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**Alliance** OF AUTOMOBILE MANUFACTURERS

U.S. DEPARTMENT OF TRANSPORTATION  
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June 26, 2000

NHTSA-00-7013-26

The Honorable Rosalyn G. Millman  
Deputy Administrator  
National Highway Traffic Safety Administration  
400 Seventh Street, S. W.  
Washington, DC 20590

Dear Deputy Administrator Millman:

**Re.: Occupant Crash Protection Final Rule; 49 CFR Parts 552, 571, 585, and 595  
Docket No. NHTSA-00-7013; (65 Fed. Reg. 30680; May 12, 2000)**

The Alliance of Automobile Manufacturers (Alliance), whose members are BMW, DaimlerChrysler, Fiat, Ford, General Motors, Isuzu, Mazda, Mitsubishi, Nissan, Porsche, Toyota, Volkswagen, and Volvo, hereby submits the enclosed petition for reconsideration of certain aspects of the final rule referenced above. This final rule amends the Occupant Crash Protection Standards at 49 CFR Parts 552, 571, 585, and 595.

Also enclosed as a separate attachment are comments concerning the scaling of injury criteria for the 5<sup>th</sup> percentile female dummy and the 6-year-old dummy. In addition comments are offered on the thoracic criteria for the 5<sup>th</sup> female dummy.

If you or your staff have any questions concerning the issues raised in either the petition or comments attached herein, please call Mr. Vann Wilber at (248) 357-4717.

Sincerely yours,  
Alliance of Automobile Manufacturers

Robert Strassburger  
Vice President  
Vehicle Safety &  
International Harmonization

**BMW Group • DaimlerChrysler • Fiat • Ford Motor Company • General Motors  
Isuzu • Mazda • Mitsubishi Motors • Nissan • Porsche • Toyota • Volkswagen • Volvo**

## **ATTACHMENT A – Petition for Reconsideration**

### **EXCLUSIVITY OF SUN VISOR WARNING LABEL**

For several years, FMVSS 208 has required a sun visor warning label appropriate for all frontal air bags, and has prohibited any other information "about air bags or the need to wear seat belts" from appearing anywhere else on the sun visor. NHTSA explained that the required specified warnings and the prohibition of others were necessary to further the important safety goals of (1) avoiding "information overload" that might deter consumers from reading and comprehending the specified, most important warnings, (2) "ensur[ing] that all vehicle occupants are repetitively exposed to consistent information and instructions and in a consistent format, since consistency and repeated exposure are most likely to result in appropriate consumer behavior," (3) not "diluting the impact of the most important information," (4) recognizing that "persons are likely to spend only a very limited time reading labels while seated in their vehicles," and (5) limiting the number of warnings because "it is crucial to ensure that labels providing important safety information are brief and identify the most important information." 58 Fed. Reg. 46551 et. seq. (September 2, 1993).

The Alliance believes that NHTSA was correct in its 1993 analysis, that the same reasoning applies today, and that motor vehicle safety would be seriously undermined by a variety of in-car warning labels giving different messages with different degrees of complexity and conflicting emphases. For this reason, the Alliance is very concerned to see the discussion in the Advanced Air Bag final rule preamble suggesting that the current rule's prohibition of additional in-car airbag warnings was being changed. 65 Fed. Reg. at 30722-30723 (May 12, 2000).

The agency cited isolated commenters who wanted additional information on the visor label. In declining to revise the label, the agency noted that "these types of information [sought by the commenters] are very design specific, so we are not changing the warning label to address these comments." The agency went on to state, however, that it would allow an additional label on the sun visor to address these "design specific" matters.

The Alliance respectfully suggests that motor vehicle safety will best be served by requiring that design-specific airbag warnings and instructions be located in the owners' manual, not on additional in-car labels. Allowing a proliferation of differing in-car labels with divergent and complex messages about airbags would completely undermine literally all of the multiple safety goals articulated by the agency in 1993. Specifically, it would contribute to the risk of "information overload," create inconsistency of in-car airbag message contents, create inconsistency of in-car airbag message locations, increase the risk that occupants would not take the time to read any of the in-car airbag warnings, and confuse occupants about which warnings and information are most important to their safety.

