

Correspondence relating to this ex parte reexamination

All correspondence relating to this *ex parte* reexamination proceeding should be directed:

By Mail to: Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

By FAX to: (571) 273-9900
Central Reexamination Unit

By hand: Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Registered users of EFS-Web may alternatively submit such correspondence via the electronic filing system EFS-Web, at https://sportal.uspto.gov/authenticate/authenticateuserlocalepf.html. EFS-Web offers the benefit of quick submission to the particular area of the Office that needs to act on the correspondence. Also, EFS-Web submissions are "soft scanned" (i.e., electronically uploaded) directly into the official file for the reexamination proceeding, which offers parties the opportunity to review the content of their submissions after the "soft scanning" process is complete.

Orange Exhibit No. 2004
IPR2024-00744

Any inquiry concerning this communication should be directed to Hetul Patel at telephone number 571-272-4184.

/HETUL PATEL/
Primary Examiner, Art Unit 3992

Conferees:

/Erik Kielin/
Primary Examiner, Art Unit 3992

/Jennifer C McNeil/
Supervisory Patent Examiner, Art Unit 3992

Orange Exhibit No. 2004
IPR2024-00744

Office Action in Ex Parte Reexamination	Control No. 90/012,430	Patent Under Reexamination 8031064	
	Examiner Hetul Patel	Art Unit 3992	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

a. ☒ Responsive to the communication(s) filed on *08/12/2013* .
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

b. ☒ This action is made FINAL.

c. ☐ A statement under 37 CFR 1.530 has not been received from the patent owner.

A shortened statutory period for response to this action is set to expire *2* month(s) from the mailing date of this letter. Failure to respond within the period for response will result in termination of the proceeding and issuance of an *ex parte* reexamination certificate in accordance with this action. 37 CFR 1.550(d). **EXTENSIONS OF TIME ARE GOVERNED BY 37 CFR 1.550(c).** If the period for response specified above is less than thirty (30) days, a response within the statutory minimum of thirty (30) days will be considered timely.

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☐ Notice of References Cited by Examiner, PTO-892.
2. ☐ Information Disclosure Statement, PTO/SB/08.
3. ☐ Interview Summary, PTO-474.
4. ☐ _____.

Part II SUMMARY OF ACTION

1a. ☒ Claims *1-23* are subject to reexamination.
1b. ☐ Claims _____ are not subject to reexamination.
2. ☐ Claims _____ have been canceled in the present reexamination proceeding.
3. ☒ Claims *8 and 10-13* are patentable and/or confirmed.
4. ☒ Claims *1-7,9,14-17,19-21 and 23* are rejected.
5. ☒ Claims *18 and 22* are objected to.
6. ☐ The drawings, filed on _____ are acceptable.
7. ☐ The proposed drawing correction, filed on _____ has been (7a) ☐ approved (7b) ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the certified copies have
      1 ☐ been received.
      2 ☐ not been received.
      3 ☐ been filed in Application No. _____ .
      4 ☐ been filed in reexamination Control No. _____.
      5 ☐ been received by the International Bureau in PCT application No. _____.
   * See the attached detailed Office action for a list of the certified copies not received.
9. ☐ Since the proceeding appears to be in condition for issuance of an *ex parte* reexamination certificate except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte* Quayle, 1935 C.D. 11, 453 O.G. 213.
10. ☐ Other: _____

cc: Requester (if third party requester)

Reexamination	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	8031064
	Certificate Date	Certificate Number

Requester Correspondence Address:	☐ Patent Owner	☒ Third Party

BACON & THOMAS, PLLC
625 SLATERS LANE, FOURTH FLOOR
ALEXANDRIA, VA 22314

LITIGATION REVIEW ☒	/HBP/ (examiner initials)	08/27/2013 (date)
Case Name		Director Initials
None		/JM/ for IY

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER
1. None	

Orange Exhibit No. 2004
IPR2024-00744

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	8031064
	Examiner	Art Unit
	HETUL PATEL	3992

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
none		8/27/2012	HBP

SEARCH NOTES		
Search Notes	Date	Examiner
Review of patented file's prosecution history	8/27/2012	HBP
Keyword search	1/18/2013	HBP
Review of patented file's prosecution history	8/27/2013	HBP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	8031064
	Examiner	Art Unit
	HETUL PATEL	3992

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/16/2013	08/27/2013							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	=	=							
	9	✓	✓							
	10	=	=							
	11	=	=							
	12	=	=							
	13	=	=							
	14		✓							
	15		✓							
	16		✓							
	17		✓							
	18		O							
	19		✓							
	20		✓							
	21		✓							
	22		O							
	23		✓							

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Bib Data Sheet

CONFIRMATION NO. 6179

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/012,430	08/10/2012 RULE	340	3992	YUHO3002RX/BEU

APPLICANTS

8031064, Residence Not Provided;
ORANGE ELECTRONIC CO., LTD.(OWNER), TAICHUNG HSIEN, TAIWAN;
BACON & THOMAS, PLLC(3RD.PTY.REQ.), ALEXANDRIA, VA;
BACON & THOMAS, PLLC, ALEXANDRIA, VA

** CONTINUING DATA **********

This application is a REX of 12/283,979 09/17/2008 PAT 8031064

** FOREIGN APPLICATIONS **********

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☐ no 35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance Verified and Acknowledged Examiner's Signature Initials			13	1

ADDRESS

24728

TITLE

TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
2850	No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other ☐ Credit

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/012,430	08/10/2012	8031064	YUHO3002RX/BFU

CONFIRMATION NO. 6179

POA ACCEPTANCE LETTER

24728
MORRIS MANNING MARTIN LLP
3343 PEACHTREE ROAD, NE
1600 ATLANTA FINANCIAL CENTER
ATLANTA, GA 30326



Date Mailed: 09/06/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/28/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/sdstevenson/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
90/012,430	08/10/2012	8031064	YUHO3002RX/BFU

CONFIRMATION NO. 6179

99536
Bui Garcia-Zamor
Intellectual Property Attorneys
3102 CLEVELAND AVE., NW
WASHINGTON, DC 20008

POWER OF ATTORNEY NOTICE

OC000000063615257

Date Mailed: 09/06/2013

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/28/2013.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/sdstevenson/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/012,430	08/10/2012	8031064	26223-92835	6170

24728 7590 09/18/2013

MORRIS MANNING MARTIN LLP
3343 PEACHTREE ROAD, NE
1600 ATLANTA FINANCIAL CENTER
ATLANTA, GA 30326

EXAMINER	
PATEL, RETUL B	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
09/18/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Orange Exhibit No. 2004
IPR2024-00744

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(THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS)

BACON & THOMAS, PLLC

625 SLATERS LANE, FOURTH FLOOR

ALEXANDRIA, VA 22314

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/012,430*.

PATENT NO. *8031064*.

ART UNIT *3992*.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

PTOL-465 (Rev. 07-04)

Orange Exhibit No. 2004
IPR2024-00744

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
90/012,430	10 August, 2012	8031064	YUHO3002RX/BEU

		EXAMINER	
MORRIS MANNING MARTIN LLP 3343 PEACHTREE ROAD, NE 1600 ATLANTA FINANCIAL CENTER ATLANTA, GA 30326		Hetul Patel	
		ART UNIT	PAPER
		3992	20130905

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

On August 28, 2013, the Patent Owner ("PO") filed a Power of Attorney without a Certificate of Service. This Power of Attorney has been accepted and entered this time, however, future submissions may not be considered unless a Certificate of Service is included.

The Final office action was mailed September 4, 2013 to the PO at the mailing address assigned to the customer number 99,536. A copy of that final office action is attached herewith in order to mail it to the new mailing address assigned to the customer number 24,728. The time period for response is restarted and is 2 months from the mailing date of this letter.

With respect to the Information Disclosure Statements (PTO/SB/08A and 08B or its equivalent) filed on August 29, 2013 and considered with this letter, the information cited has been considered as described in the MPEP. Note that MPEP 2236 indicate that degree of consideration to be given to such information will be normally limited by the degree to which the party filing the information citation has explained the content and relevance of the information.

Any inquiry concerning this communication should be directed to Hetul Patel at telephone number 571-272-4184.

/Jennifer C McNeil/ Supervisory Patent Examiner, Art Unit 3992	/Hetul Patel/ Primary Examiner, Art Unit 3992

PTO-90C (Rev.04-03)

Orange Exhibit No. 2004
IPR2024-00744

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	90012430
Filing Date	2012-08-10
First Named Inventor	Hung-Chih Yu
Art Unit	3992
Examiner Name	HETUL B PATEL
Attorney Docket Number	26223-92835

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6920785	B2	2005-07-26	TOYOFUKU	
	2	6941801	B2	2005-09-13	LEMENSE et al.	
	3	6888449	B2	2005-05-03	LIN et al.	
	4	7137296	B2	2006-11-21	SHIDA et al.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20060136782	A1	2006-06-22	CORNIOT	

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /HBP/

Orange Exhibit No. 2004
IPR2024-00744

Receipt date: 08/29/2013	Application Number	90012430	90012430 - GAU: 3992
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Filing Date	2012-08-10	
	First Named Inventor	Hung-Chih Yu	
	Art Unit	3992	
	Examiner Name	HETUL B PATEL	
	Attorney Docket Number	26223-92835	

	1	2001322411	JP	A	2001-11-20	DENSO CORP		☒
	2	02094588	WO	A1	2002-11-28	BRIDGESTONE CORPORATION et al.		☒
	3	2004009859	JP	A	2004-01-15	DENSO CORP		☒
	4	2004017909	JP	A	2004-01-22	DENSO CORP		☒
	5	201009311	TW	A	2010-03-01	ORANGE ELECTRONIC CO., LTD.		☒
	6	2011031759	JP	A	2011-02-17	ORANGE ELECTRONIC CO., LTD.		☒
	7	101881699	CN	A	2010-11-10	ORANGE ELECTRONIC CO., LTD.		☒
	8	101881699	CN	B	2013-07-10	ORANGE ELECTRONIC CO., LTD.		☒

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Intellectual Property Office, Ministry of Economic Affairs, R.O.C., "Third-Party Reexamination Communication", 06/04/2013, Taiwan.	☐

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Orange Exhibit No. 2004
IPR2024-00744

Receipt date: 08/29/2013	Application Number	90012430 90012430 - GAU: 3992
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Filing Date	2012-08-10
	First Named Inventor	Hung-Chih Yu
	Art Unit	3992
	Examiner Name	HETUL B PATEL
	Attorney Docket Number	26223-92835

	2	Intellectual Property Office, Ministry of Economic Affairs, R.O.C., "Applicant Responded toThird-Party Reexamination Communication", 07/17/2013, Taiwan.	☐
	3	Japan Patent Office, "1st Japanese Office Action", 01/31/2012, Japan.	☐
	4	Tai E International Patent & Law Office, "Comments in Chinese", 02/17/2012, Taiwan.	☐
	5	Japan Patent Office, "Response to 1st Japanese Office Action", 04/24/2012, Japan.	☐
	6	Japan Patent Office, "2nd Japanese Office Action and Chinese Translation", 11/13/2012, Japan.	☐
	7	Tai E International Patent & Law Office, "Comments in Chinese", 11/30/2012, Taiwan.	☐
	8	Japan Patent Office, "Response to 2nd Japanese Office Action", 02/28/2013, Japan.	☐
	9	State Intellectual Property Office of the People's Republic of China, "1st Chinese Office Action", 04/14/2011, China.	☐
	10	State Intellectual Property Office of the People's Republic of China, "Response to 1st Chinese Office Action", 08/09/2011, China.	☐
	11	State Intellectual Property Office of the People's Republic of China, "2nd Chinese Office Action", 12/13/2011, China.	☐
	12	State Intellectual Property Office of the People's Republic of China, "Response to 2nd Chinese Office Action", 12/30/2011, China.	☐

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /HBP/

Orange Exhibit No. 2004
IPR2024-00744

Receipt date: 08/29/2013	Application Number	90012430	90012430 - GAU: 3992
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Filing Date	2012-08-10	
	First Named Inventor	Hung-Chih Yu	
	Art Unit	3992	
	Examiner Name	HETUL B PATEL	
	Attorney Docket Number	26223-92835	

	13	State Intellectual Property Office of the People's Republic of China, "3rd Chinese Office Action", 05/11/2012, China.	☐
	14	State Intellectual Property Office of the People's Republic of China, "Response to 3rd Chinese Office Action", 07/04/2012, China.	☐
	15	State Intellectual Property Office of the People's Republic of China, "4th Chinese Office Action", 12/26/2012, China.	☐
	16	State Intellectual Property Office of the People's Republic of China, "Response to 4th Chinese Office Action", 01/25/2013, China.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/Hetul Patel/	Date Considered	09/05/2013

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

EFS Web 2.1.17 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /HBP/

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IPR2024-00744

PTO/SB/96 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: YU, HUNG-CHIH

Application No./Patent No.: 90/012,430 (Patent No. 8,031,064) Filed/Issue Date: 08/10/2012 (Issued 10/04/2011)

Titled: TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME

ORANGE ELECTRONIC CO., LTD. , a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. [X] the assignee of the entire right, title, and interest in;

2. [ ] an assignee of less than the entire right, title, and interest in (The extent (by percentage) of its ownership interest is _____ %); or

3. [ ] the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. [X] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 021898, Frame 0710, or for which a copy therefore is attached.

OR

B. [ ] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

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3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

[ ] Additional documents in the chain of title are listed on a supplemental sheet(s).

[X] As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Tim Tingkang Xia/ October 8, 2013

Signature Date

Tim Tingkang Xia Attorney for Applicant

Printed or Typed Name Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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IPR2024-00744

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	17072379
Application Number:	90012430
International Application Number:	
Confirmation Number:	6179
Title of Invention:	TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME
First Named Inventor/Applicant Name:	8031064
Customer Number:	24728
Filer:	Tim Tingkang Xia/Debby Yew
Filer Authorized By:	Tim Tingkang Xia
Attorney Docket Number:	26223-92835
Receipt Date:	08-OCT-2013
Filing Date:	10-AUG-2012
Time Stamp:	16:37:40
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73.	26223928355tatement373.pdf	74489	no	2
Warnings:					
Information:					

Orange Exhibit No. 2004
IPR2024-00744

Total Files Size (in bytes):	74488

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

EX PARTE RE-EXAMINATION | Attorney Docket No.: 26223-92835

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	Orange Electronic Co., LTD.	Confirmation No.:	6179
U.S. Patent No.:	8,031,064	Group Art Unit:	3992
Control No.:	90/012,430	Examiner:	Hetul B. Patel
Filed:	August 10, 2013		
For:	Tire Pressure Detecting Apparatus and Tire Pressure Detector Identification Copying Method for the Same		

CERTIFICATE OF SERVICE

Mail Stop Ex Parte Re-Examination
Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 9, 2013

Customer No. 24728

Dear Sir/Madam:

Pursuant to 37 CFR § 1.248, the undersigned, on behalf of the Patent Owner, hereby certifies that a copy of the following documents:

1. New Power of Attorney executed by Patent Owner (Form PTO/SB/81B, 1 pages), submitted in the above-identified application on August 28, 2013;
2. Information Disclosure Statement (Form PTO/SB/08a, 6 pages), submitted in the above-identified application on August 29, 2013;
3. CD ROM containing a copy of 29 cited references, submitted in the above-identified application on August 29, 2013; and
4. Statement under 37 CFR § 3.73(b) (Form PTO/SB/96, 2 pages), submitted in the above-identified application on October 8, 2013.

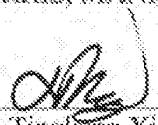
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IPR2024-00744

were served on the Third Party Requester at the following address:

Mr. Benjamin E. Urcia
Bacon & Thomas, PLLC
625 Slaters Lane, 4th Floor
Alexandria, Virginia, 22314

provided for in 37 CFR § 1.33(c) via first class mail on October 9, 2013.

Respectfully submitted,
MORRIS, MANNING & MARTIN, LLP



Tim Tingkang Xia
Reg. No. 45,242
1600 Atlanta Financial Center
3343 Peachtree Road, N.E.
Atlanta, Georgia 30326-1044
Phone: 404-233-7000
Customer No. 24728

Electronic Acknowledgement Receipt

EFS ID:	17084509
Application Number:	90012430
International Application Number:	
Confirmation Number:	6179
Title of Invention:	TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME
First Named Inventor/Applicant Name:	8031064
Customer Number:	24728
Filer:	Tim Tingkang Xia/Debby Yew
Filer Authorized By:	Tim Tingkang Xia
Attorney Docket Number:	26223-92835
Receipt Date:	09-OCT-2013
Filing Date:	10-AUG-2012
Time Stamp:	16:21:01
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reexam Certificate of Service	2622392835CertificateofService.pdf	110079 [redacted] 8bb	no	2

Warnings:	
Information:	

Orange Exhibit No. 2004
IPR2024-00744

Total Files Size (in bytes):	110079

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

EX PARTE RE-EXAMINATION | Attorney Docket No.: 26223-92835

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	Orange Electronic Co., LTD.	Confirmation No.:	6179
U.S. Patent No.:	8,031,064	Group Art Unit:	3992
Application No.:	90/012,430	Examiner:	Hetul B. Patel
Filed:	August 10, 2012		
For:	Tire Pressure Detecting Apparatus and Tire Pressure Detector Identification Copying Method for the Same		

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION IN *EX PARTE* RE-EXAMINATION

Mail Stop: *Ex Parte* Re-Examination
Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 15, 2013

Customer No. 24728

Dear Sir/Madam:

In response to the Office Action mailed September 18, 2013, please amend the above-identified application as follows and consider the following Remarks:

Amendments to the Claims begin on page **2** of this paper.

Claim Status and Support for Amendments (37 CFR 1.530(e)) begin on page **6** of this paper.

Remarks begin on page **7** of this paper.

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1-7. (Canceled).

8. (Original): The tire pressure detecting apparatus as claimed in claim 1, wherein the input module is a code scanner.

9. (Canceled).

10. (Original): A tire pressure detector identification copying method comprising the steps of:

providing a setting apparatus;

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus.

11. (Original): The method as claimed in claim 10, further comprising a step of:

verifying the identification newly recorded in the new identification rewriteable tire pressure detector.

12. (Original): The method as claimed in claim 10, wherein the setting apparatus receives a wireless signal containing the old identification from the old tire pressure detector in the step of reading the old identification.

13. (Original): The method as claimed in claim 10, wherein the setting apparatus receives the old identification through an input module in the step of reading the old identification.

14-17. (Canceled).

18. (New): A tire pressure detecting system, comprising:

an identification rewritable tire pressure detector comprising:

a micro-processing module having a rewritable memory unit to record an identification;

a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;

a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;

a power module electronically connected to the micro-processing module to supply power to the identification rewriteable tire pressure detector; and

an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit; and

a setting apparatus arranged to communicate with the identification rewriteable tire pressure detector, via wireless, including:

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus,

wherein the setting apparatus comprises:

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a control module;

an input module connected to the control module to enable an operator to input an identification to be written into the identification rewriteable tire pressure detector;

a receiving module connected to the control module to receive the RF signal from the identification rewriteable tire pressure detector and to send the RF signal to the control module;

a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and

a power source connected to the control module to supply power to the setting apparatus.

19-21. (Canceled).

22. (New): A tire pressure detecting system comprising;

an identification rewritable tire pressure detector comprising;

a micro-processing module having a rewritable memory unit to record an identification;

a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro- processing module;

a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;

a power module electronically connected to the micro-processing module to supply power to the identification rewriteable tire pressure detector;

an interface arranged to receive and send an external signal to the micro-

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processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit; and

a setting apparatus arranged to communicate with the identification rewriteable tire pressure detector, including:

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus,

wherein the setting apparatus comprises:

a control module;

an input module connected to the control module to enable an operator to input an identification to be written into the identification rewriteable tire pressure detector;

a receiving module connected to the control module to receive the RF signal from the identification rewriteable tire pressure detector and to send the RF signal to the control module;

a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and

a power source connected to the control module to supply power to the setting apparatus.

23. (Canceled).

CLAIM STATUS AND SUPPORT FOR AMENDMENTS (37 CFR 1.530(e))

Claims 1-23 were under reexamination. Of them, claims 1-13 remained unchanged relative to the original patent, and claims 14-23 were new relative to the original patent, before this amendment as set forth above.

By this amendment, claims 8 and 10-13 remain unchanged, claim 18 and 22 are amended and claims 1-7, 9, 14-17, 19-21 and 23 are canceled.

Specifically, claims 18 and 22 have been rewritten in independent form including the limitations of the base claims of claims 14 and 21, respectively, as suggested by the Examiner.

Support for the amendment can be found throughout the original patent. None of the newly added claims 18 and 22 broadens the claim scope of the originally issued claims 1-13.

Upon entry of this amendment, claims 8 and 10-13, 18 and 22 are pending in in this reexamination proceeding. The claim status is listed as follows:

Claims 1-7.	Canceled.
Claim 8.	Pending - unchanged.
Claim 9.	Canceled.
Claims 10-13.	Pending - unchanged.
Claims 14-17.	Canceled.
Claim 18.	Pending – amended.
Claims 19-21.	Canceled.
Claim 22.	Pending – amended.
Claim 23.	Canceled.

REMARKS

Claims 1-23 were under reexamination. By the amendment, claim 18 and 22 are amended, and claims 1-7, 9, 14-17, 19-21 and 23 are canceled.

In the Office Action, claims 8 and 10-13 were confirmed and claims 18 and 22 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

However, claims 14-17, 19-21 and 23 were rejected under 35 U.S.C. 305 as enlarging the scope of the claims of the patent being reexamined. Claims 1, 2, and 4 were rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi (US Pat. No. 6,927,679) in view PUR-TPMS (Advertisement for CUB sensor model PUR-TPMS, published in "Tire Rack Wholesale Update", June 20, 2008 - July 19, 2008). Claim 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi in view PUR-TPMS and Ghabra (US Pat. No. 6,838,985). Claims 5-7 were rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi in view PUR-TPMS and Shida (US Pat. No. 7,137,296). Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi in view PUR-TPMS and Toyofuku (US Pat. No. 6,920,785).

The Patent Owner acknowledges and is grateful for confirmation of the patentability of claims 8 and 10-13, and indication of the allowability of claims 18 and 22.

In response, as set forth above, without acquiescing to the Examiners' assertion, which the Patent Owner does not agree, and in order to advance the prosecution of the confirmed claims and allowable claims, the Patent Owner has canceled claims 1-7, 9, 14-17, 19-21 and 23 without prejudice, waiver or disclaimer. Furthermore, as suggested by the Examiner, allowable claims 18 and 22 have been rewritten in independent form including the limitations of the base claims 14 and 21, respectively.

Pursuant to MPEP 2260.01, the Patent Owner has not amended the dependency of claims that depend upon canceled claim 1. As noted in MPEP 2260.01, dependent claims should not be rejected merely because they depend on a rejected or canceled patent claim and "no requirement should be made for rewriting the dependent claim in independent form."

With the cancelation of claims 1-7, 9, 14-17, 19-21 and 23, the Patent Owner respectfully submits that there are no outstanding rejections in this reexamination proceeding.

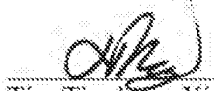
In view of the foregoing, the Patent Owner respectfully requests allowance of the presently pending claims in this reexamination proceeding.

If the Examiner believes that there are any issues that can be resolved by a telephone conference, or that there are any informalities that can be corrected by an Examiner's amendment, please call the undersigned at 404-495-3678.

It is believed that no fee is due. However, the Commissioner is hereby authorized to charge any deficiency of fees that may be required, and credit of any overpayments to Deposit Account No. 50-3537.

Respectfully submitted,
MORRIS, MANNING & MARTIN, LLP

October 15, 2013



Tim Tingkang Xia
Reg. No. 45,242
Attorney for Patent Owner on the Record

1600 Atlanta Financial Center
3343 Peachtree Road, N.E.
Atlanta, Georgia 30326-1044
Phone: 404-233-7000
Customer No. 24728

EX PARTE RE-EXAMINATION | Attorney Docket No.: 26223-92835

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	Orange Electronic Co., LTD.	Confirmation No.:	6179
U.S. Patent No.:	8,031,064	Group Art Unit:	3992
Application No.:	90/012,430	Examiner:	Hetul B. Patel
Filed:	August 10, 2012		
For:	Tire Pressure Detecting Apparatus and Tire Pressure Detector Identification Copying Method for the Same		

CERTIFICATE OF SERVICE

Mail Stop Ex Parte Re-Examination
Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 15, 2013

Customer No. 24728

Dear Sir/Madam:

Pursuant to 37 CFR § 1.248, the undersigned, on behalf of the Patent Owner, hereby certifies that a copy of the following document:

> **AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION IN *EX PARTE* RE-EXAMINATION**, submitted in the above-identified application on **October 15, 2013**,

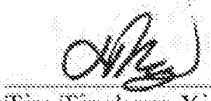
was served on the Third Party Requester at the following address:

> **Mr. Benjamin E. Urcia**
> **Bacon & Thomas, PLLC**
> **625 Slaters Lane, 4th Floor**
> **Alexandria, Virginia, 22314,**

provided for in 37 CFR § 1.33(c) via first class mail on **October 15, 2013**.

Orange Exhibit No. 2004
IPR2024-00744

Respectfully submitted,
MORRIS, MANNING & MARTIN, LLP



Tim Tingkang Xia
Reg. No. 45,242
1600 Atlanta Financial Center
3343 Peachtree Road, N.E.
Atlanta, Georgia 30326-1044
Phone: 404-233-7000
Customer No. 24728

Electronic Acknowledgement Receipt

EFS ID:	17131058
Application Number:	90012430
International Application Number:	
Confirmation Number:	6179
Title of Invention:	TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME
First Named Inventor/Applicant Name:	8031064
Customer Number:	24728
Filer:	Tim Tingkang Xia/Debby Yew
Filer Authorized By:	Tim Tingkang Xia
Attorney Docket Number:	26223-92835
Receipt Date:	15-OCT-2013
Filing Date:	10-AUG-2012
Time Stamp:	15:40:50
Application Type:	Reexam (Patent Owner)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reexam Response to Final Rejection	26223928835ResponseOA.pdf	157290	no	8
Warnings:					
Information:					

Orange Exhibit No. 2004
IPR2024-00744

2	Reexam Certificate of Service	2622392835CertificateofService.pdf	109777 [redacted] .pdf	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	367067

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Litigation Search Report CRU 3999

Reexam Control No. 90/012,431

TO: Hetul Patel Location: CRU Art Unit: 3992 Date: 10/17/2013	From: Patricia Volpe Location: CRU 3999 MDE 4B21 Phone: (571) 272-6825 Patricia.volpe@uspto.gov

Search Notes

Litigation search for U.S. Patent Number: **8,031,064**

1) I performed a KeyCite Search in Westlaw, which retrieves all history on the patent including any litigation.

2) I performed a search on the patent in Lexis CourtLink for any open dockets or closed cases.

3) I performed a search in Lexis in the Federal Courts and Administrative Materials databases for any cases found.

4) I performed a search in Lexis in the IP Journal and Periodicals database for any articles on the patent.

5) I performed a search in Lexis in the news databases for any articles about the patent or any articles about litigation on this patent.

Orange Exhibit No. 2004
IPR2024-00744

Westlaw

Date of Printing: Oct 17, 2013

KEYCITE

© US PAT 8031064 TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME, Assignee: Orange Electronic Co., Ltd. (Oct 04, 2011)

History

Direct History

=> 1 TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME, US PAT 8031064 (U.S. PTO Utility Oct 04, 2011)

Patent Family

2 TIRE PRESSURE DETECTING APPARATUS FOR DETECTING AIR PRESSURE INSIDE TIRE OF CAR, HAS POWER SOURCE ELECTRONICALLY CONNECTED TO CONTROL MODULE AND PROVIDING ELECTRICAL POWER TO SETTING APPARATUS, Derwent World Patents Legal 2010-D01202

Assignments

3 Action: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS). Number of Pages: 002, (DATE RECORDED: Sep 17, 2008)

Patent Status Files

.. Request for Re-Examination.

Prior Art (Coverage Begins 1976)

© 5 ID REGISTRATION METHOD, ID COLLATION SYSTEM INCORPORATED IN A VEHICLE CONTROL SYSTEM, EMBODIED AS A PNEUMATIC TIRE PRESSURE MONITORING APPARATUS ASSOCIATED WITH PNEUMATIC PRESSURE SENSORS, AND AN ID REGISTRATION TOOL COMBINED WITH PNEUMATIC TIRE PRESSURE MONITORING APPARATUS, US PAT 6927679Assignee: Denso Corporation, (U.S. PTO Utility 2005)

© 6 TIRE AIR PRESSURE MONITORING SYSTEM, US PAT 7137296Assignee: Nissan Motor Co., Ltd., (U.S. PTO Utility 2006)

© 7 TIRE PRESSURE SENSOR UNIT, TIRE PRESSURE MONITORING SYSTEM, AND METHOD OF REGISTERING IDENTIFICATION CODE OF TIRE PRESSURE SENSOR UNIT, US PAT 6920785Assignee: Bridgestone Corporation, (U.S. PTO Utility 2005)

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Orange Exhibit No. 2004
IPR2024-00744



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IPR2024-00744

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
90/012,430	08/10/2012	8031064	26223-92835	6170

24728 7590 10/24/2013

MORRIS MANNING MARTIN LLP
3343 PEACHTREE ROAD, NE
1600 ATLANTA FINANCIAL CENTER
ATLANTA, GA 30326

EXAMINER	
PATEL, RETUL B	

ART UNIT	PAPER NUMBER
3992	

MAIL DATE	DELIVERY MODE
10/24/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Orange Exhibit No. 2004
IPR2024-00744

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

DO NOT USE IN PALM PRINTER

(THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS)

BACON & THOMAS, PLLC

625 SLATERS LANE, FOURTH FLOOR

ALEXANDRIA, VA 22314

EX PARTE REEXAMINATION COMMUNICATION TRANSMITTAL FORM

REEXAMINATION CONTROL NO. *90/012,430*.

PATENT NO. *8031064*.

ART UNIT *3992*.

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

PTOL-465 (Rev. 07-04)

Orange Exhibit No. 2004
IPR2024-00744

Notice of Intent to Issue Ex Parte Reexamination Certificate	Control No.	Patent Under Reexamination	
	90/012,430	8031064	
	Examiner	Art Unit	AIA (First Inventor to File) Status
	Hetul Patel	3992	No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☒ Prosecution on the merits is (or remains) closed in this *ex parte* reexamination proceeding. This proceeding is subject to reopening at the initiative of the Office or upon petition. *Cf.* 37 CFR 1.313(a). A Certificate will be issued in view of
   - (a) ☒ Patent owner's communication(s) filed: *15 October 2013*.
   - (b) ☐ Patent owner's failure to file an appropriate timely response to the Office action mailed: _____.
   - (c) ☐ Patent owner's failure to timely file an Appeal Brief (37 CFR 41.31).
   - (d) ☐ The decision on appeal by the ☐ Board of Patent Appeals and Interferences ☐ Court dated _____.
   - (e) ☐ Other: _____.
2. The Reexamination Certificate will indicate the following:
   - (a) Change in the Specification: ☐ Yes ☒ No
   - (b) Change in the Drawing(s): ☐ Yes ☒ No
   - (c) Status of the Claim(s):
     - (1) Patent claim(s) confirmed: *8 and 10-13*.
     - (2) Patent claim(s) amended (including dependent on amended claim(s)): *none*.
     - (3) Patent claim(s) canceled: *1-7 and 9*.
     - (4) Newly presented claim(s) patentable: 18 and 22.
     - (5) Newly presented canceled claims: 14-17,19-21 and 23.
     - (6) Patent claim(s) ☐ previously ☐ currently disclaimed: _____.
     - (7) Patent claim(s) not subject to reexamination: none.
3. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
4. ☒ Note the attached statement of reasons for patentability and/or confirmation. Any comments considered necessary by patent owner regarding reasons for patentability and/or confirmation must be submitted promptly to avoid processing delays. Such submission(s) should be labeled: "Comments On Statement of Reasons for Patentability and/or Confirmation."
5. ☐ Note attached NOTICE OF REFERENCES CITED (PTO-892).
6. ☐ Note attached LIST OF REFERENCES CITED (PTO/SB/08 or PTO/SB/08 substitute).
7. ☐ The drawing correction request filed on _____ is: ☐ approved ☐ disapproved.
8. ☐ Acknowledgment is made of the priority claim under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the certified copies have
   - ☐ been received.
   - ☐ not been received.
   - ☐ been filed in Application No. _____.
   - ☐ been filed in reexamination Control No. _____.
   - ☐ been received by the International Bureau in PCT Application No. _____.

   * Certified copies not received: _____.
9. ☐ Note attached Examiner's Amendment.
10. ☐ Note attached Interview Summary (PTO-474).
11. ☐ Other: _____.

All correspondence relating to this reexamination proceeding should be directed to the **Central Reexamination Unit** at the mail, FAX, or hand-carry addresses given at the end of this Office action.

/Hetul Patel/
Primary Examiner, Art Unit 3992

cc: Requester (if third party requester)

NOTICE OF INTENT TO ISSUE REEXAMINATION CERTIFICATE

Table of Contents

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IV. STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION ... 4

V. CONCLUSION 6

Orange Exhibit No. 2004
IPR2024-00744

I. SUMMARY

This is an *ex parte* reexamination of U.S. Patent Number 8,031,064 ("the '064 patent") issued October 4, 2011 to Yu of Orange Electronics Co., Ltd. This Office action addresses original claims 8 and 10-13 of the '064 patent; and newly proposed claims 18 and 22 filed by the Patent Owner ("PO") on October 15, 2013 in response to the Final rejection and communication letter mailed September 18, 2013.

II. HISTORY OF PROCEEDINGS

Date	Proceeding
08/10/2012	Request for Ex Parte Reexamination by Third Party
09/04/2012	Determination – Reexam Ordered for claims 1-13
01/25/2013	Non-Final Action rejecting claims 1-7 and 9; and confirming claims 8 and 10-13
03/25/2013	Patent Owner ("PO") filed Amendment adding new claims 14-20
05/24/2013	PO filed supplemental amendment adding new claims 21-23
07/19/2013	Notice of defective paper – non-compliance with 37 CFR 1.530(d)-(j)
08/12/2013	PO filed claims again in compliance with 37 CFR 1.530(d)-(j)
09/04/2013	Final Rejection rejecting claims 1-7, 9, 14-17, 19-21 and 23; objecting claims 18 and 22; and confirming claims 8 and 10-13
09/18/2013	A copy of the previous Final Rejection mailed to PO's mailing address assigned to new customer number 24,728

Orange Exhibit No. 2004
IPR2024-00744

10/15/2013 PO filed After-final amendment cancelling 1-7, 9, 14-17, 19-21 and 23; and amending 18 and 22

III. STATUS OF CLAIMS

(1) Claims subject to reexamination: 1-13

(2) Claims not subject to reexamination: none

(3) Canceled original claims: 1-7 and 9

(4) Literally amended claims: none

(5) Effectively amended claims: none

(6) Proposed new claims: 18 and 22

IV. STATEMENT OF REASONS FOR PATENTABILITY AND/OR CONFIRMATION

Claims 8 and 10-13 are confirmed; and newly proposed claims 18 and 22 are patentable.

The following is an examiner's statement of reasons for patentability and/or confirmation of the claims found patentable in this reexamination proceeding:

The Requester failed to provide prior art showing the feature/limitation "the input module is a code scanner" as recited in claim 8. The requester, on page 11 of the request, states:

> "Claim 8 recites that the input module is a code scanner. This feature was alleged by the examiner to be illustrated in Fig. 3 of the Toyofuku patent, which characterization was also not disputed by the patent owner." (Request: 1st paragraph of page 11).

Orange Exhibit No. 2004
IPR2024-00744

However, nowhere in the Fig. 3 or the specification of the Toyofuku patent, is the code scanner shown, discussed or even mentioned as claimed. Hence, claim 8 is confirmed.

The User Guide only shows the publication year (2008) in the copyright notices at the bottom of each page. Although the requester has provided (i) explanation on pages 8-9 of the request; and (ii) other additional evidence to show an earlier publication date for the User Guide, they all lack the sufficient proof of when in the 2008 year the User Guide was published. Furthermore, it is possible that the User Guide was edited after it initially published. So it is unclear when the manual was made available to the public in its "final" form. While Examiner notes the requester attempted to relate some documents (i.e. (i) an invoice dated 02/26/2008, (ii) an export declaration dated 08/30/2008, and (iii) a certification of TPMS sensor dated 03/07/2008) with the User Guide, it is not evidence of the publication date of the User Guide earlier than 09/17/2008 (the priority/filing date of the '064 patent). Hence, the User Guide is not considered as prior art. None of Toyofuku, Shida, Ghabra, Taguchi and PUR-TPMS teaches at least the "reading" limitation of claims 10, 18 and 22. Hence, claims 10-13, 18 and 22 are also confirmed.

Any comments considered necessary by PATENT OWNER regarding the above statement must be submitted promptly to avoid processing delays. Such submission by the patent owner should be labeled: "Comments on Statement of Reasons for Patentability and/or Confirmation" and will be placed in the reexamination file.

Orange Exhibit No. 2004
IPR2024-00744

V. CONCLUSION

All correspondence relating to this *ex parte* reexamination proceeding should be directed:

By Mail to: Mail Stop *Ex Parte* Reexam
Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

By FAX to: (571) 273-9900
Central Reexamination Unit

By hand: Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Registered users of EFS-Web may alternatively submit such correspondence via the electronic filing system EFS-Web, at https://sportal.uspto.gov/authenticate/authenticateuserlocalepf.html. EFS-Web offers the benefit of quick submission to the particular area of the Office that needs to act on the correspondence. Also, EFS-Web submissions are "soft scanned" (i.e., electronically uploaded) directly into the official file for the reexamination proceeding, which offers parties the opportunity to review the content of their submissions after the "soft scanning" process is complete.

Orange Exhibit No. 2004
IPR2024-00744

Any inquiry concerning this communication should be directed to Hetul Patel at telephone number 571-272-4184.

/HETUL PATEL/
Primary Examiner, Art Unit 3992

Conferees:

/Erik Kielin/
Primary Examiner, Art Unit 3992

/Jennifer C McNeil/
Supervisory Patent Examiner, Art Unit 3992

Orange Exhibit No. 2004
IPR2024-00744

Please enter this amendment.

/HBP/ 10/15/2013

***EX PARTE* RE-EXAMINATION** **Attorney Docket No.: 26223-92835**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Owner:	Orange Electronic Co., LTD.	Confirmation No.:	6179
U.S. Patent No.:	8,031,064	Group Art Unit:	3992
Application No.:	90/012,430	Examiner:	Hetul B. Patel
Filed:	August 10, 2012		
For:	Tire Pressure Detecting Apparatus and Tire Pressure Detector Identification Copying Method for the Same		

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION IN *EX PARTE* RE-EXAMINATION

Mail Stop: *Ex Parte* Re-Examination
Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

October 15, 2013

Customer No. 24728

Dear Sir/Madam:

In response to the Office Action mailed September 18, 2013, please amend the above-identified application as follows and consider the following Remarks:

Amendments to the Claims begin on page **2** of this paper.

Claim Status and Support for Amendments (37 CFR 1.530(e)) begin on page **6** of this paper.

Remarks begin on page **7** of this paper.

Orange Exhibit No. 2004
IPR2024-00744

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	8031064
	Examiner	Art Unit
	HETUL PATEL	3992

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/18/2013	08/27/2013	10/15/2013						
	1	✓	✓	-						
	2	✓	✓	-						
	3	✓	✓	-						
	4	✓	✓	-						
	5	✓	✓	-						
	6	✓	✓	-						
	7	✓	✓	-						
8	8	=	=	=						
	9	✓	✓	-						
10	10	=	=	=						
11	11	=	=	=						
12	12	=	=	=						
13	13	=	=	=						
	14		✓	-						
	15		✓	-						
	16		✓	-						
	17		✓	-						
14	18		O	=						
	19		✓	-						
	20		✓	-						
	21		✓	-						
15	22		O	=						
	23		✓	-						

Reexamination	Application/Control No. 90012430	Applicant(s)/Patent Under Reexamination 8031064
	Certificate Date	Certificate Number C1

Requester Correspondence Address:	☐ Patent Owner	☒ Third Party
BACON & THOMAS, PLLC 625 SLATERS LANE, FOURTH FLOOR ALEXANDRIA, VA 22314		

LITIGATION REVIEW ☒	/HBP/ (examiner initials)	10/15/2013 (date)
Case Name		Director Initials
No litigation case found.		/JM/ for /Y

COPENDING OFFICE PROCEEDINGS	
TYPE OF PROCEEDING	NUMBER
1. None	

	/HETUL PATEL/ Primary Examiner, Art Unit 3992

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	6031064
	Examiner	Art Unit
	HETUL PATEL	3992

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
none		8/27/2012	HBP

SEARCH NOTES		
Search Notes	Date	Examiner
Review of patented file's prosecution history	8/27/2012	HBP
Keyword search	1/18/2013	HBP
Review of patented file's prosecution history	8/27/2013	HBP
Review of the '064 patent's prosecution and litigation history	10/15/2013	HBP

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
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BIB DATA SHEET

CONFIRMATION NO. 6179

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
90/012,430	08/10/2012 RULE	340	3992	26223-92835

APPLICANTS

8031064, Residence Not Provided;
ORANGE ELECTRONIC CO., LTD.(OWNER), TAICHUNG HSIEN, TAIWAN;
BACON & THOMAS, PLLC(3RD.PTY.REQ.), ALEXANDRIA, VA;
BACON & THOMAS, PLLC, ALEXANDRIA, VA

**** CONTINUING DATA ****************************

This application is a REX of 12/283,979 09/17/2008 PAT 8031064

**** FOREIGN APPLICATIONS ****************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /HETUL B PATEL/ Examiner's Signature ☐ Met after Allowance Initials			13	1

ADDRESS

MORRIS MANNING MARTIN LLP
3343 PEACHTREE ROAD, NE
1600 ATLANTA FINANCIAL CENTER
ATLANTA, GA 30326
UNITED STATES

TITLE

TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME

FILING FEE RECEIVED		
2520	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	8031064
	Examiner	Art Unit
	HETUL PATEL	3992

CPC		
Symbol	Type	Version

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE	Total Claims Allowed:	
(Assistant Examiner) (Date)	7	
/HETUL PATEL/ Primary Examiner, Art Unit 3992 10/18/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner) (Date)	10	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	8031064
	Examiner	Art Unit
	HETUL PATEL	3992

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION						
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED	
345	447	B	6	0	0	23:00 (2006.0)		
CROSS REFERENCE(S)								
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)							
345	449	465						
72	146	146.5						

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	7	
/HETUL PATEL/ Primary Examiner, Art Unit 3992	10/16/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	10	1

U.S. Patent and Trademark Office

Part of Paper No. 20131015

Orange Exhibit No. 2004
IPR2024-00744

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	90012430	8031064
	Examiner	Art Unit
	HETUL PATEL	3992

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17												
	2	14	18												
	3		19												
	4		20												
	5		21												
	6	15	22												
	7		23												
6	8														
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10	10														
11	11														
12	12														
13	13														
	14														
	15														
	16														

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	7	
/HETUL PATEL/ Primary Examiner, Art Unit 3992	10/18/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	10	1

U.S. Patent and Trademark Office Part of Paper No. 20131015

Orange Exhibit No. 2004
IPR2024-00744

US008031064C1

(12) EX PARTE REEXAMINATION CERTIFICATE (9926th)
United States Patent
Yu

(10) Number: US 8,031,064 C1
(45) Certificate Issued: Nov. 7, 2013

(54) TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME

(75) Inventor: Hung-Chih Yu, Taichung (TW)

(73) Assignee: Orange Electronic Co., Ltd., Tanzih Hsiang, Taichung Hsien (TW)

Reexamination Request:
No. 90/012,430, Aug. 10, 2012

Reexamination Certificate for:
Patent No.: 8,031,064
Issued: Oct. 4, 2011
Appl. No.: 12/283,979
Filed: Sep. 17, 2008

(51) Int. Cl.
B60C 23/00 (2006.01)

(52) U.S. Cl.
USPC 340/447; 340/442; 340/445; 73/146; 73/146.5

(58) Field of Classification Search
None
See application file for complete search history.

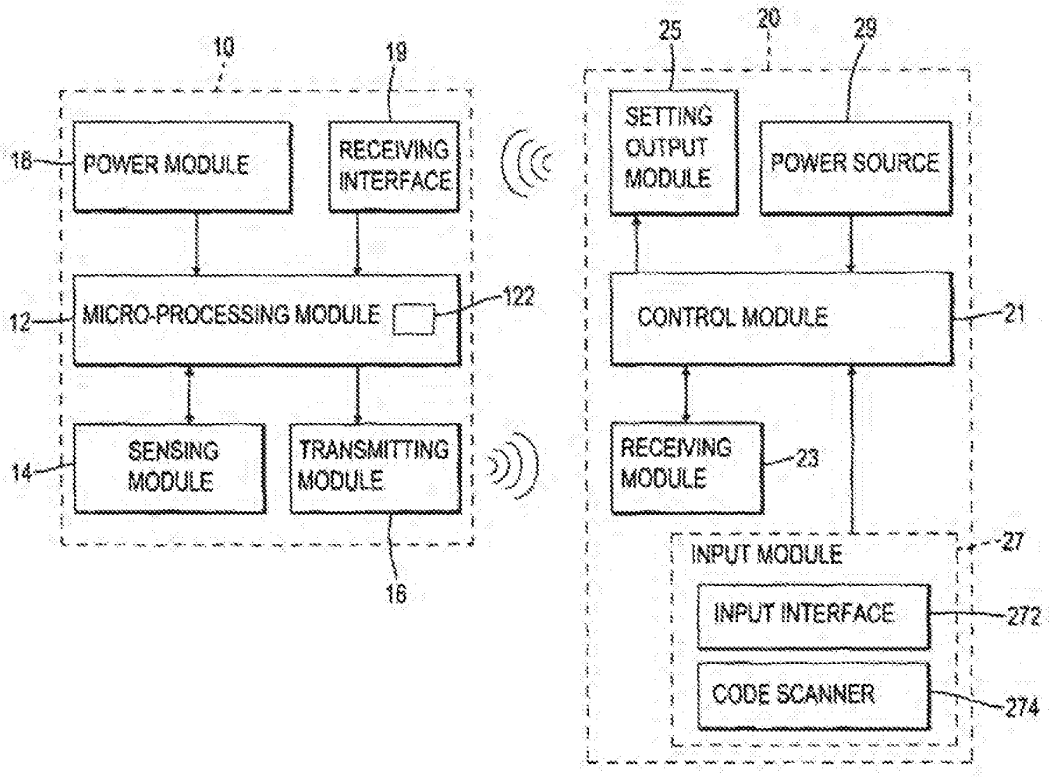
(56) References Cited

To view the complete listing of prior art documents cited during the proceeding for Reexamination Control Number 90/012,430, please refer to the USPTO's public Patent Application Information Retrieval (PAIR) system under the Display References tab.

