How to set the sub-categories of M1 \ N1

China Automotive Technology and Research Center
Chinese market is a global market, which is full of high-performance coupe, sports car, saloon car, SUV, MPV, Kei-car, Kei-truck, mini-bus, mini-truck and so on. It’s much more difficult for us to set a proper sub-categories to cover all vehicles.

We think it’s better to find some common solution for mini-bus, light-bus, mini-truck, Kei-truck, heavy M1 category, pick-up and sports car, but actually speaking, it’s difficult.
M1 category (GVW ≤ 2.5t)

- Mini-bus (Micro-Van) of China

- Common characteristic: engine arranged on the front axle, rear axle drive, more seats (always more than 5 seats), and one box body.
M1 category (GVW≤2.5t)

- The mini-bus is not all the same to Kei-car of Japan. Like CH7140 manufactured by CHANGHE-SUZUKI, have front engine, front dive axle, and two bodies like the Kei-car of Japan, belongs to saloon car in our country.
M1 category (GVW≤2.5t)

- A new MPV Vehicle between mini-bus and saloon car, this kind of vehicle is derived from the mini-bus but now have some characteristic of saloon car, which has front engine, rear axle drive and two bodies. This kind of vehicle shows the developing trend of mini-bus in the future.

**WULING SUNSHINE (Rear axle drive)**
(The United States’ magazine Forbes once called it “the most important vehicle on earth” in 2012)
M1 category (GVW≤2.5t)

- The WULING SUNSHINE, NISSAN NV200(front axle drive), CHANG’AN HONOR are all new products in Chinese market which use the front engine and two bodies arrangement;
- From the view-side of market and design, the mini-bus in the future may be replaced by such kind of vehicles.
### Typical test data of mini-bus with method B

<table>
<thead>
<tr>
<th>Seats No.</th>
<th>Test mass</th>
<th>GVV</th>
<th>Drive axle</th>
<th>Engine position</th>
<th>Pn</th>
<th>S</th>
<th>Test engine speed</th>
<th>PMR</th>
<th>Lurban</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>1060</td>
<td>1550</td>
<td>rear axle</td>
<td>middle</td>
<td>50</td>
<td>5600</td>
<td>97%</td>
<td>47.17</td>
<td>72.3</td>
</tr>
<tr>
<td>7</td>
<td>1125</td>
<td>1620</td>
<td>rear axle</td>
<td>middle</td>
<td>63</td>
<td>6000</td>
<td>62%</td>
<td>56</td>
<td>72.4</td>
</tr>
<tr>
<td>7</td>
<td>1125</td>
<td>1620</td>
<td>rear axle</td>
<td>middle</td>
<td>63</td>
<td>6000</td>
<td>60%</td>
<td>56</td>
<td>73.1</td>
</tr>
<tr>
<td>8</td>
<td>1225</td>
<td>1750</td>
<td>rear axle</td>
<td>middle</td>
<td>60.5</td>
<td>5300</td>
<td>65%</td>
<td>49.39</td>
<td>72.2</td>
</tr>
<tr>
<td>7</td>
<td>1135</td>
<td>1760</td>
<td>rear axle</td>
<td>middle</td>
<td>68</td>
<td>6000</td>
<td>74%</td>
<td>59.91</td>
<td>75.2</td>
</tr>
<tr>
<td>7</td>
<td>1135</td>
<td>1760</td>
<td>rear axle</td>
<td>middle</td>
<td>68</td>
<td>6000</td>
<td>75%</td>
<td>59.91</td>
<td>75.3</td>
</tr>
<tr>
<td>5, 7</td>
<td>1255</td>
<td>1780</td>
<td>rear axle</td>
<td>middle</td>
<td>72</td>
<td>6000</td>
<td>----</td>
<td>57.37</td>
<td>70.9</td>
</tr>
<tr>
<td>7</td>
<td>1285</td>
<td>1810</td>
<td>rear axle</td>
<td>middle</td>
<td>60</td>
<td>6000</td>
<td>76%</td>
<td>46.69</td>
<td>72.4</td>
</tr>
</tbody>
</table>

- Average value of these vehicles: 73.1 dB(A), which is nearly 2 dB(A) higher than ordinary passenger car; and the 15% cut-off value is 74dB(A).
## M1 category (GVW≤2.5t)

<table>
<thead>
<tr>
<th>Limit value</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>72 dB(A)</td>
<td><img src="image1.png" alt="Vehicle 1" /> <img src="image2.png" alt="Vehicle 2" /> <img src="image3.png" alt="Vehicle 3" /></td>
</tr>
<tr>
<td>Suggest 74 dB(A)</td>
<td><img src="image4.png" alt="Vehicle 1" /> <img src="image5.png" alt="Vehicle 2" /> <img src="image6.png" alt="Vehicle 3" /></td>
</tr>
</tbody>
</table>

