ECF Position Paper on the Implementing Legislation of the General Safety Regulations for Intelligent Speed Assistance (ISA) Systems

European Cyclists' Federation

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Executive Summary

ECF is concerned that the draft implementing legislation for the General Safety Regulations will allow cascading alarm as the sole assisting function of the Intelligent Speed Assistance system. We believe that this will not be an "…***appropriate and effective*** feedback" for maintaining speed limit.

- Auditory warnings have been shown in many studies to be the most annoying warning for drivers
- Given that the system can very easily be switched off (even within the same movement as the master switch)
- Given the annoyance of the system it will be turned off almost automatically by the driver
- *Therefore, if the driver is compelled to turn off the system more than she/he is compelled to use the system to reduce the speed, then it is not an **effective** system*
- The ISA system should encourage drivers to use the system as much as possible. Encouragement and 'pleasantness' of use should be the key to appropriate and effective feedback rather than "annoyance" and harassing the driver
- Speed Control Function (SCF) assistance systems have been shown to be 'effective' and 'pleasant' to use, and should therefore suffice as an 'appropriate and effective' system
- A vibrating (without SCF) feedback on the accelerator should also not be considered since it too has been found to be "annoying" to use and would also not encourage use

Following the European Transport Safety Council (ETSC), ECF would also require higher performance of speed limit determinants, should differentiate between the two types of signs.

- For *explicit* speed limit signs: the correct speed limit should be determined for ≥99% of sign passing events.
- For *implicit* speed limit signs*:* the correct speed limit should be determined for ≥95% of sign passing events
- The distance-based performance requirements should also require higher performance, at ≥95%, in line with the suggested event-based performance requirement for the implicit speed signs

Introduction

The review of the General Safety Regulations[1] (GSR) has the potential to be a revolutionary moment in European road safety, particularly for those outside of the vehicle. In around 30% of fatal crashes, speed is an essential contributory factor and exceeding speed limits is very common. Typically, 40 to 50% of the drivers travel faster than the speed limit, and between 10 to 20% exceed the speed limit by more than 10 km/h[2]. ETSC[3] claim that 2,100 lives could be saved each year if the average speed dropped by only 1 km/h on all roads across the EU.

Up to 30% of drivers exceed speed limits on motorways, up to 70% on roads outside built-up areas and as many as 80% in urban areas exceed speed limits, however, when asked if they ever broke the speed limit only 7% of drivers replied that they did in urban areas[4]. This shows the need of an assisting system within vehicles to assist the driver in keeping below the limit. This is not simply a question of bad drivers speeding no matter what, it is also crucially about helping law abiding drivers keep to the limit.

While car occupant fatalities have dropped by 24% over the past ten years, cycling fatalities has stalled since 2010[5]. The new GSR mandates many measures that will have an impact on saving lives outside the vehicle as well as those inside the vehicle; including Autonomous Emergency braking, better passive safety, truck direct vision, and truck Blind Spot Information systems; and others[6]. But arguably the most important is the Intelligent Speed Assistance system that will be mandatory in all vehicles from 2022. ISA can be the single most important tool to reduce fatalities and reaching the Commission targets on halving KSI rates by 2030[7], the Commission cannot afford to fail again to reach its target by a 50 % margin (as it did for the 2010 – 2020 period).

Article 6 of the GSR requires that all vehicles must have an ISA and that "it shall be possible for the driver to be made aware through the accelerator control, or through dedicated, appropriate and effective feedback, that the applicable speed limit is exceeded". The system can also be overridden, and also unfortunately turned off. Currently implementing legislation is underway to lay down explicitly the type and function of the ISA to be used in Type Approval testing. The current draft lays out the terms of the legislation as being a Speed Limit Information System (SLIF), to enable the driver to know the speed limit, but also, an assisting system that will assist the driver to keep below the speed limit, either as;

- a Speed Limit Warning Function (SLWF), or
- a Speed Control Function (SCF)

It is this assisting function that has the potential to drastically improve the road safety situation on European roads and save thousands of lives. For this assisting function the GSR requires that the driver be made aware that the speed limit is being exceeded through either;

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[1] https://eur-lex.europa.eu/eli/reg/2019/2144/oj
[2] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjx95i7ocrqAhUNqaQKHVOdBrUQFjAKegQIAhAB&url=https%3A%2F%2Fec.europa.eu%2Ftransport%2Froad_safety%2Fsites%2Froadsafety%2Ffiles%2Fpdf%2Fersosynthesis2018-speedspeedmanagement.pdf&usg=AOvVaw0tfYe3BWQFAufMn_vtNU7-
[3] Henk Stipdonk "The mathematical relation between crash risk and speed; a summary of findings based on scientific literature" quoted in ETSC PIN Report https://etsc.eu/reducing-speeding-in-europe-pin-flash-36/
[4] http://archive.etsc.eu/documents/Intelligent_Speed_Assistance_FAQs_2013.pdf
[5] https://etsc.eu/how-safe-is-walking-and-cycling-in-europe-pin-flash-38/
[6] https://eur-lex.europa.eu/eli/reg/2019/2144/oj
[7] https://ec.europa.eu/transport/road_safety/

- "the accelerator control"
    or
- "…through dedicated, appropriate and effective feedback, that the applicable speed limit is exceeded"

The system may also be overridden, and it may also be turned off. There is also no specification on the ease of actions to turn off the system, we must assume that given the antipathy of the industry to an ISA[8], the system will be made extremely easy to switch off. As well as a Speed Control Function SCF, and haptic vibrating pedal feedback, the draft implementing legislation text allows for cascading acoustic warnings to be the sole 'assisting' function in the vehicle, This is the main point of concern, as we believe that cascading acoustic warnings are neither appropriate nor effective.

