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Working Party on Lighting and Light-Signalling (GRE)
(Forty-ninth session, 30 September – 4 October 2002,
agenda item 2.2.)

PROPOSAL FOR DRAFT AMENDMENTS (SUPPLEMENT 2 TO THE 02 SERIES) TO REGULATION No. 10

(Electromagnetic Compatibility)

Transmitted by the Expert from Japan

Note: The text reproduced below is a revision of the original proposal by the expert from Japan (TRANS/WP.29/GRE/2002/4). It was prepared by the expert from Japan, at request of GRE at its the forty-eighth session (TRANS/WP.29/GRE/48, paras. 28 and 29). The modifications to the proposal in TRANS/WP.29/GRE/2002/4 are marked in **bold** text.

Note: This document is distributed to the Experts on Lighting and Light-Signalling only.

A. PROPOSAL

Paragraph 6.3.2.4., amend to read:

"6.3.2.4. Notwithstanding the limits defined in paragraphs 6.3.2.1., 6.3.2.2. and 6.3.2.3. of this Regulation, if, during the initial step described in annex 5, paragraph 1.3, the signal strength measured at the vehicle radio antenna is less than 20 dB micro-Volts (10 micro-Volts) over the frequency range ~~88-108 MHz~~**76-108 MHz**, then the vehicle shall be deemed to conform to the limits for narrowband electromagnetic disturbances and no further testing will be required."

Annex 5,

Paragraph 1.3., amend to read:

"1.3. This test is intended to measure narrowband electromagnetic disturbances such as might emanate from a microprocessor-based system or other narrowband source. First, the emission levels in the FM band (~~88-108 MHz~~**76-108 MHz**) are measured at the vehicle radio antenna using the apparatus described in paragraph 1.2. If the level specified in paragraph 6.3.2.4. of this Regulation is not exceeded, the vehicle shall be declared to conform to the limit for electromagnetic disturbances prescribed in this annex and the full test need not be carried out."

* * *

B. JUSTIFICATION

B.1. History

At the 48th GRE, Japan proposed to permit the use of another frequency band for the initial step method of the narrowband electromagnetic disturbances test set forth in annex 5 to ECE Regulation No. 10.

The proposal was examined by GRE and the GRE chairman proposed to expand the FM band to 76-108 MHz to cover both Japan's (76-90 MHz) and Europe's (88-108 MHz) FM bands. In this paper, Japan reports the results of its study on the validity of the proposed FM band expansion.

B.2. GRE Chairman's proposal

The frequency band for the initial step method of the narrowband electromagnetic disturbances test be amended from the current 88-108 MHz (the FM broadcast band in Europe and the U.S.) to a 76-108 MHz band to include Japan's FM broadcast band.

B.3. Results of Japan's study

The correlation between the initial step method using an onboard FM antenna and the 10m/3m method using a nearfield broadband antenna was examined, and it was confirmed that the correlation remains valid even if the frequency band is expanded. Accordingly Japan supports the GRE chairman's proposal for FM band expansion.

An experiment was conducted on 15 test vehicles equipped with a European-specification antenna. Figure 1 shows the level of correlation between the initial step test results obtained with the current FM band and those obtained with the amended (76-108 MHz) band from the vehicles. The correlation data were on the balance of [A] the margin of the measured value from the limit value under the 10m/3m method subtracted by [B] the margin of the measured value from the limit value under the initial step method. There was no significant difference in the data distributions, mean values and standard deviations between the two frequency bands.

A similar experiment was carried out on the same 15 test vehicles but equipped with a Japanese-specification antenna. Figure 2 shows the level of correlation between the initial step test results obtained with the Japanese FM band and those obtained with the amended (76-108 MHz) band from the vehicles. Similarly, there was no significant difference in the data distributions, mean values and standard deviations over the two test frequency bands.

Moreover, Japan previously confirmed that identical data could be obtained between the use of Japanese-specification antennas over the 76-90 MHz band and the use of European-specification antennas over the 88-90 MHz band. This was reported to the 48th GRE as formal document TRANS/WP.29/GRE/2002/4 (Fig. 3).

B.4. Test procedures

1. Fifteen test vehicles were equipped with a Japanese-specification antenna in the first routine and with a European-specification antenna in the second routine. Noise levels were measured by the 10m/3m method and the initial step method, both over the 76-108 MHz band to cover the FM broadcast bands in Japan and Europe.

2. Correlation data were taken as follows: Derive the balance of [A] the margin of the measured value from the limit value under the 10m/3m method subtracted by [B] the margin of the measured value from the limit value under the initial step method.

