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Item 9(a) of the provisional agenda

REGULATION No. 53

(Installation of lighting and light-signalling devices for L₃ category of vehicles)

Visibility of adaptive front-lighting systems (AFS) for motorcycles and glare

Proposal for Supplement 11 to the 01 series of amendments to Regulation No. 53

Submitted by the expert from Japan */

The text reproduced below was prepared by the expert from Japan in order to introduce the requirements concerning the vehicle's horizontal inclination angle adjustment-type headlamps installed on motorcycles. It is based on a document without a symbol (informal document No. GRE-60-21), distributed during the sixtieth session of the Working Party on Lighting and Light-Signalling (GRE) (see report ECE/TRANS/WP.29/GRE/60, para. 35). The modifications to the existing text of the Regulation, including draft Supplement 10 to the 01 series of amendments to Regulation No. 53, are marked in bold or strikethrough characters.

*/ In accordance with the programme of work of the Inland Transport Committee for 2006-2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance performance of vehicles. The present document is submitted in conformity with that mandate.

A. PROPOSAL

Insert new paragraphs 2.21. to 2.25., to read:

- "2.21. **"Horizontal inclination"** means the angle created between the beam pattern when the motorcycle is set as specified in paragraph 5.4., and the beam pattern when the motorcycle is banked (see drawing in Annex 6).
- 2.22. **"Horizontal inclination adjustment system (HIAS)"** means a device that adjusts the horizontal inclination of the headlamp towards zero.
- 2.23 **"Bank angle"** means: the angle made with the vertical by the vertical longitudinal median plane of the motorcycle, when the motorcycle is rotated about its longitudinal axis (see drawing in Annex 6).
- 2.24 **"Signal"** means any HIAS control signal or, any additional control input to the system or, a control output from the system to the motorcycle.
- 2.25 **"Signal generator"** means a device, reproducing one or more of the signals for system test."

Paragraphs 2.21. to 2.23. (former), renumber as paragraphs 2.26. to 2.28.

Paragraphs 6.1.5. to 6.1.5.2., amend to read:

- "6.1.5. Orientation
- 6.1.5.1. Forwards. The lamp(s) may move with the steering angle.
- 6.1.5.2. **A HIAS may be installed."**

Paragraphs 6.1.8. to 6.1.8.2.1., amend to read:

- "6.1.8 **Tell-tales**
- 6.1.8.1. "Circuit-closed" tell-tale.
- 6.1.8.1.1. Mandatory, non-flashing blue signal lamp.
- 6.1.8.2. **"HIAS failure" tell-tale**
- 6.1.8.2.1. **Mandatory, flashing amber signal lamp, which may be combined with the tell-tale referred to in paragraph 6.2.8. It shall be activated whenever a failure is detected with respect to the HIAS control signals. It shall remain activated while the failure is present. It may be cancelled in the event of system reset by the rider."**

Insert a new paragraph 6.1.9.2., to read:

"6.1.9.2. In the event of a failure of the HIAS, it shall be possible to reset the system to its initial position, without the use of any special tools.

The manufacturer shall provide with the detailed description of the procedure for resetting."

Insert new paragraphs 6.2.5.5. to 6.2.5.6., to read:

"6.2.5.5. A HIAS may be installed. However, the adjustment amount of horizontal inclination shall not exceed the vehicle's bank angle.

6.2.5.6. The requirement in paragraph 6.2.5.5. shall be tested under the following conditions:

In the absence of specific instructions, test vehicle shall be set as specified in paragraph 5.4. Incline the vehicle with the following conditions and measure the angle δ created by headlamp cut-off line (in case of asymmetrical beam headlamp, its horizontal part of cut-off is used) and HH line. (see drawing in Annex 6).

Handlebar may be fixed being in the position corresponding to the straight ahead movement so as not to move during the vehicle rotation.

For the purpose of HIAS activation during test, the system shall be tested using the signal generator, if applicable:

- (a) Maximum horizontal inclination adjustment angle specified by the manufacturer (to left and to right).**
- (b) Half of maximum horizontal inclination adjustment angle specified by the manufacturer (to left and to right).**

The system shall be considered satisfying the requirements of paragraph 6.2.5.5., if all measured angles δ are not less than zero. This may be demonstrated by the manufacturer by other means accepted by the authority responsible for type approval."

Paragraphs 6.2.8. to 6.2.9., amend to read:

"6.2.8. Tell-tales

6.2.8.1. "Circuit-closed" tell-tale.

6.2.8.1.1 Optional; non-flashing green signal lamp.

6.2.8.2. "HIAS failure" tell-tale.

6.2.8.2.1 Mandatory, flashing amber signal lamp, which may be combined with the tell-tale referred to in paragraph 6.1.8. It shall be activated whenever a failure is detected with respect to the HIAS control signals. It shall remain activated while the failure is present. It may be cancelled in the event of system reset by the rider.

