

Informal document No. **5**  
(51st GRE, 15-19 September 2003,  
agenda item 2.1.)

## REPORT ON THE FOURTH SESSION OF THE GRE INFORMAL GROUP ON ADAPTIVE FRONT-LIGHTING SYSTEMS (AFS)

(15 - 17 July 2003)

1. The GRE Informal Group on Adaptive Front-Lighting Systems (AFS) held its fourth session from 15-17 July 2003 in Frankfurt at the invitation of the German government, under the chairmanship of Mr. M. Lowe (United Kingdom). Experts from the following countries participated in the work: France; Germany; Italy; Japan; Netherlands; Poland; United Kingdom; United States of America. A representative of the European Commission (EC) participated. Experts from the following non-governmental organizations also participated: International Organization of Motor Vehicle Manufacturers (OICA); European Association of Automobile Suppliers (CLEPA); Working Party "Brussels 1952" (GTB), including experts from the AFS Group; International Electrotechnical Commission (IEC).

### ADOPTION OF THE AGENDA

Documentation: Working Paper No. 4-7/Rev.2

2. The Informal Group adopted the agenda. At the proposal of the Chairman it was agreed to discuss the principal items and key issues set out in the Working Papers (WP) for the session.

### PROPOSAL FOR A NEW DRAFT REGULATION ON AFS

Documentation: WP No. 4-1 (GTB), WP No. 4-2 (Secretariat), WP No. 4-3 (Chairman), WP No.4-8 (France), WP No. 4-9 (United Kingdom), WP No. 4-10 (GTB/AFS), WP No. 4-12 (GTB/AFS, Germany, Poland), WP No. 4-13 (United Kingdom), WP No. 4-14 (United Kingdom)

#### New Regulation (WP 4-3, item 9)

3. It was recognized that, due to the internal procedures of the European Community, the entry into force of the draft Regulation, once adopted by WP.29, could be delayed. It was also noted that

- the draft Regulation had reached an advanced stage;
- the transformation of the existing text into amendments of Regulations Nos. 98 and 112 would take considerable time and imply the possibility of errors in the structure and the detailed provisions.

On balance, the Informal Group was in favour of proceeding with the existing text and inviting the European Community representative in WP.29/AC.1 to accelerate the internal procedures as much as possible.

Safety Concept (WP 4-3, item 1.; WP 4-13; WP 4-14, item C)

4. The expert from Germany pointed out that, even in conventional lighting systems, the use of electronic software, programmable to a dedicated electrical configuration at the end of the vehicle assembly line, was current practice today and would increase in the future. For complex systems like AFS suitable provisions were needed, and the proposal in WP 4-13 should be used as a basis for minimum requirements. This view was shared by the experts from Netherlands and the United Kingdom. The experts from France, Italy, CLEPA and OICA considered that the safety aspects of AFS, as compared to braking systems, did not justify complicated testing; they noted that paragraph 2.2.2.1. of the draft Regulation already required the Applicant to submit a description of the AFS safety concept and could eventually be extended to cover more details.

5. The Informal Group requested the experts from Germany, Netherlands and the United Kingdom to prepare a common proposal, taking into account the comments made during the discussion.

Light sources not approved to Regulations Nos. 37 and 99 (WP 4-3, item 2.; WP 4-10, item D)

6. Referring to the government majority decision at the third session of the Informal Group regarding the use of non-approved light sources, the expert from GTB/AFS requested the Informal Group to reconsider this subject; this request was supported by the expert from CLEPA. The expert from Germany noted that WP.29/AC.1 had approved amendments to Regulation No. 7 permitting the use of light source modules (TRANS/WP.29/926, paras. 57 and 97) and that similar amendments to other Regulations on lighting would come before WP.29/AC.1 at their November 2003 sessions.

7. The Informal Group recognized that at present there were no standard specifications for light source modules, comparable to those in Regulations Nos. 37 and 99. The expert from Germany stated that the Technical Service responsible for type approval would have to verify correct dimensional characteristics, also regarding conformity of production.

