World Blind Union
Essential Requirements for an AVAS System

Why this paper?

In recent years, greener, more fuel-efficient cars have become increasingly popular among consumers as they deliver a positive answer to a range of environmental and health problems. Among their potential benefits are near zero air pollution, reduced fossil fuel demands and the very quiet vehicle operation at low speeds. Blind and partially sighted people welcome these benefits as much as other citizens do. **However, the advent of "silent technologies" and their impact on road traffic create great concern to blind and partially sighted people. Due to their almost silent operation, it is virtually impossible to detect electric vehicles, and to assess their distance and direction correctly early enough to avoid being hit**. Thus these vehicles present a great danger to blind people and other vulnerable road users. Moreover, they do not fully comply with Design for All principles.

WBU appreciates the efforts undertaken by the institutions of the European Union and the Working Party on Noise (GRB) to develop and adopt a Global Technical Regulation (GTR) which would make the installation of an Acoustic Vehicle Alerting System (AVAS) in electric and hybrid electric vehicles mandatory. We especially acknowledge the work done by the QRTV editing task force to specify in its draft regulatory work operational requirements for an AVAS and its activation parameters which alert pedestrians of a quiet vehicle' mode of operation[1]. **Nevertheless we strongly believe that the current draft regulation should go far beyond its proposed operational requirements for the applicability and performance of an AVAS.**

Blind and partially sighted pedestrians have the right to be on the road independently, safely and with ease as much as any other person. This paper therefore describes the main criteria we believe an AVAS needs to fulfil to ensure such a system provides full audio information about the environmental and traffic conditions to enable blind and partially sighted road users to make their own decision to cross the road independently and safely.

Is there evidence of the dangers imposed by quiet vehicles?

Yes, WBU believes there is. Over recent years research has been carried out attempting to analyse robust accident data in order to ascertain the hazard potential posed by quiet vehicles. Among the many studies it may suffice here to give the following representative examples:

- Government research was undertaken in the US by the National Highway Traffic Safety Administration (NHTSA) which compared pedestrian collisions involving hybrid electric vehicles (HEVs) and Internal Combustion Engine vehicles (ICE). The study found that the crash rate of HEVs was twice as that of cars ICE cars

[1] Uniform provisions concerning the approval of Quiet Transport Vehicles with regard to their reduced audibility (REG58-QRTV-02-02-GRB-61-02e).

in low-speed maneuver conditions such as slowing, stopping, backing up and entering a parking space.[2]

- A second NHTSA study confirmed that hybrid vehicles are too quiet for blind people to detect them.[3]

- In the UK, Morgan et al. in their comparative analysis come to the conclusion that proportionally more electric and hybrid vehicles hit a pedestrian than ICE cars.[4]

- The University of Dresden has looked into the perception and evaluation of vehicle exterior noise of HVEs and EVs and has found that "(…) additional sound is needed for detection of pre coming /approaching EVs/HEVs."

- Finally, in a recent study, TAS has examined accident data and hybrid /E(HE) vehicles and have found that these vehicles "(…) are likely to be involved in accidents where pedestrians are injured."[5]

What are WBU's main demands?

Quiet vehicles pose a life threatening hazard for blind, partially sighted and other vulnerable road users. To prevent vulnerable pedestrians from being injured or killed by an electric or hybrid electric vehicle WBU is asking for the following AVAS operational requirements to be included in the UNECE regulation:

- A **minimum clearly audible sound level** of an AVAS which enables blind and partially sighted persons to detect the presence or approach of a quiet vehicle and identify its mode of operation at a distance which is sufficient to ensure a safe crossing of the road. This minimum sound level needs to take into account the currently prevailing mixed road traffic situations, masking effects by other vehicles and ambient noises as well as the conditions and material of the road surface.

- **Sound at stationary** which indicates the presence of a quiet vehicle to a blind or partially sighted pedestrian.

- The **prohibition of a pause function** to ensure the constant operation of an AVAS.

Why does WBU want a minimum sound level higher than the one proposed by the QRTV working group?

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[2] See NHTSA"Incidence of Pedestrian and Bicyclist Crashes by Hybrid Electric Passenger Vehicles." Technical Report. September 2009

[3] See NHTSA "Quieter Cars and Safety of Blind Pedestrians". Phase I. April 2011

[4] Morgan et al. 2011: 47

[5] TAS "Quiet Vehicles. A Report for Guide Dogs." September 2013: 3

Blind pedestrians rely heavily on their hearing when crossing roads and use the noise of the oncoming traffic as an auditory cue to decide when it is safe to cross. Their entire concept of orientation is based on their accurate body alignment. The sound produced by a motor vehicle provides essential auditory clues for them to align their body position or choose a heading for the crossing. While crossing the street, blind and partially sighted people listen to parallel traffic to confirm correct alignment to parallel traffic.

However, **if these auditory clues are lacking, a safe crossing is not possible, because blind pedestrians find it difficult to maintain a straight line of travel and might run into the parallel traffic. Thus blind people need a clearly audible minimum sound level of every vehicle to enable them to cross the road safely**. If they cannot detect audibly turning traffic moving onto the pedestrian's crosswalk, the risk of collisions will increase, since blind people can not be assured that the vehicle driver will yield to them.

Therefore, WBU is calling for a **safe level of sound** which is clearly audible for blind and partially sighted pedestrians and **exceeds the proposed 56 dbA at a speed of 20 km/h**. The analysis of an effective minimum sound level needs to be carried out by sound and safety experts using objective data for their work. It should take into consideration a range of parameters such as environmental conditions, the prevailing mixed road traffic situation and any ambient noise. Tests should be performed under actual real traffic conditions involving blind and partially sighted test subjects.