Primary Examiner — Hetul Patel

(57) ABSTRACT

A tire pressure detecting apparatus has an identification rewriteable tire pressure detector and a setting apparatus. The tire pressure detector is securely mounted on a valve stem inside a tire of a vehicle and has a micro-processing module, a sensing module, a transmitting module and a receiving interface, where the micro-processing module has a memory unit. The setting apparatus is capable of reading or inputting an identification from a failure tire pressure detector, transmits the identification to the identification rewriteable tire pressure detector and writes the identification into the memory unit.



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EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims **8** and **10-13** is confirmed.

Claims **1-7** and **9** are cancelled.

New claims **14** and **15** are added and determined to be patentable.

14. A tire pressure detecting system, comprising:

an identification rewritable tire detector comprising:

a micro-processing module having a rewritable memory unit to record an identification;

a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;

a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;

a power module electronically connected to the micro-processing module to supply power to the identification rewriteable tire pressure detector; and

an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit; and

a setting apparatus arranged to communicate with the identification rewriteable tire pressure detector via wireless, including:

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus,

wherein the setting apparatus comprises:

a control module;

an input module connected to the control module to enable an operator to input an identification to be written into the identification rewriteable tire pressure detector;

a receiving module connected to the control module to receive the RF signal from the identification rewriteable tire pressure detector and to send the RF signal to the control module;

a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and

a power source connected to the control module to supply power to the setting apparatus.

15. A tire pressure detecting system comprising:

an identification rewritable tire pressure detector comprising:

a micro-processing module having a rewritable memory unit to record an identification;

a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;

a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;

a power module electronically connected to the micro-processing module to supply power to the identification rewriteable tire pressure detector;

an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit; and

a setting apparatus arranged to communicate with the identification rewriteable tire pressure detector, including:

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus,

wherein the setting apparatus comprises:

a control module;

an input module connected to the control module to enable an operator to input an identification to be written into the identification rewriteable tire pressure detector;

a receiving module connected to the control module to receive the RF signal from the identification rewriteable tire pressure detector and to send the RF signal to the control module;

a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and

a power source connected to the control module to supply power to the setting apparatus.

* * * * *

EXHIBIT
PAT-D

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT: U.S. Patent No. 8,031,064 REEXAMINATION CONTROL NO.:

DATE OF ISSUE: October 4, 2011 GROUP ART UNIT:

DATE OF FILING: September 17, 2008 EXAMINER:

INVENTORS: Hung-Chih Yu CONFIRMATION NO.:

TITLE: TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME

REQUEST FOR *EX PARTE* REEXAMINATION OF U.S. PATENT NO. 8,031,064 BY THIRD PARTY

Mail Stop: EX PARTE REEXAMINATION
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Reexamination under 35 U.S.C. §§302-307 and 37 C.F.R. §1.510 is hereby requested of 8 and 10-15 of United States Patent No. 8,031,064 entitled Tire Pressure Detecting Apparatus and Tire Pressure Detector Identification Copying Method for The Same, which issued on October 4, 2011 to inventor Hung-Chih Yu (hereinafter the " '064 patent"). This patent is still within its term of enforcement, and has not been judicially determined to be invalid or

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unenforceable. A copy of the '064 patent is submitted herewith, in accordance with 37 C.F.R. §1.510(b)(4).

Pursuant to 37 C.F.R. §1.510, included with this request for *ex parte* reexamination are:

- the fee for requesting *ex parte* reexamination;
- a statement pointing out each substantial new question of patentability based on the cited patents and printed publications;
- an identification of every claim for which reexamination is requested, and a detailed explanation of the pertinence and manner of applying the patents and printed publications to every claim for which reexamination is requested;
- a copy of every patent or printed publication relied upon or referred to in the request for *ex parte* reexamination, accompanied by an English language translation of all the necessary and pertinent parts of any non-English language patent or printed publication;
- a copy of the entire patent including the front face, drawings, and specification/claims (in double column format) for which reexamination is requested, and a copy of any disclaimer, certificate of correction, or reexamination certificate issued in the patent;

- a certification that the request for reexamination has been served in its entirety on the patent owner (through the attorney of record during prosecution) at the address shown in the accompanying Certificate of Service.

I. CLAIMS FOR WHICH REEXAMINATION IS REQUESTED AND PRIOR ART ON WHICH REQUEST FOR REEXAMINATION IS BASED

U.S. PATENT DOCUMENTS

Patent/Pub. No.	*Inventor*	*Date*
U.S. 7,079,033	Itou	July 18, 2006
U.S. 6,941,801	Lemense, et al. (hereinafter "Lemense")	September 13, 2005
U.S. 6,414,592	Dixit, et al. (hereinafter "Dixit")	July 2, 2002
U.S. 6,927,679	Taguchi, et al. (hereinafter "Taguchi")	August 9, 2005

The '064 patent issued with claims 1-13. After the previous reexamination (Control No. 90/012,430) claims 1-7 and 9 were cancelled. Claims 14-23 were added, with claims 14-17, 19-21 and 23 being subsequently cancelled (claims 18 and 22 being renumbered as claims 14 and 15 in the Ex Parte Reexamination Certificate issued November 7, 2013 "Reexamination Certificate"). Therefore, reexamination is requested of the claims present in the '064 patent

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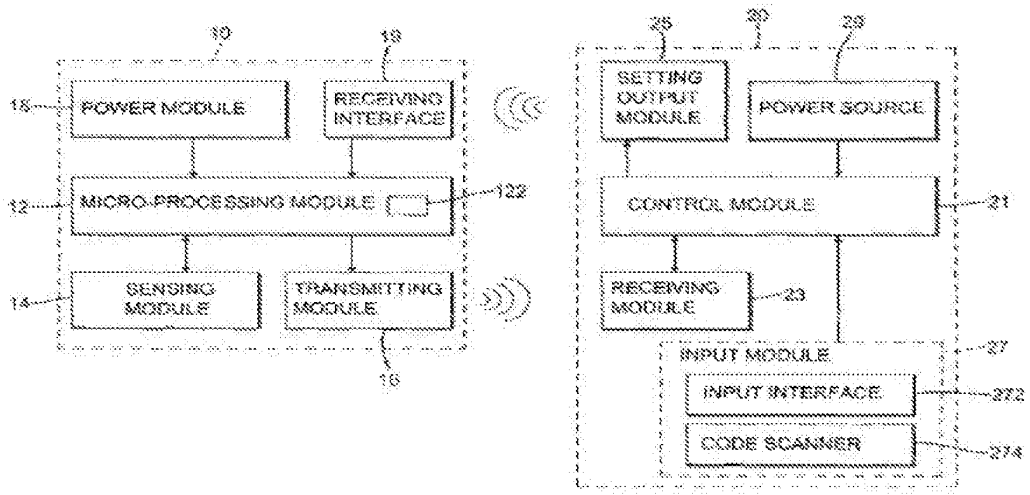
following the previous reexamination, as indicated in the Reexamination Certificate. Specifically, reexamination is requested of claims 8 and 10-15 of the '064 patent.

II. THE '064 PATENT DISCLOSURE AND PROSECUTION HISTORY

The '064 patent issued on October 4, 2011 from Application No. 12/283,979 (hereinafter " the '979 application") filed September 17, 2008.

The '064 patent is directed to a tire pressure detecting apparatus that has an identification rewritable tire pressure detector and a setting apparatus.[1]

Figure 1 of the '064 patent, reproduced below, illustrates the tire pressure detecting apparatus.



[1] See the '064 patent at Abstract.

The tire pressuring detecting apparatus, as defined by independent claim 1 of the '064 patent, includes an identification rewritable tire pressure detector 10 and a setting apparatus 20.

The identification rewritable tire pressure detector 10 includes a micro-processing module 12, a sensing module 14, a transmitting module 16, a power module 18 and a receiving interface 19.[2] The micro-processing module 12 has a rewritable memory unit capable of recording an identification.[3] The sensing module 14 is electrically connected to the micro-processing module and has a pressure-detecting unit that detects a pressure and sends a detection result to the micro-processing module.[4] The transmitting module 16 is controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and an identification of the identification rewritable tire pressure detector.[5] The power module 18 is electronically connected to the micro-processing module and provides electric power to the identification rewritable tire pressure detector.[6] The receiving interface 19 is electronically connected to the micro-processing module and receives and sends an external signal to the

[2] Id. at column 2, line 34 through column 3, line 28, and Figure 1.

[3] Id. at column 2, lines 43-50.

[4] Id. at column 2, lines 51-64.

[5] Id. at column 2, line 65 though column 3, line 2.

[6] Id. at column 3, lines 3-5.

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micro-processing module. The external signal includes an external identification to be written into the rewritable memory.[7]

The setting apparatus 20 communicates with the identification rewritable tire pressure detector 10 and includes a control module 21.[8] Furthermore, the setting apparatus 20 includes an input module 27, a receiving module 23, a setting output module 25, and a power source 29.[9] The input module 27 is electronically connected to the control module and allows an operator to input an identification to be written into the identification rewritable tire pressure detector.[10] The receiving module 23 is electronically connected to the control module and receives the RF signal from the identification rewritable tire pressure detector and sends the RF signal to the control module.[11] The setting output module 25 is controlled by the control module to send the external signal to the receiving interface, where the external signal is generated by the control module and includes the identification that is provided by the input module.[12] The power source 29 is electronically connected to the control module and provides electrical power to the setting apparatus.[13]

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[7] Id. at column 3, lines 6-28.

[8] Id. at column 3, lines 29-34.

[9] Id. at column 3, line 29 through column 4, line 3.

[10] Id. at column 3, lines 53-55.

[11] Id. at column 3, lines 35-42.

[12] Id. at column 3, lines 43-52.

[13] Id. at column 4, lines 4-6.

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Independent claim 10 defines a tire pressure identification copying method.[14] The method includes providing the setting apparatus, reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus, and wirelessly writing the old identification into a new identification rewritable tire pressure detector by the setting apparatus.

During prosecution of the '064 patent, Taguchi was applied against the claimed invention in an anticipation rejection. In response, in an Amendment filed on March 29, 2011, the Applicant amended independent claim 1 to recite that the setting apparatus includes "an input module being electronically connected to the control module and allowing an operator to input an identification to be written into the identification rewritable tire pressure detector." In distinguishing the claimed invention of the '064 patent from Taguchi, the Applicant argued that Taguchi failed to teach or suggest the newly added feature of the input module. Specifically, the Applicant explained that the input module 27 of the claimed invention receives an identification captured from a source tire pressure and that since the input module 27 performs a different operation from that of Taguchi, it was not possible to interpret the ID registration tool 60 and the ID receiving section 61, of Taguchi, as the claimed input module.[15]

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[14] Id. at column 4, lines 7-44 and Figure 3.

[15] See Amendment filed in '064 patent on March 25, 2011.

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In response to Applicant's Amendment, the Examiner issued a Notice of Allowance on June 9, 2011. The '064 patent subsequently issued on October 4, 2011.

On August 10, 2012 a Request for Ex Parte Reexamination of the '064 was filed by a third party requestor and reexamination was ordered on September 4, 2012.

During the reexamination, claims 1-7 and 9 were cancelled. Claims 14-23 were added, with claims 14-17, 19-21, and 23 subsequently being cancelled. Ultimately, claims 8, 10-13, 18, and 22 were deemed allowable.

Claims 18 and 22 were similar to independent claim 1 and included the features of independent claim 1. Additionally, claim 18 recited:

> "a setting apparatus arranged to communicate with the identification rewritable tire pressure detector via wireless, including: reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and wirelessly writing the old identification into a new identification rewritable tire pressure detector by the setting apparatus."

Somewhat similarly, claim 22 recited:

> "a setting apparatus arranged to communicate with the identification rewritable tire pressure detector via wireless, including: reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and wirelessly writing the old identification into a new identification rewritable tire pressure detector by the setting apparatus."

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The patentability of claims 8 and 10-13 was confirmed because the prior art did not teach or suggest "the input module is a code scanner," as recited in claim 8, and the reference cited against claims 10-13, 18 and 22 was not considered prior art.

A Reexamination Certificate was issued on November 7, 2013 in which the patentability of claims 8 and 10-13 was confirmed, application claims 18 and 22 were added to the '064 patent renumbered as claim 14 and 15, and claims 1 – 7 and 9 were cancelled.

III. KEY PRINCIPLES OF ANTICIPATION PERTINENT TO THE REEXAMINATION

A. The Patent Statute (35 U.S.C. § 102)

Section 102 states:

"A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the

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date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in - (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language; or

(f) he did not himself invent the subject matter sought to be patented, or

(g)(1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other."[16]

B. Anticipation Standard

The M.P.E.P. sets forth:

> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). >"When a claim covers several structures or compositions, either generically or as alternatives, the claim is deemed anticipated if any of the structures or compositions within

[16] 35 U.S.C. §102.

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> the scope of the claim is known in the prior art." *Brown v. 3M*, 265 F.3d 1349, 1351, 60 USPQ2d 1375, 1376 (Fed. Cir. 2001) (claim to a system for setting a computer clock to an offset time to address the Year 2000 (Y2K) problem, applicable to records with year date data in "at least one of two-digit, three-digit, or four-digit" representations, was held anticipated by a system that offsets year dates in only two-digit formats). See also MPEP § 2131.02.< "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Note that, in some circumstances, it is permissible to use multiple references in a 35 U.S.C. 102 rejection."[17]

Accordingly, to support an anticipation rejection, the applied prior art reference must, expressly or inherently, disclose each and every feature of the claimed invention.

IV. KEY PRINCIPLES OF OBVIOUSNESS PERTINENT TO THE REEXAMINATION

A. The Patent Statute (35 U.S.C. § 103(a))

Section 103 precludes issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would

[17] M.P.E.P. §2131.

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have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."[18]

B. KSR's Obviousness Standard

The Supreme Court, in its *KSR* decision, set forth the current standard for obviousness.[19] While affirming the applicability of the well-known Graham factors, the Supreme Court rejected the Federal Circuit's existing "teaching, suggestion, or motivation" test as being too "rigid" and "narrow."[20] The Supreme Court indicated that a more "expansive and flexible" approach should be applied.[21]

The Supreme Court emphasized that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."[22] Thus, when assessing the obviousness of a claim, the U.S.P.T.O. "must ask whether the improvement is more than a predictable use of prior art elements according to their established functions."[23]

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[18] 35 U.S.C. §103(a).

[19] *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007).

[20] Id. at 1739 and 1741-1743.

[21] Id. at 1739.

[22] Id. at 1739-1740.

[23] Id. at 1740.

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Moreover, the rationale to combine prior art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve."[24] Additionally, the expansive and flexible approach of the Supreme Court encourages the use of "common sense" when addressing obviousness.[25]

The Supreme Court stressed that applying the obviousness test is particularly straightforward in cases that involve "the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement."[26]

C. USPTO's Guidelines Based on the KSR Obviousness Standard

Following the Supreme Court's decision in *KSR*, the U.S.P.T.O. issued new obviousness examination guidelines identifying multiple "rationales" for supporting obviousness rejections[27]. The guidelines included the following, non-limiting, examples:

- Combining prior art elements according to known methods to yield predictable results;

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[24] Id. at 1742.

[25] Id. at 1742-1743.

[26] Id. at 1740.

[27] Federal Register, Vol. 72, No. 195, pp. 57526-35 (Oct. 10, 2007).

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- Simple substitution of known elements for other known elements to obtain predictable results;
- Use of a known technique to improve similar devices (methods or products) in the same way;
- Applying a known technique to a known device (method or product) in the same way;
- "Obvious to try;" and
- Some teaching, suggestion, or motivation in the prior art that would have lead one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.[28]

V. STATEMENT OF GROUNDS OF UNPATENTABILITY

1. Claim 8 is unpatentable under 35 U.S.C. § 103(a) as being obvious over Taguchi in view of Dixit and Itou.
2. Claim 8 is unpatentable under 35 U.S.C. § 103(a) as being obvious over Taguchi in view of Lemense and Itou.

[28] Id. at 57528-34.

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3. Claim 10 is unpatentable under 35 U.S.C. §102 (a) and (b) as being anticipated by Lemense.

4. Claims 14 and 15 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Taguchi in view of Lemense and Dixit.

5. Claim 14 and 15 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Taguchi in view of Lemense.

VI. STATEMENT POINTING OUT EACH SUBSTANTIAL NEW QUESTION OF PATENTABILITY

Taguchi was cited, and applied against the claims, during examination of the '064 patent application. None of the other prior art references cited in this request were considered during examination of the '064 patent. Additionally, none of the other references in this request were considered during the previous reexamination. Furthermore, the relied upon references are non-cumulative and include a new technical teaching.

A substantial new question of patentability is found at least because the listed references disclose the features that the Applicant of the '064 patent relied upon for patentability. Reexamination is requested of claims 8 and 10-15 of the '064 patent. That is, the feature upon which allowance of the '064 was based (i.e., the "input module") is disclosed by Lemense and

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Dixit. Additionally, Itou teaches the code scanner recited in claim 8. A detailed explanation of how the cited references establish a substantial new question of patentability is provided below.

1. Independent Claims

Independent claim 10

Lemense discloses a tire pressure detector identification copying method as defined in claim 10 of the '064 patent. Specifically, Lemense discloses a method and system for monitoring vehicular tire pressure and replacing or servicing tires mounted on wheels containing tire pressure sensing units.[29] The vehicle tires include sensor units 15-18 mounted on the vehicle tires. Each sensor unit includes a communication section for transmitting data and an ID code to a control module 20.[30] The system and method utilizes a service tool 24 for interacting with a sensor unit. The method includes interrogating the sensor units using the service tool 24 to receive an ID code from each sensor.[31] After a technician removes a tire for service, the sensor units are re-tested. Any non-working tires are replaced. The service tool is used to replicate or clone the ID code of the broken sensor unit into a replacement sensor unit over a LF

[29] See Lemense at column 1, lines 14-16.

[30] Id. at column 2, lines 35-43.

[31] Id. at column 3, lines 15-37 and Figure 4, Step 41.

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communication link between the service tool and the replacement tire sensor unit. Thus, Lemense teaches each and every feature recited in claim 10 of the '064 patent.

Because the teachings of Lemense provide subject matter of the '064 patent that was not taught or suggested by any of the prior art cited in the '064 patent, the teachings of Lemense raise a substantial new question of patentability.

Thus, there is a substantial new question of patentability with respect to independent claim 10.

Independent claims 14 and 15

Taguchi in combination with Lemense and/or Dixit discloses a tire pressure detecting system as defined in claims 14 and 15 of the '064 patent. Specifically, the prosecution history of the '064 patent makes it clear that Taguchi discloses a tire pressure detector and setting apparatus with all of the features cited in claims 14 and 15 (i.e., as was defined in independent claim 1 at the time the '064 patent issued) with the exception of the manual ID input. Lemense and Dixit each disclose the manual ID input as recited in claims 14 and 15 of the '064 patent, following the previous reexamination. Specifically, Dixit includes a plurality of manual input arrangements 42A-42D (Figure 1), each associated with one of the tire sensor units.[32] Additionally, as

[32] See Dixit at column 3, lines 38-45.

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illustrated in Figure 2, Dixit includes a transmitter device 44 that a person manually operates to input an identification code via an input key pad 50. Furthermore, Lemense includes a service tool 24 including a microcontroller 30. The microcontroller 30 performs various functions to interrogate a sensor unit using the service tool 24 to receive an ID code from each sensor.[33] The microcontroller 30 is connected to an interface 36 that includes an input device (i.e., keypad 26). Because the teachings of Taguchi in combination with Lemense and/or Dixit provide subject matter of the '064 patent that was not taught or suggested by any of the prior art cited in the '064 patent, the teachings of Taguchi in combination with Lemense and/or Dixit raise a substantial new question of patentability.

Thus, there is a substantial new question of patentability with respect to independent claims 14 and 15.

Claim 8

Taguchi in combination with Itou and Lemense or Dixit discloses a tire pressure detecting apparatus as defined in claim 8. Specifically, the prosecution history of the '064 patent makes it clear that Taguchi discloses a tire pressure detector and setting apparatus with all of the features cited in claim 8 (i.e., as was defined in independent claim 1 at the time the '064 patent

[33] See Lemense at column 3, lines 4-36.

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issued) with the exception of the manual ID input. Lemense and Dixit each disclose the manual ID input as recited in claim 8 of the '064 patent. Specifically, Dixit includes a plurality of manual input arrangements 42A-42D (Figure 1), each associated with one of the tire sensor units.[34] Additionally, as illustrated in Figure 2, Dixit includes a transmitter device 44 that a person manually operates to input an identification code via an input key pad 50. Furthermore, Lemense includes a service tool 24 including a microcontroller 30. The microcontroller 30 performs various functions to interrogate a sensor unit using the service tool 24 to receive an ID code from each sensor.[35] The microcontroller 30 is connected to an interface 36 that includes an input device (i.e., keypad 26). Moreover, Itou includes an ID registration tool 60 that is used to read the IDs from bar codes 5/6/7/8 for wiring the bar codes in the tire pressure monitoring apparatus 50.[36] The bar codes are representative of the IDs of the pressure sensors 10/20/30/40.[37] The ID registration tool 60 is composed on a bar-code reading unit 61 and an ID transmitting unit 62 for transmitting the IDs. Because the teachings of Taguchi in combination with Itou and Lemense or Dixit provide subject matter of the '064 patent that was not taught or suggested by

[34] See Dixit at column 3, lines 38-45.

[35] See Lemense at column 3, lines 4-36.

[36] See Itou at column 17, lines 32-44.

[37] Id. at column 17, lines 37-39.

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any of the prior art cited in the '064 patent, the teachings of Taguchi in combination with Itou and Lemense or Dixit raise a substantial new question of patentability.

Thus, there is a substantial new question of patentability with respect to claim 8.

2. Dependent Claims

Because a substantial new question of patentability is found with respect to independent claim 10, there is also a substantial new question of patentability with respect to dependent claims 11-13 dependent from claim 10.

VII. DETAILED EXPLANATION OF PERTINENCE AND MANNER OF APPLYING CITED PRIOR ART TO EVERY CLAIM FOR WHICH REEXAMINATION IS REQUESTED

Ground No. 1: §103(a) Rejection over Taguchi in view of Dixit and Itou

Claim 8 is unpatentable under 35 U.S.C. § 103(a) over Taguchi, which was filed on June 25, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent, in view of Dixit, which was filed on January 2, 2001, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent, and Itou, which was

filed on June 4, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent.

Claim 8

Claim 8 is reproduced below:

8. (Original): The tire pressure detecting apparatus as claimed in claim 1, wherein the input module is a code scanner.

As is clear from above, claim 8 is dependent from claim 1 of the '064 patent, and thus includes all of the limitations of claim 1. See 37 CFR § 1.75(c). Accordingly, the features of dependent claim 8 are addressed below wherein all limitations from now-cancelled claim 1 are incorporated into claim 8.

The correspondence between the tire pressure detector recited in claim 8 of the '064 patent and the tire pressure detecting apparatus described in Taguchi, taken in view of Dixit and Itou, is illustrated in the claim chart below.

Taguchi relates to a tire pressure detecting apparatus. The embodiment depicted in Figure 2 of Taguchi contains almost each and every element of the tire pressure detecting apparatus in claim 8 (including the limitations of now-cancelled independent claim 1) of the '064 patent. Dixit and Itou are similarly directed to tire pressure monitoring system and teach the

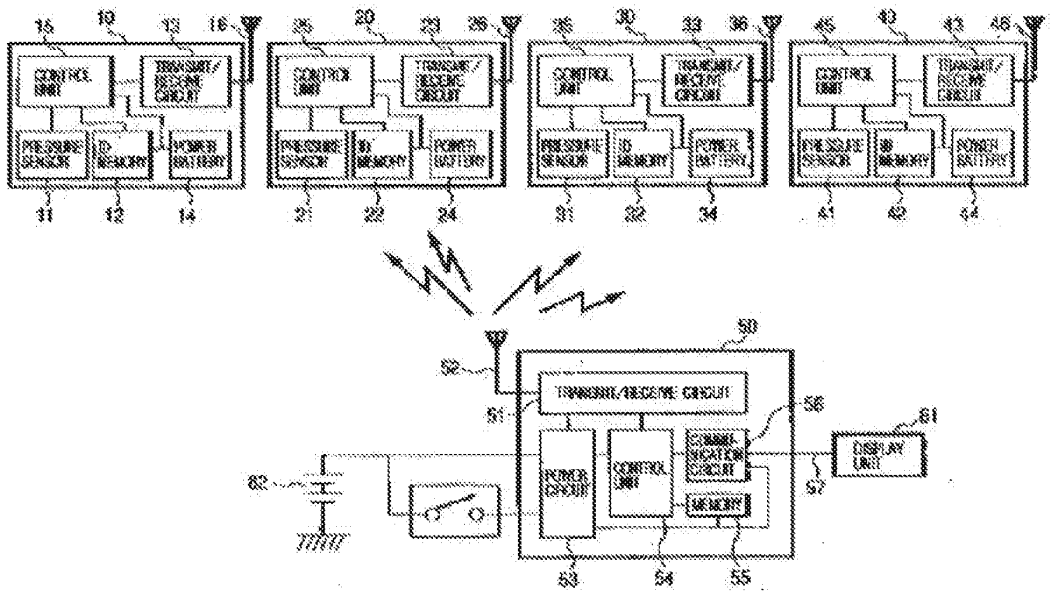
features lacking from Taguchi. A claim chart showing the one-for-one correspondence is set forth below.

Claim 8 (including features of independent claim 1)	**Taguchi in view of Dixit and Itou**
A tire pressure detecting apparatus, comprising:	**Taguchi:** combination of pressure sensors 10/20/30/40 and monitoring apparatus 50 (see Figure 2).
an identification rewritable tire pressure detector comprising:	**Taguchi:** pressure sensors 10/20/30/40 (Figure 2), including rewritable ID memory 12; into which a transmitter ID is written during a registration process (see Abstract and column 11, lines 49-54).
a micro-processing module having a rewritable memory unit being capable of recording an identification;	**Taguchi:** combination of control unit 15 and ID memory 12 (Figure 2).
a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit, the pressure-detecting unit detecting a tire pressure and sending a detection result to the micro-processing module;	**Taguchi:** pressure sensor 11 (Figure 2). Pressure sensor 11 and ID memory 12 are electrically connected, as illustrated in Figure 2.
a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal comprising the detection result and an identification of the identification rewritable tire pressure detector;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2; column 11, lines 16-25; describing transmission of detected pressure signal from sensor 11 and sensor ID stored in memory unit 12).
a power module electrically connected to the micro-processing module and providing electrical power to the identification rewritable tire pressure detector;	**Taguchi:** power battery 14 (Figure 2).
a receiving interface electronically connected to the microprocessing module, receiving and sending an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewritable memory unit;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2), step S140 "receive transmitted receiver ID by sensor" (Figure 3).
a setting apparatus communicating with the identification rewritable tire pressure detector and having a control module;	**Taguchi:** tire pressure monitor 50, which transmits the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit 12, including control unit 54.
an input module being electronically connected to the control module and allowing an operator	**Dixit:** data input arrangements 42A-42D (Figures 1 and 2) and keypad 50.

to input an identification to be written into the identification rewritable tire pressure;	
a receiving unit module electronically connected to the control module, receiving the RF signal from the identification rewritable tire pressure detector or a tire pressure detector and sending the RF signal to the control module;	**Taguchi:** transmit/receive circuit 51 and antenna 52 (Figure 2; and column 11, lines 27-35).
a setting output module controlled by the control module to send the external signal to the receiving interface, where the external signal is generated by the control module and comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module;	**Taguchi:** combination of the transmit/receive circuit 51 and the antenna 52 in Figure 2.
a power source electronically connected to the control module and providing electrical power to the setting apparatus.	**Taguchi:** power circuit 53 (Figure 2).
The tire pressure detecting apparatus as claimed in claim 1, wherein the input module is a code scanner.	**Itou:** ID registration tool 60 including bar code reading unit 61 and ID transmitting unit 62 for transmitting the IDs (Figure 2).

Reference is made to Figure 2 of Taguchi, reproduced below

FIG. 2



Taguchi discloses a tire pressure detecting apparatus including a plurality of sensors 10/20/30/40 and a monitoring apparatus 50. The pressure sensors 10/20/30/40 include a rewritable ID memory 12, in which a transmitter ID is written during a registration process.[38] The ID memory 12 is capable of recording an ID.[39] The pressure sensor 11 is electrically connected to the ID memory 12, as is illustrated in Figure 2. The pressure sensor 11 detects the tire pressure and sends the results to the control unit 15. The transmit/receive circuit 13 in combination with the antenna 16 periodically transmits the combination of detected pressure signal and the sensor ID in a signal with a predetermined frequency.[40] The pressure detector also includes a power module (power battery 14) that provides power to the pressure sensor. Furthermore, the transmit/receive circuit 13 is electronically connected to the microprocessing module, to receive and send an external signal to the microprocessing module, where the external signal includes an external identification to be written into the rewriteable memory unit.[41]

Taguchi further includes a setting apparatus (i.e., tire pressure monitor 50). The tire pressure monitor 50 sends the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit. The setting apparatus includes a control unit/module 54.[42] The tire pressure

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[38] Taguchi at column 11, lines 49-54.

[39] Id. at column 10, line 65-column 11, line 2.

[40] Id. at column 2, lines 56-59 and column 18, lines 4-9.

[41] Id. at Figure 4, S140.

[42] Id. at Figure 4, S130.

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monitor 50 includes a receiving module (transmit/receive circuit 51 and antenna 52) electrically connected to the control module.[43] Furthermore, the tire pressure monitor 50 includes a setting output module (i.e., combination of the transmit/receive circuit 51 and the antenna 52). Specifically, Taguchi teaches sending a receiver ID from the monitoring apparatus to the pressure sensors 10/20/30/40.[44] Additionally, the tire pressure monitor 50 includes a power circuit 53 electrically connected to the control unit 53 and provides electrical power to the tire pressure monitor.

It was established during prosecution of the '064 patent that Taguchi teaches each of the above features of claim 1.

Taguchi, however, fails to teach or suggest an input module to input an identification to be written into the identification rewritable tire pressure, as recited in claim 8 (by incorporation from original independent claim 1). Dixit, however, teaches the claimed input module. Specifically, Dixit includes a plurality of manual input arrangements 42A-42D (Figure 1), each associated with one of the tire sensor units.[45] Additionally, as illustrated in Figure 2, Dixit includes a transmitter device 44 that a person manually operates to input an identification code

[43] Id. at column 11, lines 25-35 and Figure 3B, S21.

[44] Id. at column 11, lines 60-62 and Figure 3, S130.

[45] See Dixit at column 3, lines 38-45.

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via an input key pad 50.[46] Thus, Dixit teaches the above feature missing from the disclosure of Taguchi.

Moreover, the modified device will perform the same functions with predictable results based on the teachings of Taniguchi and Dixit. Also, it would have been obvious to one of ordinary skill in the at the time the claimed invention was made to modify Taguchi to include the input module of Dixit to enable replacement and monitoring of tire pressure sensors without previously storing the ID, by enabling the user to visually observe the ID and manually input the ID.

The combination of Taguchi and Dixit fails to teach or suggest that the input module is a code scanner. Itou, however, teaches the above feature of the claimed invention. That is, Itou teaches a method of acquiring the ID of the outdated tire pressure sensor by access to a bar code and writing the ID into the new tire pressure sensor. Indeed, Itou includes an ID registration tool 60 that is used to read the IDs from bar codes 5/6/7/8 for wiring the bar codes in the tire pressure monitoring apparatus 50.[47] The bar codes are representative of the IDs of the pressure sensors 10/20/30/40.[48] The ID registration tool 60 is composed on a bar-code reading unit 61 and an ID

[46] Id. at column 4, lines 22-25.

[47] See Itou at column 17, lines 32-44.

[48] Id. at column 17, lines 37-39.

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transmitting unit 62 for transmitting the IDs.[49] Thus, Itou teaches the above feature of claim 8 missing from the disclosure of Taguchi and Dixit.

Moreover, it would have been obvious to one of ordinary skill in the art to modify the system of Taguchi (in view of Dixit) to include the ID registration tool 60 of Itou because "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."[50] Furthermore, the proposed modification would prevent mistaken ID registration in the tire pressure monitoring system of Taguchi.[51]

Thus, claim 8 is obvious over Taguchi in view of Dixit and Itou under 35 U.S.C. § 103, and should be cancelled.

Ground No. 2: §103(a) Rejection over Taguchi in view of Lemense and Itou

Claim 8 is unpatentable under 35 U.S.C. § 103(a) over Taguchi, which was filed on June 25, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent, in view of Lemense, which was filed on December 19, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent, and Itou, which was filed on June 4, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent.

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[49] Id. at column 17, lines 45-55.

[50] *KSR* at 1739-1740.

[51] See Itou at column 2, lines 22-31.

Claim 8

Claim 8 is reproduced below:

8. (Original): The tire pressure detecting apparatus as claimed in claim 1, wherein the input module is a code scanner.

As is clear from above, claim 8 is dependent from claim 1 of the '064 patent, and thus includes all of the limitations of claim 1. See 37 CFR § 1.75(c). Accordingly, the features of dependent claim 8 are addressed below wherein all limitations from now-cancelled claim 1 are incorporated into claim 8.

The correspondence between the tire pressure detector recited in claim 8 of the '064 patent and the tire pressure detecting apparatus described in Taguchi, taken in view of Lemense and Itou, is illustrated in the claim chart below.

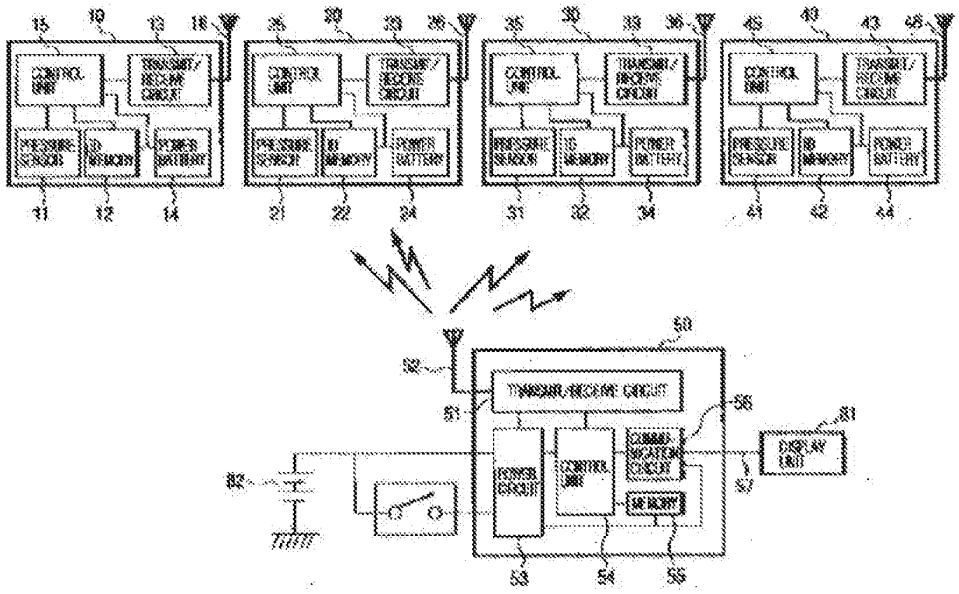
Taguchi relates to a tire pressure detecting apparatus. The embodiment depicted in Figure 2 of Taguchi contains almost each and every element of the tire pressure detecting apparatus in claim 8 (and original independent claim 1) of the '064 patent. Lemense and Itou are similarly directed to tire pressure monitoring system and teach the features lacking from Taguchi. A claim chart showing the one-for-one correspondence is set forth below.

Claim 8 (including features from independent claim 1)	**Taguchi in view of Lemense and Itou**
A tire pressure detecting apparatus, comprising:	**Taguchi:** combination of pressure sensors 10/20/30/40 and monitoring apparatus 50 (see Figure 2).
an identification rewritable tire pressure detector comprising:	**Taguchi:** pressure sensors 10/20/30/40 (Figure 2), including rewritable ID memory 12; into which a transmitter ID is written during a registration process (see Abstract and column 11, lines 49-54).
a micro-processing module having a rewritable memory unit being capable of recording an identification;	**Taguchi:** combination of control unit 15 and ID memory 12 (Figure 2).
a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit, the pressure-detecting unit detecting a tire pressure and sending a detection result to the micro-processing module;	**Taguchi:** pressure sensor 11 (Figure 2). Pressure sensor 11 and ID memory 12 are electrically connected, as illustrated in Figure 2.
a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal comprising the detection result and an identification of the identification rewritable tire pressure detector;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2; column 11, lines 16-25; describing transmission of detected pressure signal from sensor 11 and sensor ID stored in memory unit 12).
a power module electrically connected to the micro-processing module and providing electrical power to the identification rewritable tire pressure detector;	**Taguchi:** power battery 14 (Figure 2).
a receiving interface electronically connected to the microprocessing module, receiving and sending an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewritable memory unit;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2), step S140 "receive transmitted receiver ID by sensor" (Figure 3).
a setting apparatus communicating with the identification rewritable tire pressure detector and having a control module;	**Taguchi:** tire pressure monitor 50, which transmits the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit 12, including control unit 54.
an input module being electronically connected to the control module and allowing an operator to input an identification to be written into the identification rewritable tire pressure;	**Lemense:** keypad 26.
a receiving unit module electronically connected to the control module, receiving the RF signal from the identification rewritable tire	**Taguchi:** transmit/receive circuit 51 and antenna 52 (Figure 2; and column 11, lines 27-35).

pressure detector or a tire pressure detector and sending the RF signal to the control module;	
a setting output module controlled by the control module to send the external signal to the receiving interface, where the external signal is generated by the control module and comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module;	**Taguchi:** combination of the transmit/receive circuit 51 and the antenna 52 in Figure 2.
a power source electronically connected to the control module and providing electrical power to the setting apparatus.	**Taguchi:** power circuit 53 (Figure 2).
The tire pressure detecting apparatus as claimed in claim 1, wherein the input module is a code scanner.	**Itou:** ID registration tool 60 including bar code reading unit 61 and ID transmitting unit 62 for transmitting the IDs (Figure 2).

Reference is made to Figure 2 of Taguchi, reproduced below.

FIG. 2



Taguchi discloses a tire pressure detecting apparatus including a plurality of sensors 10/20/30/40 and a monitoring apparatus 50. The pressure sensors 10/20/30/40 include a

rewritable ID memory 12, in which a transmitter ID is written during a registration process.[52] The ID memory 12 is capable of recording an ID.[53] The pressure sensor 11 is electrically connected to the ID memory 12, as is illustrated in Figure 2. The pressure sensor 11 detects the tire pressure and sends the results to the control unit 15. The transmit/receive circuit 13 in combination with the antenna 16 periodically transmits the combination of detected pressure signal and the sensor ID in a signal with a predetermined frequency.[54] The pressure detector also includes a power module (power battery 14) that provides power to the pressure sensor. Furthermore, the transmit/receive circuit 13 is electronically connected to the microprocessing module, to receive and send an external signal to the microprocessing module, where the external signal includes an external identification to be written into the rewriteable memory unit.[55]

Taguchi further includes a setting apparatus (i.e., tire pressure monitor 50). The tire pressure monitor 50 sends the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit. The setting apparatus includes a control unit/module 54.[56] The tire pressure monitor 50 includes a receiving module (transmit/receive circuit 51 and antenna 52) electrically

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[52] Taguchi at column 11, lines 49-54.

[53] Id. at column 10, line 65-column 11, line 2.

[54] Id. at column 2, lines 56-59 and column 18, lines 4-9.

[55] Id. at Figure 4, S140.

[56] Id. at Figure 4, S130.

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connected to the control module.[57] Furthermore, the tire pressure monitor 50 includes a setting output module (i.e., combination of the transmit/receive circuit 51 and the antenna 52). Specifically, Taguchi teaches sending a receiver ID from the monitoring apparatus to the pressure sensors 10/20/30/40.[58] Additionally, the tire pressure monitor 50 includes a power circuit 53 electrically connected to the control unit 53 and provides electrical power to the tire pressure monitor.

It was established during prosecution of the `064 patent that Taguchi teaches each of the above features of claim 1.

Taguchi, however, fails to teach or suggest an input module to input an identification to be written into the identification rewritable tire pressure, as recited in claim 8 (by incorporation from original independent claim 1). Lemense, however, teaches the claimed input module. Specifically, Lemense includes a service tool 24 including a microcontroller 30. The microcontroller 30 performs various functions to interrogate a sensor unit using the service tool 24 to receive an ID code from each sensor.[59] The microcontroller 30 is connected to an interface 36 that includes an input device (i.e., keypad 26). Thus, Lemense teaches the above feature missing from the disclosure of Taguchi.

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[57] Id. at column 11, lines 25-35 and Figure 3B, S21.

[58] Id. at column 11, lines 60-62 and Figure 3, S130.

[59] Lemense at column 3, lines 4-36.

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Moreover, the modified device will perform the same functions with predictable results based on the teachings of Taguchi and Lemense. Also, it would have been obvious to one of ordinary skill in the at the time the claimed invention was made to modify Taguchi to include the input module of Lemense to enable replacement and monitoring of tire pressure sensors without previously storing the ID, by enabling the user to visually observe the ID and manually input the ID.

The combination of Taguchi and Lemense fails to teach or suggest that the input module is a code scanner. Itou, however, teaches the above feature of the claimed invention. That is, Itou teaches a method of acquiring the ID of the outdated tire pressure sensor by access to a bar code and writing the ID into the new tire pressure sensor. Indeed, Itou includes an ID registration tool 60 that is used to read the IDs from bar codes 5/6/7/8 for wiring the bar codes in the tire pressure monitoring apparatus 50.[60] The bar codes are representative of the IDs of the pressure sensors 10/20/30/40.[61] The ID registration tool 60 is composed on a bar-code reading unit 61 and an ID transmitting unit 62 for transmitting the IDs.[62] Thus, Itou teaches the above feature of claim 8 missing from the disclosure of Taguchi and Lemense.

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[60] See Itou at column 17, lines 32-44.

[61] Id. at column 17, lines 37-39.

[62] Id. at column 17, lines 45-55.

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Moreover, it would have been obvious to one of ordinary skill in the art to modify the system of Taguchi (in view of Lemense) to include the ID registration tool 60 of Itou because "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."[63] Furthermore, the proposed modification would prevent mistaken ID registration in the tire pressure monitoring system of Taguchi.[64]

Thus, claim 8 is obvious over Taguchi in view of Lemense and Itou under 35 U.S.C. § 103, and should be cancelled.

Ground No. 3: §102(b) Rejection over Lemense

Claims 10-13 are anticipated under 35 U.S.C. § 102(a) or (b) by Lemense, which was filed on December 19, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent.

Claim 10

Lemense relates to a method and system for replacing at least one tire of a vehicle.[65] The embodiments depicted in Figures 1-4 of Lemense contain each and every element of claim 10 of

[63] *KSR* at 1739-1740.

[64] See Itou at column 2, lines 22-31.

[65] See Lemense at Abstract; column 2, line 35 through column 4, line 15, and Figures 1-4.

the '064 patent. Therefore, Lemense anticipates claim 10. A claim chart showing the one-for-one correspondence is set forth below.

Claim 10	**Lemense**
A tire pressure detector identification copying method comprising the steps of:	A method for replacing a tire of a vehicle including cloning ID codes (e.g., see Lemense at Abstract and Figure 4).
providing a setting apparatus;	Service tool 24 is provided for interacting with sensor unit 23 (see Lemense at column 2, lines 63-65).
reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and	Service tool 24 receives and stores ID code (see Lemense at column 3, lines 14-37).
wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus.	The service tool is used to replicate or clone the ID code of a broken sensor unit into a replacement sensor unit over a LF communication link between the service tool and the replacement sensor unit (see Lemense at column 3, lines 22-26 and 51-67, and column 4, lines 1-15).

Claim 10 of the '064 patent is clearly anticipated by Lemense.

Lemense discloses a method and system for monitoring vehicular tire pressure and replacing or servicing tires mounted on wheels containing tire pressure sensing units.[66] The vehicle tires include sensor units 15-18 mounted on the vehicle tires. Each sensor unit includes a communication section for transmitting data and an ID code to a control module 20.[67] The system and method utilizes a service tool 24 for interacting with a sensor unit.