8. The Chairman drew attention to the possibility to introduce in Regulation No. 48 provisions which would specify the use of certain light sources with eventual restrictions; however, with regard to the situation indicated in paragraph 3 above, this approach was not supported by the Informal Group.

9. The Informal Group discussed and agreed the proposal in WP 4-10 (including the amendment to Regulation No. 48), with the following modifications and comments:

Paragraph 5.3.2.

Delete "being approved or not"

Paragraph 5.3.3.

Delete "for frontlighting purposes"

Paragraph 5.11., read:

"The components to which a replaceable light source or a light source module is assembled shall be so made that the light source or the light source module fits easily and, even in darkness, can be fitted in no position but the correct one."

Paragraph 5.12.

The experts from the Netherlands and the United Kingdom entered reservations regarding Annex 8, and it was agreed to review this annex at the fifth session.

Paragraph 6.5.7.

The expert from Germany proposed to require compliance with the photometric and colorimetric provisions of the Regulation, and it was agreed to discuss this proposal and eventual test procedures at the fifth session.

Traffic change mode (WP 4-3, item 3.; WP 4-10, item B)

10. The proposal by GTB/AFS, which is intended to reflect the decisions taken at previous sessions, was accepted by the Informal Group as a pragmatic solution; it was noted that traffic change means were not a "mode" as defined in paragraph 1.4. of the draft Regulation (see paragraph 26 below). The Informal Group also considered that

- there is no mandatory requirement to conserve all AFS classes/modes when the system is converted to the traffic change function;
- it is the choice of the manufacturer to provide all or part of the original AFS features for the traffic change function (e.g. switch to the neutral state and maintain a bending mode);
- the Technical Service would be responsible for testing the system classes/modes according to the information provided by the manufacturer.

The Chairman stated that such information should be included in the owner's manual and that wording should be added to paragraph 5.10. to cover requirements for testing. The Informal Group agreed the following amendments:

Paragraph 3.4., read.

"... paragraph 5.10.2.1. ..."

Paragraph 5.10.2.

Read: "...traffic change function..." and delete the square brackets around the value "1.5".

Adjustment of lighting units (WP 4-3, item 4.)

11. This item is related to the general issue of beam adjustment and aiming which is addressed in WP 4-12 regarding Annex 9 (see paragraph 31 to 36 below).

Electromagnetic compatibility (WP 4-3, item 5.; WP 4-14, items A and B)

12. The expert from GTB/AFS recalled the discussion at the third session where concerns had been raised regarding approval of aftermarket systems and the fitting to the respective vehicle type; he proposed to insert a new paragraph 4.1.6., to read:

"4.1.6. The Applicant shall indicate, in a form corresponding to the respective model in Annex 1 to this Regulation, the type(s) of vehicles for which the system is intended."

13. The expert from the United Kingdom referred to his proposal in WP 4-14 and confirmed that a system should only be approved in conjunction with the vehicle type it is intended for, although this would restrict the freedom of aftermarket producers; he also suggested to amend the scope of the draft Regulation to include aftermarket systems.

14. The expert from GTB drew attention to paragraph 2.7.26. in the draft amendments to Regulation No. 48 where reference is made to AFS approved to Regulation No. ... The expert from Germany suggested to extend this provision to all devices covered by Regulation No. 48; he agreed to submit this proposal to GRE at its fifty-first session.

Following a proposal by the experts from Germany and Italy, the Informal Group accepted the text for a new paragraph 4.1.7., to read:

- "4.1.7. If approval is sought for a system which is not intended to be included as part of the approval of a vehicle type according to Regulation No. 48,
- 4.1.7.1. the Applicant shall demonstrate the capability of the system to comply with the relevant provisions of paragraph 6.20. of Regulation No. 48 when correctly installed;
- 4.1.7.2. the system shall be approved to Regulation No.10."

Paragraph 5.8. would be deleted.

Failure provisions (WP 4-3, item 6.; WP 4-10, item C)

15. The expert from GTB/AFS noted that the proposal in WP 4-10 included three alternatives:
- C1 which referred to the lighting units providing the minimum illumination of the passing beam in neutral state ("core part" of the system) and their monitoring;
  - C2 which referred to the monitoring of all light sources/lighting units;
  - C3 which referred to a substitute function.