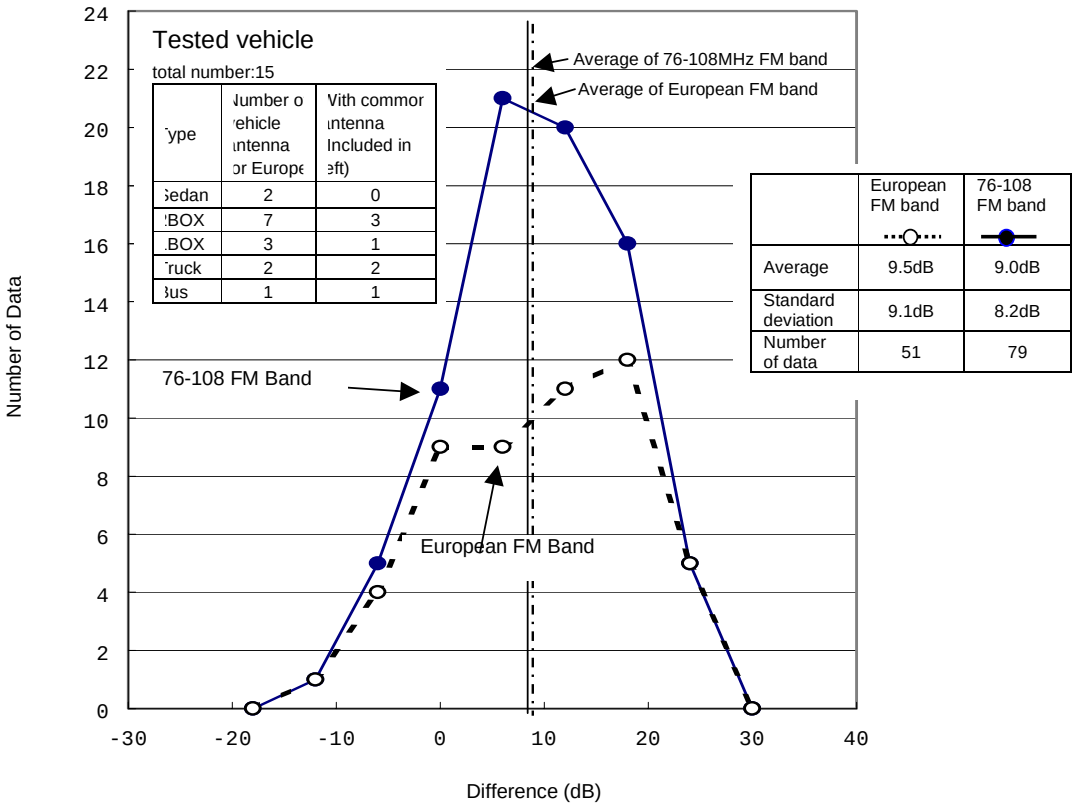
3. The correlation data were classified according to 6 dB steps, and frequency was plotted at the mean value of each step.

4. The data in Figure 1 were obtained from vehicles equipped with a European-specification antenna over the total 76-108 MHz band (n=79) and over Europe's current FM band (n=51). The data distribution is indicated in the graph, and the mean values and standard deviations are also given.

The data in Figure 2 were obtained from the same vehicles but equipped with a Japanese-specification antenna over the total 76-108 MHz band (n=79) and over Japan's current FM band (n=59). The data distribution is indicated in the graph, and the mean values and standard deviations are also given.

Figure 3 compares the measurement data over the Japanese FM band when a Japanese-specification antenna was installed, and the measurement data over the European FM band when a European-specification antenna was mounted.

Fig.1 Distribution of correlation between initial step method and 10m/3m method with expanded FM band (vehicles with a European-specification antenna)