The method includes interrogating the sensor units using the service tool 24 to receive an ID code from each sensor.[68] After a technician removes a tire for service, the sensor units are re-tested. Any non-working tires are replaced. The service tool is used to replicate or clone the ID code of the broken sensor unit into a replacement sensor unit over a LF communication link between the service tool and the replacement tire sensor unit.[69]

Therefore, Lemense teaches each and every limitation of claim 10. Accordingly, claim 10 is properly anticipated by Lemense.

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[66] Id. at column 1, lines 14-16.

[67] Id. at column 2, lines 35-43.

[68] Id. at column 3, lines 15-37 and Figure 4, Step 41.

[69] Id. at column 3, lines 37-64.

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Claim 11

Claim 11 requires verifying the identification newly recorded in the new identification rewriteable tire pressure detector. After a new or repaired tire is installed onto each wheel, each sensor unit is retested to ensure that it is still functioning using the same test procedure shown in steps 40-43 of Figure 4 of Lemense.[70] This includes interrogating the sensor to receive the ID code.[71]

Thus, claim 11 is properly anticipated by Lemense and lacks novelty.

Claim 12

Claim 12 requires that the setting apparatus receives a wireless signal containing the old identification from the old tire pressure detector in the step of reading the old identification. Lemense discloses that the service tool 24 receives the ID code from each of the sensor units during interrogating the sensor units.[72]

Thus, claim 12 is properly anticipated by Lemense and lacks novelty.

[70] Id. at column 4, lines 10-15.

[71] Id. at column 3, lines 37-46.

[72] Id. at column 3, lines 23-26.

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Claim 13

Claim 13 requires that the setting apparatus receives the old identification through an input module in the step of reading the old identification. Lemense teaches that the old identification is received through an input module (i.e., microcontroller 30).[73]

Thus, claim 13 is properly anticipated by Lemense and lacks novelty.

In view of the anticipatory description in Lemense of a method within the scope of claims 10-13 of the '064 patent, these claims lack novelty and should be cancelled.

Ground No. 4: §103(a) Rejection over Taguchi in view of Lemense and Dixit

Claims 14 and 15 are unpatentable under 35 U.S.C. § 103(a) over Taguchi, which was filed on June 25, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent, in view of Dixit, which was filed on January 2, 2001, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent, and Lemense, which was filed on December 19, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent.

[73] Id. at column 3, lines 14-37 and Figure 3.

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Claim 14

Taguchi relates to a tire pressure detecting apparatus. The embodiment depicted in Figure 2 of Taguchi contains almost each and every element of the tire pressure detecting apparatus in claim 14 of the '064 patent. Dixit and Lemense are similarly directed to a tire pressure monitoring system and teach the features lacking from Taguchi. A claim chart showing the one-for-one correspondence is set forth below.

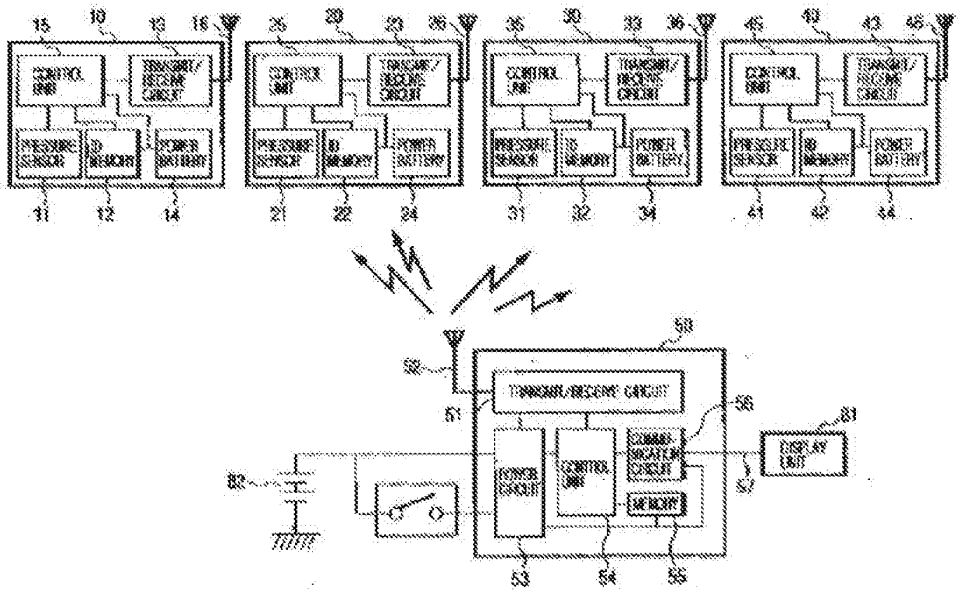
Claim 14	**Taguchi in view of Lemense and Dixit**
A tire pressure detecting system, comprising:	**Taguchi:** combination of pressure sensors 10/20/30/40 and monitoring apparatus 50 (see Figure 2).
an identification rewritable tire pressure detector comprising:	**Taguchi:** pressure sensors 10/20/30/40 (Figure 2), including rewritable ID memory 12; into which a transmitter ID is written during a registration process (see Abstract and column 11, lines 49-54).
a micro-processing module having a rewritable memory unit to record an identification;	**Taguchi:** combination of control unit 15 and ID memory 12 (Figure 2).
a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;	**Taguchi:** pressure sensor 11 (Figure 2). Pressure sensor 11 and ID memory 12 are electrically connected, as illustrated in Figure 2.
a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2; column 11, lines 16-25; describing transmission of detected pressure signal from sensor 11 and sensor ID stored in memory unit 12).
a power module electronically connected to the micro-processing module to supply power to the identification rewritable tire pressure detector; and	**Taguchi:** power battery 14 (Figure 2).
an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewritable	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2), step S140 "receive transmitted receiver ID by sensor" (Figure 3).

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memory unit;	
a setting apparatus arranged to communicate with the identification rewritable tire pressure detector via wireless, including:	**Taguchi:** tire pressure monitor 50, which transmits the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit 12.
reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and	**Lemense:** Service tool 24 receives and stores ID code (see Lemense at column 3, lines 14-37).
wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus, wherein the setting apparatus comprises:	**Lemense:** The service tool is used to replicate or clone the ID code of a broken sensor unit into a replacement sensor unit over a LF communication link between the service tool and the replacement sensor unit (see Lemense at column 3, lines 22-26 and 51-67, and column 4, lines 1-15).
a control module;	**Taguchi:** control unit 54.
an input module connected to the control module to allow an operator to input an identification to be written into the identification rewritable tire pressure;	**Dixit:** data input arrangements 42A-42D (Figures 1 and 2) and keypad 50.
a receiving unit module connected to the control module to receive the RF signal from the identification rewritable tire pressure detector and to send the RF signal to the control module;	**Taguchi:** transmit/receive circuit 51 and antenna 52 (Figure 2; and column 11, lines 27-35).
a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and	**Taguchi:** combination of the transmit/receive circuit 51 and the antenna 52 in Figure 2.
a power source connected to the control module and providing electrical power to the setting apparatus.	**Taguchi:** power circuit 53 (Figure 2).

Reference is made to Figure 2 of Taguchi, reproduced below.

FIG. 2



Taguchi discloses a tire pressure detecting apparatus including a plurality of sensors 10/20/30/40 and a monitoring apparatus 50. The pressure sensors 10/20/30/40 include a rewritable ID memory 12, in which a transmitter ID is written during a registration process.[74] The ID memory 12 is capable of recording an ID.[75] The pressure sensor 11 is electrically connected to the ID memory 12, as is illustrated in Figure 2. The pressure sensor 11 detects the tire pressure and sends the results to the control unit 15. The transmit/receive circuit 13 in combination with the antenna 16 periodically transmits the combination of detected pressure

[74] Taguchi at column 11, lines 49-54.

[75] Id. at column 10, line 65-column 11, line 2.

signal and the sensor ID in a signal with a predetermined frequency.[76] The pressure detector also includes a power module (power battery 14) that provides power to the pressure sensor. Furthermore, the transmit/receive circuit 13 is electronically connected to the microprocessing module, to receive and send an external signal to the microprocessing module, where the external signal includes an external identification to be written into the rewriteable memory unit.[77]

Taguchi further includes a setting apparatus (i.e., tire pressure monitor 50). The tire pressure monitor 50 sends the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit. The setting apparatus includes a control unit/module 54.[78] The tire pressure monitor 50 includes a receiving module (transmit/receive circuit 51 and antenna 52) electrically connected to the control module.[79] Furthermore, the tire pressure monitor 50 includes a setting output module (i.e., combination of the transmit/receive circuit 51 and the antenna 52). Specifically, Taguchi teaches sending a receiver ID from the monitoring apparatus to the pressure sensors 10/20/30/40.[80] Additionally, the tire pressure monitor 50 includes a power circuit 53 electrically connected to the control unit 53 and provides electrical power to the tire pressure monitor.

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[76] Id. at column 2, lines 56-59 and column 18, lines 4-9.

[77] Id. at Figure 4, S140.

[78] Id. at Figure 4, S130.

[79] Id. at column 11, lines 25-35 and Figure 3B, S21.

[80] Id. at column 11, lines 60-62 and Figure 3, S130.

Indeed, it was established during prosecution of the '064 patent that Taguchi teaches each of the above features from claim 14 (the above features of claim 14 were recited in claim 1 of the '064 patent).

Taguchi, however, fails to teach or suggest an input module to input an identification to be written into the identification rewritable tire pressure, as recited in claim 14.

Lemense, however, teaches the claimed input module. Specifically, Lemense includes a service tool 24 including a microcontroller 30. The microcontroller 30 performs various functions to interrogate a sensor unit using the service tool 24 to receive an ID code from each sensor.[81] The microcontroller 30 is connected to an interface 36 that includes an input device (i.e., keypad 26). Thus, Lemense teaches the above feature missing from the disclosure of Taguchi.

Furthermore, Dixit includes a plurality of manual input arrangements 42A-42D (Figure 1), each associated with one of the tire sensor units.[82] Additionally, with as illustrated in Figure 2, Dixit includes a transmitter device 44 that person manually operates to input an identification code via an input key pad 50.[83] Thus, Dixit teaches the above feature missing from the disclosure of Taguchi.

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[81] Lemense at column 3, lines 4-36.

[82] See Dixit at column 3, lines 38-45.

[83] Id. at column 4, lines 22-25.

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Moreover, the modified device will perform the same functions with predictable results based on the teachings of Taguchi, Lemense and Dixit. Also, it would have been obvious to one of ordinary skill in the at the time the claimed invention was made to modify Taguchi in view of Lemense and Dixit to enable replacement and monitoring of tire pressure sensors without previously storing the ID, by enabling the user to visually observe the ID and manually input the ID.

Claim 15

Taguchi relates to a tire pressure detecting apparatus. The embodiment depicted in Figure 2 of Taguchi contains almost each and every element of the tire pressure detecting apparatus in claim 15 of the '064 patent. Dixit and Lemense are similarly directed to a tire pressure monitoring system and teaches the features lacking from Taguchi. A claim chart showing the one-for-one correspondence is set forth below.

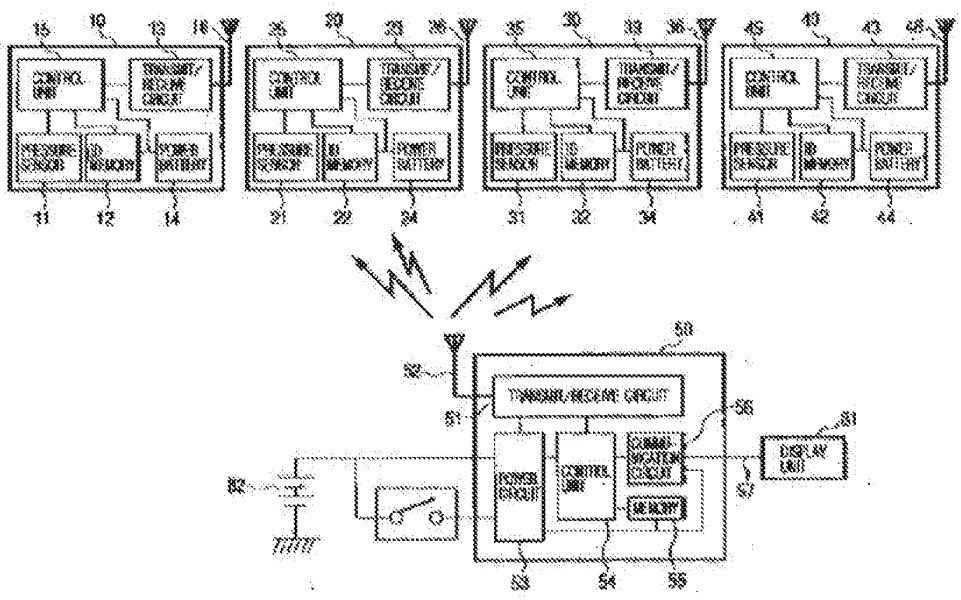
Claim 15	**Taguchi in view of Lemense and Dixit**
A tire pressure detecting system, comprising:	**Taguchi:** combination of pressure sensors 10/20/30/40 and monitoring apparatus 50 (see Figure 2).
an identification rewritable tire pressure detector comprising:	**Taguchi:** pressure sensors 10/20/30/40 (Figure 2), including rewritable ID memory 12; into which a transmitter ID is written during a registration process (see Abstract and column 11, lines 49-54).
a micro-processing module having a rewritable memory unit to record an identification;	**Taguchi:** combination of control unit 15 and ID memory 12 (Figure 2).
a sensing module electrically connected to the micro-processing module and having a	**Taguchi:** pressure sensor 11 (Figure 2). Pressure sensor 11 and ID memory 12 are electrically

pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;	connected, as illustrated in Figure 2.
a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2; column 11, lines 16-25; describing transmission of detected pressure signal from sensor 11 and sensor ID stored in memory unit 12).
a power module electronically connected to the micro-processing module to supply power to the identification rewritable tire pressure detector; and	**Taguchi:** power battery 14 (Figure 2).
an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewritable memory unit;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2), step S140 "receive transmitted receiver ID by sensor" (Figure 3).
a setting apparatus arranged to communicate with the identification rewritable tire pressure detector via wireless, including:	**Taguchi:** tire pressure monitor 50, which transmits the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit 12.
reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and	**Lemense:** Service tool 24 receives and stores ID code (see Lemense at column 3, lines 14-37).
writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus, wherein the setting apparatus comprises:	**Lemense:** The service tool is used to replicate or clone the ID code of a broken sensor unit into a replacement sensor unit over a LF communication link between the service tool and the replacement sensor unit (see Lemense at column 3, lines 22-26 and 51-67, and column 4, lines 1-15).
a control module;	**Taguchi:** control unit 54.
an input module connected to the control module to allow an operator to input an identification to be written into the identification rewritable tire pressure;	**Dixit:** data input arrangements 42A-42D (Figures 1 and 2) and keypad 50.
a receiving unit module connected to the control module to receive the RF signal from the identification rewritable tire pressure detector and to send the RF signal to the control module;	**Taguchi:** transmit/receive circuit 51 and antenna 52 (Figure 2; and column 11, lines 27-35).
a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and	**Taguchi:** combination of the transmit/receive circuit 51 and the antenna 52 in Figure 2.

a power source connected to the control module and providing electrical power to the setting apparatus.	**Taguchi:** power circuit 53 (Figure 2).

Reference is made to Figure 2 of Taguchi, reproduced below.

FIG. 2



Taguchi discloses a tire pressure detecting apparatus including a plurality of sensors 10/20/30/40 and a monitoring apparatus 50. The pressure sensors 10/20/30/40 include a rewritable ID memory 12, in which a transmitter ID is written during a registration process.[84] The ID memory 12 is capable of recording an ID.[85] The pressure sensor 11 is electrically connected to the ID memory 12, as is illustrated in Figure 2. The pressure sensor 11 detects the tire pressure and sends the results to the control unit 15. The transmit/receive circuit 13 in

[84] Taguchi at column 11, lines 49-54.

[85] Id. at column 10, line 65-column 11, line 2.

combination with the antenna 16 periodically transmits the combination of detected pressure signal and the sensor ID in a signal with a predetermined frequency.[86] The pressure detector also includes a power module (power battery 14) that provides power to the pressure sensor. Furthermore, the transmit/receive circuit 13 is electronically connected to the microprocessing module, to receive and send an external signal to the microprocessing module, where the external signal includes an external identification to be written into the rewriteable memory unit.[87]

Taguchi further includes a setting apparatus (i.e., tire pressure monitor 50). The tire pressure monitor 50 sends the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit. The setting apparatus includes a control unit/module 54.[88] The tire pressure monitor 50 includes a receiving module (transmit/receive circuit 51 and antenna 52) electrically connected to the control module.[89] Furthermore, the tire pressure monitor 50 includes a setting output module (i.e., combination of the transmit/receive circuit 51 and the antenna 52). Specifically, Taguchi teaches sending a receiver ID from the monitoring apparatus to the pressure sensors 10/20/30/40.[90] Additionally, the tire pressure monitor 50 includes a power

[86] Id. at column 2, lines 56-59 and column 18, lines 4-9.

[87] Id. at Figure 4, S140.

[88] Id. at Figure 4, S130.

[89] Id. at column 11, lines 25-35 and Figure 3B, S21.

[90] Id. at column 11, lines 60-62 and Figure 3, S130.

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circuit 53 electrically connected to the control unit 53 and provides electrical power to the tire pressure monitor.

Indeed, it was established during prosecution of the '064 patent that Taguchi teaches each of the above features of claim 15 (the above features were recited in independent claim 1 of the '064 patent).

Taguchi, however, fails to teach or suggest an input module to input an identification to be written into the identification rewritable tire pressure, as recited in claim 15.

Lemense, however, teaches the claimed input module. Specifically, Lemense includes a service tool 24 including a microcontroller 30. The microcontroller 30 performs various functions to interrogate a sensor unit using the service tool 24 to receive an ID code from each sensor.[91] The microcontroller 30 is connected to an interface 36 that includes an input device (i.e., keypad 26). Thus, Lemense teaches the above feature missing from the disclosure of Taguchi.

Furthermore, Dixit includes a plurality of manual input arrangements 42A-42D (Figure 1), each associated with one of the tire sensor units.[92] Additionally, with as illustrated in Figure 2, Dixit includes a transmitter device 44 that person manually operates to input an identification

[91] Lemense at column 3, lines 4-36.

[92] See Dixit at column 3, lines 38-45.

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code via an input key pad 50.[93] Thus, Dixit teaches the above feature missing from the disclosure of Taguchi.

Moreover, the modified device will perform the same functions with predictable results based on the teachings of Taguchi, Lemense and Dixit. Also, it would have been obvious to one of ordinary skill in the at the time the claimed invention was made to modify Taguchi in view of Lemense and Dixit to enable replacement and monitoring of tire pressure sensors without previously storing the ID, by enabling the user to visually observe the ID and manually input the ID.

Therefore, the combination of Taguchi, Lemense and Dixit teaches each and every feature of claims 14 and 15. Accordingly, claims 14 and 15 should be cancelled.

Ground No. 5: §103(a) Rejection over Taguchi in view of Lemense

Claims 14 and 15 are unpatentable under 35 U.S.C. § 103(a) over Taguchi, which was filed on June 25, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent, in view of Lemense, which was filed on December 19, 2003, and thus qualifies as prior art under 35 U.S.C. § 102(a) and (b) against the claims of the '064 patent.

[93] Id. at column 4, lines 22-25.

Claim 14

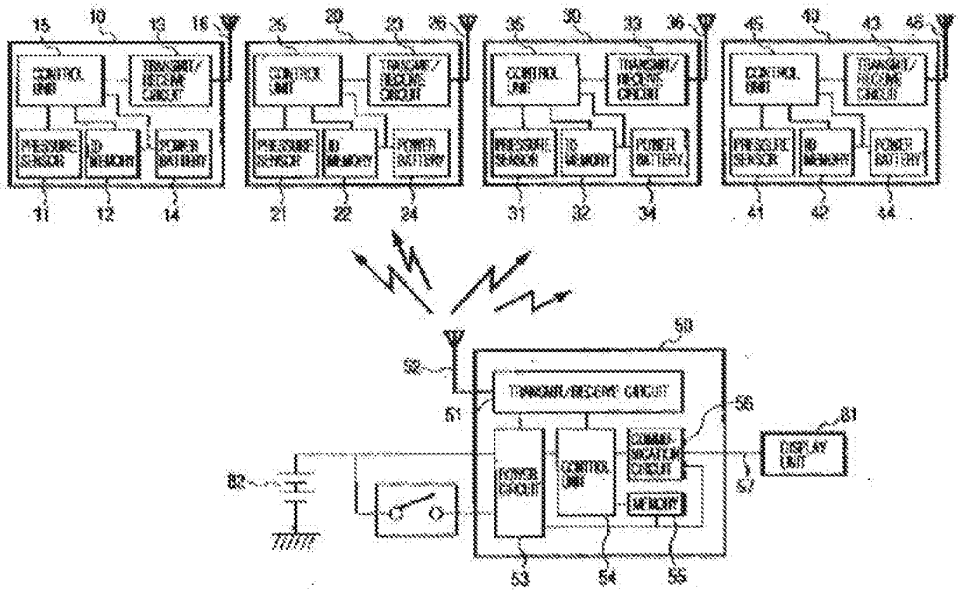
Taguchi relates to a tire pressure detecting apparatus. The embodiment depicted in Figure 2 of Taguchi contains almost each and every element of the tire pressure detecting apparatus in claim 14 of the '064 patent. Lemense is similarly directed to a tire pressure monitoring system and teaches the features lacking from Taguchi. A claim chart showing the one-for-one correspondence is set forth below.

Claim 14	**Taguchi in view of Lemense**
A tire pressure detecting system, comprising:	**Taguchi:** combination of pressure sensors 10/20/30/40 and monitoring apparatus 50 (see Figure 2).
an identification rewritable tire pressure detector comprising:	**Taguchi:** pressure sensors 10/20/30/40 (Figure 2), including rewritable ID memory 12; into which a transmitter ID is written during a registration process (see Abstract and column 11, lines 49-54).
a micro-processing module having a rewritable memory unit to record an identification;	**Taguchi:** combination of control unit 15 and ID memory 12 (Figure 2).
a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;	**Taguchi:** pressure sensor 11 (Figure 2). Pressure sensor 11 and ID memory 12 are electrically connected, as illustrated in Figure 2.
a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2; column 11, lines 16-25; describing transmission of detected pressure signal from sensor 11 and sensor ID stored in memory unit 12).
a power module electronically connected to the micro-processing module to supply power to the identification rewritable tire pressure detector; and	**Taguchi:** power battery 14 (Figure 2).
an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewritable	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2), step S140 "receive transmitted receiver ID by sensor" (Figure 3).

memory unit;	
a setting apparatus arranged to communicate with the identification rewritable tire pressure detector via wireless, including:	**Taguchi:** tire pressure monitor 50, which transmits the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit 12.
reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and	**Lemense:** Service tool 24 receives and stores ID code (see Lemense at column 3, lines 14-37).
wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus, wherein the setting apparatus comprises:	**Lemense:** The service tool is used to replicate or clone the ID code of a broken sensor unit into a replacement sensor unit over a LF communication link between the service tool and the replacement sensor unit (see Lemense at column 3, lines 22-26 and 51-67, and column 4, lines 1-15).
a control module;	**Taguchi:** control unit 54.
an input module connected to the control module to allow an operator to input an identification to be written into the identification rewritable tire pressure;	**Lemense:** keypad 26.
a receiving unit module connected to the control module to receive the RF signal from the identification rewritable tire pressure detector and to send the RF signal to the control module;	**Taguchi:** transmit/receive circuit 51 and antenna 52 (Figure 2; and column 11, lines 27-35).
a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and	**Taguchi:** combination of the transmit/receive circuit 51 and the antenna 52 in Figure 2.
a power source connected to the control module and providing electrical power to the setting apparatus.	**Taguchi:** power circuit 53 (Figure 2).

Reference is made to Figure 2 of Taguchi, reproduced below.

FIG. 2



Taguchi discloses a tire pressure detecting apparatus including a plurality of sensors 10/20/30/40 and a monitoring apparatus 50. The pressure sensors 10/20/30/40 include a rewritable ID memory 12, in which a transmitter ID is written during a registration process.[94] The ID memory 12 is capable of recording an ID.[95] The pressure sensor 11 is electrically connected to the ID memory 12, as is illustrated in Figure 2. The pressure sensor 11 detects the tire pressure and sends the results to the control unit 15. The transmit/receive circuit 13 in combination with the antenna 16 periodically transmits the combination of detected pressure

[94] Taguchi at column 11, lines 49-54.

[95] Id. at column 10, line 65-column 11, line 2.

signal and the sensor ID in a signal with a predetermined frequency.[96] The pressure detector also includes a power module (power battery 14) that provides power to the pressure sensor. Furthermore, the transmit/receive circuit 13 is electronically connected to the microprocessing module, to receive and send an external signal to the microprocessing module, where the external signal includes an external identification to be written into the rewriteable memory unit.[97]

Taguchi further includes a setting apparatus (i.e., tire pressure monitor 50). The tire pressure monitor 50 sends the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit. The setting apparatus includes a control unit/module 54.[98] The tire pressure monitor 50 includes a receiving module (transmit/receive circuit 51 and antenna 52) electrically connected to the control module.[99] Furthermore, the tire pressure monitor 50 includes a setting output module (i.e., combination of the transmit/receive circuit 51 and the antenna 52). Specifically, Taguchi teaches sending a receiver ID from the monitoring apparatus to the pressure sensors 10/20/30/40.[100] Additionally, the tire pressure monitor 50 includes a power circuit 53 electrically connected to the control unit 53 and provides electrical power to the tire pressure monitor.

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[96] Id. at column 2, lines 56-59 and column 18, lines 4-9.

[97] Id. at Figure 4, S140.

[98] Id. at Figure 4, S130.

[99] Id. at column 11, lines 25-35 and Figure 3B, S21.

[100] Id. at column 11, lines 60-62 and Figure 3, S130.

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Indeed, it was established during prosecution of the '064 patent that Taguchi teaches each of the above features of claim 14 (the above features were recited in independent claim 1 of the '064 patent).

Taguchi, however, fails to teach or suggest an input module to input an identification to be written into the identification rewritable tire pressure, as recited in claim 14.

Lemense, however, teaches the claimed input module. Specifically, Lemense includes a service tool 24 including a microcontroller 30. The microcontroller 30 performs various functions to interrogate a sensor unit using the service tool 24 to receive an ID code from each sensor.[10] The microcontroller 30 is connected to an interface 36 that includes an input device (i.e., keypad 26). Thus, Lemense teaches the above feature missing from the disclosure of Taguchi.

Moreover, the modified device will perform the same functions with predictable results based on the teachings of Taguchi and Lemense. Also, it would have been obvious to one of ordinary skill in the at the time the claimed invention was made to modify Taguchi in view of Lemense to enable replacement and monitoring of tire pressure sensors without previously storing the ID, by enabling the user to visually observe the ID and manually input the ID.

[10] Lemense at column 3, lines 4-36.

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Claim 15

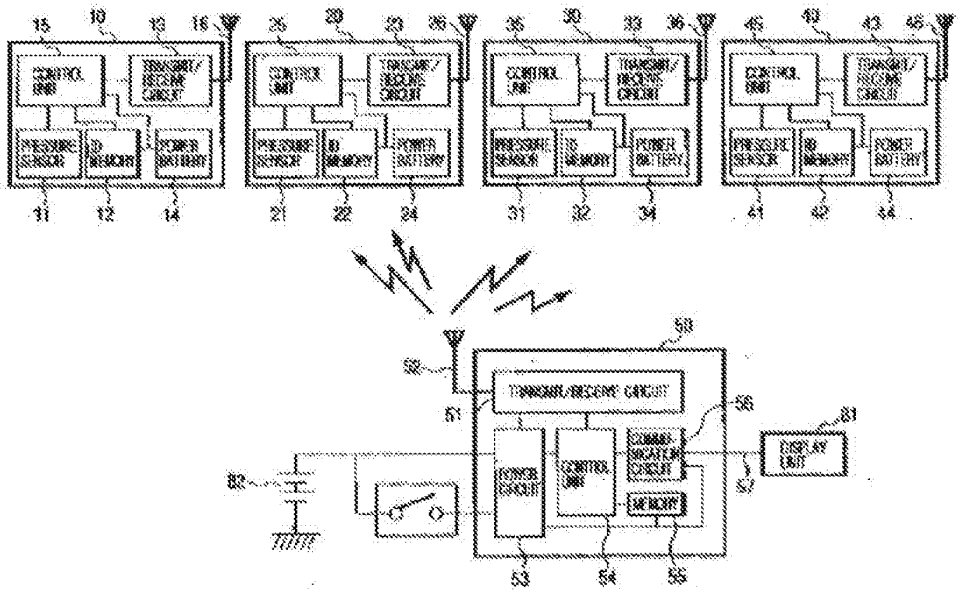
Taguchi relates to a tire pressure detecting apparatus. The embodiment depicted in Figure 2 of Taguchi contains almost each and every element of the tire pressure detecting apparatus in claim 15 of the '064 patent. Lemense is similarly directed to a tire pressure monitoring system and teaches the features lacking from Taguchi. A claim chart showing the one-for-one correspondence is set forth below.

Claim 15	**Taguchi in view of Lemense**
A tire pressure detecting system, comprising:	**Taguchi:** combination of pressure sensors 10/20/30/40 and monitoring apparatus 50 (see Figure 2).
an identification rewritable tire pressure detector comprising:	**Taguchi:** pressure sensors 10/20/30/40 (Figure 2), including rewritable ID memory 12; into which a transmitter ID is written during a registration process (see Abstract and column 11, lines 49-54).
a micro-processing module having a rewritable memory unit to record an identification;	**Taguchi:** combination of control unit 15 and ID memory 12 (Figure 2).
a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;	**Taguchi:** pressure sensor 11 (Figure 2). Pressure sensor 11 and ID memory 12 are electrically connected, as illustrated in Figure 2.
a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2; column 11, lines 16-25; describing transmission of detected pressure signal from sensor 11 and sensor ID stored in memory unit 12).
a power module electronically connected to the micro-processing module to supply power to the identification rewritable tire pressure detector; and	**Taguchi:** power battery 14 (Figure 2).
an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewritable	**Taguchi:** transmit/receive circuit 13 and antenna 16 (Figure 2), step S140 "receive transmitted receiver ID by sensor" (Figure 3).

memory unit;	
a setting apparatus arranged to communicate with the identification rewritable tire pressure detector via wireless, including:	**Taguchi:** tire pressure monitor 50, which transmits the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit 12.
reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and	**Lemense:** Service tool 24 receives and stores ID code (see Lemense at column 3, lines 14-37).
writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus, wherein the setting apparatus comprises:	**Lemense:** The service tool is used to replicate or clone the ID code of a broken sensor unit into a replacement sensor unit over a LF communication link between the service tool and the replacement sensor unit (see Lemense at column 3, lines 22-26 and 51-67, and column 4, lines 1-15).
a control module;	**Taguchi:** control unit 54.
an input module connected to the control module to allow an operator to input an identification to be written into the identification rewritable tire pressure;	**Lemense:** keypad 26.
a receiving unit module connected to the control module to receive the RF signal from the identification rewritable tire pressure detector and to send the RF signal to the control module;	**Taguchi:** transmit/receive circuit 51 and antenna 52 (Figure 2; and column 11, lines 27-35).
a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and	**Taguchi:** combination of the transmit/receive circuit 51 and the antenna 52 in Figure 2.
a power source connected to the control module and providing electrical power to the setting apparatus.	**Taguchi:** power circuit 53 (Figure 2).

Reference is made to Figure 2 of Taguchi, reproduced below.

FIG. 2



Taguchi discloses a tire pressure detecting apparatus including a plurality of sensors 10/20/30/40 and a monitoring apparatus 50. The pressure sensors 10/20/30/40 include a rewritable ID memory 12, in which a transmitter ID is written during a registration process.[102] The ID memory 12 is capable of recording an ID.[103] The pressure sensor 11 is electrically connected to the ID memory 12, as is illustrated in Figure 2. The pressure sensor 11 detects the tire pressure and sends the results to the control unit 15. The transmit/receive circuit 13 in combination with the antenna 16 periodically transmits the combination of detected pressure

[102] Taguchi at column 11, lines 49-54.

[103] Id. at column 10, line 65-column 11, line 2.

signal and the sensor ID in a signal with a predetermined frequency.[104] The pressure detector also includes a power module (power battery 14) that provides power to the pressure sensor. Furthermore, the transmit/receive circuit 13 is electronically connected to the microprocessing module, to receive and send an external signal to the microprocessing module, where the external signal includes an external identification to be written into the rewriteable memory unit.[105]

Taguchi further includes a setting apparatus (i.e., tire pressure monitor 50). The tire pressure monitor 50 sends the receiver ID to the pressure sensors 10/20/30/40 for storage in the ID memory unit. The setting apparatus includes a control unit/module 54.[106] The tire pressure monitor 50 includes a receiving module (transmit/receive circuit 51 and antenna 52) electrically connected to the control module.[107] Furthermore, the tire pressure monitor 50 includes a setting output module (i.e., combination of the transmit/receive circuit 51 and the antenna 52). Specifically, Taguchi teaches sending a receiver ID from the monitoring apparatus to the pressure sensors 10/20/30/40.[108] Additionally, the tire pressure monitor 50 includes a power circuit 53 electrically connected to the control unit 53 and provides electrical power to the tire pressure monitor.

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[104] Id. at column 2, lines 56-59 and column 18, lines 4-9.

[105] Id. at Figure 4, S140.

[106] Id. at Figure 4, S130.

[107] Id. at column 11, lines 25-35 and Figure 3B, S21.

[108] Id. at column 11, lines 60-62 and Figure 3, S130.

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Indeed, it was established during prosecution of the '064 patent that Taguchi teaches the above features of claim 15 (the above features were recited in claim 1 of the '064 patent).

Taguchi, however, fails to teach or suggest an input module to input an identification to be written into the identification rewritable tire pressure, as recited in claim 15.

Lemense, however, teaches the claimed input module. Specifically, Lemense includes a service tool 24 including a microcontroller 30. The microcontroller 30 performs various functions to interrogate a sensor unit using the service tool 24 to receive an ID code from each sensor.[109] The microcontroller 30 is connected to an interface 36 that includes an input device (i.e., keypad 26). Thus, Lemense teaches the above feature missing from the disclosure of Taguchi.

Moreover, the modified device will perform the same functions with predictable results based on the teachings of Taguchi and Lemense. Also, it would have been obvious to one of ordinary skill in the at the time the claimed invention was made to modify Taguchi in view of Lemense to enable replacement and monitoring of tire pressure sensors without previously storing the ID, by enabling the user to visually observe the ID and manually input the ID.

Therefore, the combination of Taguchi, Lemense and Dixit teach each and every feature of claims 14 and 15. Accordingly, claims 14 and 15 should be cancelled.

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[109] Lemense at column 3, lines 4-36.

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VIII. CONCLUSION

For the above reasons, it is respectfully requested that this request for *ex parte* reexamination be granted and that all claims be held unpatentable.

Date: 28 February 2014

Respectfully submitted,

/Vincent M DeLuca/

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Registration No. 32,408
Attorney for Third Party Requester

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CERTIFICATE OF SERVICE

I hereby certify that a true copy of the foregoing Request for Ex-Parte Reexamination was served on the patent owner by mailing a copy of same to the below address on this 28th day of February, 2014, by United States Mail, postage prepaid.

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Austin, TX 78758

/Vincent M DeLuca/
Vincent M. DeLuca, Esq.
Registration No. 32,408

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US008031064B2

(12) **United States Patent**
Yu

(10) **Patent No.: US 8,031,064 B2**
(45) **Date of Patent: Oct. 4, 2011**

(54) **TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME**

(75) Inventor: **Hung-Chih Yu**, Taichung (TW)

(73) Assignee: **Orange Electronic Co., Ltd.**, Tanzih Hsiang Taichung Hsien (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 420 days.

(21) Appl. No.: **12/283,979**

(22) Filed: **Sep. 17, 2008**

(65) **Prior Publication Data**

US 2010/0066524 A1 Mar. 18, 2010

(51) **Int. Cl.**
B60C 23/00 (2006.01)

(52) **U.S. Cl.** **340/447**; 340/442; 340/445; 73/146; 73/146.5

(58) **Field of Classification Search** 340/442–449, 340/425.5, 426.3, 10.06, 10.1; 73/146, 146.2–146.5
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,920,785 B2 * 7/2005 Toyoiuku 73/146
6,927,679 B2 * 8/2005 Taguchi et al. 340/442
7,137,296 B2 * 11/2006 Shida et al. 73/146.5

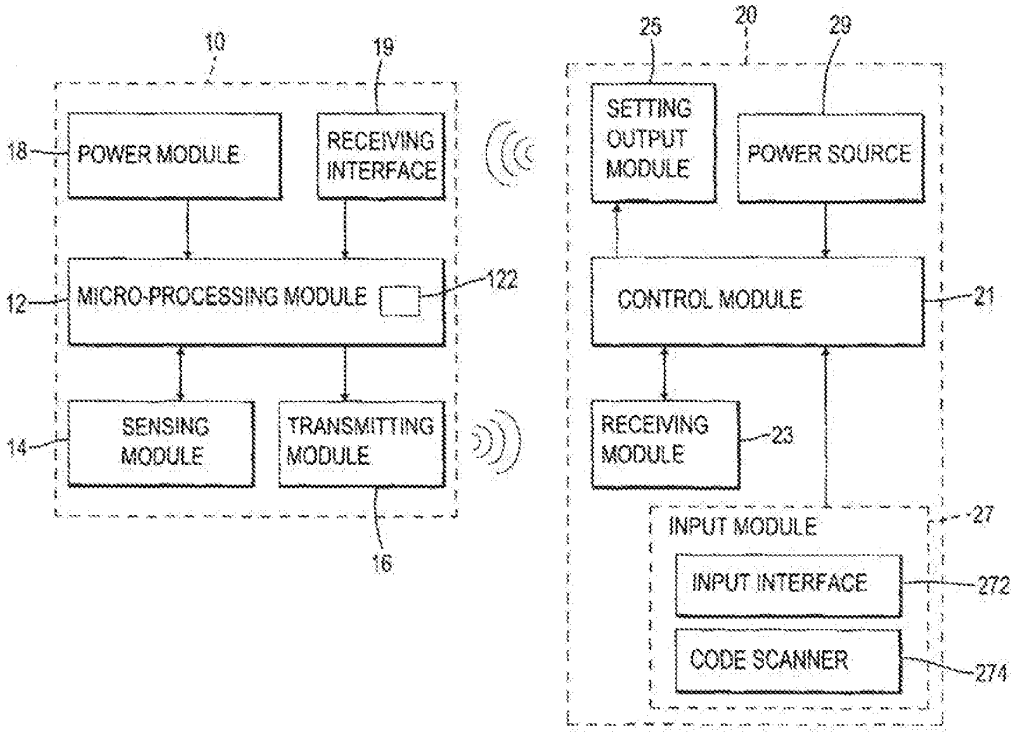
* cited by examiner

Primary Examiner — Anh V La
(74) *Attorney, Agent, or Firm* — Charles E. Baxley

(57) **ABSTRACT**

A tire pressure detecting apparatus has an identification rewriteable tire pressure detector and a setting apparatus. The tire pressure detector is securely mounted on a valve stem inside a tire of a vehicle and has a micro-processing module, a sensing module, a transmitting module and a receiving interface, where the micro-processing module has a memory unit. The setting apparatus is capable of reading or inputting an identification from a failure tire pressure detector, transmits the identification to the identification rewriteable tire pressure detector and writes the identification into the memory unit.