Attention was also drawn to

- the definitions of light sources in the GTB proposal for amendments to Regulation No. 48 regarding distributed lighting systems (TRANS/WP.29/GRE/2001/31/Rev.1), which will be incorporated in draft Supplement 8 to the 02 series of amendments;
- the provisions regarding electrical connections of light sources in Regulation No.7, paragraph 6.1. footnote 2/ (i).

16. The Chairman noted that, in the case of multiple light sources with low individual wattage (e.g. LEDs) for one function, it would be necessary to specify the extent of failure(s) which would activate a tell-tale; it would also be suitable to decide whether the activation of a tell-tale should be produced by the failure of (a) defined light source(s), or by a decrease/failure in the corresponding lighting function. The expert from Germany pointed out that future power LEDs for front lighting would have wattages which would permit to monitor the failure of individual light sources.

17. In a survey of Contracting Parties the experts from Germany, Netherlands, Poland and United Kingdom favoured a solution which would require monitoring of light source failure in all cases, whereas the experts from France, Italy and Japan preferred a solution which would refer to failure of light sources providing the basic Class C passing beam. As a consequence the Informal Group agreed to amend paragraph 5.9.1. to read:

- "5.9.1. The system shall be so made that, if a light source has failed, a failure signal in order to comply with the relevant provisions of Regulation No. 48 shall be provided."

It was also agreed to delete paragraph 5.9.4.

Photometric values (WP 4-3, item 7.; WP 4-14, item D)

18. The expert from the United Kingdom explained the proposal for segments S1 and S2 which is intended to provide sufficient lighting for overhead road signs and avoid dark spots. The expert from GTB/AFS noted that a segment width of 8L - 8R was not necessary from a practical point of view and that scanning a segment would imply more testing; he suggested to restrict measurement to 3 points for each segment (4L - V - 4R); this was supported by the expert from CLEPA.

19. The experts from Germany and GTB/AFS provided information on the new GTB proposal for a harmonized passing beam pattern which is almost completed and expected to come before GRE at its fifty-second session; they noted that the modified proposal would be in line with this beam pattern.

20. As a compromise the Informal Group agreed on the following values:

2U; 4L, V, 4R	0.2 lx
4U; 4L, V, 4R	0.1 lx.

21. As regards point 50L, the experts from the Netherlands and the United Kingdom proposed a maximum value of 15 lx for Classes C and V, taking into account the corresponding values of 15 lx (at 12 V) in Regulation No. 112 and 20 lx (at 13.5 V) in Regulation No. 98, the danger of glare on uneven roads and the gradual increase in voltage over time. The experts from France, Italy and Poland were in favour of a compromise value of 20 lx. Similar considerations were made regarding the values of 35 lx and 25 lx, respectively, for Class W. The Informal Group agreed on provisional values as follows:

Classes C and V	[15 or 20] lx
Class W	[25 or 35] lx

The experts from CLEPA and GTB/AFS expressed concerns regarding this unresolved issue and announced a document with supporting evidence for the next session.

22. The expert from GTB/AFS noted that the new point 75L (L3.43;D0.57) with a maximum of 12 lx, as proposed by the expert from the United Kingdom, would be located at the cut-off line and would be sensitive to aiming. The illumination would automatically result from the cut-off and a requirement would not be of any use. The Informal Group did not support the proposal.

23. As regards the proposal by the expert from the United Kingdom for a maximum value of 10 lx in segment D for Class C, V and E (14 lx in case 1/, i.e. if a Class W passing beam is provided), and 4 lx for Class W, the expert from GTB/AFS explained that the value of 14 lx for Classes C, V and E in the draft Regulation had already been a severe requirement. He also noted that the value of 4 lx for Class W corresponds to the second set of parameters and that both sets should be maintained in order to obtain a sensible balance between the advantage for the driver and the disadvantage for the oncoming traffic. The Informal Group accepted the proposal by the expert from the United Kingdom, except for the values concerning Class W.