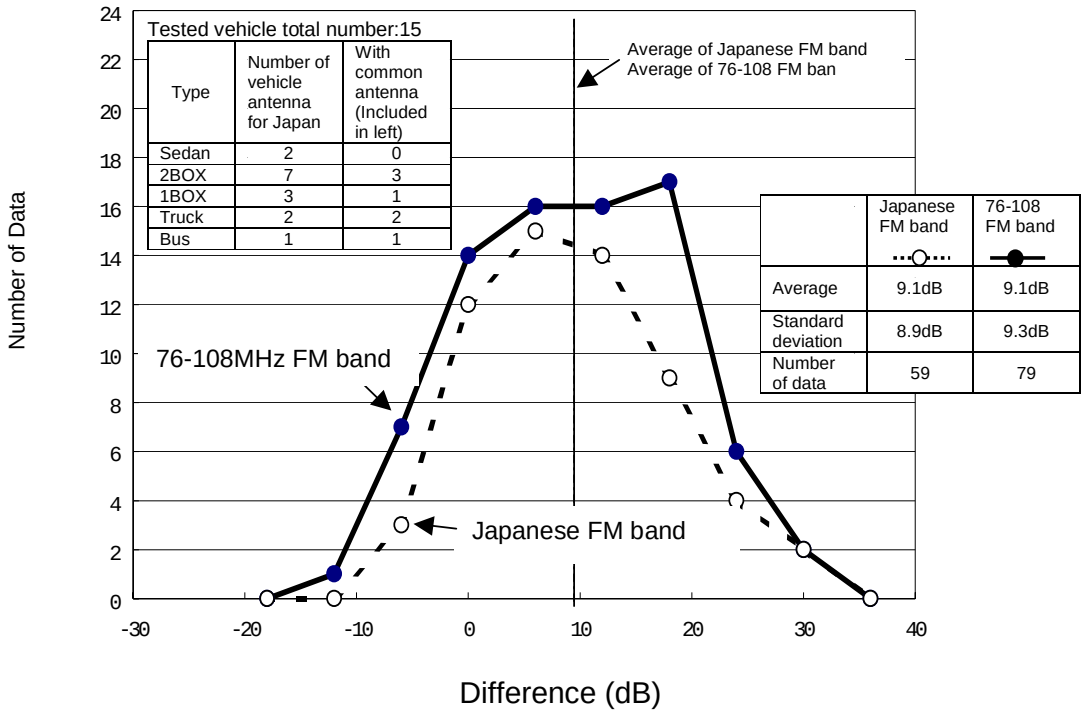
Type	Number of Vehicle (Antenna for Europe)	With common Antenna (Included in left)
Sedan	2	0
WBOX	7	3
NBOX	3	1
Truck	2	2
Bus	1	1

	European FM band	76-108 FM band
Average	9.5dB	9.0dB
Standard deviation	9.1dB	8.2dB
Number of data	51	79

(Limit of 10m/3m method – Measured value of 10m/3m method)
-(Limit of initial step method – Measured value of initial step method)

Note: Difference is divided to sections by 6dB (···, from -9 to -3, from -3 to +3, from +3 to +9, ···), and numbers of data are counted by each section and plotted at the center point of each section.

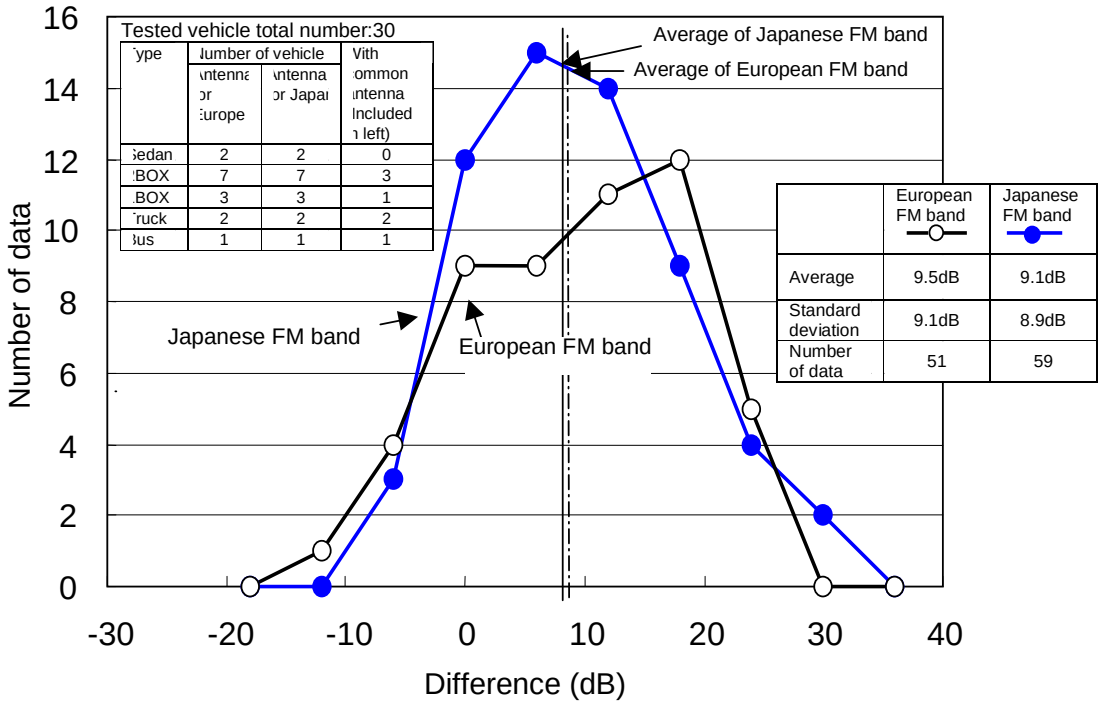
Fig.2 Distribution of correlation between initial step method and 10m/3m method with expanded FM band (vehicles with a Japanese-specification antenna)



(Limit of 10m/3m method – Measured value of 10m/3m method)
-(Limit of initial step method – Measured value of initial step method)

Note: Difference is divided to sections by 6dB (···, from -9 to -3, from -3 to +3, from +3 to +9, ···), and numbers of data are counted by each section and plotted at the center point of each section.