Cascading auditory warnings should not be the basis of an assisting ISA system

According to the General Safety Regulations, the ISA must be 'on' when the vehicle starts up, it can also be turned off. A cascading auditory alarm would be very annoying to drivers, and almost all research looking into auditory warnings believe this to be the case[9]. Paragraphs 2.5.2.1.5, and 2.6.1.3 of the draft text also recognise the importance of minimising driver annoyance.

A 2020 study led by Professor Oliver Carsten at the Institute for Transport Studies, University of Leeds, commissioned by ETSC[10], examined five different modes of feedback for ISA systems, specifically with the aim of providing recommendations for the ISA delegated act. The study found that drivers rated acoustic warnings as the most annoying type of feedback, especially when driving with a passenger (see graph below).
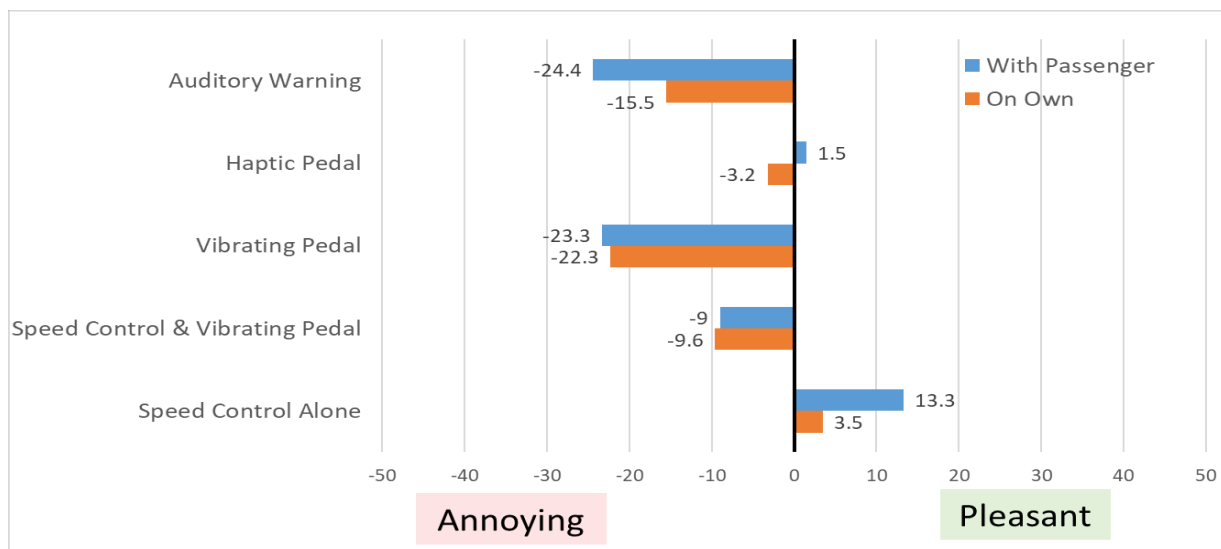
Figure 1 - Pleasantness and Annoyance. Participants completed the pleasantness/annoyance questionnaire twice: once on their own and a second time as though they had a passenger in the front seat.

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[8] https://www.acea.be/news/article/intelligent-speed-assistance-why-isa-cant-become-mandatory-today https://autovistagroup.com/news-and-insights/europe-agrees-mandatory-safety-systems-2022
[9] https://etsc.eu/new-study-offers-insights-into-most-effective-isa-systems/ ;
https://www.researchgate.net/publication/8504090_Auditory_alerts_for_in-vehicle_information_systems_The_effects_of_temporal_conflict_and_sound_parameters_on_driver_attitudes_and_performance ;
https://www.sciencedirect.com/science/article/pii/S1877042813040548?via%3Dihub
[10] Carsten, O. et al. (2020), Intelligent Speed Assistance (ISA) Interface Study, https://etsc.eu/new-study-offers-insights-into-most-effective-isa-systems/

Within the regulation there is no reference to the ease with which this system can be turned off, the ISA turn off function could even be made a part of the engine turn on master switch function[11] we have to assume that any barriers to using the ISA system will move the driver towards turning off the ISA. It is because the system can be so easily turned off that annoyance/pleasantness is such an important determinant in deciding whether a system is effective or not.

