

Automotive Dashboard Indicator: Consequences of Different Types of Indicator to the Driver

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ABSTRACT

Automotive dashboard indicator is a way of interaction between cars and drivers. Located on the instrument cluster, it indicates usage of some features or function in a type of symbol or acronym such as handbrake, lamps and also as a warning to the driver a malfunction of some components or current condition of the car. The introduction of new electronic or safety features also contributes to the existence of new indicator on instrument cluster. However, some drivers are not aware of the important usage of this indicator. Drivers who understand a certain indicator are confused when they found a same indicator but presented in different symbol or acronym in some models of cars. This study investigates the possible consequences when some indicators are displayed in different symbols or acronyms. The focus is on a possibility of confusion and distraction while driving. A quantitative method has been used as it can easily gain results based on the questionnaire survey into the numerical data. Regarding to the result of this study, it is found that different types of some indicators raise confusion among drivers and there is a need to standardize these indicators. Therefore this study will benefit the automotive manufacturers to revise a design of indicators that can be easily recognized and user friendly, hence will raise awareness among drivers the importance of those indicators to assist them while driving.

Key words: Automotive dashboard indicator; Symbol; Acronym.

INTRODUCTION

Vehicles are changing in terms of styling, technology and features. Among those changes is the growing number of indicators on the instrument cluster based on a features or equipped system. The indicators are displayed in the form of pictorial (Symbol) or text (Acronym). In line with current technology of automotive world, the usage of instrument cluster has been more sophisticated. Automotive manufacturers compete with each other to introduce the latest technology inside a modern car. In the interior of a vehicle, the purpose of indicator can be considered as guidance as well as a reminder to the drivers in regards to their vehicle function and condition. This entire indicator has a meaning and some of its types have a standard design and colour code that must be followed by automotive manufacturers in the world. Since 1980s, the design and function of indicator in a vehicle have increased till date and more new features in a modern vehicle were created to interact with drivers following the technology and vehicle segment. As discussed in an article dashboardsymbols.com entitled "*What is that light on my dashboard*" (2010), every year, a new feature is added to vehicles, each of which is accompanied by a new symbol or acronym.

In modern vehicle, indicator lights are used as a reminder to the drivers before and while driving. As discussed in the *dashboardsymbol.com*, the International Standards Organization (ISO) establishes symbols for use on controls, indicators and tell-tales applying to passenger cars, light and heavy commercial vehicles and buses, to ensure identification and facilitate use. It also indicates the colours of possible optical tell-tales, which are supposed to inform the driver of either correct operation or malfunctioning of the related devices.




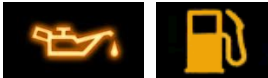


The indicators will appear on instrument cluster and illuminate to alert drivers when they turn the ignition switch to ON position, while some will remain until the drivers react to the situation that makes the lights on. Baber and Wankling (1992) have classified warning lights into three classes which are state information, advisories and warnings.

Table 1.1: Three classes of warning lights

CLASS	PURPOSE	EXAMPLE
State Information	To inform the drivers the state of driver controlled functions and are normally “On” or “Off”.	Indicators, main beam, hazard lights.
Advisories	To inform the drivers on vehicle states which require attention in the near future.	Fuel low, bulb or fuse failure, brake pads worn.
Warnings	To inform the drivers on vehicle states which require immediate attention.	High engine temperature, Low oil pressure

Normally, the indicators are illuminated by using standard colour code. Blue and green lights are used as the information indicator to drivers. Orange or amber lights mean the problem should be checked at the earliest convenience while red lights indicate a problem that should be checked immediately.

Table 1.2: Standard colour code and meaning for symbol on instrument cluster

COLOR	MEANING	EXAMPLE
	Information	
	Checked	
	Checked Immediately	

Position or arrangement of each symbol on instrument cluster is also different between types or models of the car. Each manufacturer has their needs in designing variable layouts of meter cluster, but basic indicators still remain. Some manufacturers also add some new indicators based on types of models and features inside. For instance, figure 1.1 shows that the instrument cluster of Perodua Myvi 2012 has simple layout compared to 2013 Honda CRV that has much more additional indicators.



Figure 1.1: 2012 Perodua Myvi Instrument Cluster (Left) and 2013 Honda CRV Instrument Cluster (Right). Source: www.paultan.org

PROBLEM IDENTIFICATION

Airbag, Anti-Lock Braking System (ABS), and Vehicle Stability Control are some of the new tech-based features installed in a current vehicle. It means that there will be new indicators on the instrument cluster of the vehicle to indicate the function of those features. Those indicators are supposed to be identified easily by all people everywhere in the world regardless of language and background. Some indicators also indicates a same function but has a different design. For example, an indicator for Cruise Control, Parking Brake, Check Engine and Vehicle Stability Control (VSA) as seen in figure 1.2, some automotive manufacturer use those indicators in a form of symbol and some of them use a text type indicator.

