Mercedes-Benz USA, LLC
A Mercedes-Benz AG Company

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March 6, 2020

Mr. James Owens
Acting Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue S.E., West Building
Washington D.C. 20590-0001

RE: Request for Comment (RFC)*: Advanced Driver Assistance Systems Draft Research Test Procedures*, NHTSA Docket No. 2019-0102, 84 Fed. Reg. 64405 (November 21, 2019)

Dear Mr. Owens,

Mercedes-Benz USA, LLC, on behalf of both itself and its parent company Mercedes-Benz AG (hereinafter together, "MBUSA") is pleased to submit the following to the National Highway Traffic Safety Administration ("the Agency") in response to the request for comments published in the Federal Register on November 11, 2019. As a member of the Alliance for Automotive Innovation (the "Auto Innovators"), we contributed to and fully support the comments submitted by the Auto Innovators to the docket regarding this topic.

Overall Comments

As state-of-the-art vehicle technologies continue to evolve, the scenarios that these systems will encounter must be carefully evaluated. Moreover, designing scenarios that represent real-world applications will improve safety for both drivers and other road users. Therefore, MBUSA encourages the Agency to validate all of the test procedures before rating production vehicles accordingly.

Traffic Jam Assist

Traffic Jam Assist systems are designed with specific road types and operating domains in mind, e.g., multi-lane highways where a Traffic Jam Assist system would be most useful. By contrast, testing these systems on a test track may not be as efficacious and so alternate solutions may be warranted. We would recommend that the Agency discuss this topic directly with the industry in order to come up with the best available solution.

The draft procedures state "At no time shall the SV contact the POV and/or SOV during the conduct of any trial described in this document." According to SAE J3016-2018, Level 2 systems are designed with the expectation that drivers complete object and event detection and response as well as supervise the partial automation system. Thus, the driver remains ultimately responsible for control of the vehicle, and is expected to intervene in the scenarios described in the document. If this protocol is finalized and is used for rating vehicles, we recommend that the rating scale for this test should reflect the operating

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characteristics of Level-2 systems. Therefore, awarding partial credit for Level 2 systems that provide an audio/visual warning prior to collisions that may occur during the rating test accurately reflects the intentions of the system.

In the Lead Vehicle Lane Change with Braking scenario, the POV that is performing the lane change maneuver needs to sufficiently overlap the SV during the lane change. Traffic Jam Assist systems must not only be robust enough to avoid false positives, but must also intervene when necessary. The duration of the lane change and timing of the braking of the vehicle for the two stage braking scenarios does not guarantee sufficient overlap, which is where the system would take action. We would recommend ensuring that there is at least 50% POV-to-SV overlap during the lane change to replicate a vehicle cut-in.

Active Park Assist

While the active park assist draft test procedure provides an adequate foundation for assessing parking assistance features, we offer the following points which build upon the draft document.

- S4.3 – The protocol explicitly states that the use of curbs is not specified. Manufacturers should have the choice of testing with or without curbs, depending on the design applications of the system.
- S5.4.3 – The current window for completion time of the parking action is 45 seconds. The sensors and processors take time to ensure the safe operation of the task. Removing this time limit would guarantee that the systems are designed with safety in mind.
- S5.4.4 - After the parking action completes, the protocol requires vehicles to recommend that the driver turns off the vehicle and checks the surroundings before exiting. Because this type of warning is not valid in all use cases (e.g., driver remains in the vehicle while someone else exits) we recommend that this requirement be deleted to avoid unnecessary warnings that may eventually be ignored.
- S5.4.4 - The left and right most parts of the vehicle need to be defined, whether they are based on the tires, mirrors, or strictly the outboard most part of the vehicle.
- S5.4.4 – The parking lines (perpendicular and parallel) are used to define the parking space, not a limit on the parking trajectory. Crossing a line briefly can assist the vehicle trajectory, making it a faster and safer process depending on the individual parking scenario.
- S5.6 – MBUSA agrees with the need for a manual override system. However, manufacturers should be able to design the override according to the individual capabilities of their own systems.

Opposing Traffic Safety Assist

In many cases, the application of Opposing Traffic Safety Assist systems would be on two lane highways where overtaking is prevalent. In most of these instances, vehicles are traveling at higher speeds (45 mph+). However, performing tests at lower speeds (e.g. 25 mph) may not prove effective, as systems are designed with the higher speeds in mind. We would recommend testing these systems for highway speeds only.

The OTSA procedure defines the lateral velocity for the lane changes at 0.7 m/s. The design of the oncoming traffic systems is to prevent unintentional lane departures into oncoming traffic. We recommend reducing the lateral velocity from 0.7 m/s to a range of 0.3 to 0.6 m/s. This would more accurately reflect the unintentional lane departure scenarios as well as harmonize with Euro NCAP.

As stated, the scope of the oncoming traffic safety systems should be for unintentional lane changes or departures. The current procedure requires use of the turn signal in some scenarios; use of the turn signal indicates driver intent to depart the lane. In these scenarios, the driver is ultimately responsible for the vehicle. Therefore, we recommend leaving the turn signal off for these tests.

One criteria to end a test is when a vehicle is within a lateral distance of 0.46 m relative to the POV and no SV intervention has been made. At this point, the robot driver will steer the vehicle away to avoid a collision. While we agree with this approach, we recommend reducing the safety margin from 0.46 m to 0.3 m. Euro NCAP has adopted the 0.3 m margin for several years without issue, and this approach allows additional flexibility in the design of an OTSA system.

In order to reduce the complexity of the test scenarios, we recommend harmonization with the Euro NCAP protocol which does not include a lead vehicle. Current OTSA sensor capabilities should be considered in these complex scenarios. The proposed procedures simulate a close following distance; in this scenario the SV may have limited time to respond to the POV. This needs to be considered in the test protocol and the associated performance requirements. While these are research procedures, the performance requirements should be achievable by vehicles equipped with state-of-the-art technology.

