The Center for Auto Safety
Your Independent Voice for Auto Safety, Quality, & Fuel Economy
1825 Connecticut Ave. NW Suite 330 Washington DC 20009
www.autosafety.org

March 5, 2020

James C. Owens, Acting Administrator
National Highway Traffic Safety Administration
Dockett Management Facility
U.S. Department of Transportation
1200 New Jersey Avenue SE
West Building, Ground Floor, Room W12-140
Washington, DC 20590-0001

Submitted electronically via www.regulations.gov

RE: Request for Comments on Advanced Driver Assistance Systems Draft Research Test Procedures; Docket Number NHTSA-2019-0102

Dear Acting Administrator Owens:

The Center for Auto Safety (Center) appreciates the opportunity to comment on the agency's potential procedures for testing Advanced Driver Assistance Systems (ADAS). The Center, founded in 1970, is a national, independent, non-profit, member-driven consumer advocacy organization dedicated to making all drivers, passengers, and pedestrians safer by improving vehicle safety and quality. Over the last five decades, the Center has focused on advancing safety technology for all consumers from airbags to anti-lock braking, from electronic stability control to automatic emergency braking. We have long supported innovative technology proven capable of reducing deaths, injuries, and crashes, on the nation's roads.

Accordingly, on behalf of our members nationwide, the Center urges the National Highway Traffic Safety Administration (NHTSA) to expedite the introduction of ADAS technologies into passenger and commercial vehicles by issuing an updated New Car Assessment Program (NCAP) in 2020, followed quickly by mandatory performance standards for ADAS technologies. Vehicle crashes continue to claim close to 40,000 lives in the United States every year and remain the leading killer of young people in America.

The current leadership of the Department of Transportation (DOT) has made many public pronouncements about speeding innovation by eliminating mandatory regulations,[1] yet it is now undertaking a process which slows to a crawl the potential for introduction of life

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[1] Removing Regulatory Barriers for Vehicles With Automated Driving Systems, https://www.federalregister.gov/documents/2019/05/28/2019-11032/removing-regulatory-barriers-for-vehicles-with-automated-driving-systems

saving technology. The Center submits the below comments with a hope that this is not an exercise in 'busy work' but a good faith effort to evaluate the performance of these ADAS technologies for the purpose of introducing the ones that work into passenger and commercial vehicles. Issuing press releases talking about updating NCAP[2] is not the same as actually updating NCAP, any more than accepting rulemaking petitions is the same as promulgating rulemakings.[3] For the public to believe the purpose of this information collection on ADAS technology will actually promote safety the results must be connected to a tangible result, including updating NCAP and producing mandatory motor vehicle safety standards. Otherwise, NHTSA is simply continuing to spin its wheels.

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1. *Can the test procedures be expected to assess adequately for the purposes of research, within practical limitations, the performance of the underlying ADAS technologies? If not, please provide specific reasons why, and suggestions for how they may be improved.*

> In general, the Advanced Driver Assistance Systems Draft Research Test Procedures must be written with the presumption that the test results will be used to represent the efficacy of the safety features being tested. Therefore, the test conditions should represent to the greatest extent possible the broad range of road surface, inclinations, and environmental conditions that consumers will encounter. Tests in idealized benign conditions serve a valid purpose for proof of concept validation but should not be represented as proof of safety except in those idealized circumstances. The Center recommends the extension of test conditions to be representative of those consumers are likely to encounter during the vehicle's life cycle before test results are presented as evidence of comparative or validated safety enhancements. Additional specific comments follow.

Intersection Safety Assist (ISA) System Confirmation Test (Working Draft)

> The road test surface (4.1) is not shown to be representative of nominal actual intersections with respect to either markings, friction coefficient, freedom from debris, or construction. For test purposes, the road surface should be representative of actual intersections, not idealized as in the proposed standard. The test protocol should also include presence of incidental water, since precipitation is a common occurrence and influences both coefficient of friction and visibility. As proposed, the test surface will not produce test results that translate into satisfactory evidence of public safety. Since the test intersection configuration will include four entrances (4.2), NHTSA has the opportunity to construct a variety of surfaces more representative of the real world while still including the pristine surface currently specified and test the ISA in successively

[2] NHTSA Announces Coming Upgrades to New Car Assessment Program, October 16, 2019, https://www.nhtsa.gov/press-releases/ncap-upgrades-coming

[3] A more than decade-long delay in a seat belt warning system shows how car-safety rules get bogged down in bureaucracy, https://www.autosafety.org/a-more-than-decade-long-delay-in-a-seat-belt-warning-system-shows-how-car-safety-rules-get-bogged-down-in-bureaucracy/

more challenging circumstances. Such a progressive test series would increase the significance of the test and enhance translation of the results into projection of public safety.