Nothing has changed since 1993 that would justify introducing divergent in-car airbag warnings. In particular, we are not aware of any empirical evidence, or even any suggested theory, that any design-specific in-car airbag warning or information would increase, rather than decrease, motor vehicle safety. We also are not aware of any empirical evidence, or even any suggested theory, that any design-specific in-car airbag warning would contribute more to motor vehicle safety than would in-car warnings about any of the numerous other risks commonly identified in vehicle owner's manuals. Further, since the new advanced-airbag sun visor warning label is somewhat different from the current airbag sun visor label, it is even more important to retain the uniformity of the label message as consumers adjust to the new information.

The Alliance understands that General Motors, one of the commenters originally seeking an expansion of the airbag sun visor label, will notify the agency in separate correspondence of its support for the Alliance position on this issue and its strong support for a single, uniform in-car label.

Fortunately, it appears that the regulatory text of the advanced airbag rule did not, in fact, repeal the restriction on additional labeling. The regulatory text amended S4.5.1(b)(1) and S4.5.1(b)(2), but did not amend or repeal S4.5.1(b)(3), where the current restriction can be found. Therefore, the agency need not revise the regulatory text, but should only clarify on reconsideration that it is retaining the restriction on additional labeling, and that any additional warnings and information about airbag performance should be located in the owner's manual. To the extent that the agency believes that it must formally reconsider the decision to allow additional labels, as announced in the preamble, the Alliance respectfully requests the agency to reconsider that conclusion and reinstate the prohibition on additional labels related to airbags or the need to wear seat belts.

## TEST PROCEDURES

### Low Risk Deployment - Data Acquisition

In S4.11 of the interim final rule, NHTSA specifies a 300ms test duration for the purpose of measuring injury criteria during the low risk deployment test. In adopting this requirement, the agency states:

*"...Traditionally, we have not counted data that is recorded as a result of the dummy's head neck or torso striking the vehicle interior when the dummy is no longer engaged in the air bag. We continue to believe...that the airbag is neither responsible for these injury values nor could the air bag have prevented these interactions with the vehicle compartment. However, we are concerned that truncating the data to the point at which the occupant is no longer engaged in the air bag is insufficiently objective for compliance purposes..."*

A static deployment test can be run in body-in-whites, sleds, or other laboratory type settings which may or may not have full vehicle interiors installed. A duration of 300 ms in many cases would allow contact of the dummy with other interior components, including the vehicle seats, doors, etc. The trajectory of the dummy after deployment of the airbag can not be precisely controlled, and therefore contact with other interior components would vary widely from test to test. Given that the intention for the test is to test the dummy's interaction with the airbag, and not other interior components, the Alliance believes that this requirement serves only to further complicate the certification problems, resulting in widely varied test results.

Finally, we would also point out that contact with other interior components will not be representative of real world conditions even as outlined in NHTSA's test procedures. For example, for the 5<sup>th</sup> percentile female low risk deployment test, the seat is specified to be in the mid-track position, however real world seating positions will likely be closer than mid track. Therefore injury values resulting from contact with other interior components (like the seatback, etc) will not be representative of real world conditions.

Given NHTSA's intentions outlined in the preamble, and the issues we mentioned above, the Alliance urges the agency to amend this requirement to require truncation of the data prior to impact of the torso, head and neck with interior components other than the airbag for calculation of the peak injury values. Therefore, we recommend that NHTSA adopt the language it originally proposed in its NPRM issued in this matter. Specifically the Alliance recommends that the following sentence be added at the end of Section S4.11(a):

*In calculation of the injury criteria, data are to be truncated prior to dummy interaction with vehicle components after the dummy's head is clear of the airbag.*

The Alliance understands that both Toyota – an Alliance member – and the Association of International Automobile Manufacturers (AIAM) has similar concerns as expressed here. The Alliance supports the petitions submitted by these organizations concerning this aspect of the final rule.