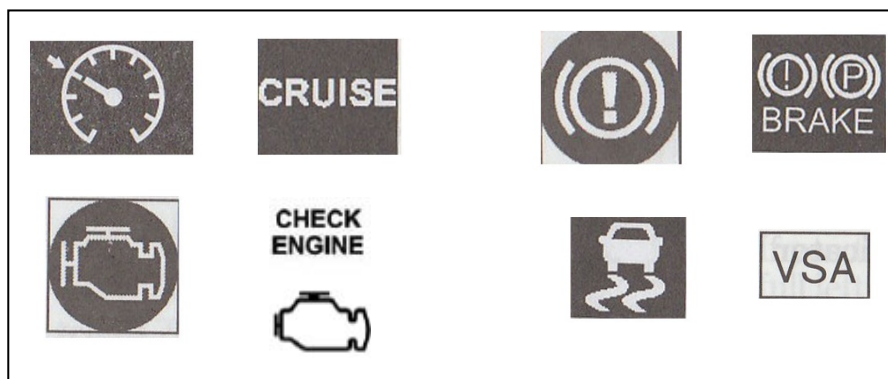


Figure 1.2: Indicators that indicate same function but has a different design.

When the number of indicators is growing, drivers have to face its consequences. Baber and Wankling (1992) noted that “a dramatic increase in the number of warning lights on a single dashboard results in excessive information load for a driver and problems of interpreting the mass of information displayed”(p. 255). This statements is also supported by the article in *dashboardsymbols.com*

entitled “*What the Hell is that Light on My Dashboard*” (2010), where drivers are frustrated, afraid and sometimes even angry at the growing number of these seemingly senseless symbols. Birrel, Stewart, Young and Mark (2011) explained:

“Based on advance in technology, motivations of manufacturers and consumer demand, the amount of instrumentation in modern vehicle has increased and this added information (indicators) raises significant ergonomic concerns for driver mental workload, distraction and driving task performance [italics added] so that more ergonomic approach would be to treat the cause by focusing on the appropriate design of in-vehicle information system (IVIS)” (p.484).

In other situation, some symbol have a different designs. Different types of indicator also lead to the driver’s inattention while driving. A ‘100-car naturalistic study’ completed in the US suggested that driver inattention accounts for almost 80% of crashes and 65% near crashes. Klauer, Dingus, Neale, Sudweeks & Ramsey, (2006) found little evidence of distraction from IVIS system which include the indicators, plays in the number and severity of road accidents (p.575).

One of the cases a pictorial symbol has been misunderstood by drivers has been discussed is the TPMS ([Tire Pressure Monitoring System](#)) indicator which is the single most misunderstood and maligned trouble light seen on instrument panel as discussed in [dashboardsymbol.com](#) website entitled “*The Single Most Misunderstood Warning Indicator on Your Instrument Panel*” (2010). In United State (US), a car or light duty vehicle manufactured after September 2007 has equipped with TPMS. According to a statement in [www.safecar.gov](#) entitled “*When will the New TPMS be Available?*”, U.S. government through National Highway Traffic Administration requires all passenger car, light trucks and vans equipped with this system starting 2008.



FIGURE 1.3 : Tire Pressure Monitoring System (TPMS) Indicator/Symbol

Under the category of misunderstood indicators, this TPMS light has been described variously by drivers as:

- i) An exclamation point in parenthesis
- ii) An exclamation point in brackets
- iii) An exclamation point in a horseshoe
- iv) Flames – destined to be a classic
- v) A wishbone
- vi) An exclamation point in a fish bowl

- vii) An exclamation point in a cup
- viii) A candle in a glass.

Further discussion in the article of the misunderstood TPMS issue, never has anyone of the drivers called and said “I have an exclamation point in the cutaway of a tire” – which is exactly the correct answer.

This issue has given a point that not all drivers clearly understand some symbols and indicators in their cars. Back to the articles, it also describe that *under the category of maligned, everyone from drivers to service personnel, believe this symbol is nothing but a pain in the neck*. But, in truth, it is doing its function; too give attention to the driver a fact that the pressure in one or more of their car tires is low. The long term advantages of using TPMS if the indicator illuminates, include saving money and spent on replacing new tires because it will reduce rolling resistance and also can extend the tire lifespan and gas inside.

There are four possible scenarios suggested according to TPMS indicator issue:

1. All the tires are low on air. This occurs seasonally as the weather cools, and possibly several times. As a solution, drivers need to check the pressure and inflate the tires properly.
2. One tire is low. It is likely that a nail or other fault is causing the tire to leak slowly. By checking every tire pressure, it will reveal a single tire to be low. A qualified service facility will be needed to address the problem.
3. The system needs to be reset. If drivers recently had the tires rotated or replaced, check with car manufacturer dealer about resetting the TPMS system.
4. If the light is flashing, there is a fault in the TPMS system, which car manufacturer dealer will have to resolve. In the first three cases, the light is simply illuminated, not flashing.