6.2.9. Other requirements

~~None~~

[When the HIAS of a motorcycle cannot meet the requirements of this regulation in the event of failure of the HIAS, it shall be possible to automatically reset the HIAS for the motorcycle to resume the beam pattern when the motorcycle is set as specified in paragraph 5.4. when the passing beam is on.]"

Insert a new Annex 6, to read:

"Annex 6

EXPLANATION ABOUT "THE HORIZONTAL INCLINATION", "THE BANK ANGLE"
AND THE ANGLE " δ ".

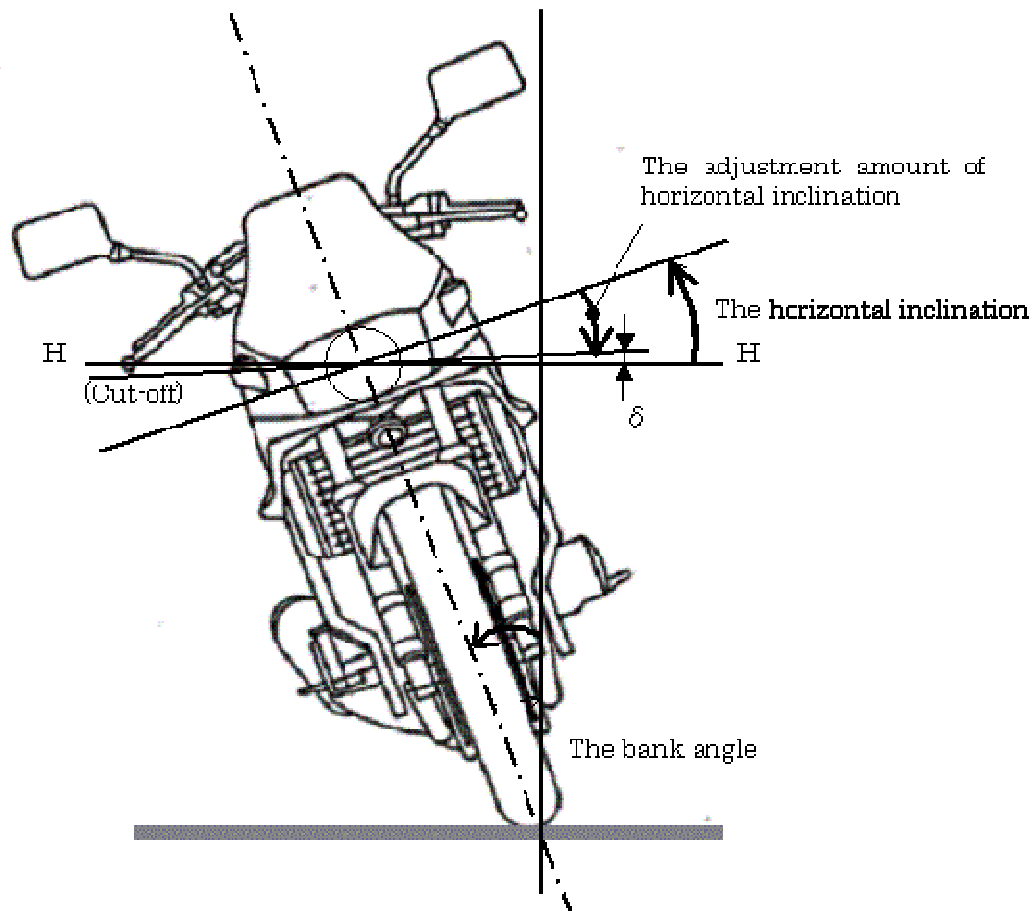


Figure 3

Note : This figure shows the motorcycle is banked to the right side."