### **Fifth Percentile Female Dummy Foot Positioning**

Section 16.3.2.3.4 of the final rule requires the left foot of the 5th percentile female dummy, when in the driver's position, to be placed flat on the floor if the foot does not reach the toeboard. This section further requires that the foot be placed as far forward as possible. In some vehicles placing the foot flat on the floor is impracticable, due to the limited rotation of the joint attaching the foot to the lower limb. In vehicles with seats having a low H-point relative to the vehicle floor pan the foot must be slid rearward quite significantly in order to position it flat on the floor. As the foot is slid rearward the knee rises into an unrepresentative and unnatural position (please see Figure A-1).

Likewise, Section 16.3.3.3 also has the same requirement for the dummy feet positioning on the passenger side. This requirement, again, results in the dummy's feet being positioned very far rearward with the knees positioned unrepresentatively and unnaturally high for seats with low H-points relative to the floor pan. The Alliance recommends that in the case that the feet do not reach the toeboard that the feet be placed as far forward as possible and positioned perpendicular to the lower limb as is already required for the 50th percentile male.

### **CRS Cinching Force**

Alliance member, Toyota, stated in its comments to the SNPRM, that it was very concerned with the 134N CRS cinching force specified at various Sections of the proposed rule. In its comments Toyota explained that it had found that this level of tension can usually only be achieved by installing the CRS of the vehicle seat, buckling the seatbelt, and moving the seat forward until the desired cinch force level is achieved. However, moving the seat forward would not allow suppression testing at the required rearward and mid track positions. The final rule adopts the 134N CRS cinch force proposed.

Alliance member Ford at attachment 4 of its December 22, 1999 comments to the SNPRM stated that in the field, CRS cinch loads tend toward a maximum of roughly 75N, with more usual loading tending to be about 60N. The Ford comments are in conflict with the agency's rationale for specifying 134N, "*VRTC has found that this level is easily achievable...*" The Alliance believes that this contradiction may result from differing test procedures and measurement methods.

Alliance members typically measure belt forces with a load cell transducer on the seatbelt anchor, along the load path, and in this configuration, 134 N is extremely difficult to achieve. A cinch force of the level prescribed by NHTSA when applied in the manner that is industry custom puts the seat in an unrealistic position on the vehicle seat. The CRS tends to rotate to the left, placing it at an angle that is unrealistic for a child's basic comfort, and it is doubtful any parent would install a seat in this manner. Given this, the Alliance urges that the agency (1) specify a test procedure consistent with industry practice and (2) adopt a CRS cinch load requirement that is consistent with FMVSS 213, namely 67N.

The Alliance understands that Toyota will petition that NHTSA specify how the cinch force load is determined, and also insure that this force is achievable. The Alliance further understands that Toyota will recommend that the load be measured along the belt path, with a load cell located between the belt anchor and the body anchor, with a maximum load of 67N. The Alliance supports the petition submitted by Toyota concerning this aspect of the final rule.

## Low Risk Deployment Test Position

Sections 22.4 and 24.4 of the final rule describe the test procedures for low risk deployment tests of the 3-year-old and 6-year-old, respectively. In these sections, two positions are described in detail. Position 1 describes the chest of the dummy on the instrument panel, while Position 2 describes the head of the dummy on the instrument panel. The Alliance feels that neither position description assures that the dummy's chest or head is positioned against the instrument panel. This contradicts the intent of the original ISO procedures upon which these test positions are based.