Suggest 74 dB(A) for 1st stage and 72 for 2nd stage.
M1 category (GVW ≤ 2.5t)

How to make the sub-category:

- **Option 1**: middle engine + rear axle drive + maximum seats No. of family ≥ 5;
- **Option 2**: the distance from the front axle to the R-point of driver ≤ 1000mm;
- **Option 3**: the height of R-point from the ground ≥ 800mm.
We are really considering about the same thing:

- Different noise test result.
- Problem of mini-bus, Kei-truck, light-bus, heavy M1, SUV, MPV, sports car......
- The different engine arrangement and different drive axle
- Suggestion of China
- Suggestion of ACEA or JAMA
- Will influence arrangement of seats and driving area.
- Different “R”-point height and different distance from the “R”-point to front axle.
M1 category \((\text{GVW} \leq 2.5\text{t})\)

- In China, we use the option 1, cause it’s much easier to carry out.
- But we found option 2 or option 3 can also be accepted during our data collecting.
- So we hope that the ECE regulation can make a proper decision not only consider the condition of China but also harmonize with the sub-category method of heavy M1 suggested by OICA or the suggestion submitted by Japan.
M1 category (GVW ≤ 2.5t)

- If we consider the harmonization with the suggestion of JAMA of Kei-truck (the distance from the front axle to the R-point of driver ≤ 1000mm)
- We will support option 2 (GVW ≤ 2.5t and the distance from the front axle to the R-point of driver ≤ 1000mm)
# M1 category (GVW≤2.5t)

<table>
<thead>
<tr>
<th>Distance from the R-point to the front axle</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1150-1300mm</td>
<td><img src="image1.jpg" alt="Vehicle 1" /> <img src="image2.jpg" alt="Vehicle 2" /> <img src="image3.jpg" alt="Vehicle 3" /> <img src="image4.jpg" alt="Vehicle 4" /></td>
</tr>
<tr>
<td>450-650mm</td>
<td><img src="image5.jpg" alt="Vehicle 5" /> <img src="image6.jpg" alt="Vehicle 6" /></td>
</tr>
</tbody>
</table>
M1 category (GVW≤2.5t)

- If we consider the harmonization with the suggestion of GRB and ACEA of heavy M1 (GVW above 2.5 tons and a R-point height greater than 850 mm from the ground)
- we will support option 3 (GVW ≤2.5t and the height of R-point from the ground ≥800mm)
# M1 category (GVW ≤ 2.5t)

<table>
<thead>
<tr>
<th>Height of R-point</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>704-785mm</td>
<td><img src="image1.png" alt="Vehicle 1" /> <img src="image2.png" alt="Vehicle 2" /> <img src="image3.png" alt="Vehicle 3" /> <img src="image4.png" alt="Vehicle 4" /></td>
</tr>
<tr>
<td>820-855mm</td>
<td><img src="image5.png" alt="Vehicle 5" /> <img src="image6.png" alt="Vehicle 6" /></td>
</tr>
</tbody>
</table>
Conclusion for mini-bus

- Not matter we choose option 1, option 2, or option 3, they can all solve the question of mini-bus of China basically. So we strongly suggest that GRB can consider such kind of option.

- But no matter option 1, option 2 or option 3 can not solve all the question of Chinese M1 category. The reason is as follows:
M1 category (GVW≤2.5t)

- In China, we have a very special classification method for vehicle carry persons, with the number “7” means saloon car, “6” means bus. The Mini-bus, light bus, SUV, MPV always named with number “6”.
- Like “SGW6390” means mini-bus with length 3.9 meters, “CA7160” means saloon car with 1.6 liter engine displacement.
The main sub-category of M1 in China

- Basic passenger car (saloon car with code No. “7”) PMR all lower than 120kW/t
- SUV (with code No. “6”) like SVW6470
- MPV (with code No. “6”) like CC6460VM
- Cross type passenger car (not the cross of Europe, only mentioned mini-bus with code No. “6”)
- Light-bus (code No. “6”)
- Off-road (with code No. “2”)
- Special purpose vehicle (with code No. “5”)

We are still worry about the other vehicle categories of M1 except the saloon cars with rear axle drive.
Typical test data of MPV and SUV with rear axle drive (method B)