The line markings as specified (4.3), which must be in very good condition, are not representative of nominal actual lane markings for intersections. The test results may therefore be unrepresentative of real world performance and unable to satisfactorily validate the ISA performance from a public safety perspective. Since the test intersection configuration will include four entrances (4.2), NHTSA has the opportunity to construct a variety of line markings more representative of the real world while still including the very good condition surface currently specified and test the ISA in successively more challenging circumstances. Such a progressive test series would increase the significance of the test and enhance translation of the results into projection of public safety.

The visibility conditions (4.3) as specified are unrepresentative of vehicle operations and cannot be expected to adequately assess the ISA performance as needed for validation of safety. The proposed visibility protocol is limited to daylight hours with good visibility. Vehicles are frequently operated at night, in fog, in dust, in rain and snow, and other reduced visibility conditions. To validate ISA with respect to public safety, the system should be tested and performance reported in a variety of conditions representative of frequently occurring operational conditions. An improved test protocol would include as a minimum both unlighted and lighted intersections at night, as well as wet intersections in all lighting conditions. It is also important to evaluate the performance of ISA in response to angular solar and lunar low angle illumination angular limits, rather than simply eliminating test conditions where washout might possibly occur, as currently proposed.

Traffic Jam Assist (TJA) System Conformation Test (Working Draft)

To be a useful driver assistance technology, TJA must be able to operate reliably in various environments, including at night and in the presence of precipitation, as implied in the statement of 1.0 Purpose and Application, “The expected operating domain for TJA includes roadways supporting low speed and stop-and-go traffic.” If the test objectives were (but they are not) merely validation of proof of concept in ideal conditions then the idealized road conditions (moderate temperatures, no precipitation, well-marked lanes, no significant solar or lunar incidence, level clean road, etc.) specified in the test protocol might be sufficient, but as written the test procedures can adequately assess TJA performance for only a very restricted operational regime, restrictions that are unrepresentative of many real world roads and circumstances. The test protocols should be expanded to include more challenging environments (nighttime operations, substandard surface condition or lane markings, wet highway, rain, solar/lunar incidence, etc.) representative of those that would be encountered by drivers in the specified domain in addition to the current benign protocol environmental limits, and intended to determine the limits of TJA performance rather than merely confirm nominal performance in ideal conditions. Such a change would allow the public to have confidence that test results confirm the actual performance they are likely to experience.

Opposing Traffic Safety Assist (OTSA) System Confirmation Test (Working Draft)

To be a useful driver assistance technology, OTSA must be able to operate reliably in various environments, including at night and in the presence of precipitation, as implied in the statement of 1.0 Purpose and Application, "The expected operating domain for OTSA includes paved undivided roadways supporting moderate speed traffic." If the test objectives were (but they are not) merely validation of proof of concept in ideal conditions then the idealized road conditions (moderate temperatures, no precipitation, well-marked lanes, no significant solar or lunar incidence, level clean road, etc.) specified in the test protocol might be sufficient, but as written the test procedures can adequately assess OTSA performance for only a very restricted operational regime, restrictions that are unrepresentative of many real world roads and circumstances. The test protocols should be expanded to include more challenging environments (nighttime operations, substandard surface condition or lane markings, wet highway, rain, solar/lunar incidence, etc.) representative of those that would be encountered by drivers in the specified domain in addition to the current benign protocol environmental limits, and intended to determine the limits of OTSA performance rather than merely confirm nominal performance in ideal conditions. Such a change would allow the public to have confidence that test results confirm the actual performance they are likely to experience.