Pedestrian Automatic Emergency Braking (P-AEB)

Automatic emergency braking has proven effective in reducing front-end collisions (https://www.iihs.org/topics/bibliography/ref/2111), including applications that involve pedestrians. In order to provide the greatest overall safety benefit, these test protocols must mirror real-world scenarios as closely as possible. This is correctly stated in S2.0 which asserts "*These test procedures were developed to evaluate the PAEB systems' performance in the two most frequent crash scenarios involving pedestrian in the United States. They include the scenario in which the pedestrian* ***crosses the road*** *in front of the vehicle known as scenario (S1), and the scenario in which the pedestrian* ***walks*** *along side of the road in the path of the vehicle known as scenario (S4)*". Contrary to the stated objective, the draft procedure prescribes the use of stationary pedestrian targets; it is our observation that pedestrians are typically moving during real-world vehicle-pedestrian collisions. Therefore, to more accurately represent the variety of real-world accident scenarios, we urge the use of pedestrian targets that depict articulated walking movement.

In the event that this protocol is published and used for rating vehicles, a set of criteria needs to be established that defines success. For example, the IIHS establishes a set of speed reductions with corresponding point values for their P-AEB and AEB tests.

Intersection Safety Assist

The Intersection Safety Assist protocol defines the left turn path as one radius (image below). While this may be simpler to perform in the tests, the results may not accurately reflect a real left turn scenario.

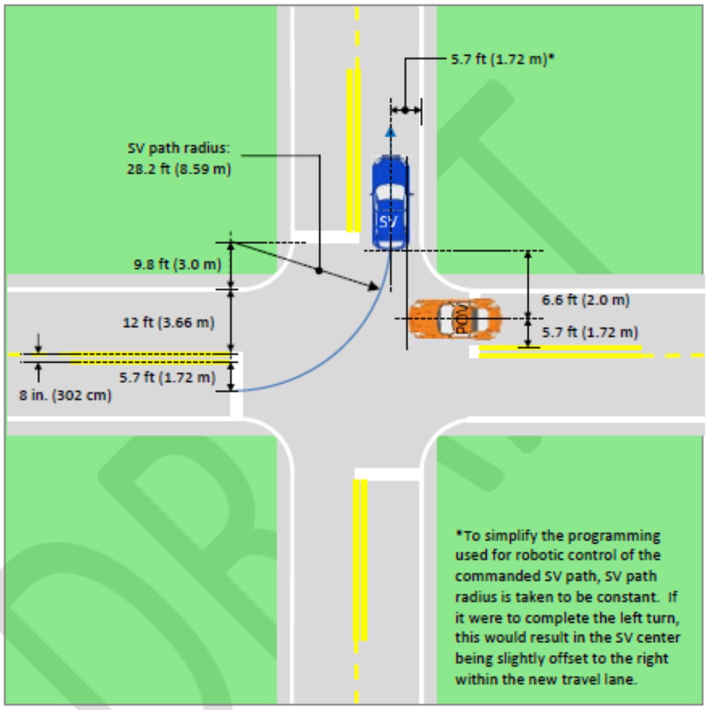
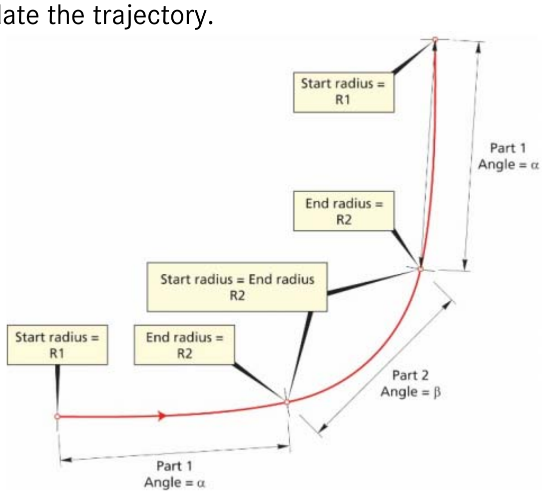


Figure A8. S3 path details, near-miss timing.

EuroNCAP depicts a left turn in the AEB C2C Version 3.0.2 protocol from January 2020. The path can be seen in the image below. This path is a combination of radii and clothoids, and those even depend on the speed the vehicle is traveling. We would recommend using a natural left turn path (such as EuroNCAP's model) or one that is based on driving behaviors within the USA. A naturalistic driving study may need to be performed in order to validate the trajectory.



Test speed	Part 1 (clothoid)			Part 2 (constant radius)			Part 3 (clothoid)		
	Start Radius R1 [m]	End Radius R2 [m]	Angle α [deg]	Start Radius R2 [m]	End Radius R2 [m]	Angle β [deg]	Start Radius R2 [m]	End Radius R1 [m]	Angle α [deg]
10 km/h	1500	9.00	20.62	9.00	9.00	48.76	9.00	1500	20.62
15 km/h	1500	11.75	20.93	11.75	11.75	48.14	11.75	1500	20.93
20 km/h	1500	14.75	21.79	14.75	14.75	46.42	14.75	1500	21.79

Figure 8-6: CCFtap scenario paths definition

Final Notes

MBUSA may provide supplementary comments to this document as it develops new technology or learns new information. For now, we appreciate this opportunity to comment and look forward to further collaboration with the Agency as it considers the issues discussed. If you have any questions or concerns regarding our response, please do not hesitate to contact Joseph Gaulin (joseph.gaulin@daimler.com).

Respectfully yours,

Gregory Gunther
Department Manager
Vehicle Compliance & Analysis

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