Therefore, to assure the chest and head contact the instrument panel, the Alliance suggests that the sections be revised in the following manner:

- The first sentence in sections 22.4.2.4 and 24.4.2.4 should be revised to read: *"With the dummy's thorax instrument cavity rear face vertical and Point 1 in Plane C, move the dummy forward until the dummy's chest contacts the instrument panel."*
- The last sentence in sections 22.4.2.4 and 24.4.2.4 should be revised to read: *"If the dummy's head contacts the windshield and keeps the dummy's chest from contacting the instrument panel, lower the dummy and move it forward again until there is no more than 5 mm (0.2 in) clearance between the head and the windshield, and the chest contacts the instrument panel."*
- Concerning sections 22.4.3.5 and 24.4.3.5, the opening text, "If contact has not been made..." should be deleted and the first sentence should be revised to read: *"Apply a force towards the front of the vehicle on the spine of the dummy between the shoulder joints, rotating the dummy forward until the head or torso comes into contact with the vehicle's instrument panel."*

## CRS Availability and Practicality

In its December 1999 comments to the SNPRM, the Alliance expressed concern about the potential for variability within a child restraint model. The Alliance observed that child restraint manufacturers often change the design of their models while retaining the same model name, discontinue models, etc. Already a scant three weeks following the promulgation of the final rule, one child seat manufacturer has notified the agency that one of the restraints that it manufactures has been discontinued<sup>1</sup>. This manufacturer goes on to recommend that an alternate CRS be substituted for the discontinued model. This submission coming so soon after the promulgation of the final rule underscores the Alliance's concerns with specifying the use of open-market products for compliance testing purposes and the attendant impracticability issues that result from instabilities and uncertainties in supply.

The Alliance renews its call for the development of generic child restraint test devices that would be used for evaluating compliance with suppression requirements. Such an approach would be more practicable than testing with numerous child restraint models that may no longer be in the marketplace by the time vehicles are to be certified. In the interim, the Alliance further calls on the agency to "freeze" the list of CRS models contained in Appendix A of the final rule so that manufacturers can have certainty of the compliance requirements in this regard.

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<sup>1</sup> See Britax Child Safety, Inc. comments to Docket No. NHTSA-00-7013, dated June 6, 2000.