13 Claims, 4 Drawing Sheets



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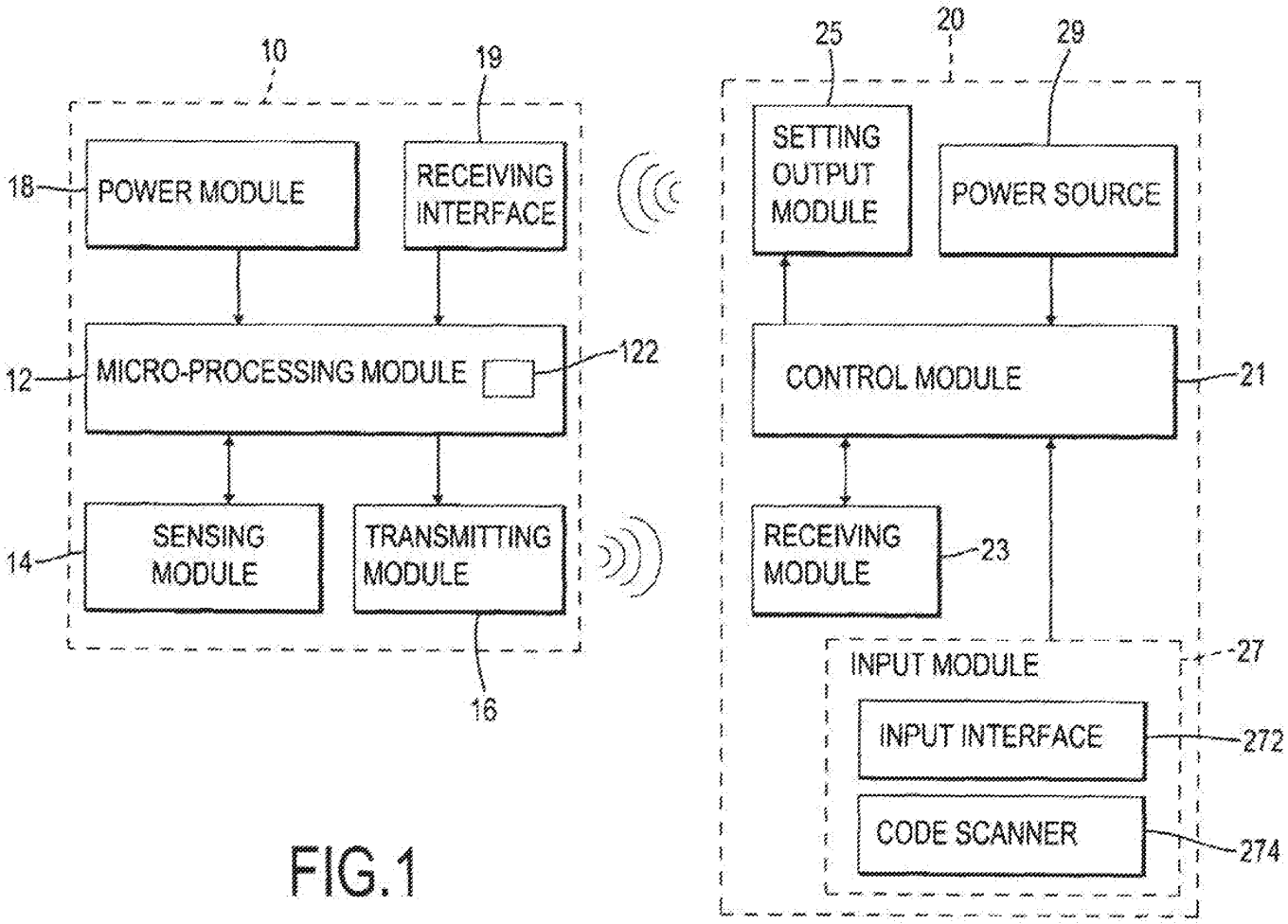

10
19
18
POWER MODULE
RECEIVING INTERFACE
12
MICRO-PROCESSING MODULE
122
14
SENSING MODULE
TRANSMITTING MODULE
16
25
20
29
SETTING OUTPUT MODULE
POWER SOURCE
CONTROL MODULE
21
RECEIVING MODULE
23
INPUT MODULE
27
INPUT INTERFACE
272
CODE SCANNER
274

FIG.1

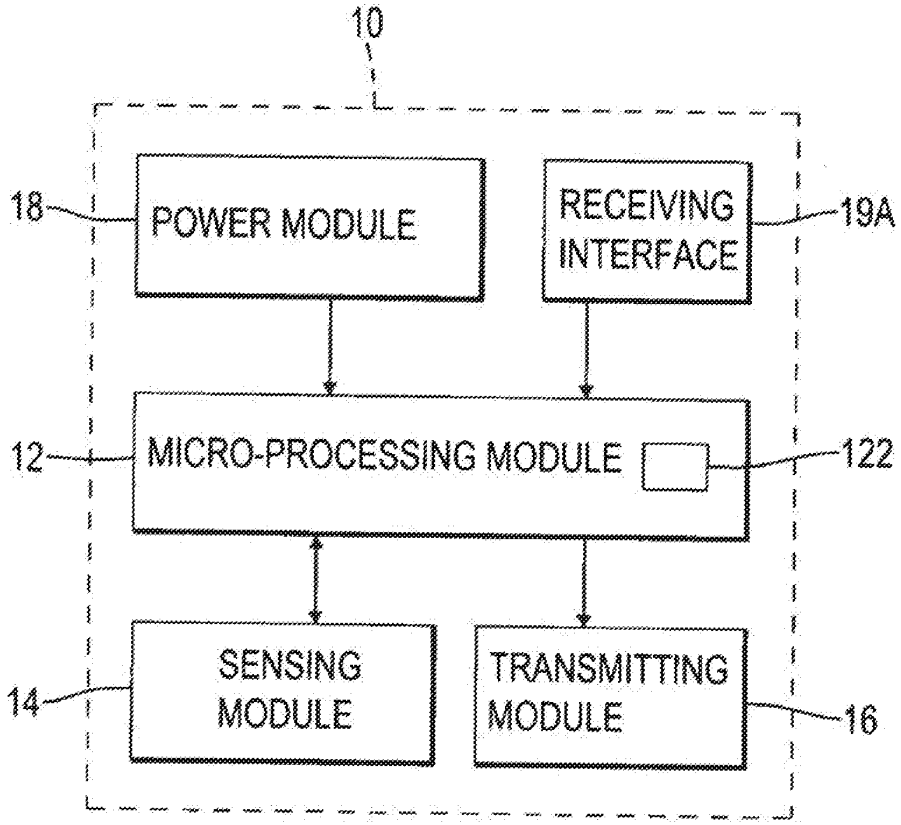


FIG.2

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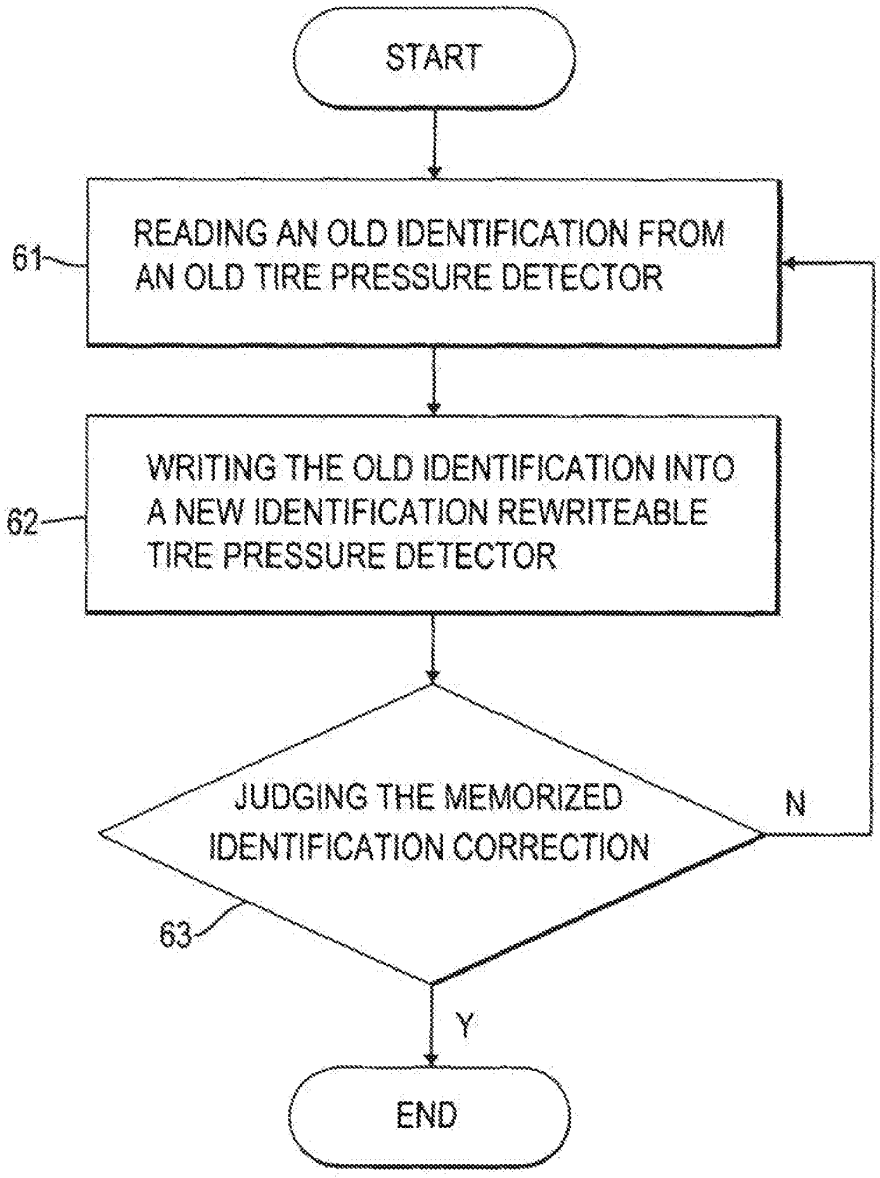


FIG.3

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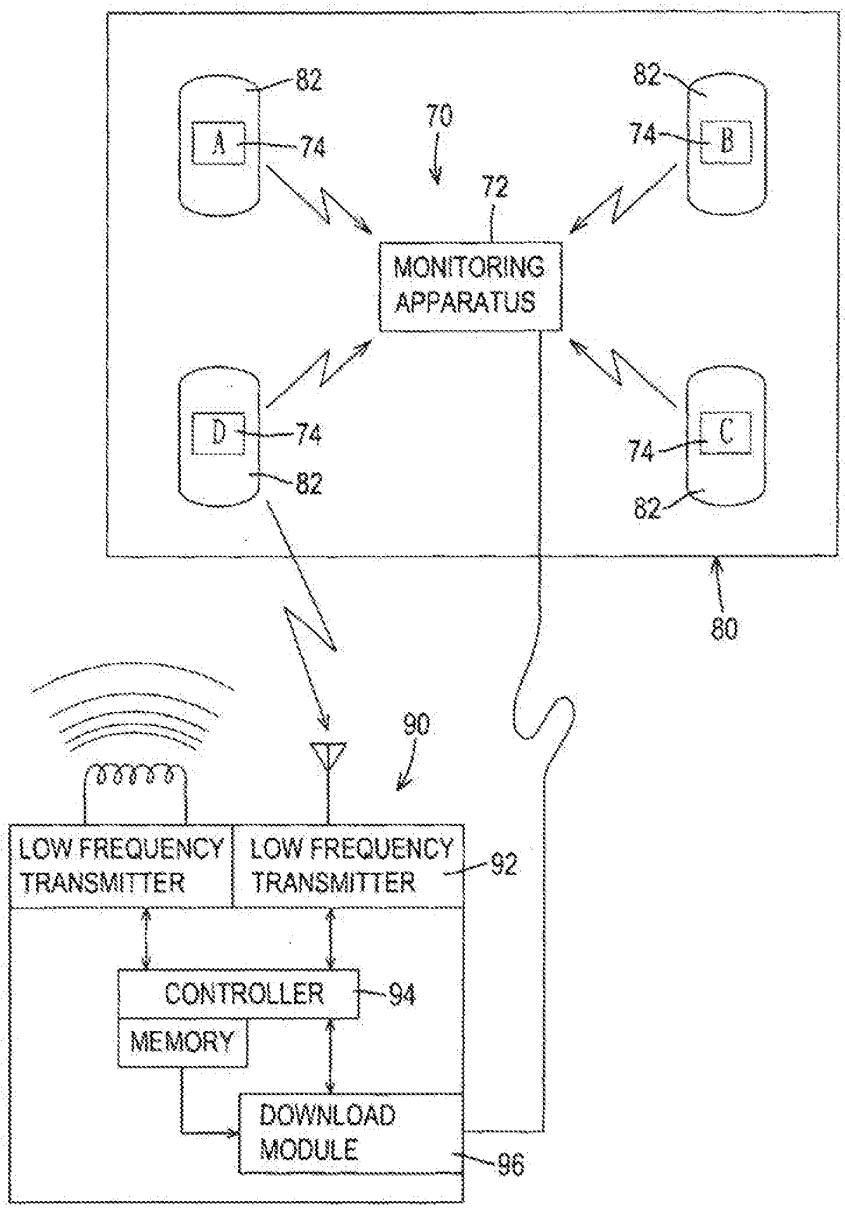


FIG.4

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TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates to a tire pressure detecting apparatus, and more particularly to an identification rewriteable tire pressure detecting apparatus.

2. Description of the Related Art

Various Tire Pressure Monitoring Systems (TPMSs) may be applied for monitoring air pressure inside tires of a vehicle to alert a driver of abnormal tire pressure or to easily check correct tire pressures are set, and a conventional TPMS comprises a tire pressure detector connected to an inner end of a valve stem. Normally, an average lifetime of the tire pressure detectors is five years, users need to change the tire pressure detectors after the tire pressure detector is failure. However, tire pressure detectors have different installation methods depending on manufacturers of the tire pressure detectors, to request an original manufacturer for installing a new tire pressure detector is necessary but troublesome.

For instance, FIG. **4** shows an existed tire pressure detecting system (**70**), the tire pressure detecting system (**70**) comprises a monitoring apparatus (**72**) and four tire pressure detectors (**74**). The monitoring apparatus (**72**) is installed inside a car (**80**) and the tire pressure detectors (**74**) are respectively installed inside four tires (**82**) of the car (**80**). The monitoring apparatus (**72**) continuously receives wireless signals sent from the tire pressure detectors (**74**). Each tire pressure detector (**74**) has an identification (ID) recorded therein so that the wireless signal sent by the tire pressure detector (**74**) may be recognized by the monitoring apparatus (**72**) since the wireless signal stream comprises the identification. In other words, the monitoring apparatus (**72**) recognizes the tire pressure detectors (**74**) by identifying the IDs in the received wireless signals. Hence, when one of the tire pressure detector (**74**) is replaced by a new one, a setting apparatus (**90**) is necessary for introducing a new ID of the new tire pressure detector (**74**) to the monitoring apparatus (**72**). The setting apparatus (**90**) has a receiving module (**92**), a controller (**94**) and a download module (**96**). The receiving module (**92**) is electronically connected to the controller (**94**), receives wireless signals from the tire pressure detectors (**74**) and sends the received wireless signals to the controller (**94**). The controller (**92**) controls the download module (**96**) to write the ID of the tire pressure detector (**74**) into the monitoring apparatus (**72**), thereby the monitoring apparatus (**72**) may start to read wireless signal after the ID is recognizable.

However, the setting apparatus (**90**) is only fitted with some specific tire pressure detectors (**74**) that have to be manufactured by the same company. Flexibility and convenience of changing the tire pressure detector (**74**) are not good since users have to look for specific service centers that have the setting apparatus (**90**) to change the tire pressure detectors (**74**).

The present invention provides a tire pressure detecting apparatus to obviate or mitigate the shortcoming of the conventional the tire pressure detector.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a tire pressure detecting apparatus which is identification rewriteable thereby an new tire pressure detector can be easily replaced a failure tire pressure detector by coping the identification of the failure tire pressure detector directly.

The tire pressure detecting apparatus has an identification rewriteable tire pressure detector and a setting apparatus. The tire pressure detector is securely mounted on a valve stem inside a tire of a vehicle and has a micro-processing module, a sensing module, a transmitting module and a receiving interface, where the micro-processing module has a memory unit. The setting apparatus is capable of reading or inputting an identification from a failure tire pressure detector, transmits the identification to the identification rewriteable tire pressure detector and writes the identification into the memory unit.

Other objectives, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of a tire pressure detecting apparatus in accordance with the present invention;

FIG. **2** is a block diagram of an identification rewriteable tire pressure detector in accordance with the present invention;

FIG. **3** is a flow chart of a tire pressure detector identification copying method in accordance with the present invention; and

FIG. **4** is a block diagram of a tire pressure detecting system and a setting apparatus in accordance with the prior art.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIGS. **1** and **2**, a tire pressure detecting apparatus in accordance with the present invention has an identification rewriteable tire pressure detector (**10**) and a setting apparatus (**20**).

The identification rewriteable tire pressure detector (**10**) is securely mounted on a valve stem inside a tire of a vehicle and has a micro-processing module (**12**), a sensing module (**14**), a transmitting module (**16**), a power module (**18**) and a receiving interface (**19**, **19A**).

The micro-processing module (**12**) has a memory unit (**122**). The memory unit (**122**) is a writeable memory and may memorize a preset identification therein, where the preset identification may be an identical 8-bit integer numbered and is given when the identification rewriteable tire pressure detector (**10**) is manufactured. Either the memory unit (**122**) is empty without memorizing any preset identification therein.

The sensing module (**14**) is electronically connected to the micro-processing module (**12**) and may have a pressure-detecting unit, at least one acceleration-detecting unit, a temperature-detecting unit and/or the like. The sensing module (**14**) is controlled by the micro-processing module (**12**) to respectively detect continuously a tire pressure signal, acceleration direction signals and a tire temperature signal of the vehicle and send a detection result to the micro-processing module (**12**). Wherein, when two acceleration-detecting units are included, the two acceleration-detecting units may detect a turning acceleration and a tuning direction of the vehicle, where the turning acceleration and the tuning direction are calculated from the detection results of the acceleration-detecting units.

The transmitting module (**16**) is controlled by the micro-processing module (**12**) to transmit a radio frequency (RF) signal, where the RF signal comprises the detection results

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and may have the preset identification. The RF signal may have frequencies such as 315 MHz, 433 MHz or the like.

The power module (18) is electronically connected to the micro-processing module (12) and provides electric power to the identification rewriteable tire pressure detector (10).

The receiving interface (19, 19A) is electronically connected to the micro-processing module (12), receives an external signal, outputs the external signal to the micro-processing module (12) and may be a connector or a low frequency receiver that are respectively shown on FIG. 1 and FIG. 2. The external signal may have an external identification thereby the micro-processing module (12) receives and memorizes the external identification into the memory unit (122) to overwrite and be the preset identification that is originally memorized in the memory unit (122). The low frequency receiver receives the external signal having a low frequency relating to the frequency of the RF signal. In a preferred embodiment of the present invention, the external signal is at kilo-Hz scale such like 125 kHz and is sent from the setting apparatus (20). A reason for adopting the low frequency receiver is that the low frequency wireless signal has a lower transparency, thereby the receiving interface (19) has to be placed nearby the setting apparatus (20) when receiving the low frequency wireless signal from the source. Hence, a person may decide to receive the external signal from one particular source by adjusting a distance with the particular source.

The setting apparatus (20) communicates with the identification rewriteable tire pressure detector (10) and tire pressure detectors that are generally using a same range of frequencies and has a control module (21), a receiving module (23), a setting output module (25), an input module (27) and a power source (29).

The receiving module (23) is electronically connected to the control module (21) and receives the RF signal from the identification rewriteable tire pressure detector (10) or the tire pressure detectors that are capable of sending the RF signals. The receiving module (23) sends the received RF signal to the control module (21) thereby the control module (21) has the preset identification of the identification rewriteable tire pressure detector (10) or the tire pressure detector.

The setting output module (25) is controlled by the control module (21) to send the external signal to the receiving interface (19, 19A). Wherein, the external signal is generated by the control module (21) and may comprise the external identification that is identical to preset identification in the RF signal received from the receiving module (23). The setting output module (25) may be an outputting connector corresponding and being electronically connected to the connector (19A) or may be a wireless transmitting interface sending the external signal wirelessly to the receiving interface (19).

The input module (27) is electronically connected to the control module (21), accepts the preset identification that is keyed in or scanned in and may have an input interface (272) and a code scanner (274).

The input interface (272) is electronically connected to the control module (21), may be a dip switch, a keyboard or the like, is capable of accepting a setup by a person to input the preset identification of a failure tire pressure detector. The person may acquire the preset identification directly from the failure tire pressure detector since the preset identification is printed or listed on a surface of the tire pressure detector. The identification may be a set of integer or a barcode printed or formed on the surface of the tire pressure detector.

The code scanner (274) is electronically connected to the control module (21) and is controlled by the control module (21) to scan the barcode on the tire pressure detector and interpret the barcode as the preset identification for the control module (21).

The power source (29) is electronically connected to the control module (21) and provides electrical power to the setting apparatus (20).

With reference to FIG. 3, a tire pressure detector identification copying method in accordance with the present invention has steps comprising: reading an old identification from an old tire pressure detector (61), writing the old identification into a new identification rewriteable tire pressure detector (62) and judging the memorized identification correction (63).

In the step of reading an old identification from an old tire pressure detector (61), a serviceman may use the setting apparatus (20) to receive the RF signal wirelessly from any old tire pressure detector or directly input the external identification (i.e. old identification) of the old tire pressure detector. If the old tire pressure detector is totally failed and can not transmit the RF signal, the serviceman may scan the barcode or input the external identification of old tire pressure detector directly through the input module (27).

In the step of writing the old identification into a new identification rewriteable tire pressure detector (62), after the external identification of the old tire pressure detector is acquired, the serviceman may rewrite the external identification into a new identification rewriteable tire pressure detector. If the new identification rewriteable tire pressure detector already has the preset identification therein, the external identification of the old tire pressure detector is overwrote the external identification.

In the step of judging the memorized identification correction (63), after the external identification of the old tire pressure detector has been memorized in the new identification rewriteable tire pressure detector, the serviceman may use the setting apparatus (20) to receive wireless signals from the new identification rewriteable tire pressure detector. The setting apparatus (20) judges the consistence of the identifications acquired from the old tire pressure detector and the new identification rewriteable tire pressure. When the identifications is not consistence, the setting apparatus performs the step of writing the old identification into a new identification rewriteable tire pressure detector (62) again.

As described above, a car user may easily replace a failed tire pressure detector with one identification rewriteable tire pressure detector (10) by few steps as described above. No more complicate sequence is needed to reset or introduce a new identification of a new tire pressure detector to a monitoring system installed inside the car.

Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only. Changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A tire pressure detecting apparatus comprising:

an identification rewritable tire pressure detector comprising:

a micro-processing module having a rewritable memory unit being capable of recording an identification;

a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit, the

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pressure-detecting unit detecting a tire pressure and sending a detection result to the micro-processing module;

a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal comprising the detection result and an identification of the identification rewritable tire pressure detector;

a power module electronically connected to the micro-processing module and providing electric power to the identification rewriteable tire pressure detector; and

a receiving interface electronically connected to the micro-processing module, receiving and sending an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit; and

a setting apparatus communicating with the identification rewriteable tire pressure detector and having a control module;

an input module being electronically connected to the control module and allowing an operator to input an identification to be written into the identification rewriteable tire pressure;

a receiving module electronically connected to the control module, receiving the RF signal from the identification rewriteable tire pressure detector or a tire pressure detector and sending the RF signal to the control module;

a setting output module controlled by the control module to send the external signal to the receiving interface, where the external signal is generated by the control module and comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and

a power source electronically connected to the control module and providing electrical power to the setting apparatus.

2. The tire pressure detecting apparatus as claimed in claim **1**, wherein

the receiving interface is a connector; and

the setting output module is an outputting connector corresponding and being electronically connected to the receiving interface and sends the external signal to the receiving interface.

3. The tire pressure detecting apparatus as claimed in claim **1**, wherein

the receiving interface is a low frequency receiver and receives the external signal wirelessly; and

the setting output module is a wireless transmitting interface sending the external signal wirelessly to the receiving interface.

4. The tire pressure detecting apparatus as claimed in claim **1**, wherein the input module is a dip switch.

5. The tire pressure detecting apparatus as claimed in claim **1**, wherein the sensing module further has at least one acceleration-detecting unit and a temperature-detecting unit.

6. The tire pressure detecting apparatus as claimed in claim **2**, wherein the sensing module further has at least one acceleration-detecting unit and a temperature-detecting unit.

7. The tire pressure detecting apparatus as claimed in claim **3**, wherein the sensing module further has at least one acceleration-detecting unit and a temperature-detecting unit.

8. The tire pressure detecting apparatus as claimed in claim **1**, wherein the input module is a code scanner.

9. The tire pressure detecting apparatus as claimed in claim **1**, wherein the input module is a keyboard.

10. A tire pressure detector identification copying method comprising steps of:

providing a setting apparatus;

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus.

11. The method as claimed in claim **10**, further comprising a step of;

verifying the identification newly recorded in the new identification rewriteable tire pressure detector.

12. The method as claimed in claim **10**, wherein the setting apparatus receives a wireless signal containing the old identification from the old tire pressure detector in the step of reading the old identification.

13. The method as claimed in claim **10**, wherein the setting apparatus receives the old identification through an input module in the step of reading the old identification.

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US008031064C1

(12) EX PARTE REEXAMINATION CERTIFICATE (9926th)
United States Patent
Yu

(10) Number: US 8,031,064 C1
(45) Certificate Issued: Nov. 7, 2013

(54) TIRE PRESSURE DETECTING APPARATUS AND TIRE PRESSURE DETECTOR IDENTIFICATION COPYING METHOD FOR THE SAME

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(73) Assignee: Orange Electronic Co., Ltd., Tanzih Hsiang, Taichung Hsien (TW)

Reexamination Request:
No. 90/012,430, Aug. 10, 2012

Reexamination Certificate for:
Patent No.: 8,031,064
Issued: Oct. 4, 2011
Appl. No.: 12/283,979
Filed: Sep. 17, 2008

(51) Int. Cl.
B60C 23/00 (2006.01)

(52) U.S. Cl.
USPC 340/447; 340/442; 340/445; 73/146; 73/146.5

(58) Field of Classification Search
None
See application file for complete search history.

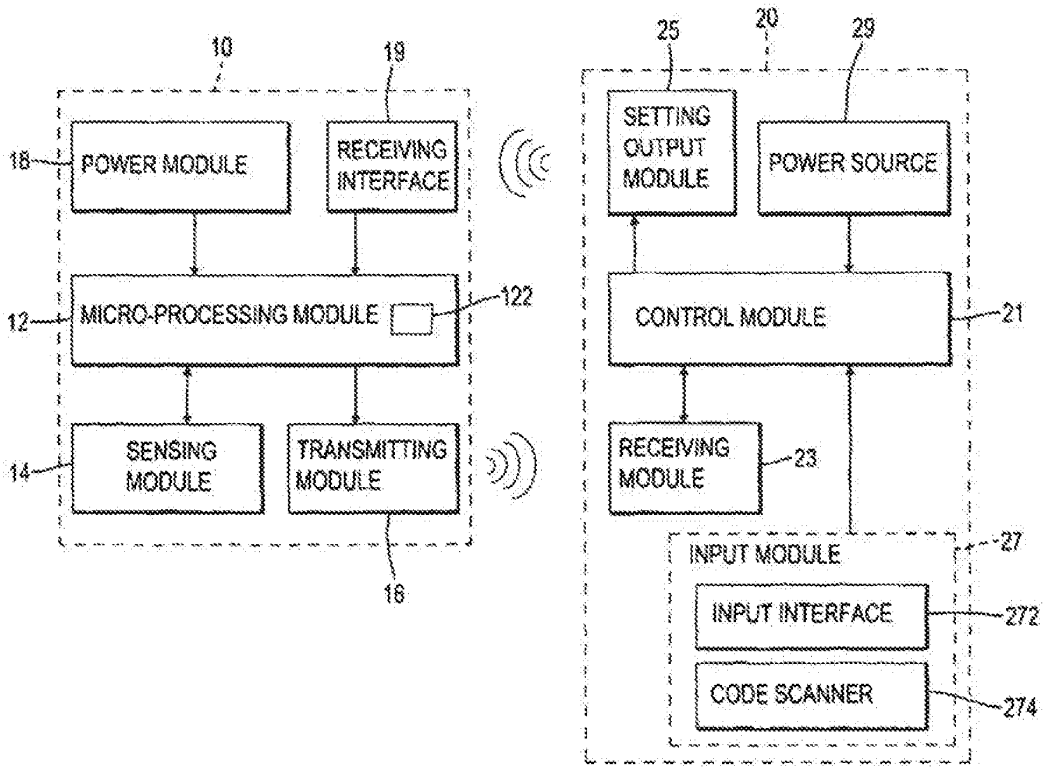
(56) References Cited

To view the complete listing of prior art documents cited during the proceeding for Reexamination Control Number 90/012,430, please refer to the USPTO's public Patent Application Information Retrieval (PAIR) system under the Display References tab.

Primary Examiner — Hetul Patel

(57) ABSTRACT

A tire pressure detecting apparatus has an identification rewriteable tire pressure detector and a setting apparatus. The tire pressure detector is securely mounted on a valve stem inside a tire of a vehicle and has a micro-processing module, a sensing module, a transmitting module and a receiving interface, where the micro-processing module has a memory unit. The setting apparatus is capable of reading or inputting an identification from a failure tire pressure detector, transmits the identification to the identification rewriteable tire pressure detector and writes the identification into the memory unit.



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EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claims **8** and **10-13** is confirmed.

Claims **1-7** and **9** are cancelled.

New claims **14** and **15** are added and determined to be patentable.

14. A tire pressure detecting system, comprising:

an identification rewritable tire detector comprising:

a micro-processing module having a rewritable memory unit to record an identification;

a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;

a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;

a power module electronically connected to the micro-processing module to supply power to the identification rewriteable tire pressure detector; and

an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit; and

a setting apparatus arranged to communicate with the identification rewriteable tire pressure detector via wireless, including:

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

wirelessly writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus,

wherein the setting apparatus comprises:

a control module;

an input module connected to the control module to enable an operator to input an identification to be written into the identification rewriteable tire pressure detector;

a receiving module connected to the control module to receive the RF signal from the identification rewriteable tire pressure detector and to send the RF signal to the control module;

a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and

a power source connected to the control module to supply power to the setting apparatus.

15. A tire pressure detecting system comprising:

an identification rewritable tire pressure detector comprising:

a micro-processing module having a rewritable memory unit to record an identification;

a sensing module electrically connected to the micro-processing module and having a pressure-detecting unit to detect a tire pressure and send a detection result to the micro-processing module;

a transmitting module controlled by the micro-processing module to transmit a radio frequency (RF) signal including the detection result and the identification of the identification rewritable tire pressure detector;

a power module electronically connected to the micro-processing module to supply power to the identification rewriteable tire pressure detector;

an interface arranged to receive and send an external signal to the micro-processing module, where the external signal comprises an external identification to be written into the rewriteable memory unit; and

a setting apparatus arranged to communicate with the identification rewriteable tire pressure detector, including:

reading an old identification from an old tire pressure detector by the setting apparatus and storing the old identification in the setting apparatus; and

writing the old identification into a new identification rewriteable tire pressure detector by the setting apparatus,

wherein the setting apparatus comprises:

a control module;

an input module connected to the control module to enable an operator to input an identification to be written into the identification rewriteable tire pressure detector;

a receiving module connected to the control module to receive the RF signal from the identification rewriteable tire pressure detector and to send the RF signal to the control module;

a setting output module controlled by the control module to send the external signal to the identification rewriteable tire pressure detector, via the interface, where the external signal comprises the identification that is provided by the input module or provided by the RF signal received from the receiving module; and

a power source connected to the control module to supply power to the setting apparatus.

* * * * *

US006414592B1

(12) **United States Patent**
Dixit et al.

(10) **Patent No.: US 6,414,592 B1**
(45) **Date of Patent: Jul. 2, 2002**

(54) **TIRE CONDITION SENSOR COMMUNICATION WITH TIRE LOCATION PROVIDED VIA MANUALLY INPUTTED UPDATE**

(75) Inventors: **Rahul Dixit**, Farmington Hills; **Timothy DeZorzi**, South Lyon, both of MI (US)

(73) Assignee: **TRW Inc.**, Lyndhurst, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/752,951**

(22) Filed: **Jan. 2, 2001**

(51) **Int. Cl.**[7] **B60C 23/00**
(52) **U.S. Cl.** **340/447**; 73/146.5; 340/442; 340/445
(58) **Field of Search** 73/146.5; 340/442, 340/445, 447; 200/61.22

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,109,213	A *	4/1992	Williams	340/447
5,301,553	A	4/1994	Schultz et al.	73/146.5
5,463,374	A	10/1995	Mendez et al.	340/442
5,473,938	A *	12/1995	Handfield et al.	340/445
5,600,301	A	2/1997	Robinson, III	340/442
5,612,671	A	3/1997	Mendez et al.	340/447
5,731,516	A *	3/1998	Handfield et al.	73/146.5
5,731,754	A *	3/1998	Lee, Jr. et al.	340/447
5,748,076	A	5/1998	Horie	340/442
5,838,229	A	11/1998	Robinson, III	340/442
5,864,580	A *	1/1999	Lowe et al.	375/222
5,880,363	A	3/1999	Meyer et al.	340/445
5,960,844	A *	10/1999	Hamaya	340/447
6,034,596	A *	3/2000	Smith et al.	340/447
6,087,930	A *	7/2000	Kulka et al.	340/447
6,243,007	B1 *	6/2001	McLaughlin et al.	340/447
6,278,363	B1 *	8/2001	Bezek et al.	340/442

OTHER PUBLICATIONS

Brochure from AVCO Precision Products Division, entitled "Tyrechek Low Tire Pressure Monitoring & Warning System", and having a lithography ID 473.
An internet press release from Siemens Automotive dated Jan. 24, 2001.

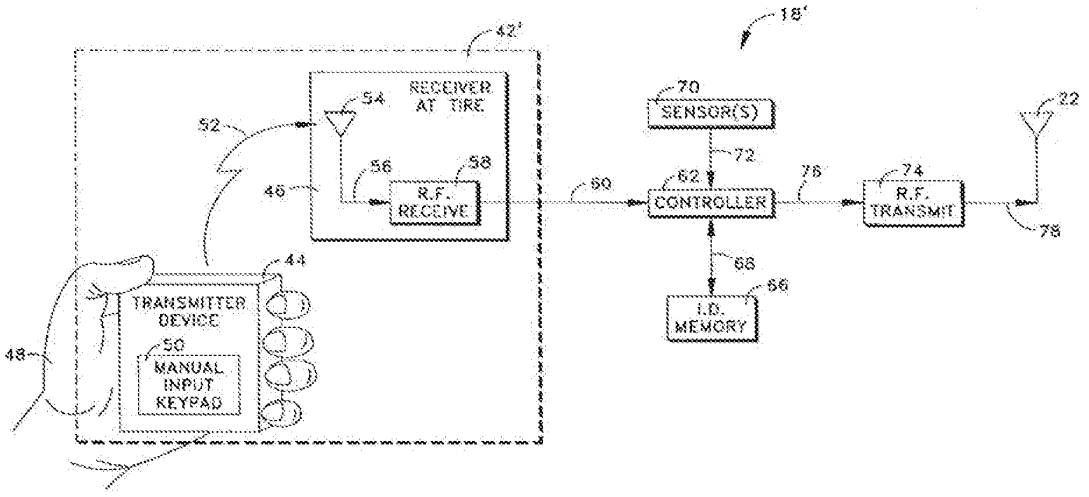
* cited by examiner

Primary Examiner—Brent A. Swarthout
(74) *Attorney, Agent, or Firm*—Tarolli, Sundheim, Covell, Tummino & Szabo L.L.P.

(57) **ABSTRACT**

A tire condition communication system (**10**) and method for a vehicle (**12**) that has a tire (e.g., **14A**). A sensor (**70**), associated with the tire (e.g., **14A**), senses at least one tire condition. A memory (**66**), associated with the tire (e.g., **14A**), holds an identification. A transmitter arrangement (**22** and **74**), associated with the tire (e.g., **14A**), transmits a signal (e.g., **24A**) that indicates the held identification and the sensed tire condition. A receiver arrangement (**28** and **30**), associated with the vehicle (**12**), receives the transmitted signal (e.g., **24A**). An identification update device is associated with the tire and is operatively connected to the memory (**66**). The update device receives an update identification and provides the received location identification to the memory (**66**) to be held as the held identification. An input device is manually actuated to provide the update identification. In one example, a receiver (**46**) at the tire and a manually actuated transmitter (**44**) provided the update and input devices. In another example, a switch (**116**) and a manually actuatable part (e.g., a valve stem part) at the tire provide the update and input devices.

13 Claims, 3 Drawing Sheets



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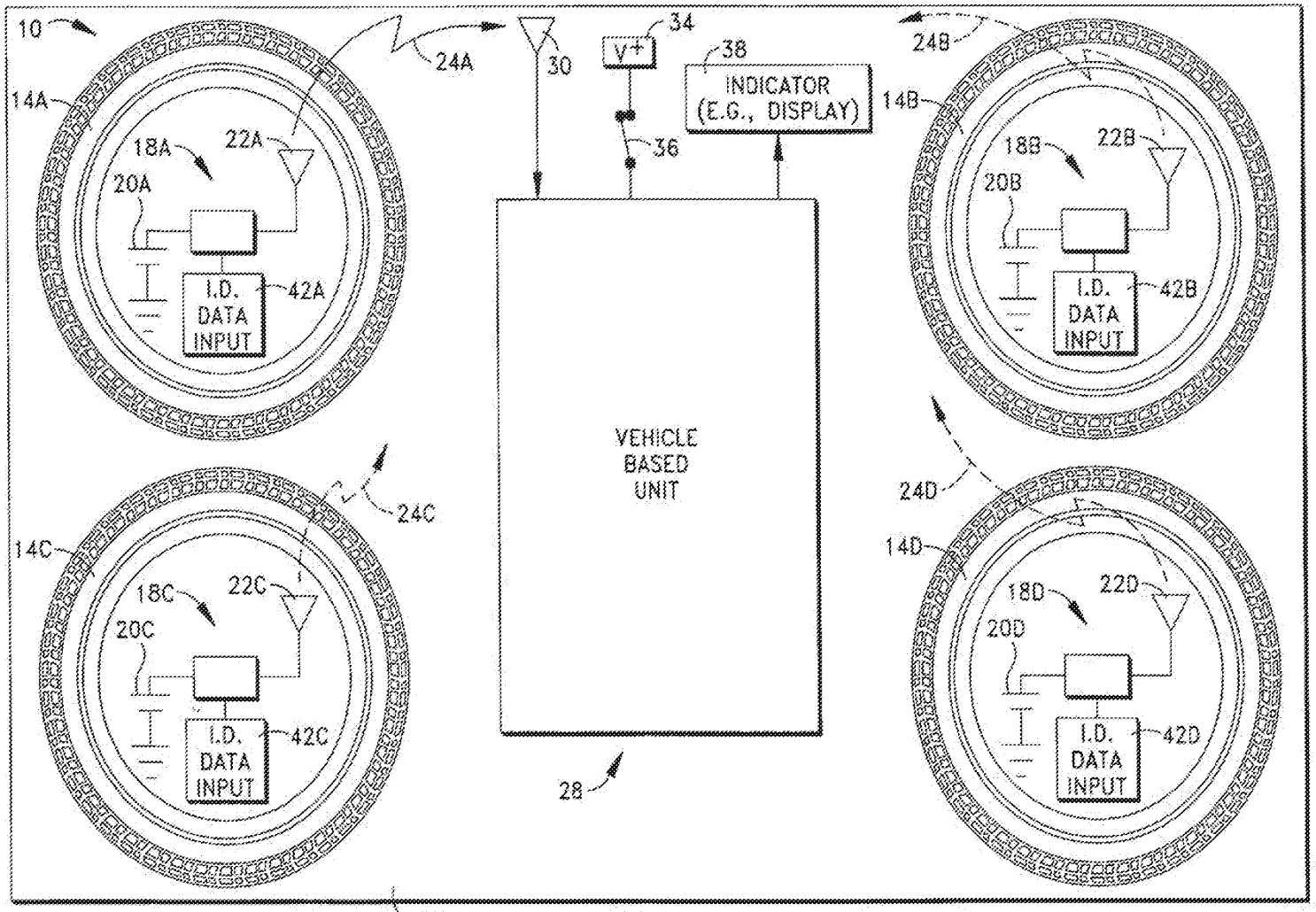

10
14A
18A
20A
22A
24A
30
V+
34
38
INDICATOR (E.G., DISPLAY)
36
I.D. DATA INPUT
42A
VEHICLE BASED UNIT
28
12
14B
18B
20B
22B
24B
42B
14C
18C
20C
22C
24C
42C
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20D
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24D
42D

Fig.1

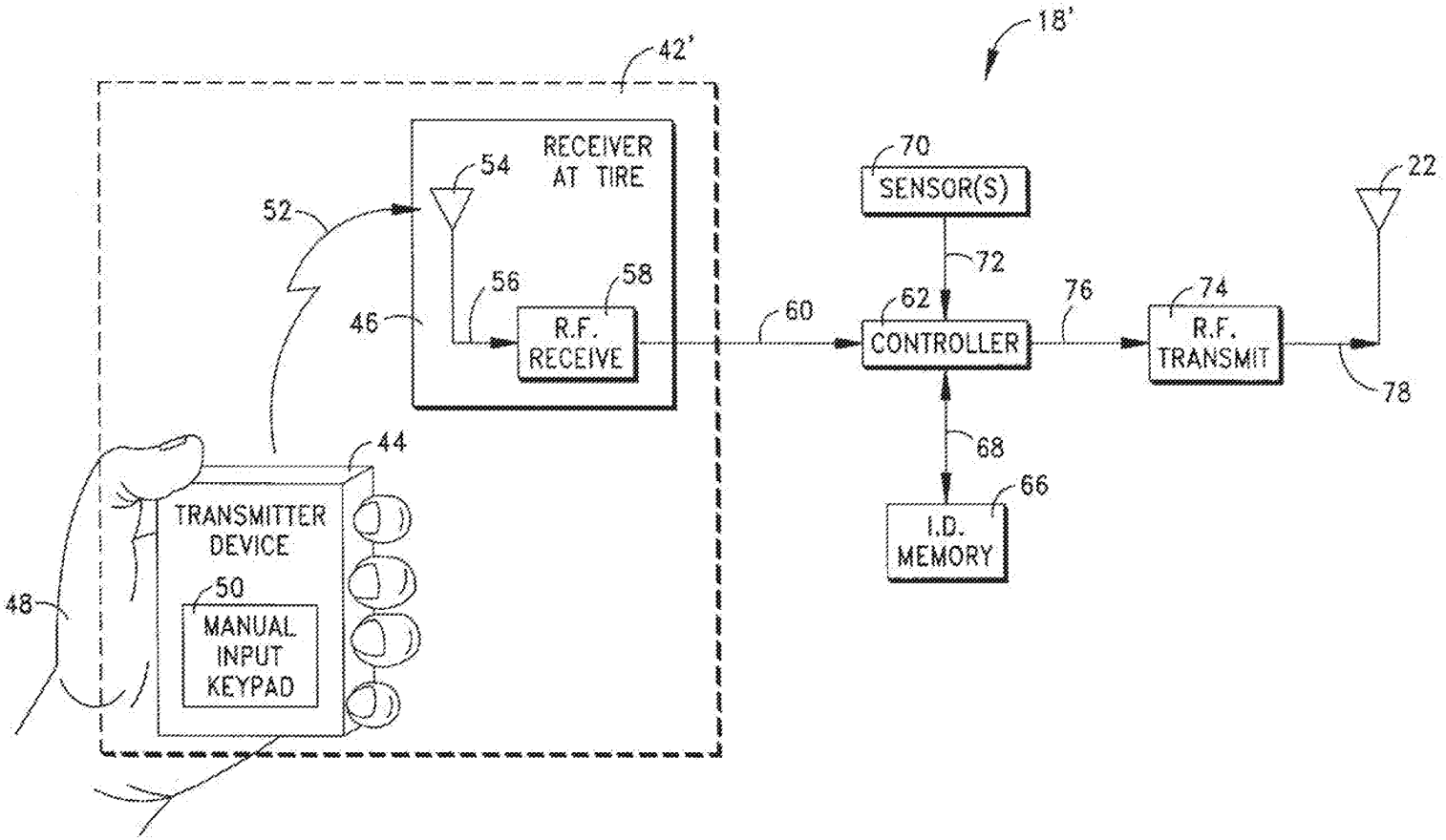

18'
42'
RECEIVER AT TIRE
54
52
56
58
46
R.F. RECEIVE
60
70
SENSOR(S)
72
62
CONTROLLER
76
74
R.F. TRANSMIT
22
78
68
66
I.D. MEMORY
44
TRANSMITTER DEVICE
50
MANUAL INPUT KEYPAD
48

Fig.2

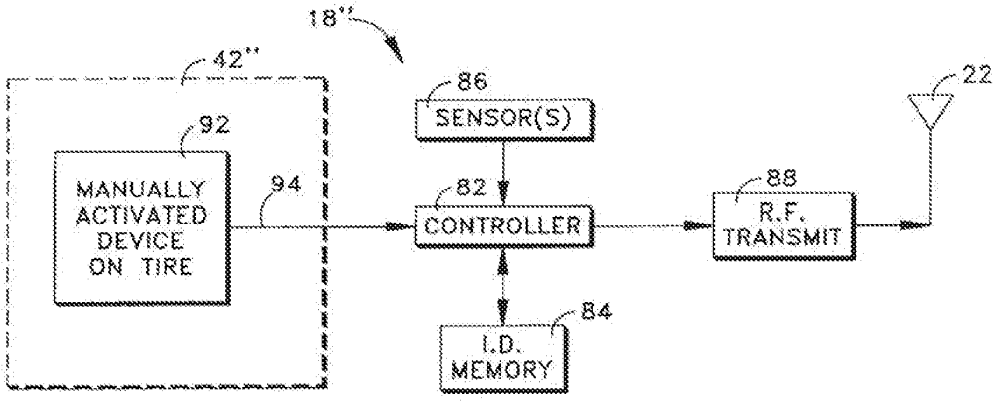


Fig.3

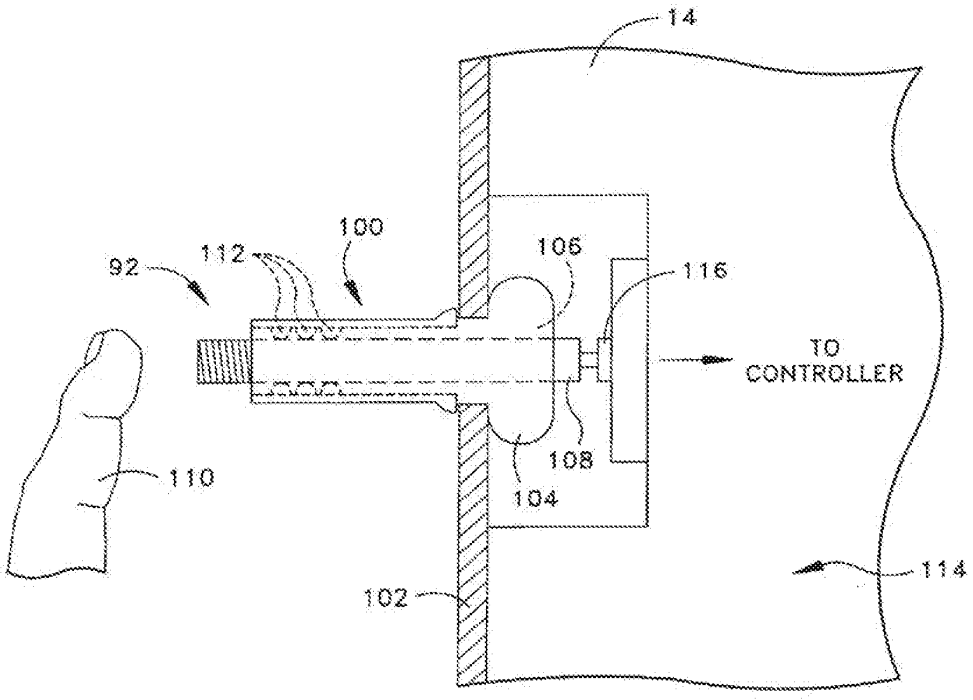


Fig.4

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TIRE CONDITION SENSOR COMMUNICATION WITH TIRE LOCATION PROVIDED VIA MANUALLY INPUTTED UPDATE

TECHNICAL FIELD

The present invention relates to a tire condition monitoring system for providing indication of a tire operation parameter, such as tire inflation pressure, to a vehicle operator. The present invention relates specifically to a tire condition monitoring system that provides ready identification of a tire providing condition information and avoids misidentification due to previous tire position change via tire position rotation or the like.

BACKGROUND OF THE INVENTION

Numerous tire condition monitoring systems have is been developed in order to provide tire operation information to a vehicle operator. One example type of a tire condition monitor system is a tire: pressure monitor system that detects when air pressure within a tire drops below a predetermined threshold pressure value.

There is an increasing need for the use of tire pressure monitoring systems due to the increasing use of "run-flat" tires for vehicles such as automobiles. A run-flat tire enables a vehicle to travel an extended distance after significant loss of air pressure within that tire. However, a vehicle operator may have difficulty recognizing the significant loss of air pressure within the tire because the loss of air pressure may cause little change in vehicle handling and visual appearance of the tire.

Typically, a tire pressure monitoring system includes a pressure sensing device, such as a pressure switch, an internal power source, and a communications link that provides the tire pressure information from a location at each tire to a central receiver. The central receiver is typically connected to an indicator or display located on a vehicle instrument panel.

The communications link between each tire and the central receiver is often a wireless link. In particular, radio frequency signals are utilized to transmit information from each of the tires to the central receiver. However, in order for the central receiver to be able to proper associate received tire pressure information with the tire associated with the transmission, some form of identification of the origin of the signal must be utilized. Such a need for identification of the origin of the transmitted tire information signal becomes especially important subsequent to a tire position change, such a routine maintenance tire position rotation.

SUMMARY OF THE INVENTION

In accordance with one aspect, the present invention provides a tire condition communication system for a vehicle that has a tire. Sensor means, associated with the tire, senses at least one tire condition. Memory means, associated with the tire, holds an identification. Transmitter means, associated with the tire and operatively connected to the sensor means and the memory means, transmits a signal that indicates the held identification and the sensed tire condition. Receiver means, associated with the vehicle, for receives the transmitted signal indicative of the held identification and the sensed tire condition. The system includes manually actuated input means, associated with the tire and operatively connected to the memory means, for inputting an update identification to be held by the memory means as the held identification.

In accordance with another aspect, the present invention provides a method of communicating information within tire condition monitoring system for a vehicle that has a tire. An input means is manually actuated to input update identification information for a tire condition sensor unit located at the tire. The input identification is held at the tire condition sensor unit. A tire condition is sensed via operation of the tire condition sensor unit. A signal is transmitted from the tire condition sensor unit, wherein the transmitted the signal indicates the held identification and the sensed tire condition. The transmitted signal is received at a location on the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other features and advantages of the present invention will become apparent to those skilled in the art to which the present invention relates upon reading the following description with reference to the accompanying drawings, in which:

FIG. **1** is a schematic block diagram of a vehicle that contains a tire condition communication system in accordance with the present invention;

FIG. **2** is a schematic function block diagram of a first embodiment of a tire condition sensor unit and an associated first embodiment of a manually actuated identification update arrangement;

FIG. **3** is a schematic function block diagram of a second embodiment of a tire condition sensor unit and an associated second embodiment of a manually actuated identification update arrangement; and

FIG. **4** is a partial cross-section of a tire that contains an identification input device in accordance with the embodiment the identification update arrangement of FIG. **3**.