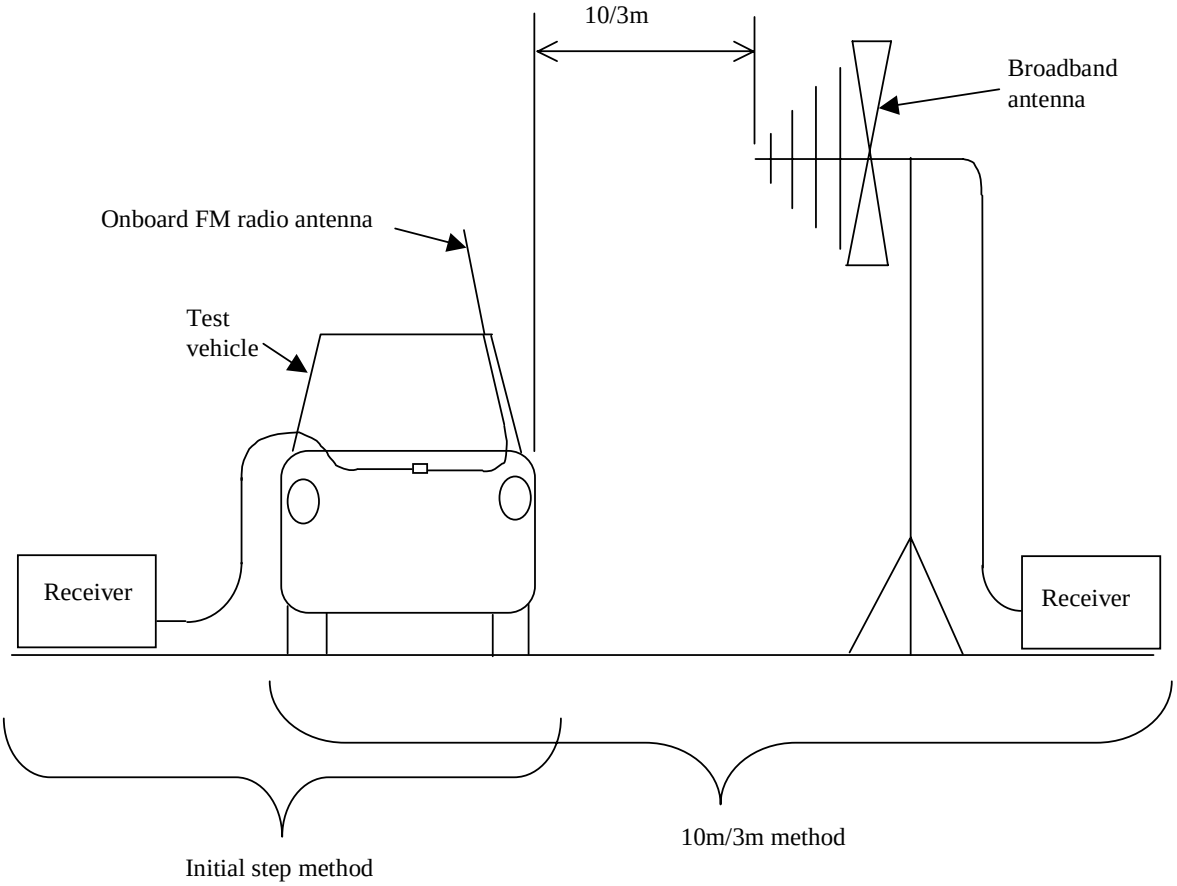
Fig.3 Distribution of correlation between initial step method and 10m/3m method with the FM band matching the antenna specification



(Limit of 10m/3m method – Measured value of 10m/3m method)
-(Limit of initial step method – Measured value of initial step method)

Note: Difference is divided to sections by 6dB (···, from -9 to -3, from -3 to +3, from +3 to +9, ···), and numbers of data are counted by each section and plotted at the center point of each section.

Correlation data measurement between initial step method and 10m/3m method



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