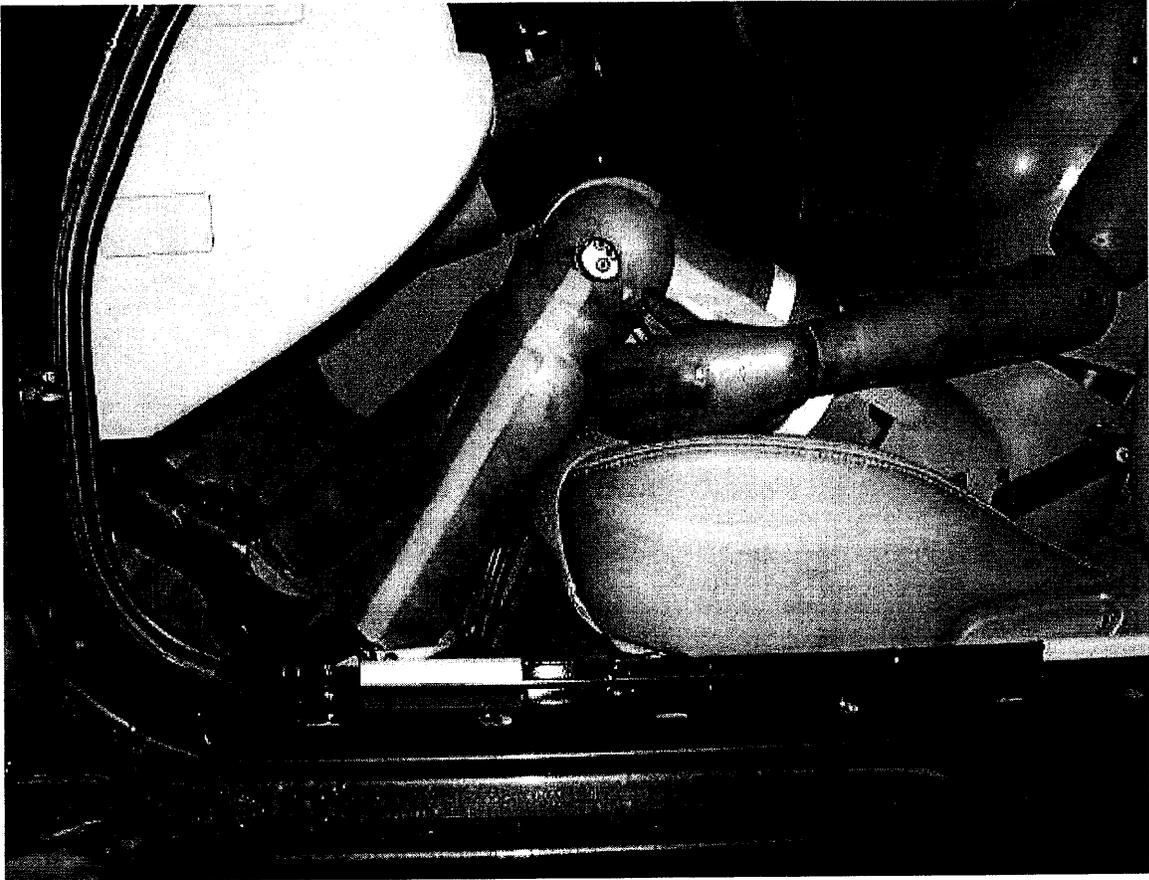


FIGURE A-1: Illustration of unrepresentative and unnatural position of 5<sup>th</sup> percentile female dummy knee when dummy's foot is positioned according to S16.3.2.3.4 in vehicles with seat with relatively low H-points.

## ATTACHMENT B – Comments on Injury Criteria

### Head Injury Criteria Limit

In its December 12, 1999 comments to the SNPRM the Alliance agreed with NHTSA that it is appropriate to scale the proposed mid-sized adult male HIC (15) limit of 700 for the Hybrid III (HIII) 3-year-old and 12-month old CRABI dummies using the following relationship:

$$\lambda_{\text{HIC}} = \lambda_{\sigma}^{2.5} / \lambda_L^{1.5}$$

Where,

$\lambda_{\text{HIC}}$  is equal to ratio of HIC limits for various dummies

$\lambda_{\sigma}$  is equal to ratio of tendon failure strengths for various dummies

$\lambda_L$  is equal to ratio of characteristic head lengths for various dummies

Consistent with this rationale, the Alliance commented that this relationship should be used to obtain the HIC limits for the 6-year-old and small adult female. Therefore, the Alliance proposed the properly scaled limits of 723 and 779 for these two dummies, respectively.

In its final rule, the agency did not adopt the Alliance proposed limits for these two dummies, and instead chose to adopt its original proposed limit of 700 for both the adult female and the 6-year-old. The agency provides the following rationale for its decision:

*"... <The Alliance> recommended that we adopt somewhat higher limits than we proposed for the 5th percentile adult female dummy (779 rather than 700) and the 6-year-old child dummy (723 rather than 700). That organization argued that we were not being consistent in applying scaling relationships from the 50th percentile adult male dummy to the other dummies.*

*After considering the comments, we have decided to adopt the limits we proposed. We note that the data from which the HIC relationship was developed represented an elderly adult population [reference to Hodgson and Thomas, 1971]<sup>1</sup>. There is no basis to assume that the population had the dimensions of 50th percentile adult males. We believe it is reasonable to apply the same 700 HIC limit to all persons who may be represented by the original data set, including 5th percentile adult females and 50th percentile adult males."*

It appears that the agency was making assumptions regarding the data that are only partially correct. The Alliance's position is based on the analysis of 53 cadaver tests reported in SAE 960099<sup>2</sup>. While the cadaver sample contained an over-representation of "older" specimens, the statistical method used accounted for this age bias and gave a risk curve for the adult population. Once 700 is used as a limit for the 50<sup>th</sup> percentile adult male, then all other equivalent limits are obtained from the scaling relationship. Using 700 for the 6-year-old and small adult female results in more conservative limits (less than a 5% risk of AIS=4) for these two dummies.