<table>
<thead>
<tr>
<th>Seats No.</th>
<th>Energy</th>
<th>Test mass</th>
<th>GVW</th>
<th>Drive axle</th>
<th>Engine position</th>
<th>Pn</th>
<th>S</th>
<th>PMR</th>
<th>Lurbain</th>
</tr>
</thead>
<tbody>
<tr>
<td>5、7、8</td>
<td>gasoline</td>
<td>1400</td>
<td>1925</td>
<td>rear axle</td>
<td>front</td>
<td>78</td>
<td>5500</td>
<td>55.71</td>
<td>73.2</td>
</tr>
<tr>
<td>7</td>
<td>gasoline</td>
<td>1280</td>
<td>1850</td>
<td>rear axle</td>
<td>front</td>
<td>79</td>
<td>5400</td>
<td>61.72</td>
<td>73.4</td>
</tr>
<tr>
<td>7</td>
<td>gasoline</td>
<td>1165</td>
<td>1750</td>
<td>rear axle</td>
<td>front</td>
<td>50</td>
<td>6000</td>
<td>42.9</td>
<td>74.0</td>
</tr>
<tr>
<td>5、7</td>
<td>gasoline/diesel</td>
<td>1995</td>
<td>2490</td>
<td>rear axle</td>
<td>front</td>
<td>100</td>
<td>3800</td>
<td>50.13</td>
<td>72.8</td>
</tr>
</tbody>
</table>
These products may meet some problem (GVW≤2.5t)

<table>
<thead>
<tr>
<th>Drive axle</th>
<th>Front</th>
<th>Rear</th>
<th>4-Wheel Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine position</td>
<td>Front</td>
<td>Middle</td>
<td>Front</td>
</tr>
<tr>
<td>Average noise（dB（A）） Method B</td>
<td>71.0</td>
<td>73.1</td>
<td>73.0</td>
</tr>
</tbody>
</table>
### M1 category (GVW ≤ 2.5t)

<table>
<thead>
<tr>
<th>Limit value</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>72 dB(A)</td>
<td>![Vehicle Image 1] ![Vehicle Image 2] ![Vehicle Image 3]</td>
</tr>
<tr>
<td>Suggest 74 dB(A) for 1st stage and 72 for 2nd stage.</td>
<td>![Vehicle Image 4] ![Vehicle Image 5] ![Vehicle Image 6]</td>
</tr>
</tbody>
</table>
Why we are different?

- Typical develop procedure of Chinese manufacturer, for example “Great Wall”:
  - 1984: vehicle refit, (only some light duty truck and special purpose vehicle);
  - 1996: manufacture the Pick-up with rear axle drive;
  - 2003: manufacture the SUV, CUV with rear axle drive;
  - 2007: manufacture the SUV, MPV with front axle drive, 4WD and passenger car.
  - Now: the best seller in Chinese SUV and Pick-up branch market and the highest profit margin auto company global.

**Conclusion:** many of Chinese M1 category MPV and SUV comes from N1 light duty truck platform, and the rear axle drive are more fit for the road condition of China.
M1 category (GVW ≤ 2.5t)

Our final target is:

- Option only 1: rear axle drive + maximum seats
  No. of family ≥ 5;

Suggestions for GRB:

- We hope other countries of GRB can also check that do you also have this kind of SUV or MPV with rear axle drive which is more loudly than Front engine Front axle drive drive vehicles.
M1 category (GVW≤2.5t)

Suggestions for GRB (three condition may happen):

- **Condition 1:** they do not have this kind of vehicle (hope GRB can consider the noise of these vehicles and give 1 or 2 dB loosen for limit value);
- **Condition 2:** they also have this kind of vehicle and they’re much more loudly than saloon car (hope GRB or OICA can organize an investigation and set a proper limit value);
- **Condition 3:** they also have this kind of vehicle but they are the same quiet to the saloon car (China will promote the technology of ourselves and try to make these products fulfill the requirement of ECE regulation).
China suggest reconsidering the influence of power train system including the engine arrangement and the drive axle to the noise test result but not only the PMR value for example:

- Why the mini-bus are much more loudly than the low power saloon car?
- Why the rear axle drive SUV are much more loudly than front axle drive SUV?
- Why the mid (rear) engine + rear axle drive sports cars are much more loudly than the coupes which nearly have the same PMR value, especially the cruise noise?
- Do we need to have some division for the really sports car with mid (rear) engine + rear axle drive and the powerful coupe?
Other topic about M1

The light bus (heavy M1 category)

- We can fully support the suggestion of GRB, ACEA, VDA and JAMA use the M1 with GVW above 2.5 tons and a R-point height greater than 850 mm from the ground.