DESCRIPTION OF EXAMPLE EMBODIMENTS

A tire condition communication system **10** is schematically shown within an associated vehicle **12** in FIG. **1**. The vehicle **12** has a plurality of inflatable tires (e.g., **14A**). In the illustrated example, the vehicle **12** has four tires **14A–14D**. It is to be appreciated that the vehicle **12** may have a different number of tires. For example, the vehicle **12** may include a fifth tire (not shown) that is stored as a spare tire.

The system **10** includes a plurality of tire condition sensor units (e.g., **18A**) for sensing one or more tire conditions at the vehicle tires (e.g., **14A**). Preferably, the number of tire condition sensor units **18A–18D** is equal to the number of tires **14A–14D** provided within the vehicle **12**. In the illustrated example, all of the tire condition sensor units **18A–18D** have the same components. Identical components are identified with identical reference numbers, with different alphabetic suffixes. It is to be appreciated that, except as noted, all of the tire condition sensor units **18A–18D** function in the same manner. For brevity, operation of one of the tire condition sensor units (e.g., **18A**) is discussed in detail with the understanding that the discussion is generally applicable to the other tire condition sensor units (e.g., **18B–18D**).

Each tire condition sensor unit (e.g., **18A**) includes a power supply (e.g., a battery **20A**) that provides electrical energy to various components within the respective sensor unit. The electrical energy enables the tire condition sensor unit (e.g., **18A**) to energize a radio frequency antenna (e.g., **22A**) to emit a radio frequency signal (e.g., **24A**) that conveys one or more sensed conditions along with a fixed identification to a central, vehicle-based unit **28**.

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A radio frequency antenna **30** receives the tire condition signal (e.g., **24A**) from the tire condition sensor unit (e.g., **18A**) and the conveyed information is processed. In one example, the system **10** is designed to operate with the tire condition signals **24A–24D** in the FM portion of the radio frequency range. Each antenna (e.g., **22A**) in conjunction with the antenna **30** comprises part of a means for communication from the respective tire condition sensor unit (e.g., **18A**) to the vehicle-based unit **28**.

A power supply (e.g., a vehicle battery) **34**, which is operatively connected (e.g., through a vehicle ignition switch **36**) to the vehicle-based unit **28**, provides electrical energy to permit performance of the processing and the like. The vehicle-based unit **28** utilizes the processed information to provide information to a vehicle operator via an indicator device **38**. In one example, the indicator device **38** may be a visual display that is located on an instrument panel of the vehicle **12**. Accordingly, the vehicle operator is apprised of the sensed condition(s) at the tire (e.g., **14A**).

It is to be noted that the sensed condition may be any condition at the tire (e.g., **14A**). For example, the sensed condition may be inflation pressure of the tire (e.g., **14A**), temperature of the tire, motion of the tire, or even a diagnostic condition of the tire condition sensor unit (e.g., **18A**) itself.

It should be noted that a single antenna of the vehicle-based unit **28** receives all of the tire condition signals **24A–24D** from a plurality of tire condition sensor units **18A–18D**. In order for the vehicle-based unit **28** to accurately "know" which tire (e.g., **14A**), via the associated tire condition sensor unit (e.g., **18A**), is providing the tire condition signal (e.g., **24A**), the tire condition signal conveys an identification of the tire. In order for the tire condition sensor unit (e.g., **18A**) to output the tire condition signal (e.g., **24A**) with an identification of the tire, the identification is provided to the tire condition sensor unit.

The provision of the location identification to the respective tire condition sensor unit is accomplished by the system **10** including a manually actuated identification data input arrangement (e.g., **42A**) for the respective tire condition sensor unit (e.g., **18A**). In the illustrated example of FIG. **1**, a plurality of manual input arrangements **42A–42D** are provided, with each manual input arrangement (e.g., **42A**) being associated with a different tire condition sensor unit (e.g., **18A**).

A different identification value is associated with each specific tire mounting location. Typically, the tire mount locations on a vehicle are identified as right-front, right-rear, left-front, left-rear, and spare mount locations. When a tire (e.g., **14A**) is located at a certain tire mounting location, the identification associated with that location is manually input via the manual input arrangement (e.g., **42A**). For example, when the locations of the tires **14A–14D** are changed, such as during a routine maintenance tire rotation, a new location identification is manually input for each tire.

The tire condition sensor unit (e.g., **18A**) utilizes the manually input location identification as the identification that is transmitted within its tire condition signal (e.g., **24A**) sent to the vehicle-based unit **28**. The vehicle-based unit **28** is programmed (e.g., taught) or has learned to recognize the location identifications for the various tire mount locations on the vehicle. Accordingly, when the vehicle-based unit **28** receives a tire condition signal (e.g., **24A**) that contains a certain location identification, the vehicle-based unit will interpret the signal as originating from a tire located at that vehicle mount location.

It is contemplated that the manual input of location identification data for use by the associated tire condition sensor unit(e.g., **18A**) may be accomplished by different methods, formats, etc. FIG. **2** illustrates a first example of a tire condition sensor unit **18'** and an associated manual input arrangement **42'**.

It is to be noted that the tire condition sensor unit **18'** and the manual input arrangement **42'** are indicated using reference numerals with primes, to signify that the examples are for a first specific discussion. Also, it is to noted that the tire condition sensor unit **18'** and the manual input arrangement **42'** are indicated without use of alphabetic suffixes to signify that the examples are generic to all of the tire condition sensor units and all of the identification provision units, respectively.

The manual input arrangement **42'** includes a manually actuatable radio frequency transmitter device **44**, located remote from the tire (e.g., **14A**), and a radio frequency receiver **46**, located at the tire. In one example, the receiver **46** is located within the tire (e.g., **14A**) with the associated tire condition sensor unit **18'**.

The transmitter device **44** is preferably a hand-held unit that a person **48** (e.g., a service technician) manually operates to inputs an identification code via an input keypad **50** on the hand-held transmitter device. The transmitter device **44** outputs a radio frequency signal **52** that conveys the input identification code and that is intended for reception by an antenna **54** of the receiver **46** at the tire (e.g., **14A**).

The antenna **54** is operatively connected **56** to RF receive circuitry **58** of the receiver **46**. In turn, the RF receive circuitry **58** is operatively connected **60** to a controller **62** of the tire condition sensor unit **18'**. When the antenna **54** receives the radio frequency signal **52** that conveys an update location identification, an electrical stimulus signal is provided by the antenna to the RF receive circuitry **58**. In turn, data bits that represent the location identification are provided to the controller **62**. A location identification memory **66** is operatively connected **68** to the controller **62**. The controller **62** provides the update location identification data to the memory **66** for storage therein.

One or more condition sensors **70** are operatively connected **72** to the controller **62**. RF transmit circuitry **74** is operatively connected **76** to the controller **62** and operatively connected **78** to the associated antenna **22**. In order to provide the tire condition signal (e.g., **24A**) for reception by the vehicle-based unit **28**, the controller **62** receives sensory information from the sensor(s) **70** and receives the location identification from the memory **66**. The controller **62** assembles a message packet that contains the identification location and the sensory information and provides the message packet to the RF transmit circuitry **74**. In turn, the RF transmit circuitry **74** provides a stimulus electrical signal to the antenna **22** such that the tire condition signal (e.g., **24A**) is emitted.

It is to be noted that the hand-held transmitter device **44** may be a device that can sequentially communicate with all of the tire condition sensor units **18A–18D** of the system **10** at the vehicle **12**, thus, avoiding the need to have a separate transmitters for each tire condition sensor unit. Moreover, the hand-held transmitter device **44** may be utilized to communicate with tire condition sensor units within different tire condition communication systems at different vehicles. In other words, the transmitter device may be a generic or universal tool used to program location identification to various tire condition sensor units.

FIG. **3** schematically illustrates another example of a tire condition sensor unit **18"** with an associated manual input

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arrangement **42"**. It is to be noted that the tire condition sensor unit **18"** and the manual input arrangement **42"** are indicated using reference numerals with double primes, to signify that the examples are for a second specific discussion. Also, it is to noted that the tire condition sensor unit **18"** and the manual input arrangement **42"** are indicated without use of alphabetic suffixes to signify that the examples are generic to all of the tire condition sensor units and all of the identification provision units, respectively.

The tire condition sensor unit **18"** includes a controller **82**, a location identification memory **84**, one or more sensors **86**, and RF transmit circuitry **88** similar to the embodiment shown in FIG. **2**. The identification memory **84**, the sensor (s) **86**, and the RF transmit circuitry **88** are operatively connected to the controller **82** similar to the embodiments shown in FIG. **2**.

In the embodiment shown in FIG. **3**, the manual input arrangement **42"** includes a manually actuated device **92** located on the tire (e.g., **14A**) that is operatively connected **94** to the controller **82**. The device **92** may be any device that is manually actuated to input information (e.g., a string of data bits) to the controller **82**.

FIG. **4** illustrates one example of the manually actuatable device **92** that is utilized to input location information. Specifically, the device **92** is partially integrated into an inflation valve stem assembly **100** utilized to supply air pressure into the tire **14**. The stem assembly **100** is mounted onto a rigid metal wheel side wall **102**. A first portion **104** of the stem assembly **100** provides a mounting arrangement and engages the side wall **102** to provide an air tight sealing arrangement with the side wall. The first portion **104** is hollow and provides a passageway **106** for air flow into the tire **14**.

A second portion **108** of the stem assembly **100** is movable relative to the first portion **104** when the second portion is manually depressed by a person (e.g., a technician) **110**. One or more sealing devices (O-rings) **112** seal against air pressure loss between the first portion **104** of the stem assembly **100** and the second portion **108** of the stem assembly.

In the illustrated example, the second portion **108** extends the length of the stem assembly **100** and protrudes into the pressurized interior **114** of the tire **14**. A micro-switch **116** is engaged with an end of the second portion **108** within the tire interior **114**. When the second portion **108** of the stem assembly **100** is pressed via manual actuation, the second portion moves sufficiently far to toggle the micro-switch **116**. Each push results in one toggling of the micro-switch **116**. The micro-switch **116** is operatively connected to the controller **82** such that the toggling of the micro-switch is supplied as an input to the controller. Accordingly, data is entered by a sequence of pushes on the second portion **108** of the stem assembly **100** to repeatedly toggle the micro-switch **116**. The controller interprets the toggles of the micro-switch to derive an input location identification value, and supplies the value to the memory for storage therein.

From the above description of the invention, those skilled in the art will perceive improvements, changes and modifications. Such improvements, changes and modifications within the skill of the art are intended to be covered by the appended claims.

Having described the invention, the following is claimed:

1. A tire condition communication system for a vehicle that has a tire, said system comprising:

sensor means, located within the tire, for sensing at least one tire condition;

memory means, located within the tire, for holding an identification;

transmitter means, located within the tire and operatively connected to said sensor means and said memory means, for transmitting a signal that indicates the held identification and the sensed tire condition;

receiver means, associated with the vehicle, for receiving the transmitted signal indicative of the held identification and the sensed tire condition;

manually actuatable input means, located on the exterior surface of the tire and operatively connected to said memory means, for inputting an update identification to be held by said memory means as the held identification wherein said manually actuatable input means on the tire includes a portion of an inflation valve assembly.

2. A system as set forth in claim **1**, wherein said inflation valve assembly includes a first portion and a second portion, said second portion being movable in relation to said first portion and being said manually actuatable input means.

3. A system as set forth in claim **2**, wherein said first portion includes an outer sleeve in an air tight sealing arrangement with the side wall of the tire and said second portion extends through the center of said first portion.

4. A system as set forth in claim **1**, wherein the at least one sensed tire condition includes tire temperature.

5. A system as set forth in claim **1**, wherein the at least one sensed tire condition includes rotational direction of the tire.

6. A method of communicating information within a tire condition monitoring system for a vehicle that has a tire, said method comprising the steps of:

inputting, via an input means, update identification information for a tire condition sensor unit located within the tire by manually actuating a portion of the input means located on the exterior of the tire;

holding the input update identification information at the tire condition sensor unit;

sensing a tire condition via operation of the tire condition sensor unit;

transmitting a signal from the tire condition sensor unit, the transmitted signal indicating the held update identification information and the sensed tire condition; and

receiving the transmitted signal at a location on the vehicle;

wherein said step of inputting update identification information via input means includes the step of actuating a portion of an inflation valve assembly.

7. A method as set forth in claim **6**, wherein said step of actuating a portion of the inflation valve assembly includes the step of moving the portion relative to a remainder of the inflation valve assembly so as to actuate a switch operatively connected to said tire condition sensor unit.

8. A method as set forth in claim **6**, wherein the step of sensing a tire condition includes the step of sensing tire temperature.

9. A method as set forth in claim **6**, wherein the step of sensing a tire condition includes the step of sensing rotational direction of the tire.

10. A tire condition communication system for a vehicle that has a tire, said system comprising: a tire condition sensing unit associated with the tire, the tire condition sensing unit including a sensor for sensing at least one tire condition and a memory for storing identification information indicative of a location of the tire on the vehicle, said tire condition sensing unit, in response to sensing the at least one tire condition, outputting a first signal that includes the

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identification information and tire condition information indicative of the at least one tire condition sensed; and

a transmitter for outputting a second signal that includes updated identification information indicative of the location of the tire on the vehicle,

the tire condition sensing unit receiving the second signal and replacing the identification information stored in said memory with the updated identification information;

wherein said transmitter includes a manually actuatable switch located at the tire and operatively connected to said tire condition sensing unit, said tire condition sensing unit interpreting sequential toggling of said switch to derive the updated identification information.

11. The tire condition communication system of claim **10** wherein said transmitter further includes a portion of an inflation valve assembly of the tire, the portion of the inflation valve assembly engaging said switch, manual actuation of said portion of said inflation valve assembly toggling said switch.

12. A method of communicating information within a tire condition monitoring system for a vehicle having a tire, said method comprising the steps of:

sensing at least one tire condition with a tire condition sensing unit;

storing identification information in the tire condition sensing unit, the identification information being indicative of a location of the tire on the vehicle;

outputting from the tire condition sensing unit a first signal that includes the identification information and tire condition information indicative of the at least one tire condition sensed;

outputting from a transmitter a second signal that includes updated identification information indicative of the location of the tire on the vehicle; and

receiving the second signal at the tire condition sensing unit and replacing the identification information stored with the updated identification information;

further including the steps of sequentially toggling a switch located at the tire, the switch being operatively connected to said tire condition sensing unit; and

deriving the updated identification information by interpreting said sequential toggling of the switch.

13. A tire condition communication apparatus for a vehicle that has a tire comprising:

a sensor assembly, located within the tire, including a tire condition sensor, a memory for storing identification data, a transmitter, and a manually actuated input means for inputting the identification data, which extends to the exterior surface of the tire;

A receiver, located within the vehicle, for receiving tire condition information from said sensor assembly;

wherein said input means extends to the exterior of the tire through an inflation valve.

* * * * *

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US006927679B2

(12) **United States Patent**
Taguchi et al.

(10) **Patent No.: US 6,927,679 B2**
(45) **Date of Patent: Aug. 9, 2005**

(54) **ID REGISTRATION METHOD, ID COLLATION SYSTEM INCORPORATED IN A VEHICLE CONTROL SYSTEM, EMBODIED AS A PNEUMATIC TIRE PRESSURE MONITORING APPARATUS ASSOCIATED WITH PNEUMATIC PRESSURE SENSORS, AND AN ID REGISTRATION TOOL COMBINED WITH PNEUMATIC TIRE PRESSURE MONITORING APPARATUS**

(75) Inventors: **Akihiro Taguchi**, Ooba (JP); **Shintarou Itou**, Toyokawa (JP); **Ryozo Okumura**, Kariya (JP)

(73) Assignee: **Denso Corporation**, Kariya (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 11 days.

(21) Appl. No.: **10/602,699**

(22) Filed: **Jun. 28, 2003**

(65) **Prior Publication Data**

US 2005/0099282 A1 May 12, 2005

(30) **Foreign Application Priority Data**

Jun. 26, 2002 (JP) 2002-185394

(51) **Int. Cl.**[7] **B60C 23/00**

(52) **U.S. Cl.** ..... **340/442**; 340/445; 340/447; 340/825.69; 340/10.1; 73/146.2; 116/34 R

(58) **Field of Search** ..... 340/10.1, 442, 340/445, 447, 443, 461, 525, 825.69, 825.72; 73/146.5, 146.2, 4; 116/34 R

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,602,524	A	2/1997	Mock et al.	
6,218,936	B1 *	4/2001	Imao	340/447
6,271,748	B1	8/2001	Derbyshire	
6,275,148	B1 *	8/2001	Takamura et al.	340/442
6,505,507	B1 *	1/2003	Imao et al.	73/146.5
6,545,599	B2	4/2003	Derbyshire	
6,604,416	B2 *	8/2003	Tsujita	73/146.5
6,707,390	B2 *	3/2004	Hirohama et al.	340/870.11
6,737,965	B2 *	5/2004	Okubo	340/445

FOREIGN PATENT DOCUMENTS

JP	3-33381	2/1991
JP	6-195582	7/1994
JP	3212311	7/2001
JP	A-2001-357471	12/2001

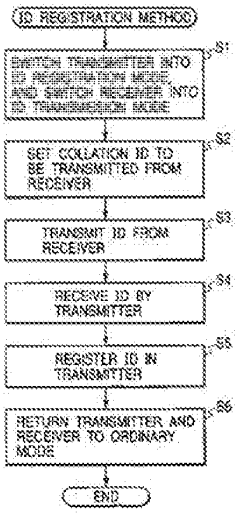
* cited by examiner

Primary Examiner—Davetta W. Goins
(74) *Attorney, Agent, or Firm*—Posz Law Group, PLC

(57) **ABSTRACT**

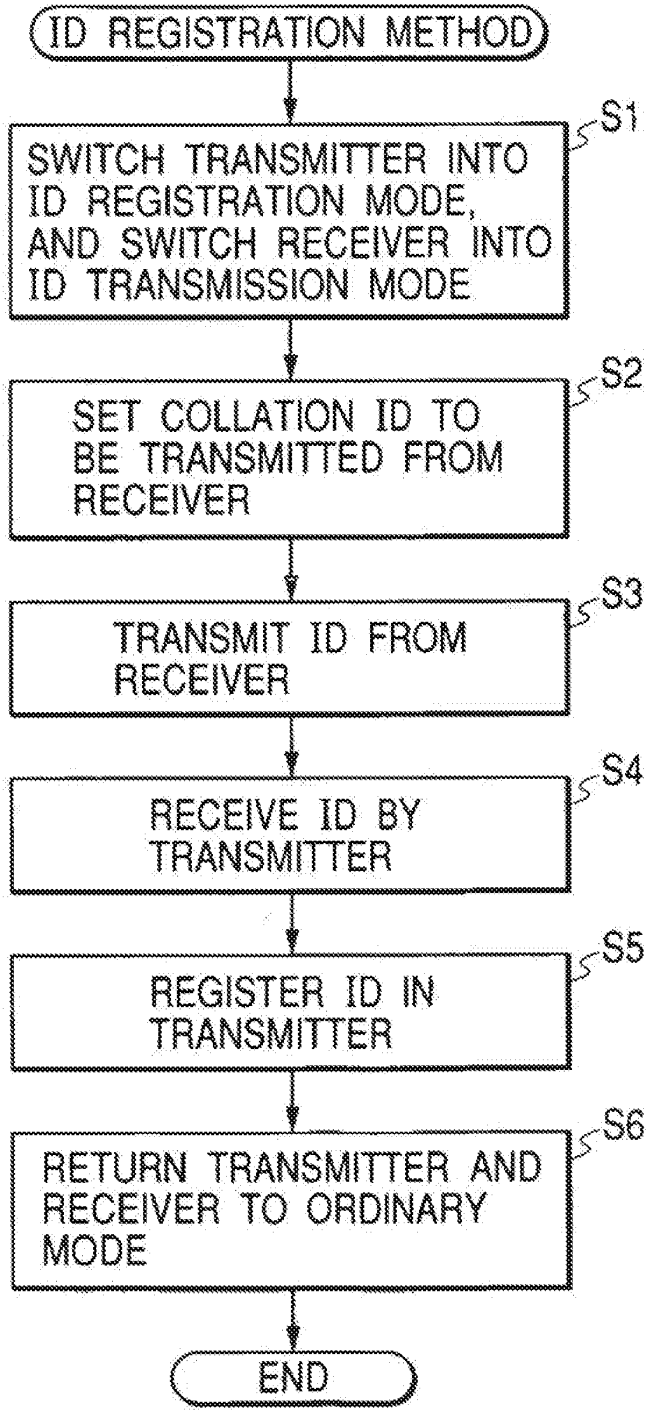
A transmitter mode switching apparatus switches a transmitter into an ID registration mode, while a receiver mode switching apparatus switches a receiver into an ID transmission mode (step S1). Then, a collation ID to be transmitted from the receiver is set based on an ID assigned inherently to the receiver (step S2). Subsequently, an ID transmitting apparatus of the receiver transmits the collation ID (step S3). An ID receiving apparatus of the transmitter receives the collation ID (step S4). An ID registration apparatus of the transmitter stores the received collation ID as a registered ID of the transmitter (step S5). After the ID registration is accomplished, the transmitter mode switching apparatus returns the transmitter to an ordinary mode, while the receiver mode switching apparatus returns the receiver to an ordinary mode (step S6).

23 Claims, 21 Drawing Sheets



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FIG. 1



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FIG. 2

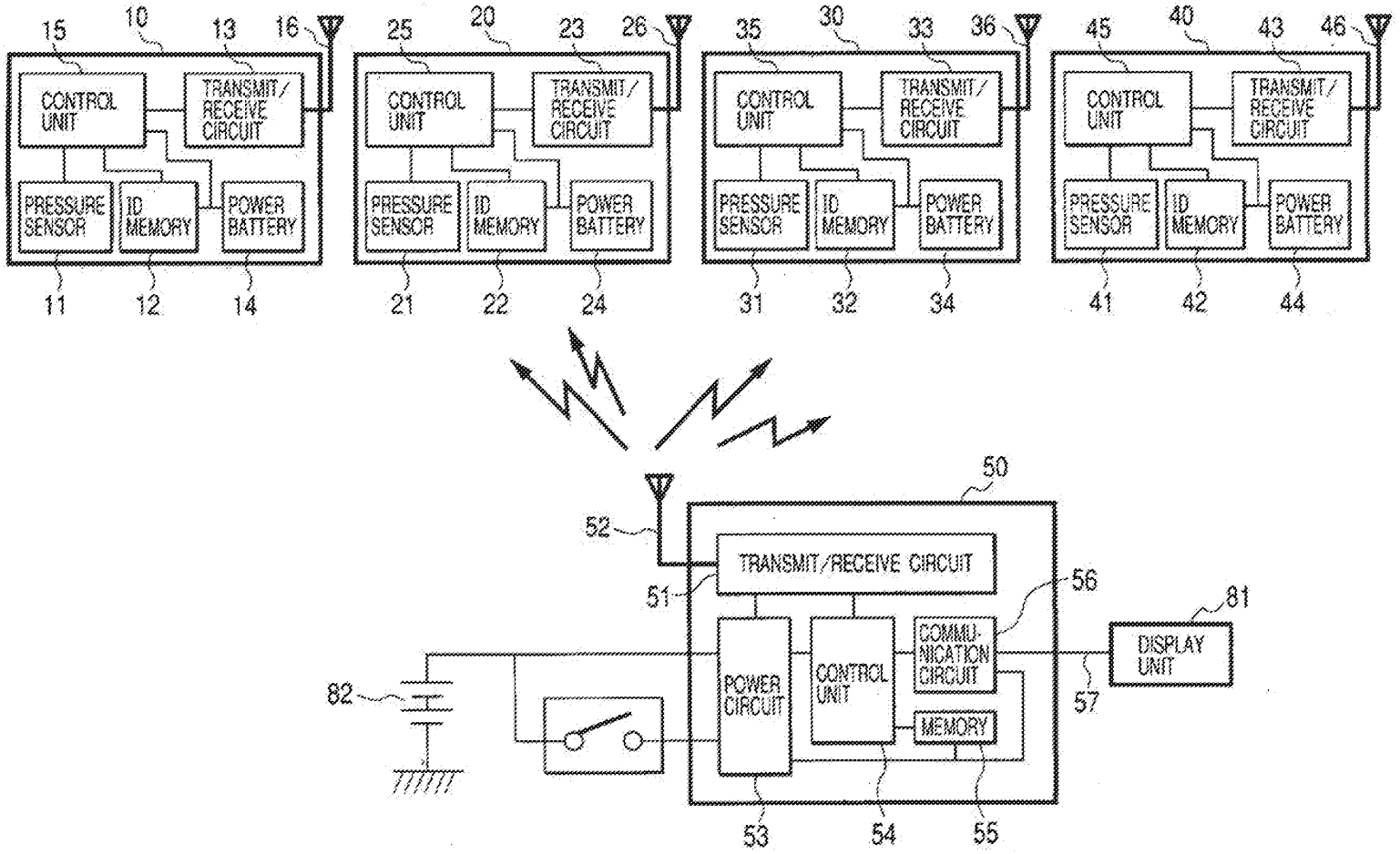

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CONTROL UNIT
TRANSMIT/ RECEIVE CIRCUIT
PRESSURE SENSOR
ID MEMORY
POWER BATTERY
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TRANSMIT/RECEIVE CIRCUIT
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COMMU-NICATION CIRCUIT
DISPLAY UNIT
POWER CIRCUIT
CONTROL UNIT
MEMORY
82
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FIG. 3A

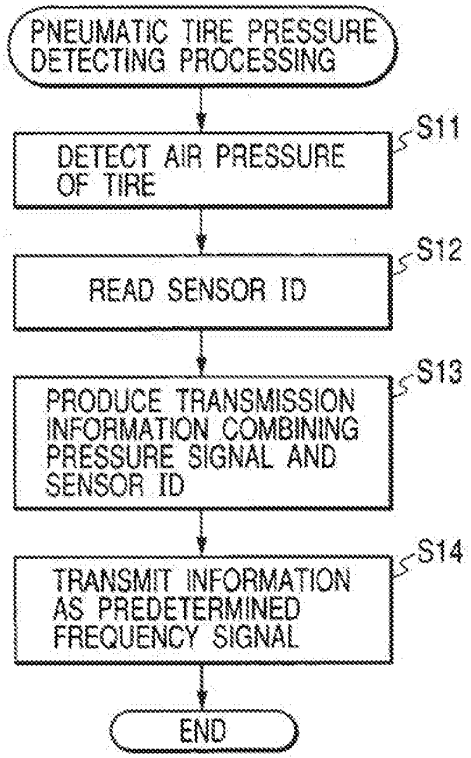
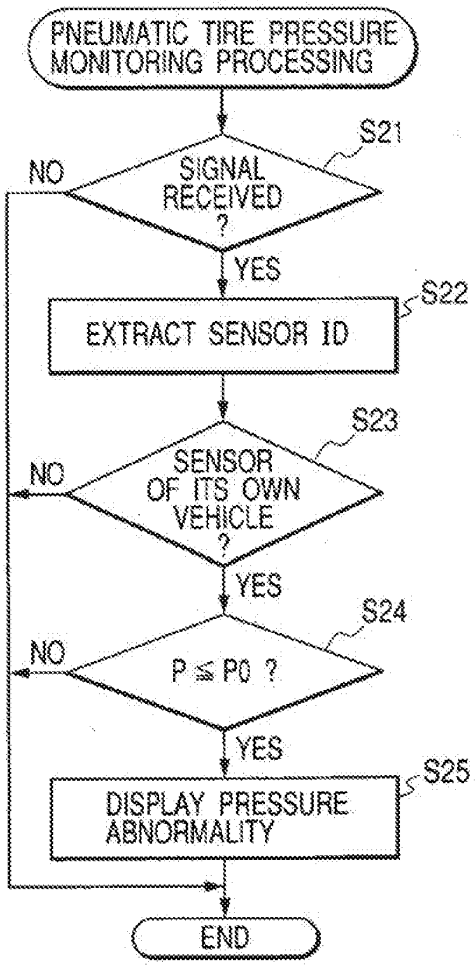
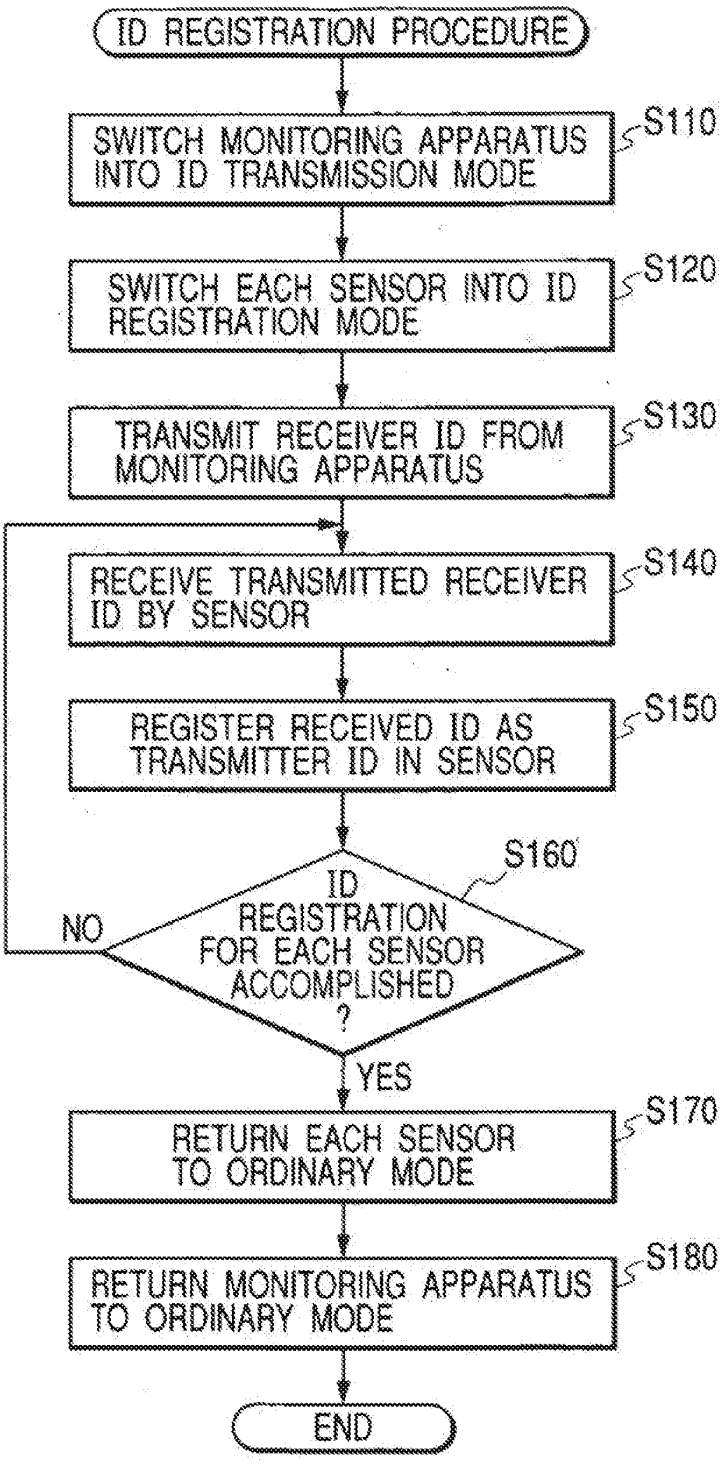


FIG. 3B



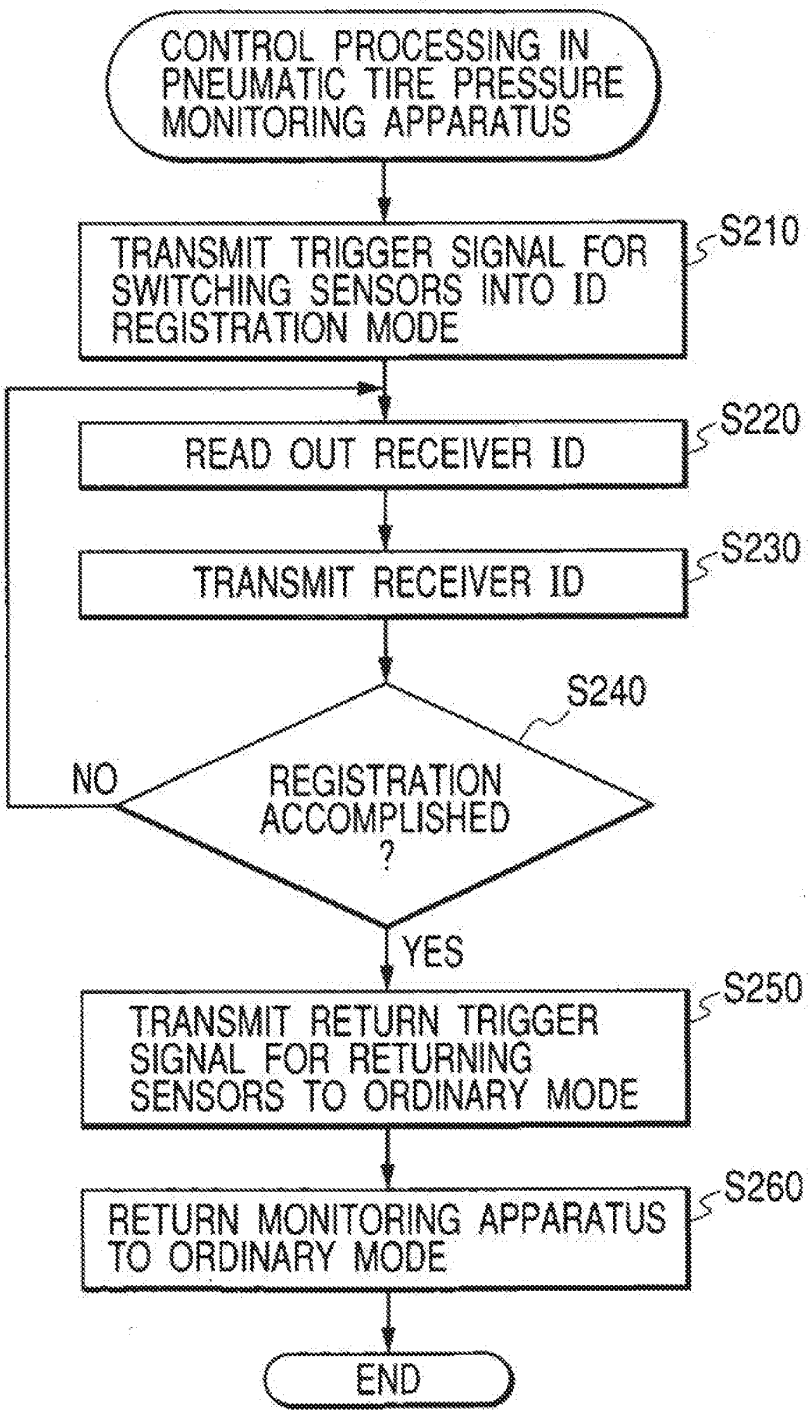
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FIG. 4



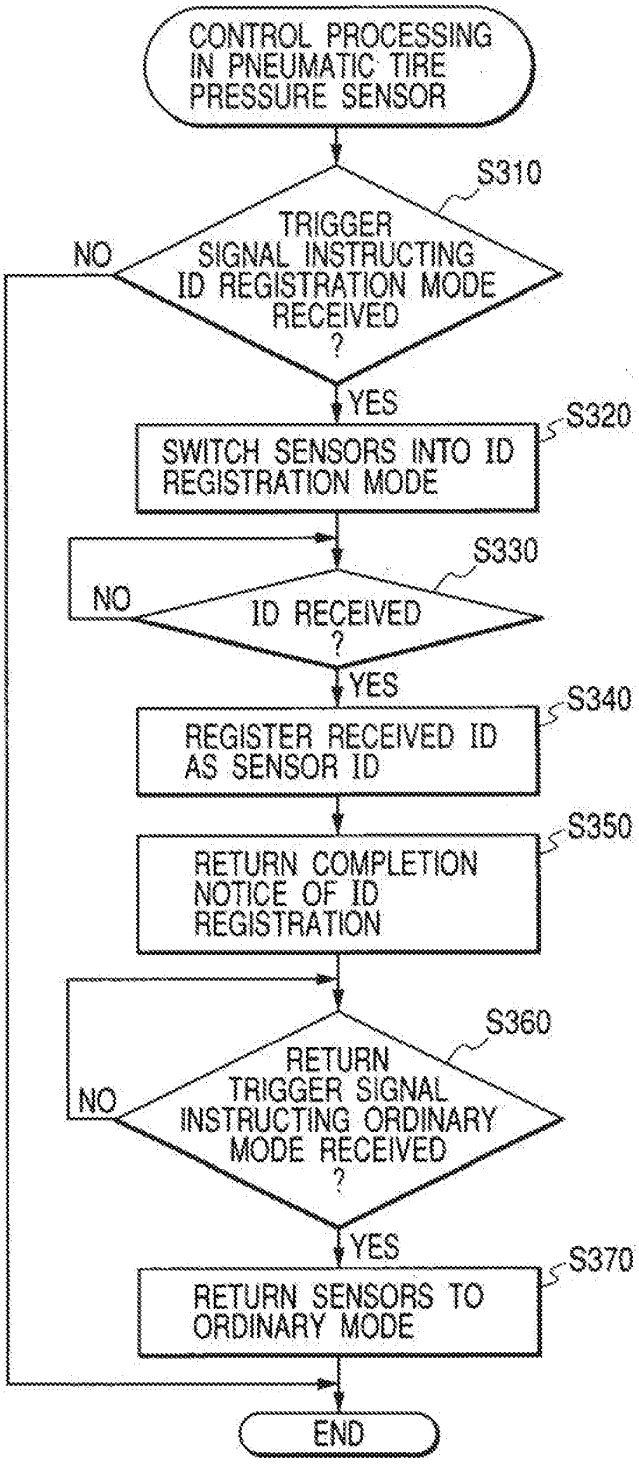
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FIG. 5



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FIG. 6



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FIG. 7

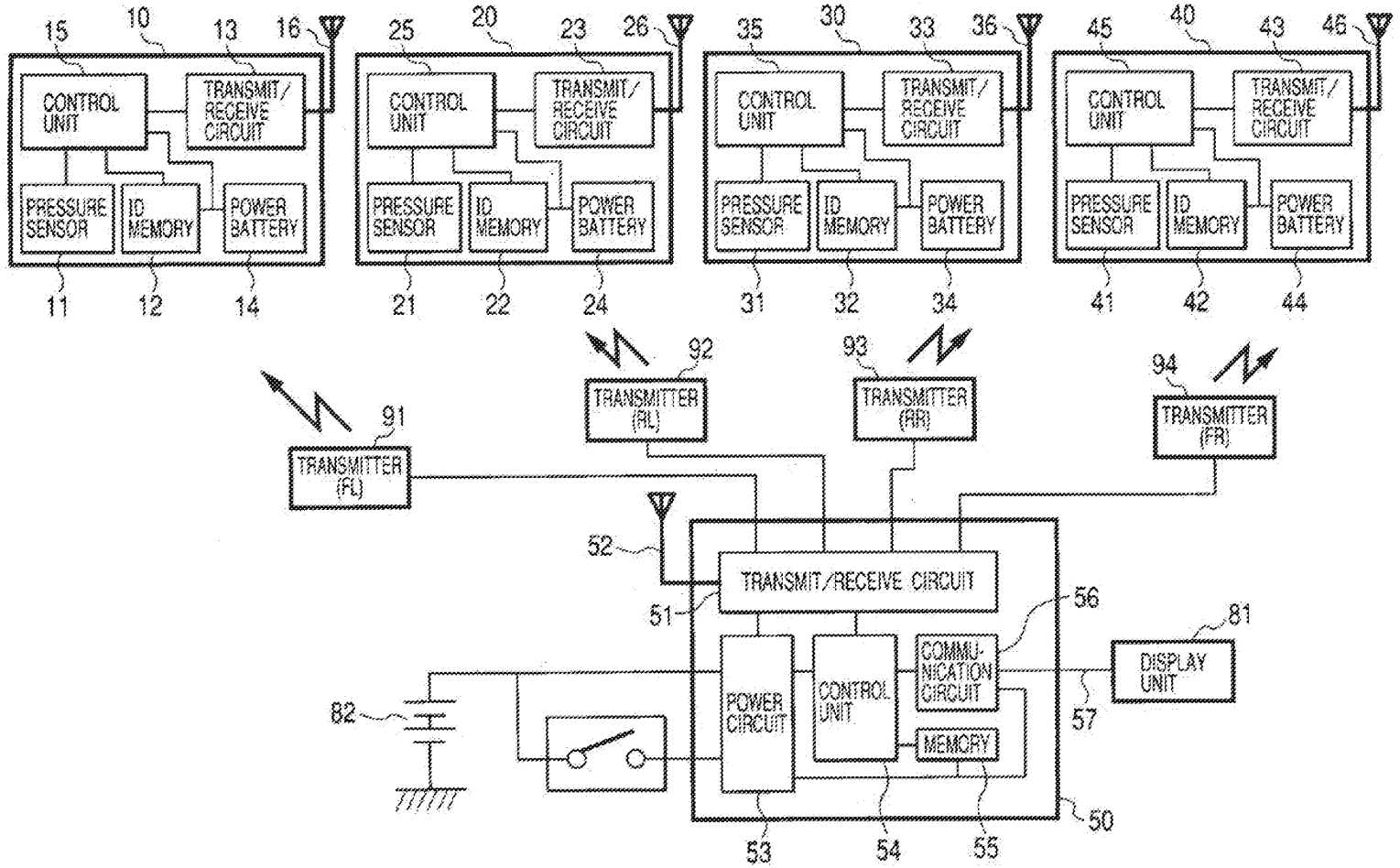
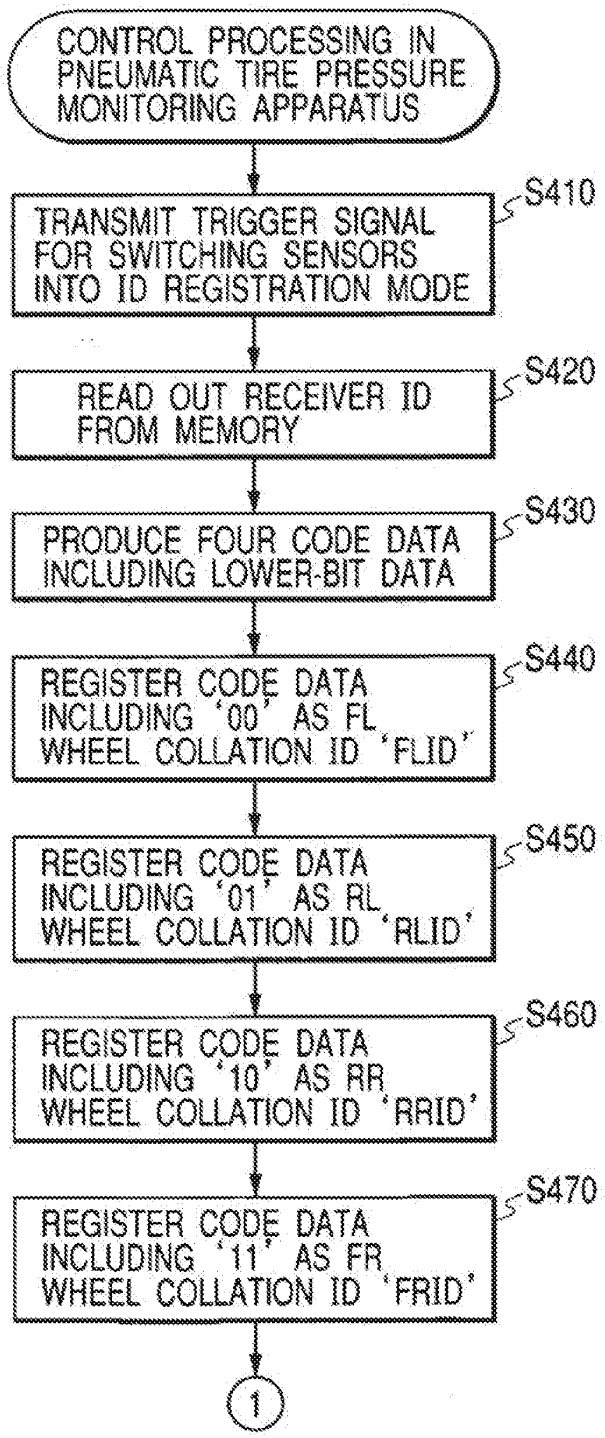
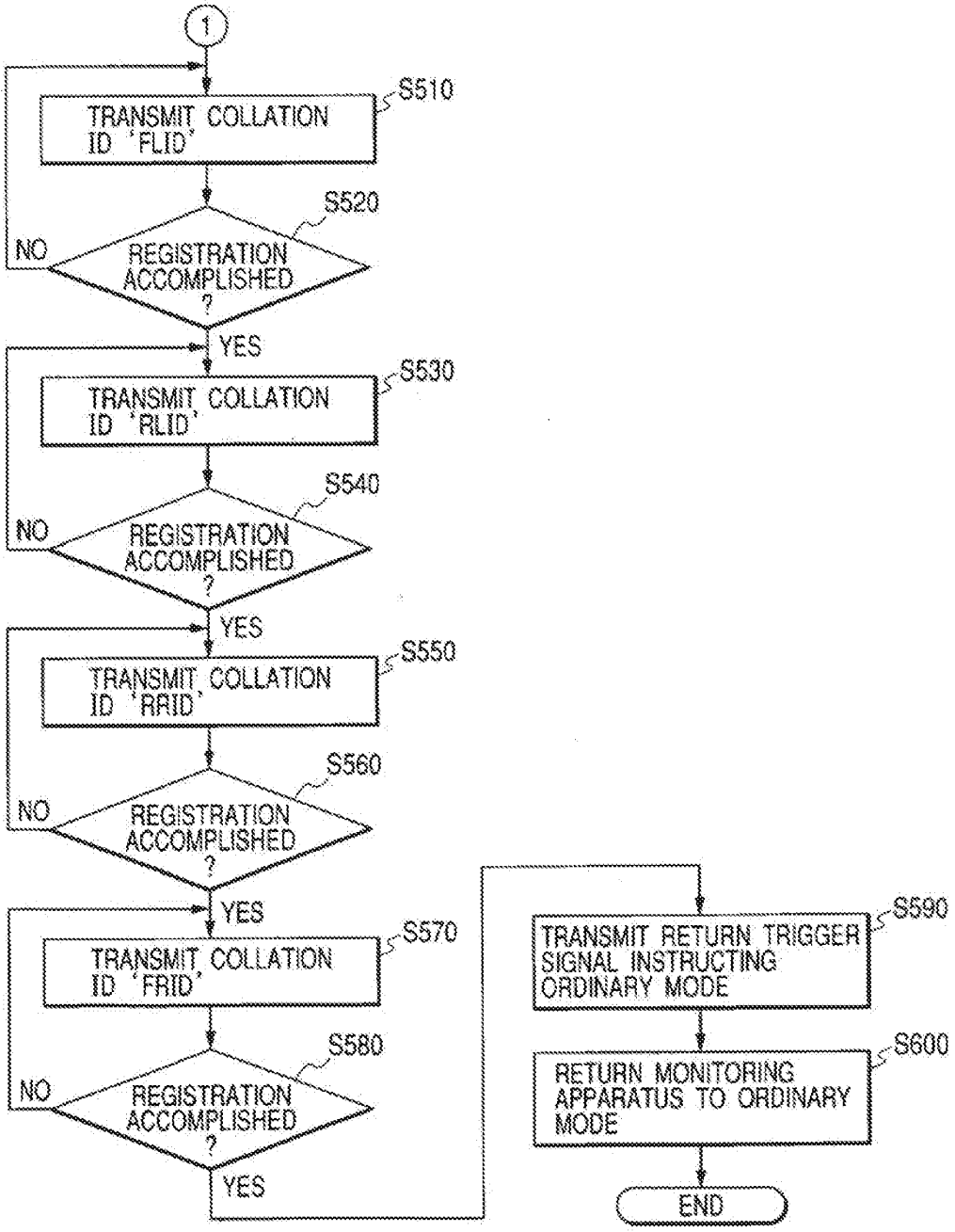