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<sup>1</sup> Hodgson, V.R. and Thomas, L.M., "Comparison of Head Acceleration Injury Indices in Cadaver Skull Fracture", Proceedings of the Fifteenth Stapp Car Crash Conference, SAE Technical Paper No. 710854, 1971.

<sup>2</sup> Mertz, H.J., Prasad, P. and Nusholtz, G., "head Injury Risk Assessment for Forehead Impacts", SAE Paper No. 960099, International Congress and Exposition, Feb. 26 ~ March 1, 1996.

## Thoracic Criteria Limit

In its comments to the SNPRM, the Alliance provided comments on the agency's proposed thoracic acceleration limits. Although the Alliance maintained the viewpoint that thoracic acceleration is not a unique predictor of thoracic injury risk, it supported the values that it proposed in Attachment C of its SNPRM comments. Most of the limits proposed in Attachment C mirrored those proposed by the agency with the exception of the adult female limit of 60 g's. This limit is the same as the one proposed for the adult male. Consistent with the Alliance comments on HIC above that the limits should be based on scaling, and such scaling should be applied to all sizes and ages of dummies, the Alliance suggested that NHTSA adopt a limit of 73 g's for the adult female. However, NHTSA declined to accept the Alliance proposal.

In its final rule, NHTSA states:

*"After considering the comments we are adopting the proposed 60 g's chest acceleration limit for the 5<sup>th</sup> percentile adult female dummy. AAM's recommended chest acceleration limit of 73 g's for this dummy was obtained using scaling procedures that only considered the effects of the geometric differences between 50<sup>th</sup> percentile adult males and 5<sup>th</sup> percentile adult female. However, we believe the additional effect of decrease in bone strength for the more elderly population at risk in out-of-position situations should also be taken into account."*

Actually, bone strength does not appear to change differently for females than males. Mosekilde and Mosekilde (1990)<sup>3</sup>, Ruff and Hayes (1988)<sup>4</sup>, and Martin and Atkinson (1977)<sup>5</sup> have all shown that bone material strength in both males and females declines equally with age.

Accordingly, the acceleration tolerance of the small female can be scaled directly from the mid-sized male value because the elderly female tolerance appears to be no different than the elderly male tolerance.

Additionally, the Alliance is concerned that if NHTSA retains its adult female acceleration limit of 60 g's, it will force the industry to further re-power air bags. Initial reviews of Alliance member company belted test data shows that current systems are producing adult female thoracic acceleration numbers that, although meet the 60 g limit in most cases, are close enough to the limit to cause the companies concern. Although thorough analysis is needed before concrete conclusions can be made, initial reactions indicate that in order to lower the chest g numbers, manufacturers may be forced to lower the output of the seat belt load limiters. If the load limiters were reduced, the air bag would need to become more aggressive in order to absorb the mass of the 50<sup>th</sup> percentile adult male in 35-mph crash tests. The Alliance wishes to avoid a situation that would lead to the re-powering of air bags given the favorable performance of current depowered systems in protecting occupants.

Although the Alliance does not support thoracic acceleration as a valid injury predictor, if the agency insists on using thoracic acceleration limits to regulate restraint performance, the Alliance recommends that the agency properly scale the thoracic acceleration limit for the adult female and adopt a limit of 73 g's.

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<sup>3</sup> Mosekilde, L. and Mosekilde, L.: "Sex differences in age-related changes in vertebral body size, density and biomechanical competence in normal individuals", *Bone*, Vol. 11:67-73, 1990

<sup>4</sup> Ruff, C.B. and Hayes, W.C.: "Sex differences in age-related remodeling of the femur and tibia", *J. Orthop. Res.*, Vol. 6:886-896, 1988.

<sup>5</sup> Martin, R.B. and Atkinson, P.J.: "Age- and sex-related changes in the structure and strength of the human femoral shaft", *J. Biomechanics*, Vol.10: 223-231, 1977.