Blind Spot Detection (BSD) Confirmation Test (Working Draft)

To be a useful driver assistance technology, BSD must be able to operate reliably in various environments, including at night and in the presence of precipitation, as implied in the statement of 1.0 Purpose and Application, "Current BSD technology relies on sensors to detect the presence of other vehicles in the equipped vehicle's left and right blind zones." If the test objectives were (but they are not) merely validation of proof of concept in ideal conditions then the idealized road conditions (moderate temperatures, no precipitation, well-marked lanes, no significant solar or lunar incidence, level clean road, etc.) specified in the test protocol might be sufficient, but as written the test procedures can adequately assess BSD performance for only a very restricted operational regime, restrictions that are unrepresentative of many real world roads and circumstances. The test protocols should be expanded to include more challenging environments (nighttime operations, substandard surface condition or lane markings, wet highway, rain, solar/lunar incidence, etc.) representative of those that would be encountered by drivers in the specified domain in addition to the current benign protocol environmental limits, and intended to determine the limits of BSD performance rather than merely confirm nominal performance in ideal conditions. Such a change would allow the public to have confidence that test results confirm the actual performance they are likely to experience.

The sentence (3.1 Blind Spot Detection), "Depending on the implementation, BSD activation may or may not require the driver to operate their turn signal indicator during their lane change.", conveys no information since it includes both a thesis and its antithesis, and should be edited to remove its ambiguity, e.g., "BSD turn signal indicator operation during lane change may be designed to be automatic or alternatively designed to require manual initiation."

Rear Automatic Braking Feature (RAB) – Draft Test Procedure Assessment DOT HS 812 766

To be a useful driver assistance technology, RAB must be able to operate reliably in various environments, including at night and in the presence of precipitation. If the test objectives were (but they are not) merely validation of proof of concept in ideal conditions then the idealized road conditions (moderate temperatures, no precipitation, well-marked lanes, no significant solar or lunar incidence, level clean road, etc.) specified in the test protocol might be sufficient, but as written the test procedures can adequately assess RAB performance for only a very restricted operational regime, restrictions that are unrepresentative of many real world roads and circumstances. The test protocols should be expanded to include more challenging environments (nighttime operations, substandard surface condition or lane markings, wet highway, rain, solar/lunar incidence, etc.) representative of those that would be encountered by drivers in the specified domain in addition to the current benign protocol environmental limits, and intended to determine the limits of RAB performance rather than merely confirm nominal performance in ideal conditions. Such a change would allow the public to have confidence that test results confirm the actual performance they are likely to experience.

Active Park Assist (APA) System Confirmation Test DOT HS 812 714

To be a useful driver assistance technology, APA must be able to operate reliably in various environments, including at night and in the presence of precipitation, as implied in the statement of 1.0 Purpose and Application, "The expected operating domain for active park assist includes low speed, object rich environments such as parking lots and high-density residential, commercial, and industrial areas." If the test objectives were (but they are not) merely validation of proof of concept in ideal conditions then the idealized road conditions (moderate temperatures, no precipitation, well-marked lanes, no significant solar or lunar incidence, level clean road, no additional structures representing an object-rich environment in line of sight of SV sensors, etc.) specified in the test protocol might be sufficient, but as written the test procedures can adequately assess APA performance for only a very restricted operational regime, restrictions that are unrepresentative of many real world roads and circumstances.

Including the surrogate 50% male pedestrian is a valuable and important feature of the test protocol. That aspect of the test could be further enhanced by use of additional surrogate pedestrians, especially a child surrogate, a wheelchair surrogate, and a bicyclist surrogate, all of which are common where structured parking spaces are found.

The test protocols should be expanded to include more challenging environments (nighttime operations, substandard surface condition or lane markings, wet highway, rain, solar/lunar incidence additional roadside structures, etc.) representative of those that would be encountered by drivers in the specified domain in addition to the current benign protocol environmental limits. The tests should determine the limits of APA performance in a broad range of circumstances likely to be encountered during the vehicle's service life rather than merely confirm nominal performance in ideal conditions. Such a change would allow the public to have confidence that test results confirm the actual performance they are likely to experience.

Pedestrian Automatic Emergency Brake System (PAEB) Confirmation Test (Working Draft)

To be a useful driver assistance technology, PAEB must be able to operate reliably in various environments, including at night and in the presence of precipitation, as implied in the statement of 1.0 Purpose and Application, "Current PAEB technology relies on forward-looking detection capability provided by sensors to actively assist the driver by automatically applying brakes to avoid or mitigate a potential contact between the equipped vehicle and pedestrians." If the test objectives were (but they are not) merely validation of proof of concept in ideal conditions then the idealized road conditions (moderate temperatures, no precipitation, well-marked lanes, no significant solar or lunar incidence, level clean road, etc.) specified in the test protocol might be sufficient, but as written the test procedures can adequately assess PAEB performance for only a very restricted operational regime, restrictions that are unrepresentative of many real world roads and circumstances.