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CONTROL UNIT
TRANSMIT/ RECEIVE CIRCUIT
PRESSURE SENSOR
ID MEMORY
POWER BATTERY
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TRANSMITTER (FL)
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TRANSMITTER (RL)
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TRANSMITTER (RR)
94
TRANSMITTER (FR)
52
TRANSMIT/RECEIVE CIRCUIT
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DISPLAY UNIT
82
POWER CIRCUIT
CONTROL UNIT
COMMU-NICATION CIRCUIT
MEMORY
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FIG. 8



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FIG. 9



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FIG. 10

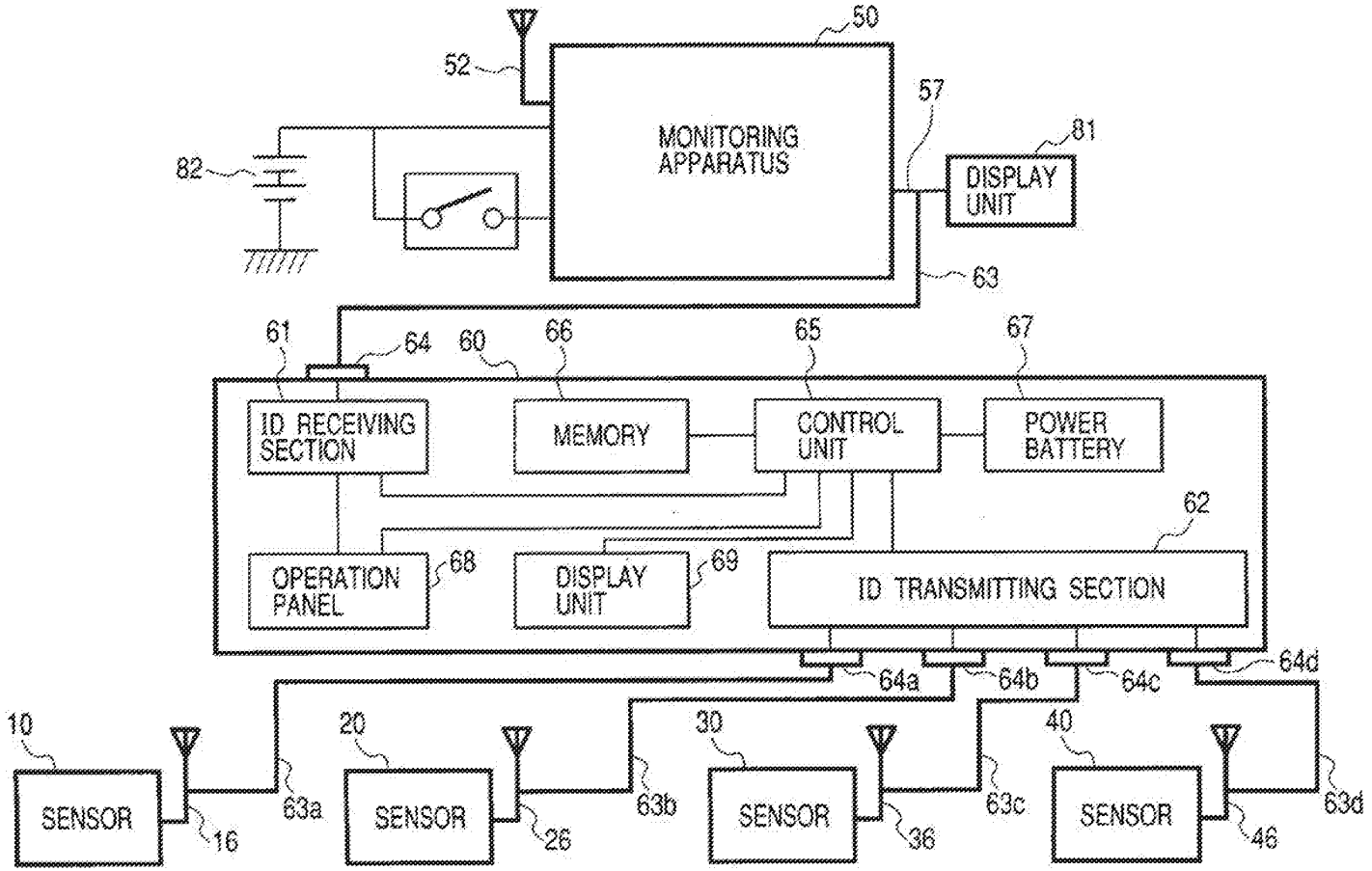
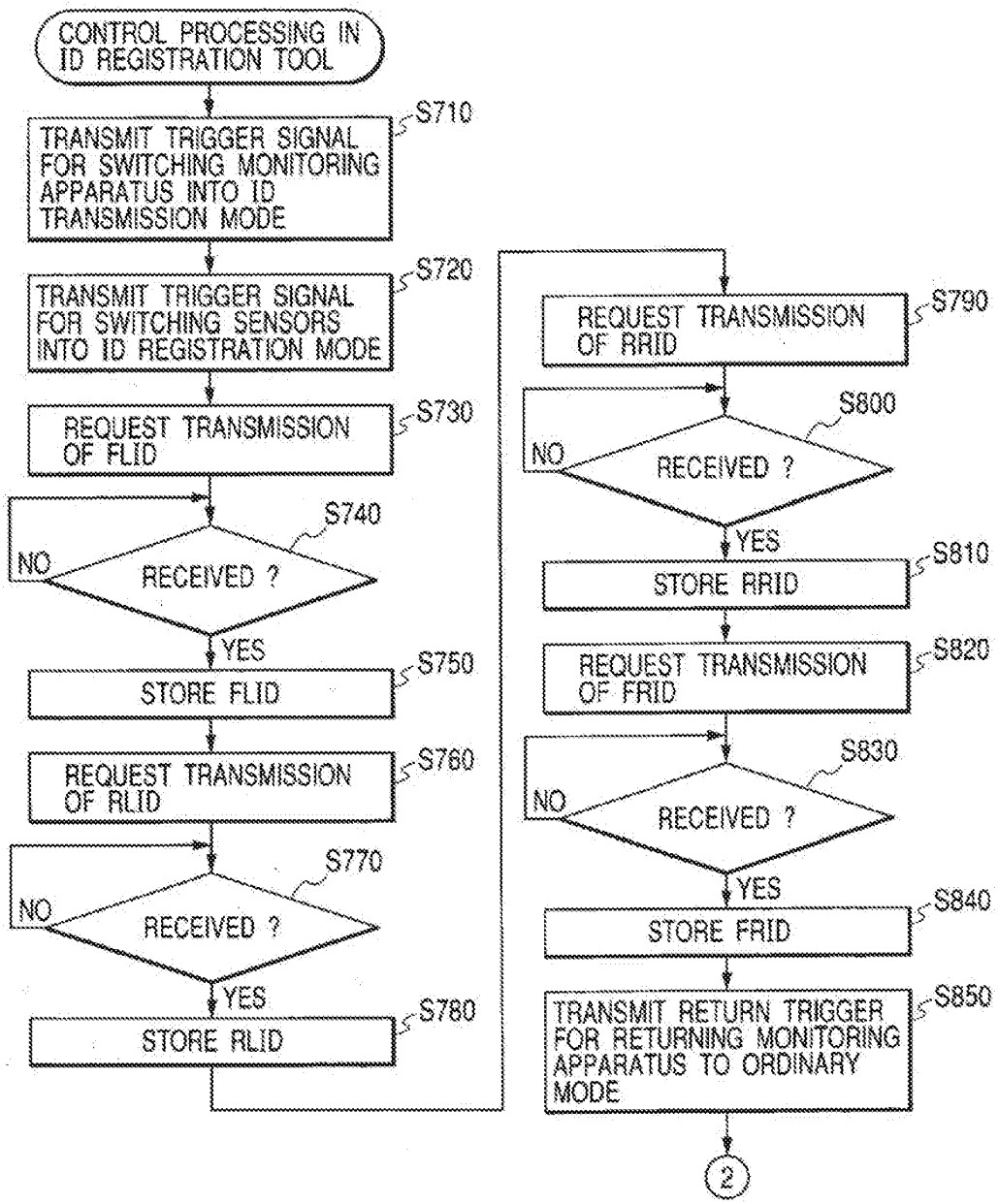
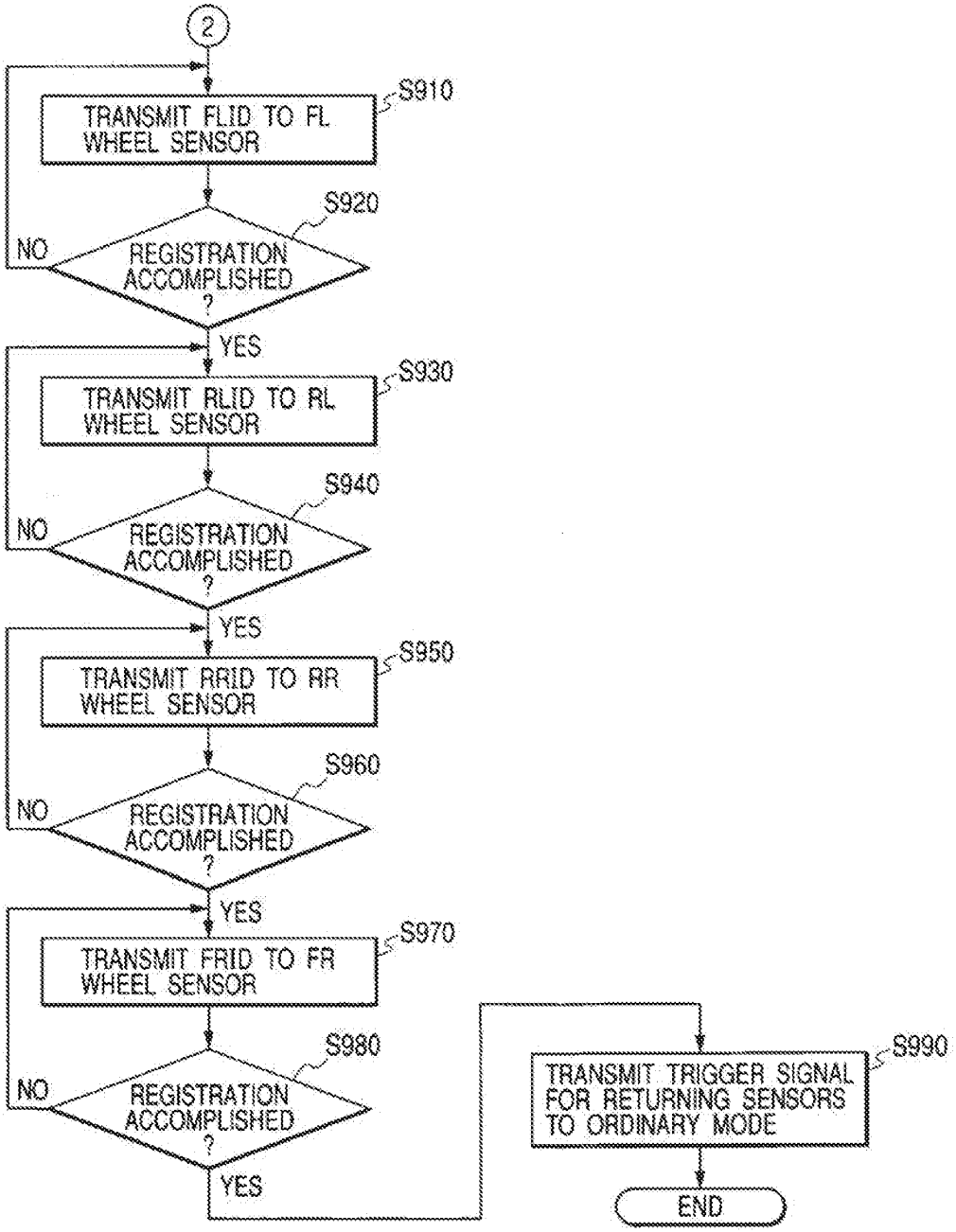

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81
MONITORING APPARATUS
DISPLAY UNIT
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64
60
66
65
67
ID RECEIVING SECTION
MEMORY
CONTROL UNIT
POWER BATTERY
62
OPERATION PANEL
68
DISPLAY UNIT
69
ID TRANSMITTING SECTION
64a
64b
64c
64d
10
20
30
40
SENSOR
SENSOR
SENSOR
SENSOR
16
26
36
46
63a
63b
63c
63d

FIG. 11



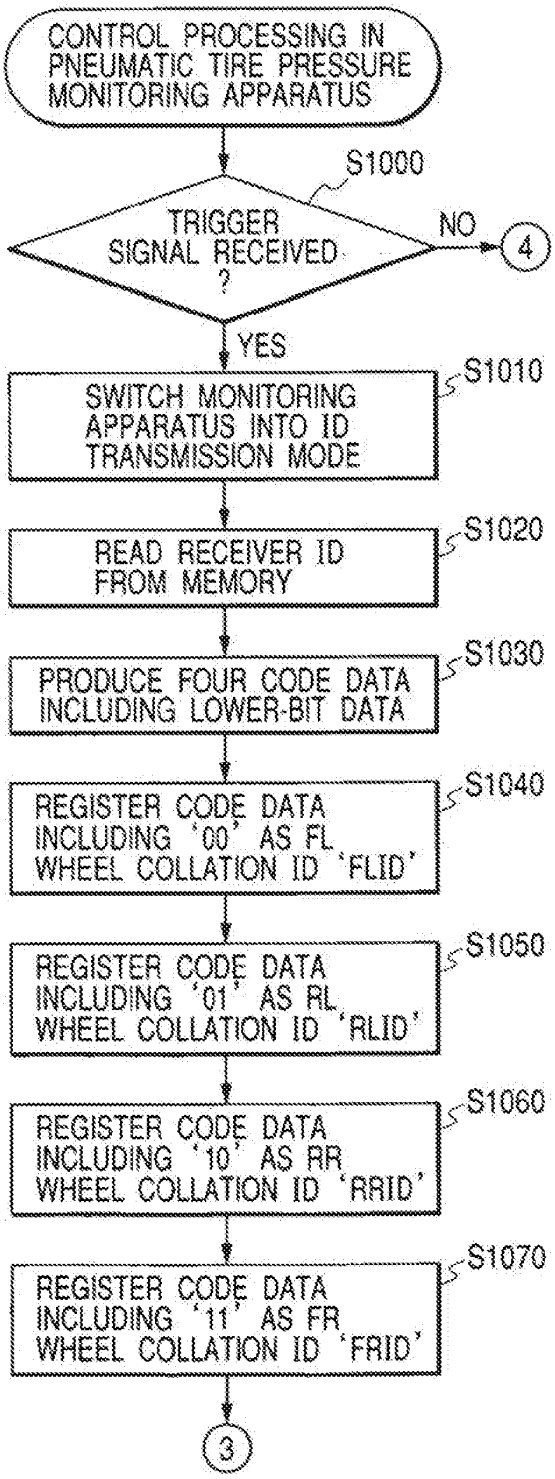
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FIG. 12



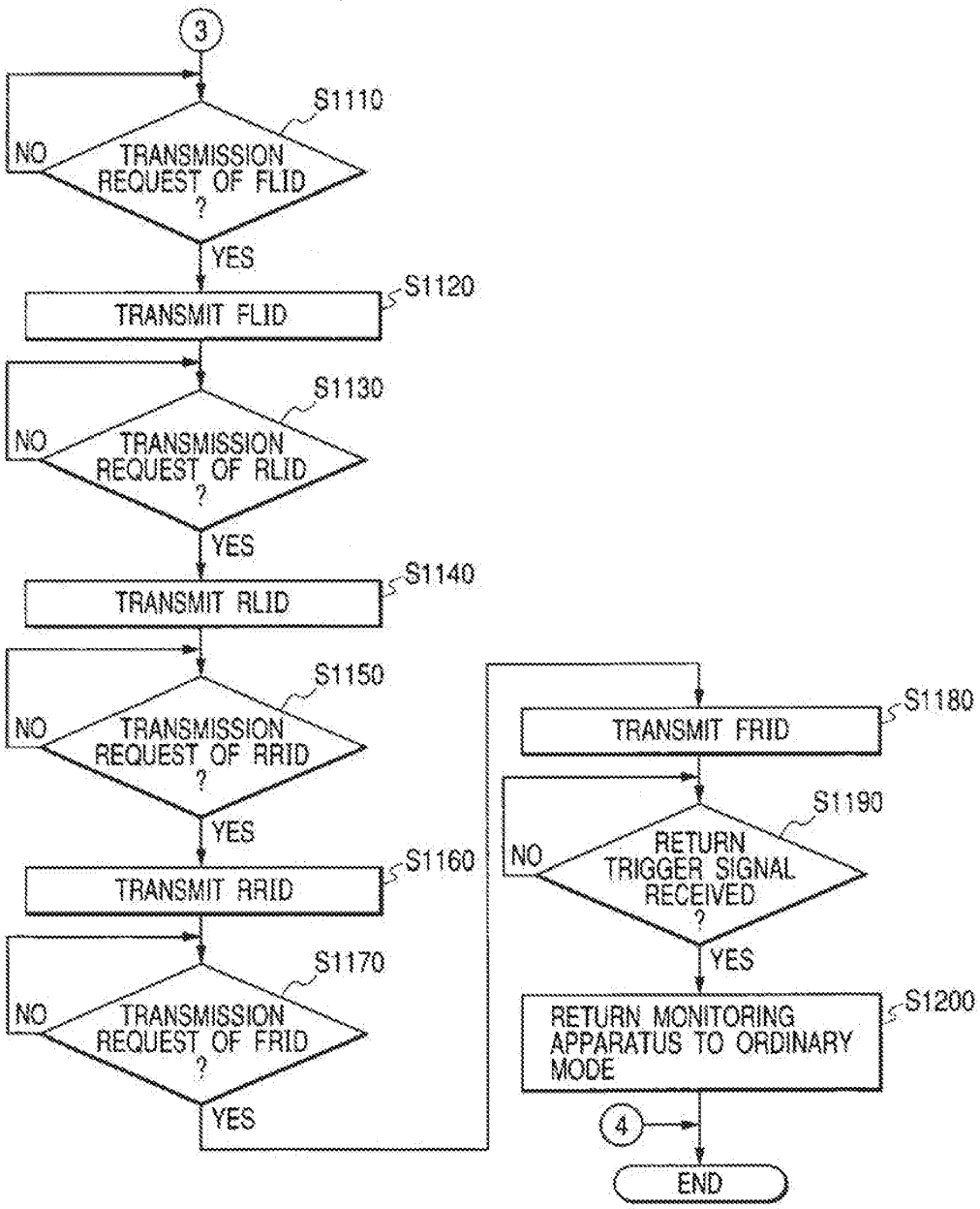
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FIG. 13



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FIG. 14



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FIG. 15

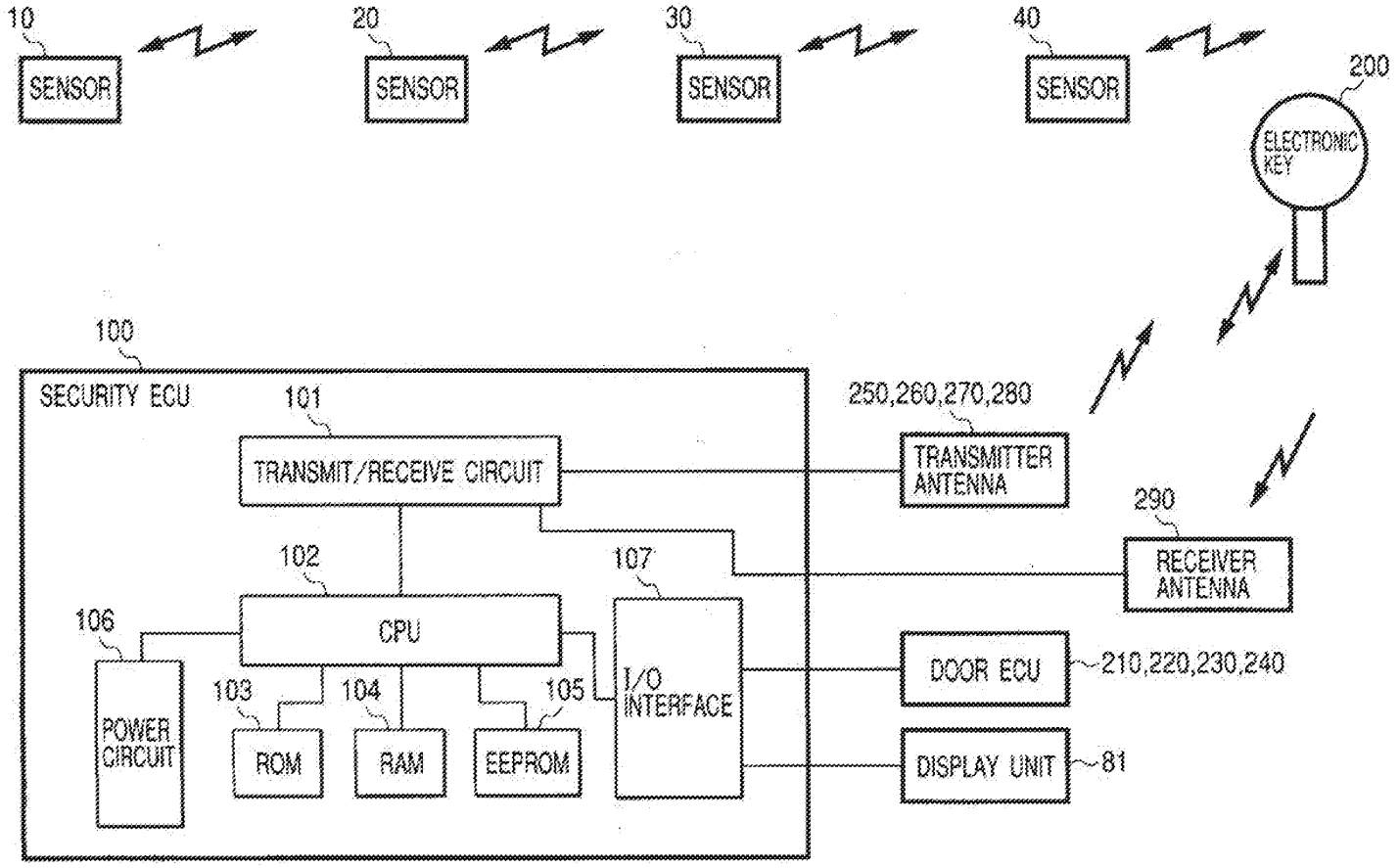
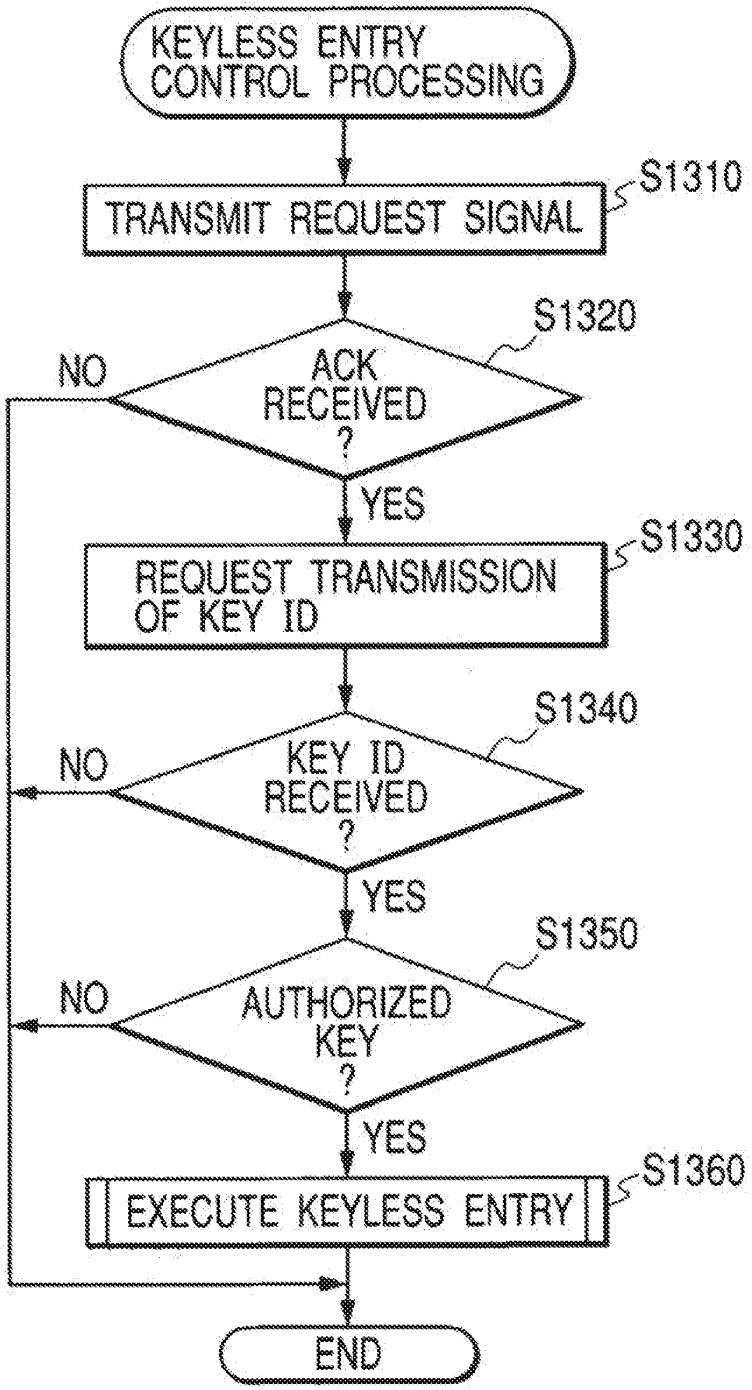
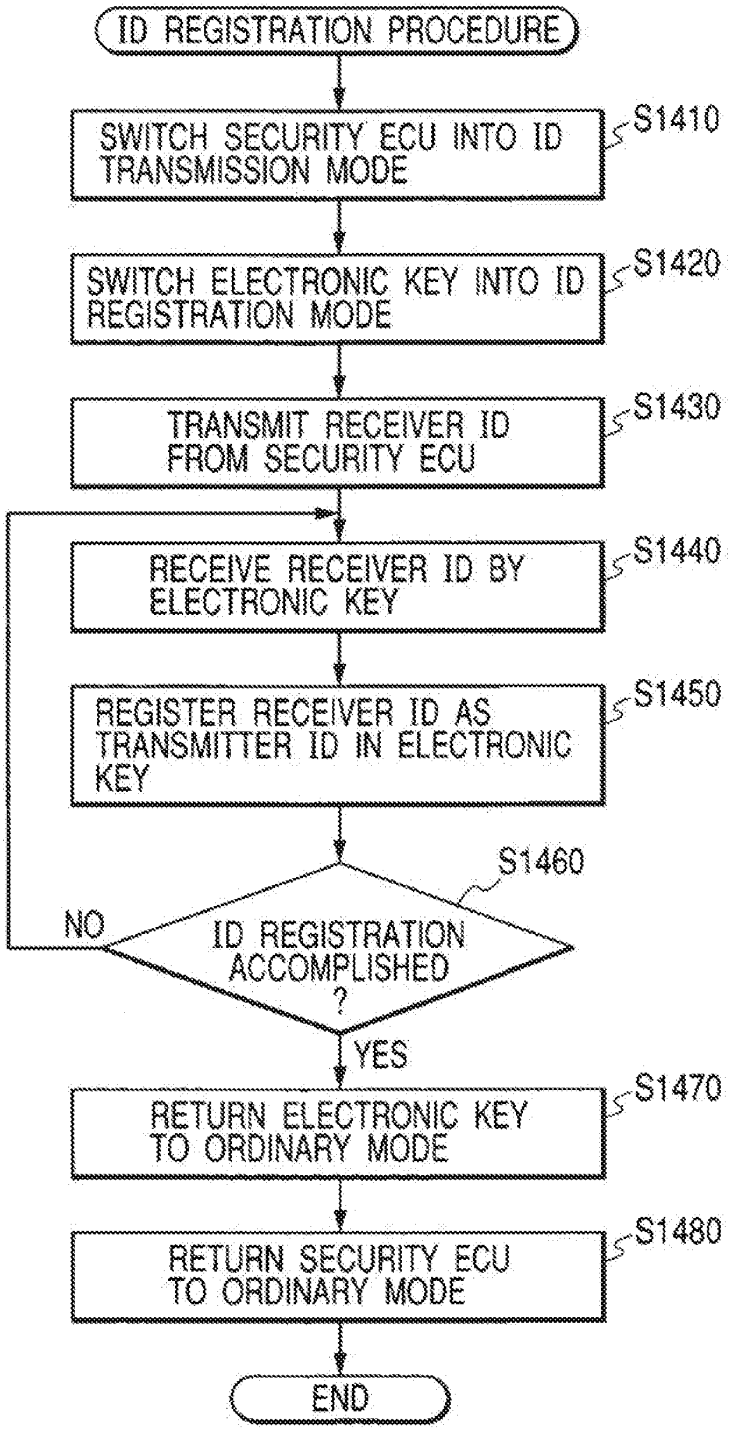

10
SENSOR
20
SENSOR
30
SENSOR
40
SENSOR
200
ELECTRONIC KEY
100
SECURITY ECU
101
TRANSMIT/RECEIVE CIRCUIT
250,260,270,280
TRANSMITTER ANTENNA
290
RECEIVER ANTENNA
102
CPU
107
I/O INTERFACE
106
POWER CIRCUIT
103
ROM
104
RAM
105
EEPROM
DOOR ECU
210,220,230,240
DISPLAY UNIT
81

FIG. 16



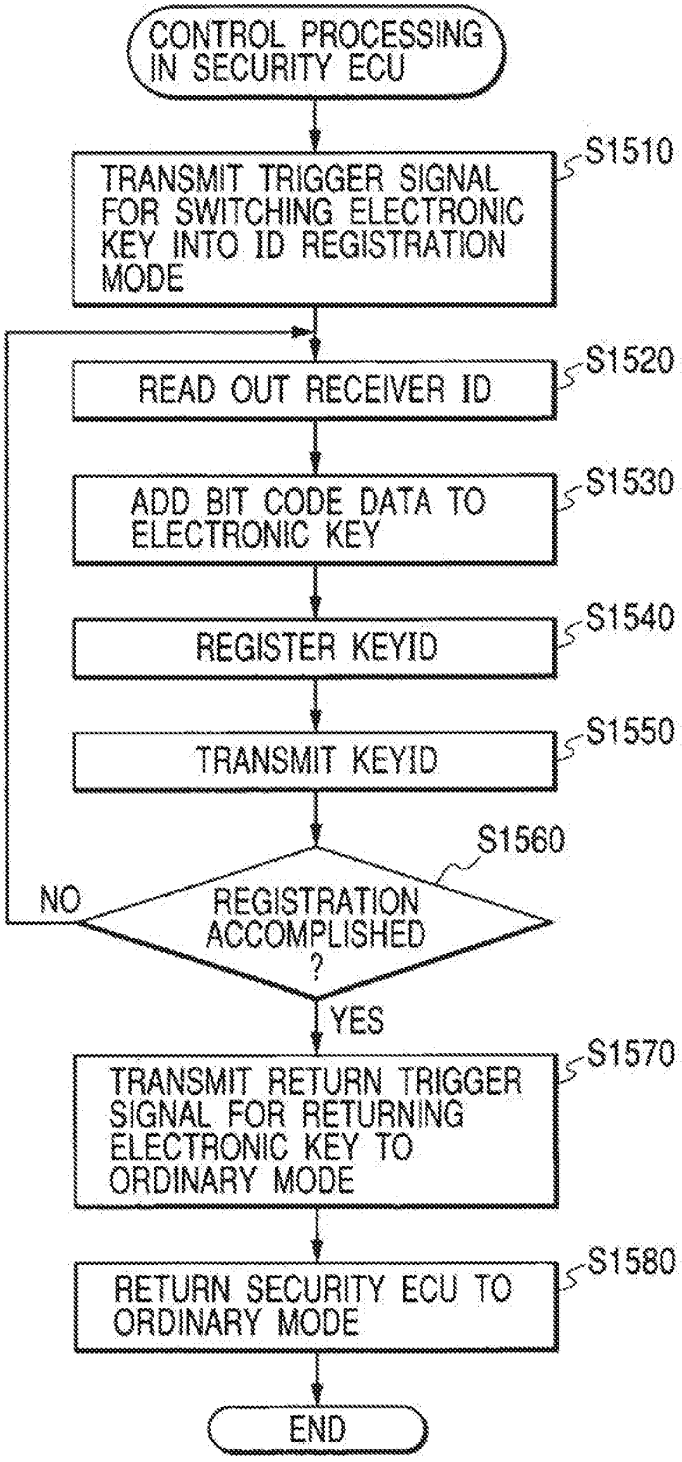
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FIG. 17



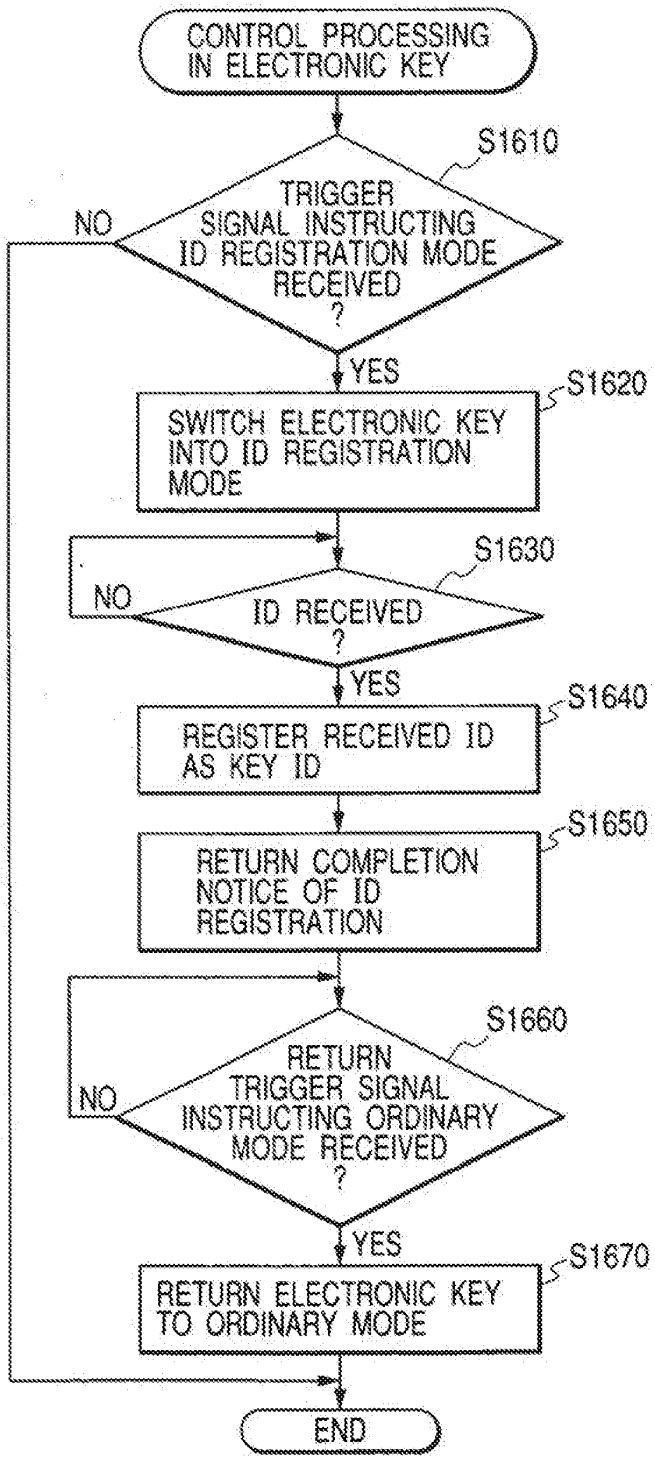
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FIG. 18



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FIG. 19



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FIG. 20
(PRIOR ART)

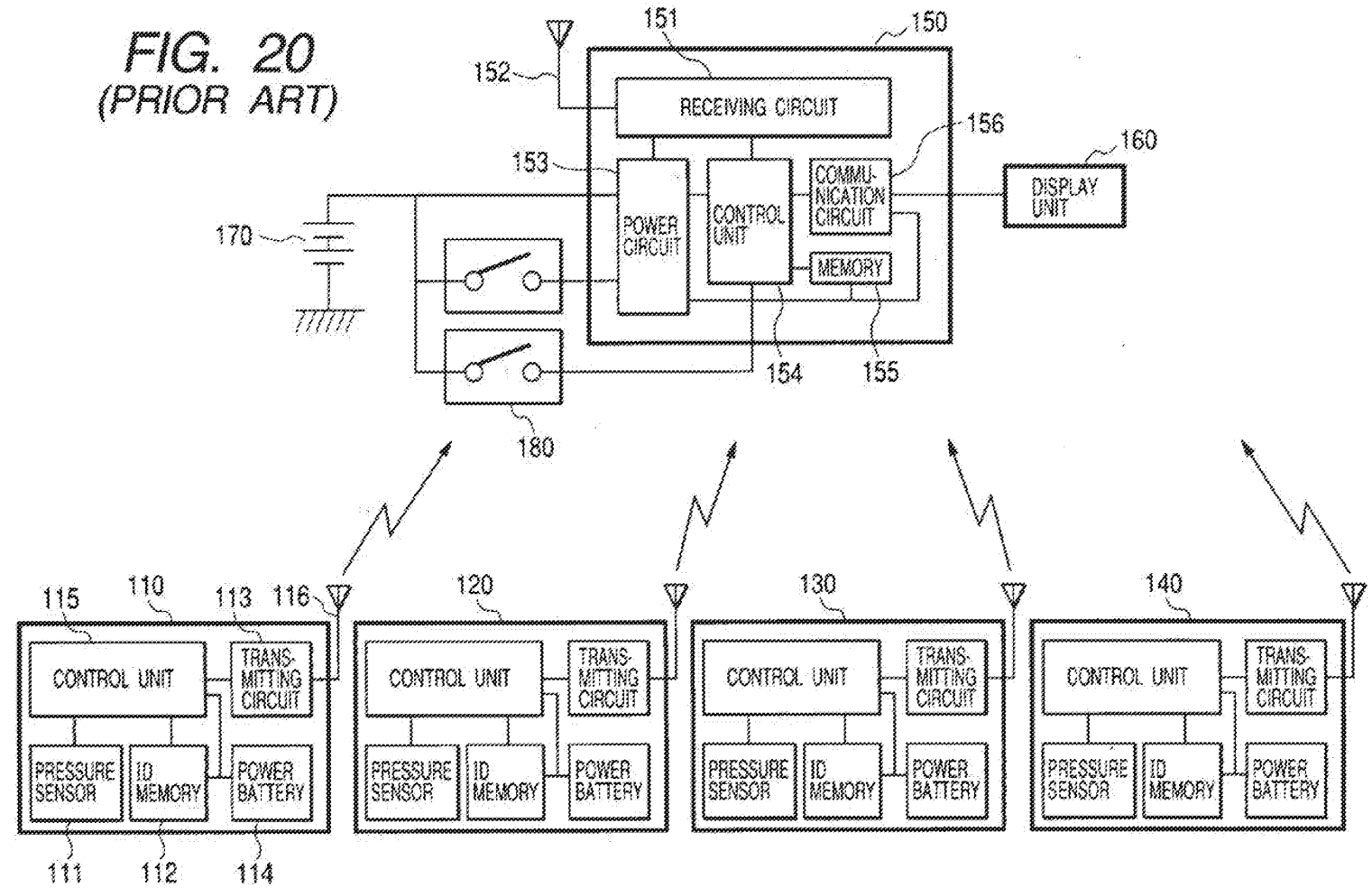
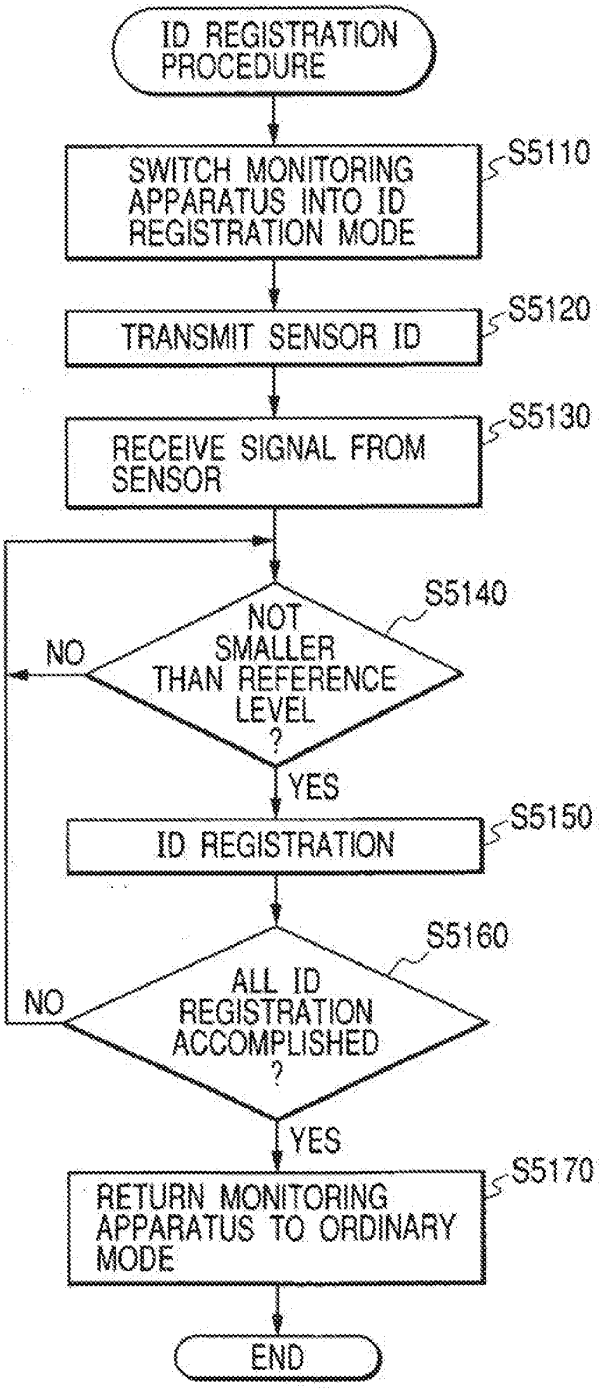


FIG. 21
(PRIOR ART)



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ID REGISTRATION METHOD, ID COLLATION SYSTEM INCORPORATED IN A VEHICLE CONTROL SYSTEM, EMBODIED AS A PNEUMATIC TIRE PRESSURE MONITORING APPARATUS ASSOCIATED WITH PNEUMATIC PRESSURE SENSORS, AND AN ID REGISTRATION TOOL COMBINED WITH PNEUMATIC TIRE PRESSURE MONITORING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to an ID (i.e., identification) registration method and an ID collation system incorporated in a vehicle control system, embodied as a pneumatic tire pressure monitoring apparatus associated with pneumatic pressure sensors. More specifically, the present invention relates to a pneumatic tire pressure monitoring system monitoring the pneumatic pressure of a tire, an electronic key system performing contactless lock/unlock of a door, and a vehicle security control system controlling the pneumatic tire pressure monitoring system and the electronic key system.