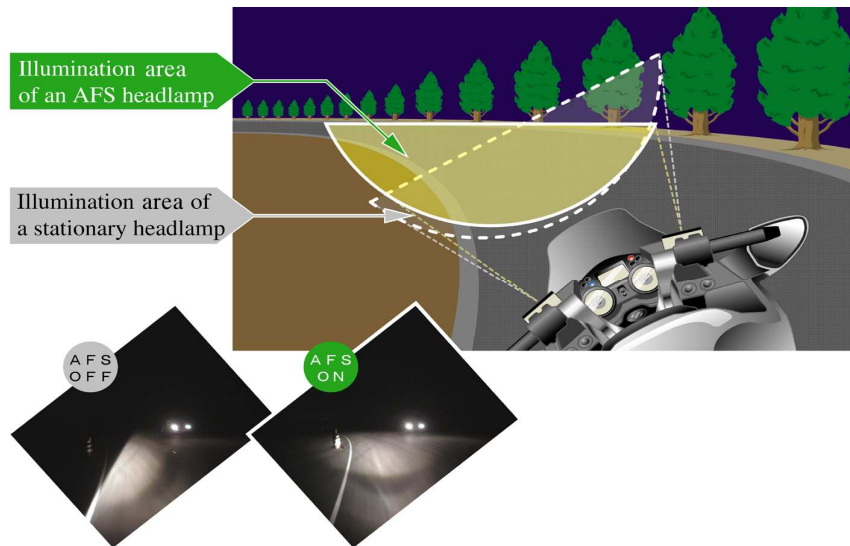
B. JUSTIFICATION

This proposal specifies the requirements concerning the vehicle's horizontal inclination angle adjustment-type headlamps installed on motorcycles.

The Adaptive Front Lighting System (AFS), which improves the visibility by controlling the optical axis with the steering angle and providing additional light sources, has been incorporated into the headlamps for four-wheel vehicles.

In the case of a motorcycle, due to its driving characteristics, the headlamp inclines with the vehicle when the vehicle is running on a curved road, narrowing the illumination area of the headlamp in the travelling direction. Therefore, by adjusting the variation of the headlamp's light distribution from that when the vehicle is upright (i.e.: in the standard condition), to keep the illumination area wide enough, the visibility is expected to improve.

Figure 1. Description of the Function of the Inclination Angle adjustment-Type AFS



To submit this proposal for amendments and confirm its validity, the expert from Japan conducted a research on the "vehicle's horizontal inclination angle adjustment-type headlamps for motorcycles" at the Japan Automobile Research Institute (JARI) by carrying out an "evaluation of the visibility" and an "evaluation of the effect on glare". The result is outlined below:

(a) Evaluation of the visibility

It was confirmed that the visibility improved when the vehicle was running on a curved road and when turning right and left by adjusting the change in the light distribution when the vehicle was upright.

(b) Evaluation of the effect on glare

It was found that generation of glare against oncoming vehicle, which may be caused by this device, could be avoided by ensuring that the maximum adjustment amount of the light distribution of the headlamp is the variation caused by the vehicle inclination.

As for the details of the research at JARI, see informal document GRE-59-17.

The following description gives the background to each amendment proposed herein:

Paragraph 2.: Definitions

- (a) The "horizontal inclination" does not mean an inclination angle of the vehicle. It means the angle created by a change in the beam pattern between the upright and inclined position of the vehicle and when it is inclined. The HIAS is a device that adjusts this angle.
- (b) paragraphs 2.24. and 2.25., which have been added, were developed based on Paragraphs 1.10. and 1.11. of Regulation No. 123.

Paragraph 6.1.: Driving Beam Headlamp

- (a) Since there is no glare issue for the driving beam headlamp, this paragraph does not contain the requirement "the adjustment amount of horizontal inclination shall not exceed the vehicle's bank angle", which is specified for the passing beam headlamp.
- (b) For the "HIAS failure" tell-tale, the indication method and the colour were based on paragraph 6.22.8.2. of Regulation No. 48 and on paragraph 8. of Annex 4 of Regulation No. 60, respectively. The tell-tale shall remain activated while the failure is present. However, when the lamp is reset to its initial position for temporary repair work, the function of the lamp will be the same as that of the conventional lamp without AFS and therefore the tell-tale will be allowed to be deactivated. In addition, the same tell-tale indicator may be used for both driving beam headlamp and passing beam headlamp.
- (c) In the event of a failure, it shall be possible for the rider to reset the lamp to its initial position without using any special tools, and the detailed information on the resetting procedures shall be provided by the manufacturer.

Paragraph 6.2.: Passing Beam Headlamp

- (a) Test procedures for confirming that the adjustment amount of horizontal inclination will not exceed the vehicle's bank angle have been specified. δ is the angle created by cut-off line and HH line. When this angle is zero or above, no glare will be given to oncoming vehicles. In addition, the statement to the effect that signals for activating the AFS may be input from the outside during testing if necessary, which was based on paragraph 3.1.1. of Annex 9 of Regulation No. 123, has been added.
- (b) The specifications of "HIAS failure" tell-tale are exactly the same as that for driving beam headlamp, and the same indicator may be used for both headlamps.

Paragraph 6.2.9.: Other requirements

- (a) The requirement on automatic resetting of the lamp to its initial position in the event of a failure was based on paragraph 5.7. of Regulation No. 123 and paragraph 5.9.2. of Regulation No. 112 to ensure the visibility without glare to oncoming vehicles.

This proposal lays the foundation for the dissemination of vehicle's horizontal inclination angle adjustment-type headlamps that always correct the illumination area to that when the vehicle is upright regardless of the vehicle inclination position. A widespread use of this device will improve the night-time visibility of motorcycles and contribute to the prevention of traffic accidents.

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