24. As regards the proposal by the expert from the United Kingdom to amend the multiplier in Annex 10, paras. 2.2. and 2.4. to read 0.74, the experts from Germany and GTB/AFS explained that the value of 0.7 (taken from Regulation No. 98) was based on the estimation of a voltage of 13.5 V and should be maintained. They also noted that the issue of test/supply voltage was under consideration in GRE. The Informal Group did not support the proposal.

25. As regards paragraph 6.2.9.1., the expert from France recalled the decision taken at the third session of the Informal Group and confirmed that it may not be possible to provide 3 lx in point 50V by the V Class passing beam. The Informal Group confirmed the exemption for the Class V passing beam and decided to remove the square brackets.

#### Scope and definitions (WP 4-1; WP 4-10, item A)

26. The Informal Group discussed the proposals by the expert from GTB/AFS; the comments and decisions are set out below.

#### SCOPE

The second part (... which ... lighting system(s)) should be deleted; this should apply to all Regulations for headlamps.

#### Paragraph 1.2.

In order to define the minimum configuration of an AFS and to avoid an unnecessary reference (see paragraph 14 of this report) the text was amended to read:

- "1.2. "Adaptive front lighting system" ( or "system") means a lighting device providing two or more different classes for automatic adaptation..."

As a consequence, paragraph 6.1.1. should be amended to read:

- "6.1.1. Each system shall provide a Class C (basic) passing beam according to paragraph 6.2.5. below and one or more additional classes of passing beam; it may incorporate one or more additional modes within each class of passing beam and the front-lighting functions ..."

#### Paragraph 1.3.

The experts from France and Italy requested to re-instate a reference to the intended use of the different classes of a passing beam, although they recognized that the previous text did not provide an exact description. Following a proposal by the expert from GTB/AFS it was agreed to provide suitable information in a footnote and to amend the text to read:

- 1.3. "Class" of a passing beam (C, V, E or W) means the designation of a passing beam, identified by particular provisions according to this Regulation and to Regulation No. 48 1/

1/ For explanation only:

The provisions for the classes are dedicated to conditions as follows:

Class C for the basic beam;

Class V for use in lit areas such as towns;

Class E for use on roads such as motorways;

Class W for use in adverse conditions such as wet road."

#### Paragraph 1.4.

Following a question by the expert from Germany, the expert from GTB/AFS explained that this definition was intended to permit not only a bending mode but also variations of the illumination within the photometric framework of a class, e.g. as a function of speed within class C, or the sharpness of the cut-off as a function of road surface. The Informal Group accepted a revised version of the paragraph, to read:

- "1.4. "Mode" of a passing beam (C1, C2, ...) means a beam of a front-lighting function provided by a system within the relevant provisions for one of the classes, designed and specified by the manufacturer for adaptation to dedicated vehicle and ambient conditions."

#### Conformity of production control procedures (WP 4-10, item E)

27. The expert from GTB/AFS explained that the proposal for amendments to paragraph 1.2.1.1. in Annexes 5 and 7 was based on the standard system for COP which was the result of the work of a small Group created by GRE at its fifteenth session in 1986; the requirements for COP had then been introduced consecutively in all Regulations regarding lighting and light-signalling. He noted that work had been initiated in GTB to revise the COP procedures, in particular with regard to harmonization.

28. The Informal Group accepted the proposal. The expert from Germany announced that he would submit a proposal for revised COP provisions in Regulations on lighting to GRE. The expert from GTB offered to contribute the results of ongoing work, when these are available.

Photometric measurement provisions for bending mode (WP 4-10, item F)

29. The Informal Group accepted the proposal by the expert from GTB/AFS with an editorial amendment; paragraph 3.1.2. in Annex 10 would read:

"...occurs. If this cannot be confirmed, compliance with the requirements in Table 1 of Annex 3 to this Regulation shall be checked."

Communication form (WP 4-10, item G)

30. The Informal Group accepted the proposal by the expert from GTB/AFS for a new version of paragraphs 17. and 18. of Annex 1, which would provide a complete description of AFS classes and modes.

