

Electric vehicles operate almost inaudibly and are a danger to vulnerable road users. Benedikt van den Boom, campaign lead for the European Blind Union, explains the importance of acoustic alerts systems for silent cars

Some noise is desirable: electric vehicles

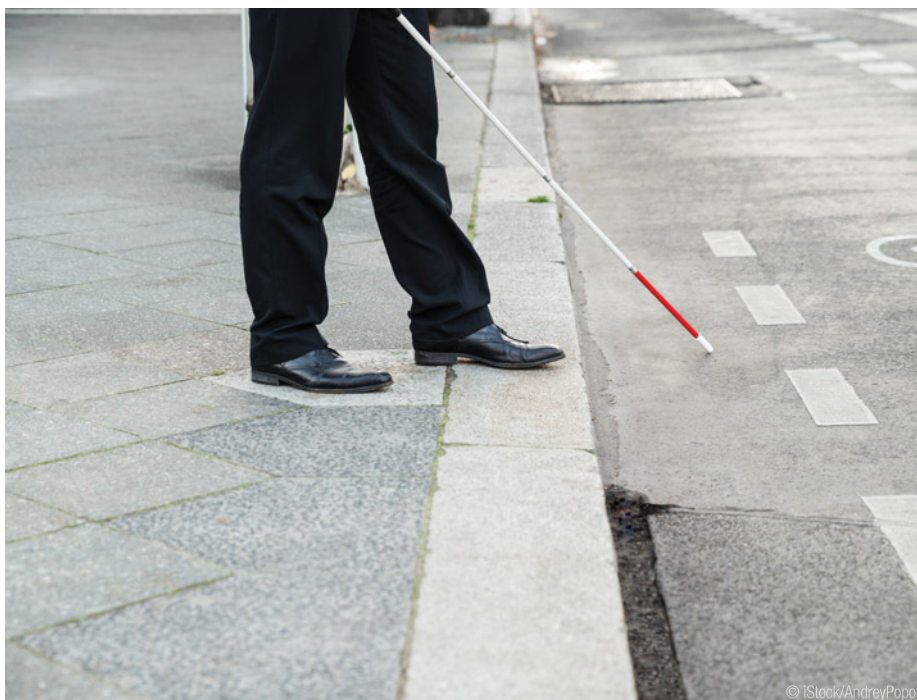
Some weeks ago, in a leafy suburb of Berlin, two parents admonished their child: “If you want to cross the road, you need to look and listen”, they urged. This lesson is neither wrong nor uncommon. The main slogan of the UK government’s road safety campaign is “Stop, Look, Listen, Think.”¹ In other European countries, the mantras are similar. They all refer to acoustic information as a core part of road safety. However, the increasing prominence of non-conventional vehicles jeopardises these lessons.

Vulnerable road users

According to at least one industry analyst, there are around 1.3 million electric and hybrid vehicles on the road in Europe.² Compared to conventional vehicles, these silent cars operate almost inaudibly at a low speed and are ‘far more difficult to detect’ than conventional vehicles.³ An authoritative study by the US National Highway Traffic Safety Administration showed that they are 37% and 56% more likely to be involved in accidents with pedestrians and cyclists respectively.⁴ As such, they are a source of danger for all vulnerable road users, among them children, the elderly, cyclists and inattentive pedestrians.

Silent cars are particularly hazardous for the 30 million blind and partially sighted people in Europe.⁵ Not being able to process visual information regarding their surroundings, this group fundamentally relies on acoustic traffic information in at least three regards.⁶

- 1) Engine sounds alert visually impaired pedestrians of vehicles in their proximity. This is relevant for cars leaving parking lots or gateways.
- 2) Engine sounds alert pedestrians about crossing traffic, especially where vehicles are allowed to



turn at the intersection at the same time as pedestrians are allowed to cross the street.

- 3) Blind and partially sighted persons sometimes use sounds to orient themselves. Using acoustic mapping, they maintain a steady distance to parallel traffic when crossing a larger street.

Naturally, silent cars make it more difficult for visually impaired persons to navigate their surroundings. Not surprisingly, *The Observer* recently referenced a study that 93% of all blind and partially sighted persons have had problems with electric and hybrid vehicles.⁷

The key term: AVAS

Because of this, the World Blind Union and the European Blind Union (EBU) have advocated over

the last ten years for a solution that benefits all vulnerable road users and makes use of the human ability to perceive distance, direction and acceleration of approaching objects by hearing. In short, we demanded an *Acoustic Vehicle Alert System (AVAS)*.