Unfortunately, the test protocol unnecessarily restricts the pedestrian definition to a 50% adult male and 7 year old child, ignoring other vulnerable pedestrians such as the mobility impaired and bicyclists, common vulnerable road users. The test protocols should be expanded to include more challenging environments and vulnerable road users (nighttime operations, substandard surface condition or lane markings, wet highway, rain, solar/lunar incidence, wheelchair users, bicyclists, etc.) representative of those that would be encountered by drivers in the specified domain. Since the test results will likely be used to support claims of vehicular safety, the tests should be designed to determine the suitability of PAEB performance with a broad spectrum of users in realistic conditions rather than merely confirm nominal performance in ideal conditions. Such a change would allow the public to have confidence that test results confirm the actual performance they are likely to experience

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Blind Spot Intervention (BSI) DOT HS 812 760

To be a useful driver assistance technology, BSI must be able to operate reliably in various environments, including at night and in the presence of precipitation as implied in 1.0 PURPOSE AND APPLICATION, “The expected operating domain for BSI includes roadways supporting moderate-to-high speed traffic.”, without environmental restrictions. If the test objectives were (but they are not) merely validation of proof of concept in ideal conditions then the idealized road conditions (moderate temperatures, no precipitation, well-marked lanes, no significant solar or lunar incidence, level clean road, etc.) specified in the test protocol might be sufficient, but as written the test procedures can adequately assess BSI performance for only a very restricted operational regime, restrictions that are unrepresentative of many real world roads and circumstances.

The test protocols should be expanded to include more challenging environments (nighttime operations, substandard surface condition or lane markings, wet highway, rain, solar/lunar incidence, etc.) representative of those that would be encountered by drivers in the specified domain in addition to the current benign protocol environmental limits, and intended to determine the limits of BSI performance rather than merely confirm nominal performance in ideal conditions. Such a change would allow the public to have confidence that test results confirm the actual performance they are likely to experience.

The test maneuver speed (Table 2., 3., 4a, 4b) of 45 mph is uncharacteristically slower than the ‘roadways supporting … high-speed traffic’ which are the stated purpose of the test. The test speed range should be increased to representative high-speed traffic (no less than 65 mph, the speed limit commonly found on interstate highways) to support the stated test purpose.

The sentence (3.0 Blind Spot Detection), “Depending on the implementation, BSD activation may or may not require the driver to operate their turn signal indicator during their lane change.”, conveys no information since it includes both a thesis and its antithesis, and should be edited to remove its ambiguity, e.g., “BSD turn signal indicator operation during lane change may be designed to be automatic or alternatively designed to require manual initiation.”

Test Track Procedures For Heavy-Vehicle Forward Collision Warning And Automatic Emergency Braking Systems (DOT HS 812 675)

Like automobiles with similar capabilities as stated in section 1.0, “These [forward collision warning (FCW) and automatic emergency braking (AEB)] systems use forward-looking sensors, typically radars and/or cameras, to detect vehicles in the roadway.” The test protocol includes tests for false positives, viz. “The first false positive test scenario uses a steel trench plate placed in the center of the lane of travel, and the second scenario places two parked vehicles on the adjacent lanes of travel.” This is a useful and important part of the test protocol. It isn’t clear why the test protocols for light vehicles do not include similar tests for false positive results and challenging environments, particularly when there are reported instances of lethal defects resulting from either false positives or incapacities of automatic safety devices in those vehicles.[4] If such tests can be included in heavy vehicle test protocols, there is no reason why similar test setups designed to determine the limits of sensors in real-world situations and environments cannot be included in light vehicle ADAS tests.

4. *Are the ranges of test speeds, speed combinations, and/or speed increments specified within each draft research test procedure reasonable? If not, please provide any data or evidence to support any claim of unreasonableness from a research perspective.*

The BSI test maneuver speed (BSI Table 2., 3., 4a, 4b) of 45 mph is uncharacteristically slower than the 'roadways supporting … high-speed traffic' which are the stated purpose of the test. The test speed range should be increased to representative high-speed traffic (no less than 65 mph, the speed limit commonly found on interstate highways) to support the stated test purpose.