Passing beam cut-off and aiming provisions (WP 4-8; WP 4-12)

31. The expert from France introduced WP 4-8, which was intended to provide a simple and straightforward procedure for AFS aiming.

32. The expert from GTB/AFS introduced WP 4-12 which had been established in cooperation with the experts from Germany and Poland; he noted that the text before the Informal Group constituted an intermediate stage which would be the subject of further discussion between the experts.

33. The expert from GTB recalled that proposals regarding cut-off provisions for Regulations Nos. 98 and 112 were being studied by GRE (TRANS/WP.29/GRE/23 and 24).

34. The Chairman drew attention to paragraph 3.1. of WP 4-12 where two alternatives for the distance - 10 and 25m - are indicated for measurement of the sharpness of a cut-off. The expert from GTB explained that this solution, which is also part of the proposals indicated in paragraph 33 above, had been chosen in order to reconcile two objectives:

- using conventional equipment for photometry measurements for type approval by a Technical Service at 25m;
- cut-off sharpness tests at a distance of 10m, which is current practice for aiming of headlamps, e.g. in periodical technical inspection and after repair.

He also noted that the results of the two procedures were not identical and could not be mutually converted.

35. The experts from EC and the United States stated the importance of a procedure which could be used by inspectors when checking AFS on vehicles in service.

36. The expert from GTB/AFS offered to convene a special meeting of experts from GTB/AFS, France, Germany, Poland and United States to prepare a revised version of WP 4-12 which could be submitted for the next session of the Informal Group.

PROPOSAL FOR AMENDMENTS TO REGULATION NO: 48

Documentation: WP No. 4-4 (Chairman), WP No. 4-5 (GTB), WP No. 4-11 (GTB/AFS), WP No. 4-15 (United Kingdom)

Substitute function (WP 4-10, item C3)

37. The expert from Italy explained the proposals discussed in GTB for introducing provisions regarding the substitute functions in Regulations on lighting. The Informal Group agreed to refer to the proposal in WP 4-10 when such provisions would be considered necessary in the amendments to Regulation No. 48.

Tell-tale (WP 4-4, item 3.; WP 4-15)

38. The Informal Group had a general exchange of views on requirements for tell-tales which are intended to indicate various stages of operation/failure of the AFS to the driver and noted that the definition of "operating tell-tale" in paragraph 2.18. of Regulation No. 48 was not sufficient to cover the needs of current and future lighting systems.

39. The expert from Italy expressed his preference for one AFS tell-tale (e.g. of yellow colour) which would indicate the neutral state when steady-burning and a failure when flashing; it would remain flashing as long as the failure persists. It should also be required to detect all safety-related failures of an AFS. The expert from OICA expressed his concern regarding a continuously flashing tell-tale.

40. The Informal Group accepted the proposal for a failure tell-tale and suggested to establish a list of safety-related failure conditions which would produce activation of one or more tell-tales. Such a list could be inserted either in the draft Regulation on AFS (regarding signal generation) and/or in Regulation No. 48 (regarding function). The expert from the United Kingdom agreed to prepare a revised version of his proposal for the next session.

#### PROPOSAL FOR AMENDMENTS TO REGULATION NO. 45

Documentation: WP No. 4-6 (GTB)

41. Due to lack of time, this subject was not discussed.

#### DOCUMENTS TO BE SUBMITTED FOR THE FIFTY-FIRST GRE SESSION

42. The Informal Group agreed that the report on the fourth session would be submitted to GRE at its fifty-first session as an informal document. Discussion on the unresolved AFS issues would be continued at the fifth session of the Informal Group. Subject to approval by GRE, this session will be held from 28 to 30 October, 2003 in Bonn, at the invitation of the German government. The expert from Germany requested all experts intending to participate to indicate attendance not later than 10 October, 2003 to the German Ministry of Transport, using the email address [Baerbel.Esser@bmvbw.bund.de](mailto:Baerbel.Esser@bmvbw.bund.de).

43. All Working Papers for the fifth session of the Informal Group, including those carried over from the fourth session, shall carry the symbol "WP 5-..." and should be submitted to the ECE Secretariat not later than 30 September, 2003.

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