Drivers very often do not mean to breach speed limits. In cars that are silent with incredible electronic suspension, speed is difficult to assess, add to this the difficulty in knowing the speed limit on many roads; an ISA system is there to assist these drivers. Combatting drivers who will speed at any cost are lost to a system that can be easily switched off. But more importantly, ETSC's Pin Flash Report on Speeding[12] shows that on urban roads between 35% and 75% of vehicle speed observations across Europe are higher than the legal speed; this is not simply a problem of persistent law-breaking speeders. Maintaining the speed on the roads can be problematic for even law-abiding motorists. This system must attempt to coax those law-abiding drivers to use this system. Therefore, _the ISA system must aim at helping the majority of drivers who do wish to stay within the speed limits_. But by introducing an annoying cascading alarm which will be easily turned off even by law abiding drivers we miss an opportunity to reduce the speed of the European vehicle fleet.

The driver has a choice; either be often warned by an annoying cascading alarm when the speed limit is breached or turn the system off at the same time or just after switching on the master control of the engine. The third choice of using an ISA to reduce the speed, the outcome that the legislation is attempting to achieve, would be of secondary importance when a simple turn of a switch would be easier than reducing the speed in the vehicle. This should be a key requirement within the legislation when deciding whether a system is effective or not.

If the driver is compelled to turn off the system more than compelled to reduce the speed, then it is not an effective system.

To be an effective ISA system a driver should be given every opportunity to work with the system more than wanting to turn it off. ECF would contend that an annoying cascading auditory system would not fulfil this requirement.

Given the simplicity of being able to turn the ISA off and even that it could be built into a Master switch, _"annoyance" and bullying the driver should not be the main feature of assisting drivers to reduce speed_. Instead _the system should encourage drivers to use the system as much as possible_. Encouragement and 'pleasantness' of use should be the key to effectiveness rather than annoyance and harassing the driver.

This was anticipated by the Parliament and Council with Recital 8 of the draft delegated act states that in order "to minimise driver annoyance by sub-optimal systems in the real-world, ambitious requirements should be set to, first, ensure that vehicle manufacturers will employ appropriate technologies in the vehicle fleet (…)". Allowing for cascading auditory warnings as the sole assisting function in the delegated act thereby contravenes the goals set out in its recitals, as ISA systems with auditory warnings will annoy drivers and are therefore sub-optimal systems.

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[11] Perhaps as simple as a turn switch with two ratchets; a turn 45 degree to turn the engine on and then continue another 45 degrees to turn off the ISA. Or a button next to the master switch
[12] https://etsc.eu/reducing-speeding-in-europe-pin-flash-36/

This would also apply to the haptic vibrating (without SCF) pedal. Carsten's report on various assisting technologies also found the vibrating pedal was similarly annoying and therefore likely to be switched off.

Conclusion –

If the driver is compelled to turn off the ISA system more than compelled to reduce the speed, then the ISA would not be an effective system. Given the annoyance factor associated with cascading alarms, and the ease with which they can be turned off, these auditory signals should not be a part of the ISA assisting function as it would not be an 'appropriate or effective' feedback. Nor should a vibrating pedal be considered since it too would not be used by the driver, and therefore would not be effective. A Speed Control Function, with or without haptic feedback should be considered as the choice for the assisting function.

Improvement of detection rate

An ISA system that frequently provides the driver with incorrect speed limit information will annoy the driver, which in turn will increase the likelihood of drivers turning off the ISA system – thereby limiting the system's effectiveness for road safety. ECF would call for an increase in the detection rates for the event-based performance requirements to be set at ≥99% for explicit speed limit signs (signs specifically marked with the limit) and ≥95% for implicit (signs where the limit is inferred) speed limit signs, and the distance-based performance requirement should be set at 95%.

Given the ease of modern-day camera and sensing systems a target of ≥99% should be set for explicit speed limit signs. According to mapmakers, 60% of the speed limits in Europe are set by implicit speed limit signs, versus 40% by explicit signs. It is therefore important that ISA systems are required to correctly identify these implicit signs as they have a major impact on the correct use of speed limits by the ISA system. However, as these signs are relatively more complex than signs with a numerical value, they are more challenging for ISA to correctly identify, therefore a slightly lower performance requirement of ≥95% is acceptable, in order to allow for a minor margin of error.

Adaptive Cruise Control

It is important that there is a requirement that the speed control function be used when the driver is in (adaptive) cruise control mode

Deactivation of the ISA system

The system should be difficult to turn off regardless of what Assisting system is being used. All other systems require a sequence of actions by the driver. The ISA operational instructions should be comparable and intuitively coordinated into the other Advanced Driver Assistance Systems ADAS systems on board the vehicle. It would ensure harmonisation across the requirements for different ADAS systems and thereby help minimize driver confusion. This is an HMI issue to make is easy to understand that systems are turned off and on in the same way. It should be clear in differentiating between turning off and temporarily de-activating the system.

Speed Control Function and the Use of Service Brakes

The draft delegated act however does not specify minimum or maximum deceleration values for the speed control function when using brakes. There should be both minimum and maximum deceleration values to be included in the delegated act for the SCF's deceleration when using the service brakes or endurance brakes. Brakes should not be applied too strongly that it creates a sudden braking hazard, nor too weak that there is limited feedback to the driver.