A conventional pneumatic tire pressure monitoring system is, for example, disclosed in Japanese Patent No. 3212311 corresponding to U.S. Pat. No. 5,602,524.

According to this kind of conventional pneumatic tire pressure monitoring system, a pneumatic pressure sensor equipped with a transmitter is attached to each tire. The pneumatic pressure sensor transmits an air-pressure detection signal together with an ID assigned to this sensor. A pneumatic tire pressure monitoring apparatus installed in a vehicle body receives the air-pressure detection signal. When any abnormal tire having a lower air pressure is detected, a warning indicator is turned on.

In this case, each sensor ID is also registered in the pneumatic tire pressure monitoring apparatus, so that the monitoring apparatus can check whether or not the received air-pressure signal is transmitted from the tire of its own vehicle.

According to the above conventional system, the sensor ID is assigned to each sensor at the shipment or delivery stage of this sensor from a sensor maker. Then, this sensor is installed into a designated vehicle in an automobile maker. In this assembling process, the pneumatic tire pressure monitoring apparatus installed in a vehicle body is switched into an ID registration mode so that the ID transmitted from the sensor can be received by the monitoring apparatus and the received ID can be registered in the monitoring apparatus.

More specifically, as shown in FIG. **20**, the conventional pneumatic tire pressure monitoring system includes a plurality of pneumatic pressure sensors **110**, **120**, **130**, and **140** attached to respective tires and a pneumatic tire pressure monitoring apparatus **150** installed in a vehicle body. The pneumatic pressure sensor **110** includes an air pressure sensor **111** detecting the air pressure of a tire, an ID memory **112** storing a registered sensor ID, a transmitting circuit **113**, a power source battery **114**, a control unit **115**, and a transmitting antenna **116**. Other pneumatic pressure sensors **120**, **130**, and **140** are identical in arrangement with the sensor **110**.

The pneumatic tire pressure monitoring apparatus **150** includes a receiving circuit **151**, a receiving antenna **152**, a power source circuit **153**, a control unit **154**, a memory **155**, and a communication circuit **156**. The communication circuit **156** is connected via a signal line to a display unit **160**

such as an indicator or LED to transmit display data to the display unit **160**. A vehicle battery **170**, supplying electric power, is connected to the pneumatic tire pressure monitoring apparatus **150**. A mode changing switch **180** is provided to switch the operation of the control unit **154** between an ordinary mode and an ID registration mode.

The ID registration is performed in an automobile manufacturing line in accordance with a procedure shown in FIG. **21**. First of all, the pneumatic tire pressure monitoring apparatus **150** is switched into an ID registration mode (step **S5110**). Next, respective pneumatic pressure sensors **110**, **120**, **130**, and **140** transmit their sensor IDs stored in their ID memories (step **S5120**) into the air. The pneumatic tire pressure monitoring apparatus **150** receives the sensor IDs via the receiving antenna **152** (step **S5130**). Then, the control unit **154** of the pneumatic tire pressure monitoring apparatus **150** makes a judgment as to whether or not the received signal has a level equal to or larger than a reference level (step **S5140**). When the received signal level is not smaller than the reference level (i.e., YES in step **S5140**), the sensor ID included in the received signal is registered in the memory **155** of the pneumatic tire pressure monitoring apparatus **150** (step **S5150**). Then, the control unit **154** makes a judgment as to whether or not the registration of the sensor IDs of respective sensors **110**, **120**, **130**, and **140** has been accomplished (step **S5160**). When the ID registration for respective sensors **110**, **120**, **130**, and **140** is already accomplished (YES in step **S5160**), the mode changing switch **180** is switched to return the monitoring apparatus **150** to the ordinary mode (step **S5170**).

In this manner, according to the conventional system, the sensor ID of the pneumatic pressure sensor actually attached to each tire of a vehicle is registered in the monitoring apparatus. In the ordinary mode, the monitoring apparatus checks whether or not the ID contained in each signal received through the receiving antenna **152** agrees with a collation ID stored in the memory **155**. When the agreement is recognized, the air-pressure condition of the tire is judged based on a received pressure signal. Display of the display unit **160** is performed based on the judgment result. Registering the collation ID as described above is effective in preventing erroneous display performed based on a signal transmitted from a pneumatic pressure sensor attached to a tire of any other vehicle traveling or stopping nearby.

However, many vehicles are successively conveyed on the same assembling line at short intervals of time. Performing the registration of collation ID in such a congested condition will be possibly subjected to the problem of interference occurring in radio data transmission, according to which the monitoring apparatus of a vehicle may erroneously receive the ID signal sent from a pneumatic pressure sensor of a neighboring vehicle. The similar problem occurs in a repair shop in which the re-registering operation of the collation ID is performed.

Furthermore, electronic keys are recently used for controlling automotive vehicles by performing radio or wireless communication between the electronic key and an automotive security control computer (i.e., security ECU). For example, the electronic key allows a user to open or close an automotive door without inserting the key into a key cylinder. Furthermore, it is known that the electronic key can be used to start the engine before the user enters into the car. According to such an electronic key system, a key ID of the authorized electronic key is registered in the security ECU. Then, the security ECU performs ID collection with reference to the registered key ID when communicating with the

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electronic key. Thus, even in such an electronic key system, it is necessary to eliminate erroneous ID registration.

The employment of such an electronic key system is not limited to automotive vehicles. For example, a similar key system can be applied to an entrance door of a house in which a security computer is installed. Even in such a housing security system, the ID collation is performed with reference to ID information registered beforehand for an authorized key.

SUMMARY OF THE INVENTION

In view of the above-described problems, the present invention has an object to eliminate ID erroneous registration in an ID collation system which includes a receiver receiving an ID transmitted from a transmitter and performs predetermined processing based on check result with reference to collation ID. More specifically, the present invention has an object to make it easy to register the ID when a transmitter is newly added or the transmitter is modified.

In order to accomplish the above and other related objects, the present invention provides an ID (i.e., identification) registration method for an ID collation system which includes a receiver receiving information transmitted from a transmitter, checks an ID contained in the information received by the receiver, and performs predetermined processing designated by the information based on check result of ID. The ID registration method of the present invention includes a step of switching the transmitter into an ID registration mode and also switching the receiver into an ID transmission mode, a step of causing the receiver to transmit a collation ID determined based on an ID assigned inherently to the receiver, and a step of causing the transmitter to receive the collation ID transmitted from the receiver and store the received collation ID as a registered ID of the transmitter.

The ID registration method of the present invention is opposed in the way of registration to a conventional registration method according to which a transmitter ID is sent from a transmitter to a receiver and registered in the receiver. In other words, the present invention brings the transmitter and the receiver into a reversed master/slave relationship so that a collation ID is transmitted from the receiver to the transmitter, not from the transmitter to the receiver. Namely, the collation ID is stored in the receiver (i.e., master) and the collation ID is transmitted from the receiver to the transmitter (i.e., slave) and registered in the transmitter. The collation ID transmitted from the receiver to the transmitter is, for example, ① an ID registered beforehand in the receiver or ② an ID newly produced by the receiver and registered in the receiver when it is transmitted to the transmitter.

According to the ID registration method of the present invention, it becomes possible to surely prevent the ID registration from being erroneously performed in the receiver. No transmitter ID of other transmitter is registered. Thus, the erroneous ID registration is effectively eliminated. When a faulty transmitter is replaced by a new one, the collation ID stored in the receiver is registered in the new transmitter according to the above-described procedure. Thus, the maintenance is easy.

In the ID registration method of the present invention, the collation ID stored in the receiver is determined based on the ID assigned inherently to the receiver. The ID assigned inherently to the receiver is discriminable from other IDs of receivers installed in other vehicles. Thus, an objective vehicle is discriminable from other vehicles based on the ID assigned inherently to the receiver installed in this objective vehicle. In this case, the collation ID is completely identical with or partly includes "the ID assigned inherently to the receiver."

The above method of determining the collation ID based on the ID assigned inherently to the receiver is preferably employed in a case ① where there are a plurality of transmitters transmitting information used for controlling an apparatus or in a case ② where there are a plurality of different kinds of transmitters transmitting different information to control one or more apparatuses.

In both of the above cases ① and ②, administration and collation of ID in the receiver become easy. The process of judging whether or not a concerned transmitter is an authorized transmitter belonging to the system can be easily performed by checking whether or not the inherent ID of the receiver is contained in the received information. In the above case ①, the collation ID can be constituted by a code combining additional bit data with the inherent ID of the receiver. For example, using two-bit data makes it possible to discriminate a total of four transmitters from each other. Even in the above case ②, the above discrimination among the transmitters becomes feasible by adding a bit or bits for discriminating the type of the transmitters.

To realize the ID registration method, the present invention provides an ID collation system including a transmitter for transmitting information, a receiver for receiving the information transmitted from the transmitter, a control apparatus for checking an ID contained in the information received by the receiver and performing predetermined processing designated by the information based on check result of ID. The ID collation system of the present invention includes a transmitter mode switching apparatus for switching the transmitter into an ID registration mode and a receiver mode switching apparatus for switching the receiver into an ID transmission mode. The receiver includes an ID transmitting apparatus for transmitting a collation ID being determined based on an ID assigned inherently to the receiver and used in ID checking when the receiver is switched into the ID transmission mode by the receiver mode switching apparatus. The transmitter includes an ID receiving apparatus for receiving the collation ID transmitted from the receiver when the transmitter is switched into the ID registration mode by the transmitter mode switching apparatus, and an ID registration apparatus for storing the collation ID received by the ID receiving apparatus as a registered ID of the transmitter.

When the ID registration is performed by the above ID collation system of the present invention, as shown in FIG. 1, the transmitter mode switching apparatus switches the transmitter into the ID registration mode while the receiver mode switching apparatus switches the receiver into the ID transmission mode (step S1). Then, the collation ID to be transmitted from the receiver is set (step S2). This step S2 can include one of the following processes.

(A) a process of reading out a collation ID registered beforehand in the receiver.

(B) a process of producing a collation ID to be registered in the receiver and setting the produced collation ID as transmission information. The produced collation ID is immediately or later registered in a memory of the receiver.

In any case, the collation ID is determined based on an ID assigned inherently to the receiver.

Subsequently, the ID transmitting apparatus of the receiver transmits the collation ID (step S3). Then, the ID receiving apparatus of the transmitter receives the collation ID (step S4). The ID registration apparatus of the transmitter

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stores the received collation ID as a registered ID of the transmitter (step S5). After the ID registration is accomplished, the transmitter mode switching apparatus returns the transmitter to the ordinary mode while the receiver mode switching apparatus returns the receiver to the ordinary mode (step S6).

Furthermore, to accomplish the above and other objects, the present invention provides a first vehicle control system including a transmitter for transmitting information required to control a device installed in a vehicle, a receiver installed in a vehicle body for receiving the information transmitted from the transmitter, a control apparatus installed in the vehicle body for checking an ID contained in the information received by the receiver with reference to a collation ID and executing control of the device according to the information based on check result of ID, a transmitter mode switching apparatus for switching the transmitter into an ID registration mode, and a receiver mode switching apparatus for switching the receiver into an ID transmission mode. Furthermore, the receiver includes an ID transmitting apparatus for transmitting the collation ID used in ID checking when the receiver is switched into the ID transmission mode by the receiver mode switching apparatus. The transmitter includes an ID receiving apparatus for receiving the collation ID transmitted from the receiver when the transmitter is switched into the ID registration mode by the transmitter mode switching apparatus, and an ID registration apparatus for storing the collation ID received by the ID receiving apparatus as a registered ID of the transmitter. Furthermore, according to the first vehicle control system of the present invention, the device installed in a vehicle is a pneumatic air pressure monitoring apparatus for displaying monitoring result with respect to an air pressure of a tire installed in the vehicle. The transmitter is incorporated in a pneumatic pressure sensor attached to the tire. And, the control apparatus executes control for the display of monitoring result with respect to the air pressure of the tire installed in the vehicle when the information received by the receiver is confirmed based on the result of ID checking as being transmitted from the pneumatic pressure sensor attached to the tire.

It is preferable that the collation ID is transmitted to the transmitter via a transmitter antenna provided in a tire house of the vehicle. This arrangement is convenient when the ID is registered for each of four pneumatic pressure sensors attached to front-left, rear-left, rear-right, and front-right wheels of a vehicle.

Furthermore, the present invention provides a second vehicle control system including a transmitter for transmitting information required to control a device installed in a vehicle, a receiver installed in a vehicle body for receiving the information transmitted from the transmitter, a control apparatus installed in the vehicle body for checking an ID contained in the information received by the receiver with reference to a collation ID and executing control of the device according to the information based on check result of ID, a transmitter mode switching apparatus for switching the transmitter into an ID registration mode, and a receiver mode switching apparatus for switching the receiver into an ID transmission mode. Furthermore, the receiver includes an ID transmitting apparatus for transmitting the collation ID used in ID checking when the receiver is switched into the ID transmission mode by the receiver mode switching apparatus. The transmitter includes an ID receiving apparatus for receiving the collation ID transmitted from the receiver when the transmitter is switched into the ID registration mode by the transmitter mode switching apparatus, and an ID registration apparatus for storing the collation ID received by the ID receiving apparatus as a registered ID of the transmitter. Furthermore, according to the second vehicle control system of the present invention, the device installed in a vehicle is a keyless entry apparatus for executing contactless lock/unlock of a vehicle door, the transmitter is incorporated in an electronic key, and the control apparatus executes the contactless lock/unlock of the vehicle door based on checking result of ID of the electronic key contained in the information received by the receiver.

Furthermore, the present invention provides a third vehicle control system including a transmitter for transmitting information required to control a device installed in a vehicle, a receiver installed in a vehicle body for receiving the information transmitted from the transmitter, a control apparatus installed in the vehicle body for checking an ID contained in the information received by the receiver with reference to a collation ID and executing control of the device according to the information based on check result of ID, a transmitter mode switching apparatus for switching the transmitter into an ID registration mode, and a receiver mode switching apparatus for switching the receiver into an ID transmission mode. The receiver includes an ID transmitting apparatus for transmitting the collation ID used in ID checking when the receiver is switched into the ID transmission mode by the receiver mode switching apparatus. The transmitter includes an ID receiving apparatus for receiving the collation ID transmitted from the receiver when the transmitter is switched into the ID registration mode by the transmitter mode switching apparatus, and an ID registration apparatus for storing the collation ID received by the ID receiving apparatus as a registered ID of the transmitter. Furthermore, according to the third vehicle control system of the present invention, the device installed in a vehicle includes a pneumatic air pressure monitoring apparatus for displaying monitoring result with respect to an air pressure of a tire installed in the vehicle and a keyless entry apparatus for executing contactless lock/unlock of a vehicle door. The transmitter is incorporated in a pneumatic pressure sensor attached to the tire and also in an electronic key. And, the control apparatus executes control for the display of monitoring result with respect to the air pressure of the tire installed in the vehicle when the information received by the receiver is confirmed based on the result of ID checking as being transmitted from the pneumatic pressure sensor attached to the tire, and also executes the contactless lock/unlock of the vehicle door when the information received by the receiver is confirmed based on the result of ID checking as being transmitted from an authorized electronic key.

It is preferable that the collation ID is determined based on an ID assigned inherently to the receiver. Administration of ID in the receiver becomes easy. The ID collation processing for checking whether or not a concerned transmitter belongs to the receiver can be easily done.

For example, according to the electronic key system, it is possible to register a plurality of authorized electronic keys. In such a case, the same ID (i.e., the ID inherent to the receiver) is registered in each authorized electronic key. The receiver is required to perform the ID collation processing commonly for all of the authorized electronic keys. The processing becomes simple. Meanwhile, if it is necessary to discriminate each of the authorized electronic keys, it will be preferable that the collation ID for each key includes additional bit data for identifying each key.

Furthermore, according to the pneumatic tire pressure monitoring system, a total of four transmitters are required

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for the wheels of a four-wheel vehicle. In this case, the processing for identifying whether or not a signal arrives from the pneumatic pressure sensor attached to a tire of this vehicle becomes simple. In general, to precisely perform the pneumatic tire pressure monitoring operation, it is preferable to discriminate each of the wheels. In such a case, two-bit additional code for discriminating each wheel can be added to the collation ID.

Furthermore, a security control system executes control processing for different kinds of devices, such as a combination of the pneumatic tire pressure monitoring system and the electronic key system. In such a security control system, it is possible to use the same ID for the pneumatic pressure sensor and the electronic key. The processing becomes simple. The administration becomes simple, too.

It is preferable that the collation ID is transmitted from the receiver to the transmitter via a predetermined external device. For example, the external device is an ID registration tool carried by an operator or a worker. First of all, the ID registration tool is placed near a receiver to receive the collation ID transmitted from the receiver. Then, this tool is carried to the vicinity of a transmitter and the registered collation ID is transmitted to the transmitter. The ID registration is accomplished in this manner.

Furthermore, it is preferable that the external device is detachably connected via a signal line to the receiver and to the transmitter. Using a signal line or a comparable cable is effective to surely eliminate interference occurring in data transmission.

In the system executing the ID registration by cable, it is preferable that the transmitter mode switching apparatus is provided in the transmitter while the receiver mode switching apparatus is provided in the receiver, and the external device includes a trigger signal transmitting apparatus which transmits a trigger signal for causing the transmitter mode switching apparatus to switch the transmitter into the ID registration mode and a trigger signal for causing the receiver mode switching apparatus to switch the receiver into the ID transmission mode. The ID registration can be smoothly performed.

Furthermore, to accomplish the above and other related objects, the present invention provides a pneumatic tire pressure monitoring apparatus including a receiver for receiving an air-pressure signal transmitted together with a sensor ID from a pneumatic pressure sensor of each tire installed in a vehicle, a control apparatus for checking whether or not a received sensor ID agrees with the sensor ID of the pneumatic pressure sensor of the tire installed in the vehicle and for executing control for monitoring an air pressure of the tire with reference to the air-pressure signal based on check result of ID, a receiver mode switching apparatus for switching the receiver into an ID transmission mode, and an ID transmitting apparatus for transmitting a collation ID used in ID checking when the receiver is switched into the ID transmission mode by the receiver mode switching apparatus, wherein the collation ID is determined based on an ID assigned inherently to the receiver.

According to the pneumatic tire pressure monitoring apparatus of the present invention, in a vehicle assembling line, the receiver mode switching apparatus switches the receiver into the ID transmission mode. Then, the ID transmitting apparatus transmits a collation ID used in ID checking to the pneumatic pressure sensor, thereby performing the ID registration.

Furthermore, as the collation ID is determined based on the ID assigned inherently to the receiver, administration of ID is easy.

Furthermore, to accomplish the above and other related objects, the present invention provides a pneumatic tire pressure sensor including a pressure sensor for detecting an air pressure of a tire, an ID memory for storing a transmitter ID, a transmitting circuit for transmitting the air pressure of the tire detected by the pressure sensor together with the transmitter ID stored in the ID memory, a receiving circuit for receiving a collation ID transmitted from a pneumatic tire pressure monitoring apparatus, and a transmitter ID registering apparatus for registering the collation ID received via the receiving circuit as a transmitter ID and storing the registered transmitter ID in the ID memory.

According to the pneumatic tire pressure sensor of the present invention, the collation ID stored in the pneumatic tire pressure monitoring apparatus is registered in the transmitter as a transmitter ID. Especially, when the sensor is replaced by a new one, the ID registration is accurately and easily performed between the pressure sensor and the monitoring apparatus.

It is, for example, preferable that the receiving circuit receives a signal via a cable and the ID memory is a rewritable memory element having an overwriting function for renewing the data stored therein. Erroneous registration due to interference occurring in data transmission can be surely eliminated.

Furthermore, to accomplish the above and other related objects, the present invention provides an ID registration tool for a pneumatic tire pressure monitoring system including a pneumatic pressure sensor attached to a tire of a vehicle and a pneumatic tire pressure monitoring apparatus installed in a vehicle body to receive an air-pressure signal transmitted from the pneumatic pressure sensor together with a transmitter ID of the pneumatic pressure sensor, thereby monitoring an air pressure of the tire, in which the ID registration tool is used for registering a collation ID between the pneumatic tire pressure monitoring apparatus and the pneumatic pressure sensor. The ID registration tool of the present invention includes an ID transmission requesting apparatus for requesting the pneumatic tire pressure monitoring apparatus to transmit the collation ID used in ID checking, an ID receiving circuit for receiving the collation ID transmitted from the pneumatic tire pressure monitoring apparatus in response to a request of the ID transmission requesting apparatus, and an ID transmitting circuit for transmitting the collation ID received by the ID receiving circuit to the pneumatic pressure sensor.

According to the ID registration tool for a pneumatic tire pressure monitoring system, the ID transmission requesting apparatus requests the pneumatic tire pressure monitoring apparatus to transmit the collation ID. The ID receiving circuit receives the collation ID transmitted from the pneumatic tire pressure monitoring apparatus in response to the request of the ID transmission requesting apparatus. The ID transmitting circuit transmits the received collation ID to the pneumatic pressure sensor. The ID used in the collation in the pneumatic tire pressure monitoring control can be easily registered between the pneumatic tire pressure monitoring apparatus and the pneumatic pressure sensor. As a result, in the case of exchanging pneumatic pressure sensors or in the case of rotating the position of the tires, the ID registration can be accurately performed.

The ID collation system of the present invention is not limited to the above-described vehicle control system and accordingly can be applied, for example, to the ID registra-

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tion of an electronic key in a contactless lock/unlock system for an entrance door of a house. Furthermore, it is needless to say that the ID collation system of the present invention can be also applied to various control systems other than vehicles.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description which is to be read in conjunction with the accompanying drawings, in which:

FIG. **1** is a flowchart showing the procedure of ID registration executed in an ID collating system in accordance with the present invention;

FIG. **2** is a block diagram showing a pneumatic tire pressure monitoring system in accordance with a first embodiment of the present invention;

FIG. **3**A is a flowchart showing pneumatic tire pressure detecting processing executed by a pneumatic tire pressure sensor of the pneumatic tire pressure monitoring system in accordance with the first embodiment of the present invention;

FIG. **3**B is a flowchart showing pneumatic tire pressure monitoring processing executed by a pneumatic tire pressure monitoring apparatus of the pneumatic tire pressure monitoring system in accordance with the first embodiment of the present invention;

FIG. **4** is a flowchart showing ID registration procedure in accordance with the first embodiment of the present invention;

FIG. **5** is a flowchart showing the contents of control processing executed in the pneumatic tire pressure monitoring apparatus to realize the ID registration procedure shown in FIG. **4**;

FIG. **6** is a flowchart showing the contents of control processing executed in the pneumatic tire pressure sensor to realize the ID registration procedure shown in FIG. **4**;

FIG. **7** is a block diagram showing a pneumatic tire pressure monitoring system in accordance with a second embodiment of the present invention;

FIG. **8** is a flowchart showing the contents of control processing relating to ID registration executed in the pneumatic tire pressure monitoring apparatus in accordance with the second embodiment of the present invention;

FIG. **9** is a flowchart showing the rest of the control processing relating to ID registration executed in the pneumatic tire pressure monitoring apparatus in accordance with the second embodiment of the present invention;

FIG. **10** is a block diagram showing a pneumatic tire pressure monitoring system including an ID registration tool in accordance with a third embodiment of the present invention;

FIG. **11** is a flowchart showing the contents of control processing of ID registration tool in accordance with the third embodiment of the present invention;

FIG. **12** is a flowchart showing the rest of the control processing of the ID registration tool in accordance with the third embodiment of the present invention;

FIG. **13** is a flowchart showing the contents of control processing executed in the pneumatic tire pressure monitoring system in accordance with the third embodiment of the present invention;

FIG. **14** is a flowchart showing the rest of the control processing executed in the pneumatic tire pressure monitoring system in accordance with the third embodiment of the present invention;

FIG. **15** is a block diagram showing a security control system in accordance with a fourth embodiment of the present invention;

FIG. **16** is a flowchart showing the contents of keyless entry processing in accordance with the fourth embodiment of the present invention;

FIG. **17** is a flowchart showing ID registration procedure in accordance with the fourth embodiment of the present invention;

FIG. **18** is a flowchart showing contents of control processing relating to ID registration to an electronic key executed by the security control system in accordance with a fourth embodiment of the present invention;

FIG. **19** is a flowchart showing the contents of control processing relating to ID registration executed by the electronic key in accordance with the fourth embodiment of the present invention;

FIG. **20** is a block diagram showing a conventional pneumatic tire pressure monitoring system; and

FIG. **21** is a flowchart showing the contents of conventional ID registration procedure.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be explained hereinafter with reference to attached drawings.

FIG. **2** is a block diagram showing a schematic arrangement of a pneumatic tire pressure monitoring system in accordance with a first embodiment of the present invention. As shown in FIG. **2**, the pneumatic tire pressure monitoring system includes a plurality of pneumatic pressure sensors (i.e., transmitters) **10**, **20**, **30**, and **40**, and a pneumatic tire pressure monitoring apparatus (i.e., receiver) **50** equipped in a vehicle body. The pneumatic pressure sensor **10** includes an air pressure sensor **11** detecting the air pressure of a tire, an ID memory **12** storing a registered sensor ID, a transmit/receive circuit **13**, a power source battery **14**, a control unit **15**, and a transmit/receive antenna **16**. The pneumatic pressure sensor **20** includes an air pressure sensor **21** detecting the air pressure of a tire, an ID memory **22** storing a registered sensor ID, a transmit/receive circuit **23**, a power source battery **24**, a control unit **25**, and a transmit/receive antenna **26**. The pneumatic pressure sensor **30** includes an air pressure sensor **31** detecting the air pressure of a tire, an ID memory **32** storing a registered sensor ID, a transmit/receive circuit **33**, a power source battery **34**, a control unit **35**, and a transmit/receive antenna **36**. And, the pneumatic pressure sensor **40** includes an air pressure sensor **41** detecting the air pressure of a tire, an ID memory **42** storing a registered sensor ID, a transmit/receive circuit **43**, a power source battery **44**, a control unit **45**, and a transmit/receive antenna **46**.

Compared with a conventional pneumatic pressure sensor **110** shown in FIG. **20**, the pneumatic pressure sensors **10**, **20**, **30**, and **40** of this embodiment is characterized in that the transmit/receive circuits **13**, **23**, **33**, and **43** have the capability of not only transmitting information, data, and signals but also receiving the same. It is needless to say that the transmit/receive antennas **16**, **26**, **36**, and **46** are for transmitting and receiving the information, data, and signals. Each of the transmit/receive antennas **16**, **26**, **36**, and **46** is a mouth piece of a valve through which the air is introduced into a tire. Each of ID memories **12**, **22**, **32**, and **42** is an EEPROM (i.e., Electrically Erasable and Programmable Read Only Memory) or a comparable rewritable memory

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element which is nonvolatile and has an overwriting function for renewing the data stored therein.

The pneumatic tire pressure monitoring apparatus **50** includes a transmit/receive circuit **51**, a transmit/receive antenna **52**, a power source circuit **53**, a control unit **54**, a memory **55**, and a communication circuit **56**. The communication circuit **56** is connected a via signal line **57** to a display unit **81** such as an indicator or LED to transmit display data to the display unit **81**. The communication circuit **56** also has a function of receiving a signal representing the display condition from the display unit **81**. A vehicle battery **82**, supplying electric power, is connected to the pneumatic tire pressure monitoring apparatus **50**. The memory **55** stores a receiver ID assigned inherently to the pneumatic tire pressure monitoring apparatus **50**.

According to the pneumatic tire pressure monitoring apparatus **50**, as shown in FIG. **3**A, respective pneumatic pressure sensors **10**, **20**, **30**, and **40** detect the air pressure of a corresponding tire (step S**11**), read the sensor ID registered in their associated ID memories **12**, **22**, **32**, and **42** (step S**12**), produce transmission information as a combination of a detected pressure signal and the sensor ID (step S**13**), and transmit this transmission information as a signal of predetermined frequency at predetermined time intervals (step S**14**). The pneumatic tire pressure monitoring apparatus **50**, as shown in FIG. **3**B, checks whether or not the signal of predetermined frequency is received (step S**21**). When the signal of predetermined frequency is received (i.e., YES in step S**21**), the pneumatic tire pressure monitoring apparatus **50** extracts the sensor ID from the received signal (step S**22**), and compares the extracted sensor ID with a collation ID registered beforehand in the memory **55** to check whether or not the received signal is transmitted from any one of the sensors **10**, **20**, **30**, and **40** equipped in its own vehicle (step S**23**). When the received signal is a signal transmitted from any one of the sensors **10**, **20**, **30**, and **40** equipped in the own vehicle (i.e., YES in step S**23**), the pneumatic tire pressure monitoring apparatus **50** compares a momentary tire pressure P calculated based on the pressure signal contained in the received signal with a predetermined judgment value P**0** (step S**24**). When the momentary tire pressure P is less than the judgment value P**0** (i.e., YES in step P**24**), the pneumatic tire pressure monitoring apparatus **50** recognizes that the tire pressure is in the abnormal condition and causes the display unit **81** to indicate the state of abnormal pressure (step S**25**). When the judgment is NO in each of the steps S**21**, S**23**, and S**24**, the pneumatic tire pressure monitoring processing is terminated.

According to this embodiment, the collation ID used in the above pneumatic tire pressure monitoring processing is the receiver ID assigned inherently to the pneumatic tire pressure monitoring apparatus **50**. This receiver ID is registered as a transmitter ID in each of the pneumatic pressure sensors **10**, **20**, **30**, and **40**.

The ID registration is performed in accordance with the procedure shown in the flowchart of FIG. **4**.

First of all, the pneumatic tire pressure monitoring apparatus **50** is switched into an ID transmission mode (step S**110**). Respective pneumatic pressure sensors **10**, **20**, **30**, and **40** are switched into an ID registration mode (step S**120**). Then, the pneumatic tire pressure monitoring apparatus **50** transmits the receiver ID (step S**130**). The receiver ID having been thus transmitted from the monitoring apparatus **50** is received by respective sensors **10**, **20**, **30**, and **40** (step S**140**). The received receiver ID is registered as a transmitter ID in the ID memories **12**, **22**, **32**, and **42** of respective sensors **10**, **20**, **30**, and **40**, respectively (step S**150**). The above processing in the steps S**140** and S**150** is repeated until the ID registration of all sensors **10**, **20**, **30**, and **40** is accomplished (step S**160**). After the ID registration of respective sensors **10**, **20**, **30**, and **40** is accomplished (i.e., YES in step S**160**), the sensors **10**, **20**, **30**, and **40** are returned to the ordinary mode (step S**170**). The monitoring apparatus **50** is returned to the ordinary mode, too (step S**180**). Thus, the ID registration is accomplished.

Next, the contends of a program installed in the pneumatic tire pressure monitoring apparatus **50** to execute the above-described ID registration will be explained with reference to the flowchart shown in FIG. **5**. Depressing a predetermined button provided on an operation panel of the pneumatic tire pressure monitoring apparatus **50** runs the following program. The depression of this button also makes the pneumatic tire pressure monitoring apparatus **50** change its operation from the ordinary mode to the ID transmission mode.

As shown in FIG. **5**, the ID transmission mode processing includes transmission of a trigger signal for switching respective sensors **10**, **20**, **30**, and **40** into the ID registration mode (step S**210**). The frequency of this trigger signal is identical with that used in the pneumatic tire pressure monitoring processing explained with reference to FIG. **3**. Next, the receiver ID registered in the memory **55** is read out (step S**220**). The readout receiver ID is transmitted as a signal having the same frequency as that used in the pneumatic tire pressure monitoring processing (step S**230**). Then, it is checked whether or not a reply with respect to completion of the ID registration has arrived from respective sensors **10**, **20**, **30**, and **40** (step S**240**). When no reply has arrived during a predetermined period of time (i.e., NO in step S**240**), the control procedure returns to the above step S**220**. On the other hand, when the reply with respect to completion of the ID registration has arrived (i.e., YES in step S**240**), a return trigger signal for returning respective sensors **10**, **20**, **30**, and **40** to the ordinary mode is transmitted (step S**250**). The monitoring apparatus **50** is changed to the ordinary mode (step S**260**). Thus, the ID transmission mode processing is accomplished.

Next, the contents of the control processing executed in respective sensors **10**, **20**, **30**, and **40** will be explained. According to this control processing, as shown in FIG. **6**, it is first checked whether or not the trigger signal for switching the operation into the ID registration mode has been received (step S**310**). When no trigger signal is received (i.e., NO in step S**310**), this control processing is terminated. When the trigger signal is received (i.e., YES in step S**310**), each of respective sensors **10**, **20**, **30**, and **40** is switched into the ID registration mode (step S**320**). Then, it is checked whether or not the ID has been received (step S**330**). When the sensors **10**, **20**, **30**, and **40** have received the ID (i.e., YES in step S**330**), the received ID is registered as sensor ID, i.e., transmitter ID, in their ID memories **12**, **22**, **32**, and **42**, respectively (step S**340**). Then, the completion notice of the ID registration is returned (step S**350**). This notice is returned as a signal combined with the transmitter ID registered in the above step S**340**. Thereafter, it is checked whether or not the return trigger signal for returning the operation to the ordinary mode has been received (step S**360**). When the return trigger signal has been received (i.e., YES in step S**360**), the sensors **10**, **20**, **30**, and **40** are returned to the ordinary mode (step S**370**). Thus, the control processing of respective sensors **10**, **20**, **30**, and **40** is accomplished.

In the above step S**340**, the ID registration is executed in such a manner to overwrite a previous ID having been

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already registered in respective ID memories **12**, **22**, **32**, and **42**. Accordingly, in an event that exchange or position rotation of tires is performed, a new ID to be re-registered in respective sensors **10**, **20**, **30**, and **40** as well as in the monitoring apparatus **50** is newly issued by a repair shop or by a dealer.

According to this embodiment, as a result of the above-described control processing executed in the pneumatic tire pressure monitoring apparatus **50** and also in respective pneumatic pressure sensors **10**, **20**, **30**, and **40**, it becomes possible to register the transmitter ID based on the receiver ID. As a result that the transmitter ID agrees with the receiver ID, it becomes possible to easily register a correct transmitter ID to the pneumatic pressure sensor of a newly installed tire by executing the above-described control processing in the case that the tires are exchanged due to puncture or other reasons.

Next, a second embodiment of the present invention will be explained. The pneumatic tire pressure monitoring system in accordance with the second embodiment is similar to the above-described monitoring system of the first embodiment but is different in that respective tire houses are equipped with transmitters **91**, **92**, **93**, and **94** as shown in FIG. **7**. These transmitters **91**, **92**, **93**, and **94** are connected to the transmit/receive circuit **51** of the pneumatic tire pressure monitoring apparatus **50** via signal lines.

The contents of the program installed in the pneumatic tire pressure monitoring system **50** in accordance with the second embodiment will be explained with reference to the flowcharts shown in FIGS. **8** and **9**.

First, as shown in FIG. **8**, the trigger signal for switching respective pneumatic pressure sensors **10**, **20**, **30**, and **40** into the ID registration mode is transmitted (step **S410**). This trigger signal is transmitted via the transmitters **91**, **92**, **93**, and **94** provided in the tire houses. Next, the receiver ID is read out from the memory **55** (step **S420**). Then, the readout receiver ID is modified into a total of four code data by adding each of lower-bit data of '00', '01', '10', and '11' (step **S430**). The code data including the lower-bit '00' is registered as front-left wheel collation ID (i.e., FLID) into the memory **55** (step **S440**). The code data including the lower-bit '01' is registered as rear-left wheel collation ID (i.e., RLID) into the memory **55** (step **S450**). The code data including the lower-bit '10' is registered as rear-right wheel collation ID (i.e., RRID) into the memory **55** (step **S460**). And, the code data including the lower-bit '11' is registered as front-right wheel collation ID (i.e., FRID) into the memory **55** (step **S470**).

Then, as shown in FIG. **9**, the collation ID 'FLID' corresponding to the front-left wheel's pneumatic pressure sensor is read out from the memory **55** and is transmitted to the transmitter **91** provided in the tire house of the front-left wheel (**S510**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **10** attached to the front-left wheel (step **S520**). When no notice is returned from the sensor **10** within a predetermined period of time (i.e., NO in step **S520**), the control procedure returns to the above step **S510**. When the completion notice of the ID registration is returned from the sensor **10** (i.e., YES in step **S520**), the collation ID 'RLID' corresponding to the rear-left wheel's pneumatic pressure sensor is read out from the memory **55** and is transmitted to the transmitter **92** provided in the tire house of the rear-left wheel (**S530**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **20** attached to the rear-left wheel (step **S540**). When no notice is returned from the sensor **20** within a predetermined period of time (i.e., NO in step **S540**), the control procedure returns to the above step **S530**. When the completion notice of the ID registration is returned from the sensor **20** (i.e., YES in step **S540**), the collation ID 'RRID' corresponding to the rear-right wheel's pneumatic pressure sensor is read out from the memory **55** and is transmitted to the transmitter **93** provided in the tire house of the rear-right wheel (**S550**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **30** attached to the rear-right wheel (step **S550**). When no notice is returned from the sensor **30** within a predetermined period of time (i.e., NO in step **S560**), the control procedure returns to the above step **S550**. When the completion notice of the ID registration is returned from the sensor **30** (i.e., YES in step **S560**), the collation ID 'FRID' corresponding to the front-right wheel's pneumatic pressure sensor is read out from the memory **55** and is transmitted to the transmitter **94** provided in the tire house of the rear-right wheel (**S570**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **40** attached to the front-right wheel (step **S580**). When no notice is returned from the sensor **40** within a predetermined period of time (i.e., NO in step **S580**), the control procedure returns to the above step **S570**. When the completion notice of the ID registration is returned from the sensor **40** (i.e., YES in step **S580**), the return trigger signal for returning respective pneumatic pressure sensors **10**, **20**, **30**, and **40** to the ordinary mode is transmitted to respective transmitters **91**, **92**, **93**, and **94** (step **S590**). The monitoring apparatus **50** is also returned to the ordinary mode (step **S600**). Thus, the ID transmission mode processing is accomplished.

The program installed in respective pneumatic pressure sensors **10**, **20**, **30**, and **40** is similar to that of the first embodiment. According to the second embodiment, in addition to the effects of the first embodiment, it becomes possible to register the transmitter ID specifying the wheel position because the receiver IDs of respective sensors **10**, **20**, **30**, and **40** include the lower-bit data representing the wheel position. Accordingly, the monitoring result with respect to the pneumatic tire pressure can be shown together with the wheel position on the monitor. As the receiver ID is simply produced by adding two lower bits, it is possible to suppress the bit number of the data constituting the transmitter ID.

Next, a third embodiment of the present invention will be explained with reference to FIG. **10**. The pneumatic tire pressure monitoring system in accordance with the third embodiment includes an ID registration tool **60** in addition to the pneumatic pressure sensors **10**, **20**, **30**, and **40** and the pneumatic tire pressure monitoring apparatus **50** which are already explained in the first embodiment.

As shown in FIG. **10**, the ID registration tool **60** includes an ID receiving section **61** and an ID transmitting section **62**. The ID receiving section **61** receives the transmitter ID of each wheel produced based on the receiver ID by the pneumatic tire pressure monitoring apparatus **50**. The ID transmitting section **62** transmits the transmitter ID, received by the ID receiving section **61**, to respective pneumatic pressure sensors **10**, **20**, **30**, and **40**. Furthermore, the ID registration tool **60** has connectors **64** and **64***a*–**64***d* of signal lines **63** and **63***a*–**63***d* connecting the ID registration tool **60** to the pneumatic tire pressure monitoring apparatus **50** and to respective pneumatic pressure sensors **10**, **20**, **30**, and **40**. The signal lines **63** and **63***a*–**63***d* have front ends each being configured into an alligator clip which are detachably con-

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nected to the signal line **57** extending from the communication circuit **56** of the pneumatic tire pressure monitoring apparatus **50** to the display unit **81** and to antennas **16**, **26**, **36**, and **46** of the pneumatic pressure sensors **10**, **20**, **30**, and **40**.

Furthermore, the ID registration tool **60** includes a control unit **65**, a memory **66**, a power source battery **67**, an operation panel **68**, and a display unit **69**. The control unit **65**, constituted by a microcomputer including CPU, ROM, and RAM, performs the controls of various processes to be executed through the ID registration tool **60**. The memory **66** is an EEPROM (i.e., electrically erasable and programmable ROM) or a flash memory, and a DRAM (i.e., dynamic RAM). The power source battery **67** is a dry cell, a button cell or the like. The operation panel **68** is equipped with operation keys allowing an operator to instruct the contents of the processing to be executed through the ID registration tool **60**. The display unit **69**, for example constituted by an LCD, displays ID data received by the ID receiving section **61** or displays the operation mode of the ID registration tool **60**.

The contents of the program installed in the ID registration tool **60** in accordance with the third embodiment will be explained with reference to the flowcharts shown in FIGS. **11** and **12**.

Depressing a predetermined button provided on the operation panel **68** of the ID registration tool **60** runs the following program. According to this program, as shown in FIG. **11**, the trigger signal for switching the pneumatic tire pressure monitoring apparatus **50** into the ID transmission mode is transmitted (step **S710**). Furthermore, the trigger signal for switching respective pneumatic pressure sensors **10**, **20**, **30**, and **40** into the ID registration mode is transmitted (step **S720**).

Next, a command instructing transmission of the transmitter ID of the front left wheel (i.e., FLID) is transmitted to the pneumatic tire pressure monitoring apparatus **50** (step **S730**). When the FLID is received from the monitoring apparatus **50** (i.e., YES in step **S740**), the received data (i.e., FLID) is stored in the memory **66** in connection with the corresponding tire position FL (step **S750**). Next, a command instructing transmission of the transmitter ID of the rear left wheel (i.e., RLID) is transmitted to the pneumatic tire pressure monitoring apparatus **50** (step **S760**). When the RLID is received from the monitoring apparatus **50** (i.e., YES in step **S770**), the received data (i.e., RLID) is stored in the memory **66** in connection with the corresponding tire position RL (step **S780**). Next, a command instructing transmission of the transmitter ID of the rear right wheel (i.e., RRID) is transmitted to the pneumatic tire pressure monitoring apparatus **50** (step **S790**). When the RRID is received from the monitoring apparatus **50** (i.e., YES in step **S800**), the received data (i.e., RRID) is stored in the memory **66** in connection with the corresponding tire position RR (step **S810**). Next, a command instructing transmission of the transmitter ID of the front right wheel (i.e., FRID) is transmitted to the pneumatic tire pressure monitoring apparatus **50** (step **S820**). When the FRID is received from the monitoring apparatus **50** (i.e., YES in step **S830**), the received data (i.e., FRID) is stored in the memory **66** in connection with the corresponding tire position FR (step **S840**). Then, the return trigger signal is sent to the pneumatic tire pressure monitoring apparatus **50** to return its operation to the ordinary mode (step **S850**).

Next, as shown in FIG. **12**, the FLID is read out from the memory **66** and is transmitted to the pneumatic pressure sensor **10** of the front left wheel (step **S910**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **10** (step **S920**). When no notice is returned from the sensor **10** within a predetermined period of time (i.e., NO in step **S920**), the control procedure returns to the above step **S910**. When the completion notice of the ID registration is returned from the sensor **10** (i.e., YES in step **S920**), the RLID is read out from the memory **66** and is transmitted to the pneumatic pressure sensor **20** of the rear left wheel (step **S930**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **20** (step **S940**). When no notice is returned from the sensor **20** within a predetermined period of time (i.e., NO in step **S940**), the control procedure returns to the above step **S930**. When the completion notice of the ID registration is returned from the sensor **20** (i.e., YES in step **S940**), the RRID is read out from the memory **66** and is transmitted to the pneumatic pressure sensor **30** of the rear right wheel (step **S950**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **30** (step **S960**). When no notice is returned from the sensor **30** within a predetermined period of time (i.e., NO in step **S960**), the control procedure returns to the above step **S950**. When the completion notice of the ID registration is returned from the sensor **30** (i.e., YES in step **S960**), the FRID is read out from the memory **66** and is transmitted to the pneumatic pressure sensor **40** of the front right wheel (step **S970**). Then, it is checked whether or not the completion notice of the ID registration is returned from the pneumatic pressure sensor **40** (step **S980**). When no notice is returned from the sensor **40** within a predetermined period of time (i.e., NO in step **S980**), the control procedure returns to the above step **S970**. When the completion notice of the ID registration is returned from the sensor **40** (i.e., YES in step **S980**), the return trigger signal is sent to respective pneumatic pressure sensors **10**, **20**, **30**, and **40** to return their operation to the ordinary mode (step **S990**).

Next, the contents of the control processing executed in the pneumatic tire pressure monitoring apparatus **50** will be explained with reference to the flowcharts shown in FIGS. **13** and **14**. First, it is checked whether or not the trigger signal for switching the operation to the ID transmission mode has been received (step **S1000**). When no trigger signal is not received (i.e., NO in step **S1000**), this processing is terminated. When the trigger signal is received (i.e., YES in step **S1000**), the pneumatic tire pressure monitoring apparatus **50** is switched into the ID transmission mode (step **S1010**). Then, the receiver ID is read out from the memory **55** (step **S1020**). Then, the readout receiver ID is modified into a total of four code data by adding each of lower-bit data of '00', '01', '10', and '11' (step **S1030**). The code data including the lower-bit '00' is registered as front-left wheel collation ID (i.e., FLID) into the memory **55** (step **S1040**). The code data including the lower-bit '01' is registered as rear-left wheel collation ID (i.e., RLID) into the memory **55** (step **S1050**). The code data including the lower-bit '10' is registered as rear-right wheel collation ID (i.e., RRID) into the memory **55** (step **S1060**). And, the code data including the lower-bit '11' is registered as front-right wheel collation ID (i.e., FRID) into the memory **55** (step **S1070**).