METHODOLOGY

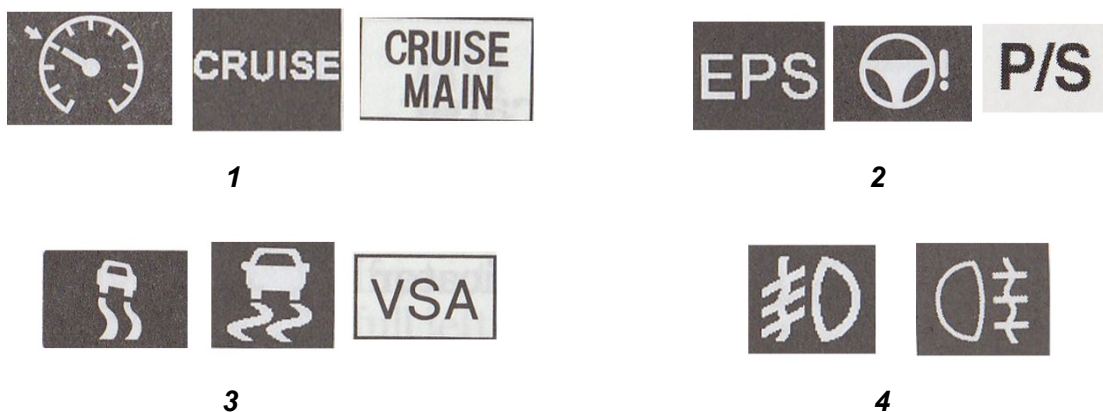
The intention of this study is to determine the consequences of the use of different type of indicators found on instrument cluster in various car brands. In order to achieve this, it is crucial to get a perspective viewpoint from drivers of the car itself the possibility their focus on while driving is distracted due to different types of indicators. The quantitative approach was selected as a method for this study because it could easily gain results based on the questionnaire survey into the numerical/statistical data. The results can be used to describe the effects of different indicators on instrument cluster of the vehicle. Quantitative studies have results that are based on numeric analysis and statistics. Quantitative approach is fast and economical and is suitable when time and resources are limited, suitable with this research because the reference related to the indicator, symbol & acronym is limited.

To gather the data for this study, a number of 70 questionnaires were distributed through a survey to 70 drivers or users that has been randomly selected. The criteria of the selected participant were based on their age, career, gender and driving experience. The non-experimental research has been used in this research in order to gain reliable results as it is also known as survey research. Chua (2012) agree that advantages of this type of research method can be used widely as it was useful in explaining attitudes, views and behavior, easy to conduct by using questionnaire, the data can be quickly collected by using large samples, data collected directly from participants and the results can be generalized. To compare

a different design of indicators, a sample from three automotive manufacturers owner’s manual book has been used which are Proton Exora (2012), Toyota Vios (2009) and Suzuki Swift (2007).

FINDINGS

Based on the data analysis results, most participants were confused by four indicators which are Cruise Control System (1), Electric Power Steering System (EPS) (2), Electronic Stability Control (ESC) or Vehicle Stability Control (VSC) System (3) and Front (Left) and Rear (Right) Fog Lamp (4). This is because they have different types of indicators based on the brand of the car. However, those indicators represent same features except for front and rear fog light.



One of the indicators confusing drivers is rear fog light indicator. It serves as a warning lamp to the vehicle behind when the weather is foggy, snowy or heavy rain. In, Malaysia, this function can be found on the car as it was a compulsory features by Road Transport Department following the UNECE regulations since 2012. Based on data analysis, 53 out of 70 participants are confused with this indicator. This results is a proof that many drivers misused this feature because they assume it represents an indicator for front fog lamps. The light from rear fog lamps is brighter than the rear combination lamps and may distract other drivers on the road when the drivers misuse this function in an unacceptable state.



Figure 1.4: A symbol represent front fog lamp (left) and rear fog lamp (right)

and also the position of the rear fog lamps on the car
 Source: dashboardsymbol.com & brokenssecrets.com

With various automotive brand selling their vehicles currently, it is possible that indicators will have different designs and keep growing. It requires drivers especially new ones to always be alert of the changes on the indicators design to reduce the possibility of lost concentration while driving.

CONCLUSION AND RECOMMENDATION

Different indicators can lead to confusion to the drivers if the indicators have different designs according to vehicle brands but represent the same function. Drivers can also be confused if they see a new indicator that represents new features inside the vehicles and this is why owner's manual book needs to be used.

Suggested recommendation for this research is based on analyzed results from the questionnaire survey. Indicators on instrument cluster inside vehicles actually help or guide drivers or users to always be alert before, while and after they drive any vehicle. Road Transport Department should create a guideline on a standard design of indicators especially the important indicators for automotive manufacturer. This can be done by a cooperation with Malaysia Design Council and Standard and Industrial Research of Malaysia (SIRIM) to standardize indicators design on instrumentation panel. In addition, a syllabus content in driving school should have an information about the basic indicators inside a vehicle to enhance knowledge of new drivers about the function and features inside the car.

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