It is difficult to believe that a sound which is considerably quieter than an internal combustion engine will provide sufficient audio warning. We are therefore concerned about the 56 dbA sound level at 20 km/h proposed by the QRTV Working Group. **In any case, the sound must effectively indicate the presence, location and navigation of a vehicle**. WBU believes that all pedestrians must have the information they need to make safe crossing decisions. This is common sense, good public policy and a fundamental human right as enshrined in the UN Convention of the Rights of Persons with Disabilities which has been signed and ratified by many UN States.

Why does WBU insist on stationary sound?

WBU is deeply concerned that section 6.2.4 of the draft Global Technical Regulation does not include a mandatory requirement for electric and hybrid vehicles to make a sound when they are operational yet stationary. Car manufacturers may install stationary sound as an additional AVAS feature, but are not obliged to do so. The justification used by the QRTV working group is that a car at stationary has not harmed anyone yet and is indeed unable to do so. **However, WBU believes that this argument is too simplistic and fails to understand the complexities.**

Stationary vehicles, e.g. when stopped at a traffic light or in a parking lot, are not moving, but may indeed start to move at any moment. This is true for predictable and less predictable situations. For example, if the driver is preparing to make a right turn, he will look to the left to make sure that the near lane is clear of any oncoming traffic.[6] If the blind pedestrian is unaware of the presence of the vehicle he or she will continue to

[6] This example refers to countries which have right-hand driving which is the overwhelming majority. In countries such as the United Kingdom or the USA where they have right-hand driving, it is the other way round.

walk and may step out in front of the car just as the driver starts to turn. It is unexpected pedestrian behaviour such as this that greatly increase the probability of an accident. A driver would not anticipate that a pedestrian steps out in front of a car which has pulled forward (perhaps into the crosswalk) and would clearly proceed to make a right turn as soon as the near lane is clear.

This example clearly shows that awareness of the presence of a vehicle that may move at any moment is essential for a blind or partially sighted road user to make safe go/don't go decisions to enable him to walk past a stationary vehicle unharmed and with ease and confidence.

Within the framework of QRTV research various studies identified and stressed that there is a clear need for sound at stationary. Thus a study carried out by the University of Duisburg-Essen states "(that there are) special problems for blind people at crossings without signals, because standing cars (BEV, HEV or ICE with automatic start/stop) cannot be heard…"[7]

WBU strongly believes that all quiet vehicles must be equipped with an alert sound at stationary to ensure pedestrian safety. At the same time WBU does not object to a reasonable level of attenuation for stationary vehicles.

Why does WBU urge a ban on the pause function?

WBU is deeply concerned that section 6.2.7 of the draft Global Technical Regulation contains the requirement for car manufacturers to equip their vehicles with a pause function by which the driver can switch off the AVAS at any time. At the same time, politicians and car manufacturers try to allay our fears by saying that the pause function will hardly be used by car drivers. The pause function will be disabled after restarting the vehicle, so drivers might find it annoying to activate it.

Again,
WBU strongly feels that the pause switch should be prohibited. The AVAS is a **safety device**. Like other safety devices like brake lights, airbags etc. there must be no possibility for the driver to switch it off whenever he likes. A driver cannot really know at what moment he will encounter a pedestrian. The assessment when it might be theoretically safe to dispense with the warning sound produced by the AVAS must not be left to the driver.

What training will drivers use to determine that the AVAS is not needed?
On what basis can it be assured that the AVAS will not be turned off in situations in which it is needed? If we could rely on drivers to make safe judgments at all times and in any situation, there would be fewer accidents.
However, in such an imaginary world, there would be no need for seatbelts or airbags either. In the real world we live in, the AVAS must not be an optional safety device or lives will be put at risk.

The draft Global Technical Regulation suggests inclusion of a reference in the drivers manual to state that the pause function " (…) shall not be used unless for an obvious

[7]Unpublished paper for the QRTV meeting 09-02.

lack of necessity to emit sound for alert in the surrounding area and that it is certain that there are no pedestrians within the short distance."[8] **This is simply pious hope and will never help to create a maximum of safety blind and partially sighted pedestrian need to be out on the roads with confidence and ease.**

If the driver activates the pause function, the AVAS it will be disabled for the entire journey until the vehicle is turned off. This unfortunate provision will significantly increase the risk of unpredictable collisions between quiet vehicles and pedestrians and will jeopardize the lives and safety of those pedestrians. The installation of a pause function therefore constitutes a clear violation of the rights of disabled persons enshrined in the UN Convention of the Rights of Persons with Disabilities. It undermines the design for all principles and exposes blind and partially sighted persons to a great risk of being injured or even killed.

Call to Action

Bearing in mind the arguments presented further above, WBU urgently calls on the QRTV and GRB members: Please help ensure a high level of road safety for blind and partially sighted people and enable them to travel independently with ease and confidence by:

- Mandating a minimum clearly audible sound level of AVAS
- Including sound at stationary in the Global Technical Regulation as an indispensable safety feature
- Prohibiting a pause function to ensure the constant operation of the AVAS at speeds up to 20 KMh.

Who we are

The **World Blind Union (WBU)** is the internationally recognized organization, representing the 285 million blind and partially sighted persons in 190 member countries. We are the Voice of the Blind, speaking to governments and international bodies on issues concerning blindness and visual impairments in conjunction with our members. WBU brings together all the major national and international organizations of blind persons and those organizations providing services to the visually impaired to work on the issues affecting the quality of life for blind people.

[8] Ibd 6.2.7.4