Next, it is checked whether or not the command instructing transmission of the front left wheel's transmitter ID 'FLID' has been received (step **S1110**). When this command has been received (i.e., YES in step **S1110**), the FLID is read out from the memory **55** and is transmitted to the ID registration tool **60** (step **S1120**). Next, it is checked whether

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or not the command instructing transmission of the rear left wheel's transmitter ID 'RLID' has been received (step S1130). When this command has been received (i.e., YES in step S1130), the RLID is read out from the memory 55 and is transmitted to the ID registration tool 60 (step S1140). Next, it is checked whether or not the command instructing transmission of the rear right wheel's transmitter ID 'RRID' has been received (step S1150). When this command has been received (i.e., YES in step S1150), the RRID is read out from the memory 55 and is transmitted to the ID registration tool 60 (step S1160). Next, it is checked whether or not the command instructing transmission of the front right wheel's transmitter ID 'FRID' has been received (step S1170). When this command has been received (i.e., YES in step S1170), the FRID is read out from the memory 55 and is transmitted to the ID registration tool 60 (step S1180). Then, it is checked whether or not the return trigger signal for returning the operation to the ordinary mode has been received (step S1190). When the return trigger signal is received (i.e., YES in step S1190), the pneumatic tire pressure monitoring apparatus 50 is returned to the ordinary mode (step S1200). Thus, the ID transmission mode processing is accomplished.

The program installed in respective pneumatic pressure sensors 10, 20, 30, and 40 is similar to that of the first embodiment. According to the third embodiment, in addition to the effects of the first embodiment, it becomes possible to register the ID data of respective pneumatic pressure sensors in connection with their tire positions FL, RL, RR and FR as a result of the above-described control processing executed by the combination of the ID registration tool 60, the pneumatic tire pressure monitoring apparatus 50, and respective pneumatic pressure sensors 10, 20, 30 and 40. Thus, it becomes possible to eliminate erroneous registration caused by interference in radio data transmission or prevent other radio waves from interrupting the ID registration. Furthermore, in the case that tires are exchanged, executing the above-described control processing for the exchanged sensor makes it possible to correctly register a collation ID stored in the monitoring apparatus 50 to the sensor of a newly installed tire. Furthermore, in the case of performing the position rotation of the tires, the ID registration can be repetitively and accurately performed in accordance with the changed tire position.

Next, a fourth embodiment of the present invention will be explained. The pneumatic tire pressure monitoring system in accordance with the fourth embodiment is associated with a keyless entry apparatus so as to function as a security control system. The keyless entry apparatus allows a car user carrying an electronic key to lock/unlock the vehicle door without directly touching the door. As shown in FIG. 15, the security control system of the fourth embodiment includes the pneumatic pressure sensors (transmitters) 10, 20, 30, and 40 attached to respective tires, a security ECU (electronic control unit) 100 installed in the vehicle body, door ECUs 210, 220, 230, and 240 equipped in respective doors, transmitter antennas 250, 260, 270, and 280 provided in respective doors, a receiver antenna 290, the display unit 81, and an electronic key 200. The pneumatic pressure sensors 10, 20, 30, and 40 are identical in arrangement with those disclosed in the first embodiment.

The security ECU 100 includes a transmit/receive circuit 101, CPU 102, RPM 103, RAM 104, EEPROM 105, a power source circuit 106, and an input/output circuit 107. The display unit 81 and the door ECUs 210, 220, 230, and 240 are connected to the input/output interface 107 of the security ECU 100. The transmitter antennas 250, 260, 270, and 280 and the receiver antenna 290 are connected to the transmit/receive circuit 101. An ID assigned inherently to this security ECU 100, i.e., receiver ID, is stored in the ROM 103.

The electronic key 200 is, for example, a compact electronic unit installed at the top of a vehicle key to be inserted into a key cylinder. The electronic key 200 incorporates EEPROM, CPU or the like to register its ID and is constituted so as to execute radio (or wireless) transmit/receive operation of information or data.

The security control system not only functions as the pneumatic tire pressure monitoring system which executes the control processing shown in FIG. 3 but also functions as the keyless entry system which executes the control processing shown in FIG. 16. According to the keyless entry processing shown in FIG. 16, a request signal having a predetermined frequency is transmitted at predetermined time intervals (step S1310). The generation of this request signal is for confirming whether or not the authorized electronic key 200 exists within a predetermined peripheral area of the vehicle. Then, it is checked whether or not the receiver antenna 290 has received an acknowledge signal (ACK) corresponding to this request signal within the predetermined time (step S1320). When no ACK is received (i.e., NO in step S1320), this processing is terminated. On the other hand, when the ACK is received (i.e., YES in step S1320), the receiving processing starts by transmitting a request signal requesting transmission of a key ID used in the key collation (step S1330). When the key ID in response to this request signal is received (i.e., YES in step S1340), the key collation is executed (step S1350). When the detected electronic key 200 is an authorized one (i.e., YES in step S1350), predetermined keyless entry operation is executed (step S1360). The keyless entry operation includes check of a human sensor provided in the vicinity of a door handgrip, judgment of lock/unlock to be executed, and generation of a control command to the door ECU 210 or others based on the judgment result.

According to this embodiment, the receiver ID assigned inherently to the security ECU 100 is commonly used as collation ID for the pneumatic tire pressure monitoring processing and for the keyless entry processing. Accordingly, the receiver ID of the security ECU 100 is registered as transmitter ID of respective sensors 10, 20, 30, and 40 and of the electronic key 200. The registration procedure for the pneumatic pressure sensors 10, 20, 30, and 40 is identical with that already explained in the first embodiment. Regarding the electronic key 200, the transmitter ID is registered in the following manner.

FIG. 17 shows the ID registration procedure for the electronic key 200. First of all, the security ECU 100 is switched into the ID transmission mode (step S1410). Next, the electronic key 200 is switched into the ID registration mode (step S1420). Then, the security ECU 100 transmits the receiver ID (step S1430). The electronic key 200 receives the receiver ID being thus transmitted from the security ECU 100 (step S1440). The electronic key 200 registers the received receiver ID as its transmitter ID and stores the registered transmitter ID into EEPROM (step S1450). When the ID registration of the electronic key 200 is accomplished (YES in step S1460), the electronic key 200 resumes the ordinary mode (step S1470) and the security ECU 100 resumes the ordinary mode (step S1480). Thus, the ID registration processing is accomplished.

Next, the program installed in the security ECU 100 for executing the above-described registration processing will be explained with reference to the flowchart shown in FIG. 18. Depressing a predetermined button provided on an

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operation panel of the security ECU **100** runs the following program. The depression of this button also makes the security ECU **100** change its operation from the ordinary mode to the ID transmission mode.

As shown in FIG. **18**, the ID transmission mode processing for the electronic key **200** includes transmission of a trigger signal for switching the electronic key **200** into the ID registration mode (step **S1510**). The frequency of this trigger signal is identical with that used in the keyless entry processing explained with reference to FIG. **16**. Next, the receiver ID registered in the ROM **103** is read out (step **S1520**). Then, a predetermined bit number of code data is added to the readout receiver ID to produce a transmitter ID 'KEYID' for the electronic key **200** (step **S1530**). The predetermined bit number of code data being thus included in the transmitter ID 'KEYID' is for discriminating the transmitter ID 'KEYID' from the transmitter IDs assigned to respective pneumatic pressure sensors explained in the above-described second embodiment. The transmitter ID 'KEYID' of the electronic key **200** is registered in the EEPROM **105** (step **S1540**). The KEYID is transmitted as a signal having the same frequency as that used in the keyless entry processing (step **S1550**). Then, it is checked whether or not a reply with respect to completion of the ID registration has arrived from the electronic key **200** (step **S1560**). When no reply has arrived during a predetermined period of time (i.e., NO in step **S1560**), the control procedure returns to the above step **S1520**. On the other hand, when the reply with respect to completion of the ID registration has arrived (i.e., YES in step **S1560**), a return trigger signal for returning the electronic key **200** to the ordinary mode is transmitted (step **S1570**). The security ECU **100** is returned to the ordinary mode (step **S1580**). Thus, the ID transmission mode processing for the electronic key **200** is accomplished.

Next, the control processing executed in the electronic key **200** will be explained with reference to FIG. **19**. First of all, it is checked whether or not the trigger signal for switching the operation into the ID registration mode has been received (step **S1610**). When no trigger signal is received (i.e., NO in step **S1610**), this control processing is terminated. When the trigger signal is received (i.e., YES in step **S1610**), the electronic key **200** is changed into the ID registration mode (step **S1620**). Then, it is checked whether or not the KEYID has been received (step **S1630**). When the KEYID is received (i.e., YES in step **S1630**), the received KEYID is registered as key ID, i.e. transmitter ID, in the EEPROM (step **S11640**). Then, the completion notice of the ID registration is returned (step **S1650**). This notice is returned as a signal combined with the KEYID registered in the above step **S1640**. Thereafter, it is checked whether or not the return trigger signal for returning the operation to the ordinary mode has been received (step **S1660**). When the return trigger signal has been received (i.e., YES in step **S1660**), the electronic key **200** is returned to the ordinary mode (step **S1670**). Thus, the control processing of the electronic key **200** is accomplished.

As a result of the above-described control processing executed in the security ECU **100** and the electronic key **200**, the fourth embodiment makes it possible to register the transmitter ID (i.e., KEYID) of the electronic key **200** based on the receiver ID of the security ECU **100**. Furthermore, the KEYID of the electronic key **200** is identical with the receiver ID of the security ECU **100** except for the bit data added to discriminate the type of the transmitter. Thus, it becomes possible to commonly perform the collation processing for the pneumatic tire pressure monitoring system and for the keyless entry system. The software can be simplified. Especially, directly registering the receiver ID to the pneumatic pressure sensors **10**, **20**, **30**, and **40** and to the electronic key **200** is effective in realizing more simplified system. Furthermore, using the common transmitter ID in two different systems is effective in reducing the required bit number of the transmitter ID.

The present invention is not limited to the above-described embodiments and therefore can be modified in various ways without departing from the scope of the invention.

For example, the present invention can be applied to a vehicle equipped with only a keyless entry system. Furthermore, when the ID registration tool **60** is used, it is possible to execute wireless processing for receiving the transmitter ID between the pneumatic tire pressure monitoring apparatus **50** and the ID registration tool **60** without providing the signal line connecting them. In this case, the ID registration tool **60** transmits the transmitter ID to respective pneumatic pressure sensors **10**, **20**, **30**, and **40** by wireless.

Furthermore, when the control processing is performed based on information from a transmitter in a vehicle control other than the pneumatic tire pressure monitoring system or the keyless entry system, the collation ID of a receiver may be equalized with that of the transmitter. In such a case, the present invention is preferably employable as a vehicle control system. Meanwhile, the present invention can be also applied to ID registration for a system other than the vehicle.

Furthermore, the ID registered in the transmitter needs not be based on the receiver ID. For example, the purpose of the present invention is accomplished by transmitting a collation ID registered in the receiver to the transmitter and registering it as transmitter ID. Namely, the present invention differs from the conventional ID registration method according to which the ID of a transmitter is registered in a receiver. According to the present invention, the ID information registered in a receiver is registered in a transmitter. The ID registration according to the present invention is superior to the conventional method in that the ID registration can be accurately performed between the transmitter and the receiver even in the case that an additional transmitter is newly added or the transmitter is modified.

What is claimed is:

1. An ID registration method for an ID collation system which includes a receiver receiving information transmitted from a transmitter, comprising the steps of:

causing said receiver to transmit a collation ID to said transmitter;

causing said transmitter to receive said collation ID transmitted from said receiver and register the received collation ID as a registered ID of said transmitter;

causing said transmitter to produce transmission information including said registered ID of said transmitter and transmit said transmission information to said receiver;

causing said receiver to receive said transmission information and compare said registered ID included in said transmission information with said collation ID stored in said receiver to check whether or not said transmission information is transmitted from said transmitter; and

causing said receiver to perform predetermined processing according to said transmission information when said transmission information is transmitted from said transmitter.

2. An ID collation system comprising:

a transmitter for transmitting information including a registered ID;

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a receiver for receiving the information transmitted from said transmitter;

a control apparatus for checking the registered ID contained in the information received by the receiver and performing predetermined processing according to said information based on a check result of the registered ID;

a transmitter mode switching apparatus for switching said transmitter into an ID registration mode; and

a receiver mode switching apparatus for switching said receiver into an ID transmission mode,

wherein said receiver comprises an ID transmitting apparatus for transmitting a collation ID used in ID checking when the receiver is switched into the ID transmission mode by said receiver mode switching apparatus, and

said transmitter comprises an ID receiving apparatus for receiving the collation ID transmitted from said receiver when said transmitter is switched into the ID registration mode by said transmitter mode switching apparatus, and an ID registration apparatus for registering the collation ID received by said ID receiving apparatus as the registered ID of said transmitter.

3. A vehicle control system comprising:

a transmitter installed in a vehicle for transmitting information including a registered ID which is required to control a device installed in the vehicle;

a receiver installed in the vehicle for receiving the information transmitted from said transmitter;

a control apparatus for checking the registered ID contained in the information received by the receiver with reference to a collation ID and executing control of said device according to said information based on a check result of the registered ID;

a transmitter mode switching apparatus for switching said transmitter into an ID registration mode; and

a receiver mode switching apparatus for switching said receiver into an ID transmission mode,

wherein said receiver comprises an ID transmitting apparatus for transmitting said collation ID used in ID checking when said receiver is switched into the ID transmission mode by said receiver mode switching apparatus, and

said transmitter comprises an ID receiving apparatus for receiving said collation ID transmitted from said receiver when said transmitter is switched into the ID registration mode by said transmitter mode switching apparatus, and an ID registration apparatus for registering the collation ID received by said ID receiving apparatus as the registered ID of said transmitter,

wherein said device is a pneumatic air pressure monitoring apparatus for displaying monitoring result with respect to an air pressure of a tire installed in said vehicle,

said transmitter is incorporated in a pneumatic pressure sensor attached to said tire, and

said control apparatus executes control for the display of monitoring result with respect to the air pressure of the tire installed in said vehicle when the information received by said receiver is confirmed based on the result of ID checking as being transmitted from the pneumatic pressure sensor attached to said tire.

4. The vehicle control system in accordance with claim 3, wherein said collation ID is transmitted to said transmitter via a transmitter antenna provided in a tire house of said vehicle.

5. A vehicle control system comprising:

a transmitter for transmitting information required to control a device installed in a vehicle;

a receiver installed in a vehicle body for receiving the information transmitted from said transmitter;

a control apparatus installed in the vehicle body for checking an ID contained in the information received by the receiver with reference to a collation ID and executing control of said device according to said information based on check result of ID;

a transmitter mode switching apparatus for switching said transmitter into an ID registration mode; and

a receiver mode switching apparatus for switching said receiver into an ID transmission mode,

wherein said receiver comprises an ID transmitting apparatus for transmitting said collation ID used in ID checking when said receiver is switched into the ID transmission mode by said receiver mode switching apparatus, and

said transmitter comprises an ID receiving apparatus for receiving said collation ID transmitted from said receiver when said transmitter is switched into the ID registration mode by said transmitter mode switching apparatus, and an ID registration apparatus for storing the collation ID received by said ID receiving apparatus as a registered ID of said transmitter,

wherein said device installed in a vehicle is a keyless entry apparatus for executing contactless lock/unlock of a vehicle door,

said transmitter is incorporated in an electronic key, and

said control apparatus executes the contactless lock/unlock of the vehicle door based on checking result of ID of the electronic key contained in the information received by said receiver.

6. A vehicle control system comprising:

a transmitter for transmitting information required to control a device installed in a vehicle;

a receiver installed in a vehicle body for receiving the information transmitted from said transmitter;

a control apparatus installed in the vehicle body for checking an ID contained in the information received by the receiver with reference to a collation ID and executing control of said device according to said information based on check result of ID;

a transmitter mode switching apparatus for switching said transmitter into an ID registration mode; and

a receiver mode switching apparatus for switching said receiver into an ID transmission mode,

wherein said receiver comprises an ID transmitting apparatus for transmitting said collation ID used in ID checking when said receiver is switched into the ID transmission mode by said receiver mode switching apparatus, and

said transmitter comprises an ID receiving apparatus for receiving said collation ID transmitted from said receiver when said transmitter is switched into the ID registration mode by said transmitter mode switching apparatus, and an ID registration apparatus for storing the collation ID received by said ID receiving apparatus as a registered ID of said transmitter,

wherein said device installed in a vehicle includes a pneumatic air pressure monitoring apparatus for displaying monitoring result with respect to an air pressure of a tire installed in said vehicle and a keyless entry apparatus for executing contactless lock/unlock of a vehicle door,

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said transmitter is incorporated in a pneumatic pressure sensor attached to said tire and also in an electronic key, and

said control apparatus executes control for the display of monitoring result with respect to the air pressure of the tire installed in said vehicle when the information received by said receiver is confirmed based on the result of ID checking as being transmitted from the pneumatic pressure sensor attached to said tire, and also executes the contactless lock/unlock of the vehicle door when the information received by said receiver is confirmed based on the result of ID checking as being transmitted from an authorized electronic key.

7. The vehicle control system in accordance with claim 3, wherein said collation ID is determined based on an ID assigned inherently to said receiver.

8. The vehicle control system in accordance with claim 3, wherein said collation ID is transmitted to said transmitter via a predetermined external device.

9. The vehicle control system in accordance with claim 8, wherein said external device is detachably connected via a signal line to said receiver and to said transmitter.

10. The vehicle control system in accordance with claim 9, wherein

said transmitter mode switching apparatus is provided in said transmitter while said receiver mode switching apparatus is provided in said receiver, and

said external device comprises a trigger signal transmitting apparatus which transmits a trigger signal for causing said transmitter mode switching apparatus to switch said transmitter into the ID registration mode and a trigger signal for causing said receiver mode switching apparatus to switch said receiver into the ID transmission mode.

11. A pneumatic tire pressure monitoring apparatus comprising:

a pneumatic pressure sensor for each tire of a particular vehicle for transmitting an air-pressure signal together with a sensor ID of said pneumatic pressure sensor;

a receiver installed in the particular vehicle for receiving the air-pressure signal together with the sensor ID from one of the pneumatic pressure sensors;

a control apparatus for checking whether or not the received sensor ID agrees with the collation ID determined based on an ID assigned inherently to said receiver, and for executing control for monitoring an air pressure of said tire relating to the pneumatic pressure sensor with reference to said air-pressure signal based on check result of the received sensor ID; and

a receiver mode switching apparatus for switching said receiver into an ID transmission mode,

wherein said receiver comprises an ID transmitting apparatus for transmitting the collation ID used in ID checking when said receiver is switched into the ID transmission mode by said receiver mode switching apparatus,

and wherein each of the pneumatic pressure sensors of the tires of the particular vehicle comprises an ID receiving apparatus for receiving the collation ID transmitted from said receiver, and an ID registration apparatus for registering the collation ID received by said ID receiving apparatus as the sensor ID of the pneumatic pressure sensor.

12. A pneumatic tire pressure sensor comprising:

a pressure sensor installed in a particular vehicle for detecting an air pressure of a tire of the particular vehicle;

a receiving circuit for receiving a collation ID transmitted from a pneumatic tire pressure monitoring apparatus of the particular vehicle;

a transmitter ID registering apparatus for registering said collation ID received via said receiving circuit as a transmitter ID;

an ID memory for storing the transmitter ID registered by said transmitter ID registering apparatus; and

a transmitting circuit for transmitting a signal of the air pressure of the tire detected by said pressure sensor together with the transmitter ID stored in said ID memory to the pneumatic tire pressure monitoring apparatus, the pneumatic tire pressure monitoring apparatus checking whether or not the signal of the air pressure is transmitted from said pressure sensor by comparing the transmitter ID with the collation ID, and performing predetermined processing according to the signal of the air pressure when the signal of the air pressure is transmitted from said pressure sensor.

13. The pneumatic tire pressure sensor in accordance with claim 12, wherein

said receiving circuit receives a signal via a cable, and

said ID memory is a rewritable memory element having an overwriting function for renewing the data stored therein.

14. An ID registration tool for a pneumatic tire pressure monitoring system including a pneumatic pressure sensor attached to a tire of a vehicle and a pneumatic tire pressure monitoring apparatus installed in a vehicle body

wherein said ID registration tool comprises:

an ID transmission requesting apparatus for requesting said pneumatic tire pressure monitoring apparatus to transmit a collation ID used in ID checking;

an ID receiving circuit for receiving the collation ID transmitted from said pneumatic tire pressure monitoring apparatus in response to a request of said ID transmission requesting apparatus; and

an ID transmitting circuit for transmitting the collation ID received by said ID receiving circuit to said pneumatic pressure sensor, said pneumatic pressure sensor registering the collation ID transmitted by said ID transmitting circuit as a transmitter ID, said pneumatic pressure sensor transmitting an air-pressure signal together with the transmitter ID of said pneumatic pressure sensor to said pneumatic tire pressure monitoring apparatus, said pneumatic tire pressure monitoring apparatus receiving the air-pressure signal together with the transmitter ID, checking whether or not the received air-pressure signal is transmitted from said pneumatic pressure sensor by comparing the received transmitter ID with the collation ID, and monitoring an air pressure of the tire indicated by the air-pressure signal when the air-pressure signal is transmitted from said pneumatic pressure sensor.

15. The vehicle control system in accordance with claim 5, wherein said collation ID is determined based on an ID assigned inherently to said receiver.

16. The vehicle control system in accordance with claim 6, wherein said collation ID is determined based on an ID assigned inherently to said receiver.

17. The vehicle control system in accordance with any claim 5, wherein said collation ID is transmitted to said transmitter via a predetermined external device.

18. The vehicle control system in accordance with claim 6, wherein said collation ID is transmitted to said transmitter via a predetermined external device.

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19. The ID registration method in accordance with claim 1, wherein said collation ID is determined based on an ID assigned inherently to said receiver.

20. The ID registration method in accordance with claim 1, wherein said receiver is installed in a vehicle in which said transmitter is installed.

21. The ID registration method in accordance with claim 2, wherein said collation ID is determined based on an ID assigned inherently to said receiver.

22. The ID collation system in accordance with claim 2, wherein said receiver is installed in a vehicle in which said transmitter is installed.

23. The ID registration tool in accordance with claim 14, wherein said collation ID is determined based on an ID assigned inherently to said pneumatic tire pressure monitoring apparatus.

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US006941801B2

(12) **United States Patent**
Lemense et al.

(10) **Patent No.: US 6,941,801 B2**
(45) **Date of Patent: Sep. 13, 2005**

(54) **TIRE PRESSURE MONITORING SYSTEM**

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(73) Assignee: **Lear Corporation**, Southfield, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 107 days.

(21) Appl. No.: **10/742,490**

(22) Filed: **Dec. 19, 2003**

(65) **Prior Publication Data**

US 2005/0132792 A1 Jun. 23, 2005

(51) **Int. Cl.**[7] **E01C 23/00**
(52) **U.S. Cl.** **73/146**; 340/440
(58) **Field of Search** 73/146–146.5; 340/440–444

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,600,301	A	2/1997	Robinson, III	
5,838,229	A	11/1998	Robinson, III	
6,181,241	B1	1/2001	Normann et al.	
6,507,276	B1	1/2003	Young et al.	
6,696,935	B2 *	2/2004	Bonardi et al.	340/447
6,804,999	B2 *	10/2004	Okubo	73/146
2003/0030553	A1	2/2003	Schofield et al.	
2004/0149025	A1 *	8/2004	Toyofuku	73/146

OTHER PUBLICATIONS

Jeff Burgess, Motorola Inc., *Tire Pressure Monitoring: An Industry Under Pressure*, Jul. 2003, pp. 1–5.
Atmel Corporation, *Interface IC for 125 kHz Wake-Up Function*, 2003, pp. 1–13.
Tier One, *Dyco Tire Pressure Monitoring Systems*, Oct. 24, 2001, pp. 1–18.
Atmel Corporation, *Tire-Pressure Monitoring (TPM) Products*, Jun. 2003, pp. 1–10.

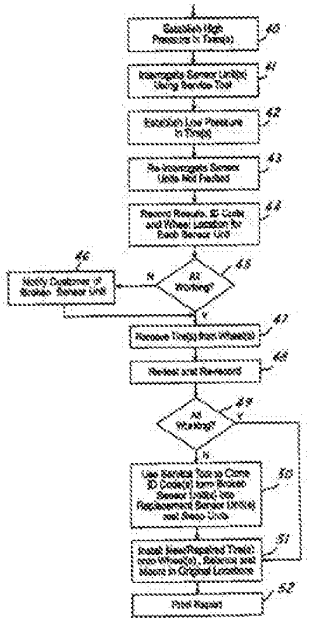
* cited by examiner

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Assistant Examiner—Alandra Ellington
(74) *Attorney, Agent, or Firm*—MacMillan, Sobanski & Todd, LLC

(57) **ABSTRACT**

A method is provided for replacing at least one tire of a vehicle on a first wheel in a first wheel position, the vehicle having a tire pressure monitoring system with a first sensor unit having a first ID code mounted to the first wheel. The first sensor unit is interrogated. Either a nominal result or a faulted result of the interrogation is detected. The at least one tire is removed from the first wheel. If the nominal result is detected during the interrogating step, then the first sensor unit is re-interrogated. Either a nominal result or a faulted result of the re-interrogation is detected. If either of the interrogation or the re-interrogation provide a faulted result then the first ID code is cloned into a replacement sensor unit and then the replacement sensor unit is swapped for the first sensor unit on the first wheel. A new tire is installed onto the first wheel. The first wheel is installed onto the vehicle in the first wheel position.

10 Claims, 2 Drawing Sheets



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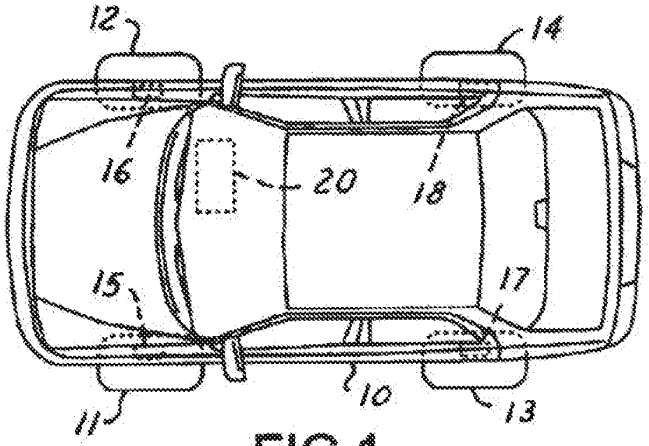


FIG.1

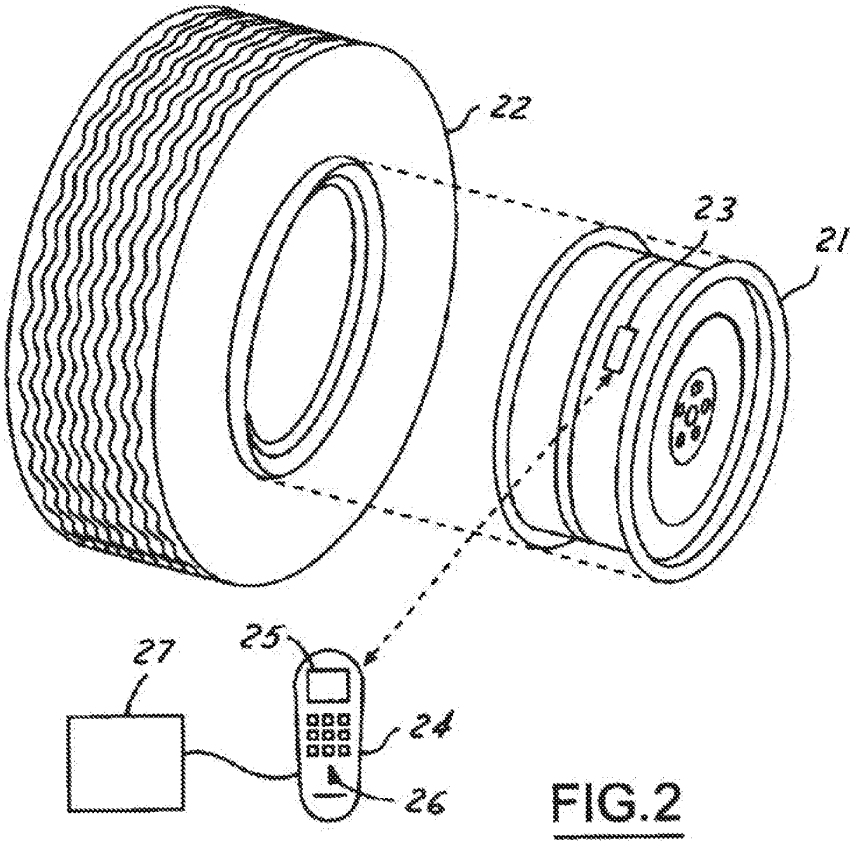


FIG.2

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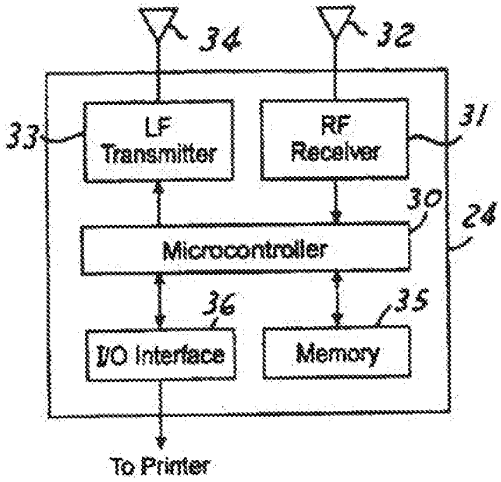


FIG.3

FIG.4

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TIRE PRESSURE MONITORING SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

Not Applicable.

BACKGROUND OF THE INVENTION

The present invention relates in general to vehicular tire pressure monitoring systems, and, more specifically, to replacing or otherwise servicing tires mounted on wheels containing tire pressure sensing units.

Real-time tire pressure monitoring systems (TPMS) can be used for the tires of transportation vehicles such as motor vehicles to alert a driver when proper tire inflation is not being maintained. Proper tire inflation is important to increase tire life, maximize fuel economy, and optimize tire performance in terms of handling, braking distance, and tire integrity.

A self-contained pressure/temperature sensor unit is typically mounted to a wheel in communication with the interior of the tire, e.g., mounted on the wheel spider. Since the wheel and the pressurized interior of a tire are not stationary, the sensor unit usually utilizes a radio transmitter to provide sensor data to a control module in the vehicle. Since each wheel typically has its own respective sensor unit which communicates with a single control module and since nearby vehicles may use the same transmission frequencies and protocols, the sensor transmissions are differentiated by providing a unique ID code within each sensor which is included in the transmissions. The control module must be configured to associate certain ID codes with respective wheel positions on the vehicle (e.g., left-front, right-front, left-rear, and right-rear for a 4-wheel passenger vehicle). Thus, when a particular pressure sensor indicates that an inadequate pressure is being sensed in its respective tire, the control module can alert the driver as to which tire is affected.

The presence of sensor units of tire pressure monitoring systems in or on the wheels of vehicles gives rise to certain difficulties when tires or wheels are repaired or replaced. The act of removing a tire from a wheel may result in inadvertent damage to the sensor unit. If after tire or wheel servicing it is noticed that a sensor unit is inoperative, then it may be difficult or impossible to determine whether the unit was faulty prior to or during servicing. Yet responsibility for assuming the cost of replacing the sensor unit may depend on a determination of when the unit was damaged.

When a sensor unit is replaced, the control module of the prior art has been reconfigured with a new ID code embedded in the replacement sensor so that its transmissions can be associated with the correct wheel position on the vehicle. The control module is typically placed into a "learning mode" and the respective sensor units are made to transmit their ID codes in sequence to the control module. However, this process add time, complexity, and expense when servicing the TPMS system.

SUMMARY OF THE INVENTION

The present invention has the advantage of providing a simple and efficient process for servicing tires in a tire pressure monitoring system so that the time at which a pressure sensing unit was damaged can be determined and reconfiguring of the control module can be avoided.

In one aspect of the invention, a method is provided for replacing at least one tire of a vehicle on a first wheel in a first wheel position, the vehicle having a tire pressure monitoring system with a first sensor unit having a first ID code mounted to the first wheel. The first sensor unit is interrogated. Either a nominal result or a faulted result of the interrogation is detected. The at least one tire is removed from the first wheel. If the nominal result is detected during the interrogating step, then the first sensor unit is re-interrogated. Either a nominal result or a faulted result of the re-interrogation is detected. If either of the interrogation or the re-interrogation provide a faulted result then the first ID code is cloned into a replacement sensor unit and then the replacement sensor unit is swapped for the first sensor unit on the first wheel. A new tire is installed onto the first wheel. The first wheel is installed onto the vehicle in the first wheel position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic view of a vehicle having a tire pressure monitoring system.

FIG. **2** shows a tire pressure sensing unit mounted to a wheel and being interrogated by a service tool.

FIG. **3** shows the service tool in greater detail.

FIG. **4** is a flowchart showing a preferred method of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. **1**, a vehicle **10** includes wheels **11–14** having pressure sensor units **15–18**, respectively, mounted thereon. Each sensor unit preferably includes a sensing and signal processing section (for generating a data signal indicative of the tire inflation pressure—either a pressure measurement or an indication of pressure being above or below a threshold) and a communication section for transmitting the data signal and an ID code to a control module **20**. Sensor units are known in the art, and may comprise commercially available, specialized components such as the MPXY8000 Series pressure and temperature sensor from Motorola, Inc. The RF link between the sensor units and control module **20** may utilize the same RF channel as is commonly used for remote keyless entry (RKE) systems for automobiles (e.g., a UHF channel at 315 MHz). As known in the art, control module **20** may integrate both the RKE and TPMS functions. Thus, the sensor units may include a commercially available microcontroller/transmitter component such as the MC68HC908RE2 MCU/transmitter chip, also from Motorola, for establishing a communication link from the sensor unit to the control module. For diagnostic and servicing purposes, the sensor unit may also include a wake-up receiver responsive to a low frequency (LF) signal to initiate execution of a sensing/transmission cycle or other predetermined routines. The LF receiver may be comprised of the ATA5283 wake-up receiver IC available from Amtel Corporation, for example, which responds to a 125 kHz wake-up signal.

As shown in FIG. **2**, a sensor unit **23** is mounted to a wheel **21** so that it is exposed to the interior of a tire **22** when it is installed on wheel **21**. A service tool **24** is utilized in the present invention for interacting with sensor unit **23** using the UHF radio link. It preferably includes a display **25** and

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a control keypad **26**. It may further be coupled to a printer **27** in order to create written records showing the results of testing of the sensor units during tire servicing.

FIG. **3** shows service tool **24** in greater detail. A microcontroller **30** is coupled to an RF receiver **31** and to an LF transmitter **33**. RF receiver **31** receives transmissions from a sensor unit via an antenna **32**. LF transmitter **33** sends a wake-up signal under control of microcontroller **30** to a sensor unit via an antenna **34**. Microcontroller **30** is coupled to a memory **35** for storing the results of testing (e.g., interrogating a sensor unit and evaluating the validity of its response) and to an I/O interface **36** which includes display **25**, keypad **26**, and a printing port for connecting to a printer.

Microcontroller **30** is programmed to perform various functions in order to interrogate a sensor unit that is placed within a close proximity (i.e., within the short range of the LF wake-up signal). An overall method of tire servicing according to the present invention is shown in FIG. **4**. In order to establish a known pressure condition for testing a sensor unit, a full (i.e., high) pressure is established in a tire or tires to be serviced in step **40**. The sensor unit(s) is (are) interrogated in step **41** using the service tool to send a wake-up command and to receive a data signal and ID code from each sensor unit involved in the tire replacement or repair. By comparing the data signal (i.e., pressure measurement or pressure range indication) with that expected in view of the full pressure present in the tire, the result of each interrogation can be classified by the service tool as a nominal result of a faulted result. A below normal (i.e., low) pressure is established in the tire or tires being serviced in step **42**. The sensor unit(s) is (are) re-interrogated in step **41** again using the service tool and the result(s) of the re-interrogation(s) are classified. In step **44**, the nominal or faulted results are recorded in memory by the service tool along with the respective ID codes and wheel locations (i.e., left-front, right-front, left-rear, right-rear).

In step **45**, either a tire service technician or the service tool itself makes a determination whether all sensor units for all tires being serviced are working properly. If not, then a vehicle owner or customer is notified of the broken sensor unit in step **46**, prior to actually beginning to service the tire. Thus, it can be clearly established that breakage of the sensor unit was not caused during servicing of the tire. The notification may include a printed report of the results stored in the memory of the service tool.

In step **47**, the tire service technician proceeds to remove the tire(s) from the wheel(s). During time removal, inadvertent damage may occur to the sensor unit because of the prying or jarring that may be required to break the tire seal and clear the tire over the wheel rims. After tire removal, the sensor unit(s) are re-tested and the corresponding results are recorded in step **48**. A check is made in step **49** to determine whether all the sensor units on wheels being serviced are working properly.

In step **50**, any non-working sensor units are replaced. Preferably, the service tool is used to replicate or clone the ID code of a broken sensor unit into a replacement sensor unit over a LF communication link between the service tool and the replacement sensor unit. The replacement sensor unit is swapped with the original (faulted) sensor unit by mounting the replacement to the corresponding wheel prior to re-installing a tire. If sensor unit damage prevents RF communication, then the corresponding ID code may be determined by other means (e.g., reading from a printed label on the sensor unit or obtaining the stored ID code from the control unit) and may then be programmed into the replacement sensor by the service tool. The sensor units may preferably be comprised of a universal replacement sensor of the type described in co-pending U.S. application serial number (Lear attorney docket 4056).

In step **51**, a new or repaired tire is installed onto each wheel being serviced. The wheels are balanced and then mounted in their original locations. Consequently, there is no need to reconfigure the correlation of ID codes with wheel locations stored in the control unit since these have not changed even if a sensor unit has been replaced. It may be desirable to retest each sensor after mounting to ensure that each is still functioning using the same test procedure shown in steps **40** through **43**. If desired, a final report describing the results of the testing and replacement of sensor units can be printed in step **52**.

What is claimed is:

1. A method of replacing at least one tire of a vehicle on a first wheel in a first wheel position, said vehicle having a tire pressure monitoring system with a first sensor unit having a first ID code mounted to said first wheel, said method comprising the steps of:

interrogating said first sensor unit;

detecting either a nominal result or a faulted result of said interrogation;

removing said one tire from said first wheel;

if said nominal result is detected during said interrogating step, then re-interrogating said first sensor unit;

detecting either a nominal result or a faulted result of said re-interrogation;

if either of said interrogation or said re-interrogation provide a faulted result then cloning said first ID code into a replacement sensor unit and swapping said replacement sensor unit for said first sensor unit on said first wheel;

installing a new tire onto said first wheel; and

installing said first wheel onto said vehicle in said first wheel position.

2. The method of claim **1** wherein said interrogating step and said re-interrogating step each comprises the steps of:

transmitting a low-frequency command from a service tool to said first sensor unit;

said first sensor unit transmitting a radio-frequency response message including sensor data and said first ID code; and

said service tool receiving said radio-frequency response message.

3. The method of claim **1** wherein said interrogating step comprises the steps of:

establishing a high pressure in said one tire;

transmitting a low-frequency command from a service tool to said first sensor unit;

said first sensor unit transmitting a first radio-frequency response message including sensor data and said first ID code;

said service tool receiving said first radio-frequency response message;

establishing a low pressure in said one tire;

transmitting a low-frequency command from said service tool to said first sensor unit;

said first sensor unit transmitting a second radio-frequency response message including sensor data and said first ID code; and

said service tool receiving said second radio-frequency response message.

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4. The method of claim 3 wherein said first detecting step comprises comparing said sensor data in said first and second radio-frequency response messages with predetermined data.

5. The method of claim 1 further comprising the step of:

recording said results of said interrogation and said re-interrogation to establish involvement of said removing step in any faulted result.

6. A method of replacing a plurality of tires of a vehicle on respective wheel in respective wheel positions, said vehicle having a tire pressure monitoring system with respective sensor units having respective ID codes mounted to said respective wheels, said method comprising the steps of:

sequentially interrogating said respective sensor units;

detecting either a nominal result or a faulted result of each of said interrogations;

removing said plurality of tires from said respective wheels;

re-interrogating said respective sensor units for which a nominal result was detected during said respective interrogations;

detecting either a nominal result or a faulted result of each of said re-interrogations;

if either of said interrogation or said re-interrogation for a respective sensor unit provide a faulted result then cloning said respective ID code of said respective sensor unit into a replacement sensor unit and swapping said replacement sensor unit for said respective sensor unit on said respective wheel;

installing a respective new tire onto each of said respective wheels; and

installing said respective wheels onto said vehicle in their respective wheel positions.

7. The method of claim 6 wherein said interrogating steps and said re-interrogating steps each comprise the steps of:

transmitting a low-frequency command from a service tool to a respective sensor unit;

said respective sensor unit transmitting a radio-frequency response message including sensor data and said respective ID code; and

said service tool receiving said radio-frequency response message.

8. The method of claim 6 wherein said interrogating steps each comprise the steps of:

establishing a high pressure in a respective tire;

transmitting a low-frequency command from a service tool to said respective sensor unit;

said respective sensor unit transmitting a first radio-frequency response message including sensor data and said respective ID code;

said service tool receiving said first radio-frequency response message;

establishing a low pressure in said respective tire;

transmitting a low-frequency command from said service tool to said respective sensor unit;

said respective sensor unit transmitting a second radio-frequency response message including sensor data and said respective ID code; and

said service tool receiving said second radio-frequency response message.

9. The method of claim 8 wherein said first detecting step comprises comparing said sensor data in said first and second radio-frequency response messages with predetermined data.

10. The method of claim 6 further comprising the step of:

recording said results of said interrogation and said re-interrogation to establish involvement of said removing step in any faulted result.

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US007079033B2

(12) **United States Patent**
Itou

(10) **Patent No.: US 7,079,033 B2**
(45) **Date of Patent: Jul. 18, 2006**

(54) **ID REGISTRATION METHOD FOR TIRE PRESSURE SENSOR, ID REGISTRATION APPARATUS, ID REGISTRATION TOOL FOR TIRE PRESSURE MONITORING SYSTEM, AND TIRE WITH AIR PRESSURE SENSOR**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 19 days.

(21) Appl. No.: **10/453,638**

(22) Filed: **Jun. 4, 2003**

(65) **Prior Publication Data**

US 2003/0227379 A1 Dec. 11, 2003

(30) **Foreign Application Priority Data**

Jun. 5, 2002 (JP) 2002-164985
Jun. 19, 2002 (JP) 2002-179149

(51) **Int. Cl.**
G08B 13/14 (2006.01)

(52) **U.S. Cl.** **340/572.3**; 340/442; 340/572.1; 340/10.51; 340/10.52; 340/557; 73/146

(58) **Field of Classification Search** ..... 340/572.3, 340/572.1, 442, 445, 447, 443, 461, 525, 340/825.69, 825.72, 10.51, 10.52, 572.8, 340/555–557; 73/146.5, 146.2, 146; 116/34 R; 152/510; 301/95.101; 428/195.1

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

649,988 A * 5/1900 Heneck et al. 417/35
4,687,942 A * 8/1987 Takagi et al. 250/556
4,734,674 A 3/1988 Thomas et al.
4,970,491 A 11/1990 Saini et al.
5,274,355 A * 12/1993 Galan 340/445
5,602,524 A 2/1997 Mock et al.
6,140,060 A * 11/2000 Meadows 235/462.01

(Continued)

FOREIGN PATENT DOCUMENTS

JP 6-68097 3/1994

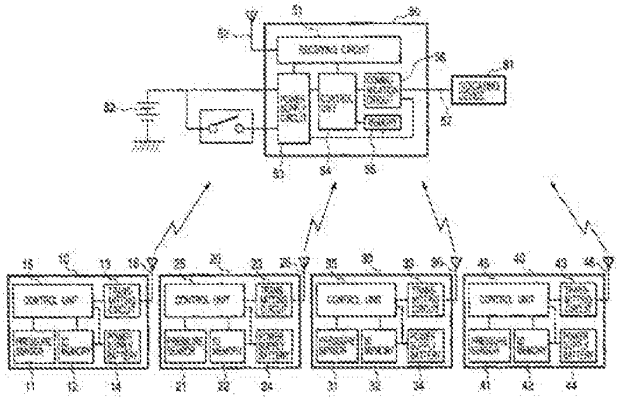
(Continued)

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(57) **ABSTRACT**

Provided is a tire pressure monitoring system capable of preventing mistaken registration of ID due to radio interference. In the system, a tire pressure monitoring apparatus is switched into an ID registration mode while an ID is read out from a bar code or the like and is transmitted to the tire pressure monitoring apparatus. The tire pressure monitoring apparatus registers the received ID in a memory. After the completion of the registration of a necessary number of IDs, the tire pressure monitoring apparatus is switched into a normal mode, before the ID registration operation comes to an end. On the other hand, in the case of tire replacement, through the use of an ID registration tool, an ID is read out from a bar code adhered onto a tire detached and is transmitted to the tire pressure monitoring apparatus. The tire pressure monitoring apparatus removes an ID corresponding to this ID from the memory, and through the use of the ID registration tool, an ID is read out from a bar code adhered onto a tire to be newly mounted and is transmitted to the tire pressure monitoring apparatus to be registered therein.

40 Claims, 79 Drawing Sheets



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