AVAS artificially creates a sound. It first appeared in the early 1900s, when a guide on the first electric vehicles pointed out the problems with silent cars. The solution then was to add a bell,⁸ while in the 1980s some electric vehicles played a musical instrument digital interface file from an on-board computer.⁹ In principle, this is still the main way that AVAS works today, either through loudspeakers or through vibrating elements of the car chassis. However, almost no silent car to date is equipped with an AVAS. Therefore, EBU



worked intensively for a binding requirement at the EU level.

A European success story

As a result, two international rules were passed in the last years. The first crucial document is the EU Regulation 540/2014 of April 2014. Article 8 states that by 1 July 2019 all new electric and hybrid vehicle types must have an AVAS. By 1 July 2021 all new vehicles regardless of their type must be equipped.¹⁰ The technical details are further specified in the European Commission's Delegated Regulation 2017/1576 of June 2017.¹¹ In practice, all silent cars sold in or imported to the EU will have an AVAS.

The second crucial document is the UN Regulation 138 of the World Forum for Harmonised Vehicle Regulations (WP29). It was passed in October 2016 and updated to UN R138.01 in November 2017.¹² This regulation gives detailed information on the technical details of AVAS and how vehicle manufacturers need to test their system to show compliance with the regulation. While this standard is non-binding, it is used as a reference document by the EU.

The specific design of AVAS in the EU is straightforward. It applies to all private and commercial vehicles with four or more wheels, that is to say cars, transporters, busses and trucks.¹³ It will be activated if a car drives forward or backward with a speed of up to 20 km/h.¹⁴ The minimum sound level at a speed of 20km/h is 56 dB(A), which is roughly equivalent to the sound level of a fridge.¹⁵ The maximum sound level is defined as the noise of a comparable conventional vehicle in the EU, or as 75 dB(A) by the UN.¹⁶ As

such, AVAS will not make street soundscapes louder than they are now.

Importantly, the AVAS sound 'shall be similar to the sound of a vehicle of the same category equipped with an internal combustion engine.' Therefore, AVAS will neither make the 'beep' sound commonly associated with warning sounds, nor any artificial 'spaceship' or 'nature' sounds. Moreover, the sound generated by AVAS needs to be continuous and 'shall be easily





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indicative of vehicle behaviour.¹⁷ In practice, sound level and pitch will change to indicate acceleration of the vehicle.

Improving AVAS

EBU perceives these rules as a major success story on road safety for vulnerable road users in Europe. However, there are four shortcomings that should be amended by the European Commission during the next revision cycle in July 2021 in order to make the best out of this policy framework.¹⁸

First, the EU legislation still allows manufacturers to build in a pause switch for AVAS.¹⁹ This would allow drivers to deliberately disengage a crucial safety element of their vehicle, which EBU opposes. The UN shares this opinion and has already banned any pause switch for AVAS in silent cars.²⁰ The European Commission has already committed to banning the switch in the EU as well, which we expect to enter into force before AVAS becomes mandatory on 1 July 2019.

Secondly, AVAS should be activated for speeds of up to 30 km/h. The current threshold of 20 km/h is based on the assumption that at higher speeds the drag of air and tyres creates a sufficient sound level. In the US, the threshold for this point has been set to 18.6 mph (30km/h). Across Europe, 30km/h is also a benchmark speed limit for many residential zones, in which the safety issues related to silent cars are particularly relevant.

Thirdly, informal tests of existing AVAS solutions with blind and partially sighted persons in 2018 indicate that the minimum sound level of AVAS should be raised. The threshold is too low to ensure detection in most traffic situations, especially for persons of advanced age, who are incidentally more likely to be visually impaired. While 56 dB(A) might be sufficiently audible in sterile testing conditions, real-life traffic situations require a higher minimum.

Last but not least, there should be a mandatory stationary sound. Visually impaired persons need this input to be aware of vehicles that are about to start driving. This is particularly relevant in parking areas or residential zones, not least because of the rapid acceleration of electric vehicles. At the moment, stationary sounds are still optional.²¹

Importantly, EBU welcomes more electric mobility. We strongly support the lower carbon emissions of electric and hybrid vehicles. We are as affected by noise pollution as everybody else. But we are of the firm conviction that road safety for children, cyclists, elderly pedestrians and visually impaired people should always come first. The EU rules on AVAS are a crucial step in this direction. Back in 1908, during the first debates on AVAS, one concerned driver asked, “Is some noise desirable?”²² Today we can say, yes, it is.



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