5. *To reduce test burden for the assessment of some technologies for research purposes, the number of repeated trials per test condition is proposed to be less than or equal to seven based on our experience from past test procedure design work. Is this adequate, or should another number of repeated trials be performed for all technology/condition combinations to support an assessment of whether differences in the test results, for a given condition, are statistically significant?*

The required reliability and statistical confidence are unstated. Using a binomial distribution for determining the confidence of test results, seven tests with no failures yields the following results for reliability and confidence, which are always coupled:

7 Tests, No failures	
Reliability	Confidence
99%	7%
95%	30%
90%	50%
80%	75%
70%	88%
60%	94%
50%	97%

With seven tests, only 7% confidence is available at 99% reliability. NHTSA should state the levels of reliability and statistical confidence in test results are

[4] US opens probe into Nissan Rogue automatic emergency braking, https://wtop.com/lifestyle/2019/09/us-opens-probe-into-nissan-rogue-automatic-emergency-braking/;
Self-driving Uber car that hit and killed woman did not recognize that pedestrians jaywalk, https://www.nbcnews.com/tech/tech-news/self-driving-uber-car-hit-killed-woman-did-not-recognize-n1079281; 3 crashes, 3 deaths raise questions about Tesla's Autopilot, https://lasvegassun.com/news/2020/jan/03/3-crashes-3-deaths-raise-questions-about-teslas-au/.

required, rather than focusing on a prescribed number of tests. If, for example NHTSA requires 90% reliability with 50% confidence (not necessarily recommended coupled reliability and confidence; an example only based on the proposed seven tests. 99% reliability with 50% confidence requires a minimum of 9 tests, a small additional investment for much better results.) in successful operation, then the numbers of tests required vs. number of test failures is as follows:

Needed # of Tests vs. Failures to Achieve 90% Reliability and 50% Confidence	
Failures	Tests
0	7
1	17
2	27
3	37

By publishing baseline reliability and confidence for a test passing grade rather than focusing on the number of tests, NHTSA would eliminate uncertainty in evaluation of test results and provide a level playing field for all test subjects, assuring statistical significance.

F. Conclusion

The Center has consistently advocated incorporating available safety technology and vehicle safety testing into motor vehicle safety standards wherever possible. We believe that vehicle safety testing, particularly the NCAP program, has provided invaluable information confirming the benefits of life-saving design improvements and providing consumers with information they need to make informed purchasing choices. Unfortunately, the NCAP program has not kept pace with design improvements and is now primarily an adjunct of vehicle OEM marketing organizations. NCAP improvements are needed to separate companies making a good faith effort to improve crashworthiness from those merely treading water and accepting the status quo or unacceptable carnage on our highways.[5]

The proposed Advanced Driver Assistance Systems Draft Research Test Procedures identify opportunities to test advanced life saving technology and provide valuable information to consumers that will allow them to make informed comparisons among vehicle offerings. Unfortunately, the proposed test guidelines seem designed to shine the best possible light on emerging safety technologies, not to evaluate them in real-world conditions that everyday motorists will face. This will provide a false sense of security to motorists and do more to advance the interests of vehicle marketers than to validate the safety technologies' efficacy. It is important that any such test program not follow the

[5] Center for Autos Safety NCAP Comments in response to New Car Assessment Program Request for Comments 8/3/2018, https://www.regulations.gov/document?D=NHTSA-2018-New Car Assessment Program_0055-0009

path of the NCAP program and become a rubber stamp for industry marketers. The test program should be designed to identify safety claims that are not realizable in the real world and separate those vehicles from others that are truly able to save lives in real world conditions. Our recommendations will assure that consumers can rely on the proposed test results and make informed decisions for their own and their family's safety.

NHTSA is responsible for creating and enforcing FMVSS regulations that govern vehicle performance to save motorist, passenger, and vulnerable road user lives. Unfortunately, the proposed test guidelines will not provide the needed data, and any regulations written on the basis of such tests will be inadequate. The recommendations provided above will provide the needed data and assure that regulations written in response to those tests will accomplish the objective of saving lives as autonomous and driver assistance technology advances. The Center remains a strong advocate of advanced technology and test programs that save lives. NHTSA now has the opportunity to initiate a test program for Advanced Driver Assistance Systems that will save lives and inform consumers of the best choices available for their own safety as well as every driver, passenger, and pedestrian on the road. We urge NHTSA to make the necessary enabling changes to the proposed test programs.

Sincerely,

Jason Levine
Executive Director
Center for Auto Safety