- We can support the suggestion from GRB expert group that have some special treatment with the sports cars (mid or rear engine).
N1 category (GVW ≤ 2.5t)

- The mini-truck of China always has the same chassis structure to mini-bus;
- And the vehicle has the same structure to the Kei-truck of Japan, but the only difference is Chinese mini-truck is more powerful and with larger size;
- There is no evidence shows that this kind of vehicle will develop into the style of Van in Europe, or some structure between the mini-bus and saloon car like the new products of mini-bus;
- This kind of vehicle need to be treated separately, with the limit value 74 dB(A).
Kei N1

Light N1 (GVM ≤ 2.0t)

Heavy N1 (GVM > 2.0t)

Van type

Same group
Truck type

different

Similar

ECE-TRANS-WP29-GRB-54-inf15e (Japan)
N1 category (Chinese style mini-truck)

(CEC-TRANS-WP29-GRB-57-inf05)

Chinese van and mini-truck: we are all the Kei-truck style but only a little bigger, and with different bodies.

Japanese Kei-truck
N1 category (GVW ≤ 2.5t)

The mini-truck has the same structure to mini-bus, so it also has:

- engine arranged on the front axle, rear axle drive.
- We suggest for the limit value of 74 dB(A) for stage one for these vehicles.
N1 category (GVW≤2.5t)

How to make the sub-category:

- Option 1: middle engine + rear axle drive;
- Option 2: the distance from the front axle to the R-point of driver≤1000mm;
- Option 3: the height of R-point from the ground ≥800mm.
N1 category (GVW\(\leq\)2.5t)

Conclusion for mini-Truck

- Not matter we choose option 1, option 2, or option 3, they can all solve the question of mini-truck of China basically. So we strongly suggest that GRB can consider such kind of option.

- But no matter option 1, option 2 or option 3 can not solve all the question of Chinese small N1 category. The reason is as follows:
N1 category (GVW ≤ 2.5t)

Other topic about small N1 category

- There are many small pick-up with the same structure of Heavy pick-up of America but with 2.0t < GVW ≤ 2.5t, this kind of vehicle seems very hard to fulfill the requirement of 72dB(A).
- We hope that GRB can consider about this kind of condition and make some additional dB, for these vehicles.
### Typical test data of N1 with method B

<table>
<thead>
<tr>
<th>Test mass</th>
<th>GVW</th>
<th>Drive axle</th>
<th>Engine position</th>
<th>Energy type</th>
<th>Pn</th>
<th>S</th>
<th>PMR</th>
<th>Lurban</th>
</tr>
</thead>
<tbody>
<tr>
<td>1225</td>
<td>1725</td>
<td>rear axle</td>
<td>middle</td>
<td>gasoline</td>
<td>64.5</td>
<td>----</td>
<td>52.65</td>
<td>75.2</td>
</tr>
<tr>
<td>1125</td>
<td>1970</td>
<td>rear axle</td>
<td>middle</td>
<td>gasoline</td>
<td>60.5</td>
<td>5300</td>
<td>53.78</td>
<td>71.9</td>
</tr>
<tr>
<td>1515</td>
<td>2240</td>
<td>rear axle</td>
<td>front</td>
<td>diesel</td>
<td>76</td>
<td>4500</td>
<td>50.17</td>
<td>75.9</td>
</tr>
<tr>
<td>1180</td>
<td>2350</td>
<td>rear axle</td>
<td>middle</td>
<td>gasoline</td>
<td>79</td>
<td>5400</td>
<td>66.95</td>
<td>74.6</td>
</tr>
<tr>
<td>1735</td>
<td>2485</td>
<td>rear axle</td>
<td>front</td>
<td>diesel</td>
<td>58</td>
<td>3600</td>
<td>33.43</td>
<td>77.6</td>
</tr>
<tr>
<td>1645</td>
<td>2495</td>
<td>4WD(front)</td>
<td>front</td>
<td>diesel</td>
<td>68</td>
<td>3600</td>
<td>41.34</td>
<td>72.4</td>
</tr>
</tbody>
</table>
## N1 category (GVW ≤ 2.5t)

<table>
<thead>
<tr>
<th>Limit value</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>72 dB(A)</td>
<td>![Vehicles Image]</td>
</tr>
<tr>
<td>Suggest 74 dB(A)</td>
<td>![Vehicles Image]</td>
</tr>
</tbody>
</table>
N1 category (GVW $\leq 2.5t$)

Our final target is:
- Option only 1: rear axle drive;

Suggestions for GRB:
- We hope other countries of GRB can also check that do you also have this kind of pick-up or mini-truck with rear axle drive which is more loudly than front engine- front drive van style of Europe.
N1 category (GVW≤2.5t)

Suggestions for GRB (three condition may happen):

- **Condition 1:** they do not have this kind of vehicle (hope GRB can consider the noise of these vehicles and give 1 or 2 dB loosen for limit value);

- **Condition 2:** they also have this kind of vehicle and they’re much more loudly than front axle drive car (hope GRB or OICA can organize an investigation and set a proper limit value);

- **Condition 3:** they also have this kind of vehicle but they are the same quiet to the front axle drive car (China will promote the technology of ourselves and try to make these products fulfill the requirement of ECE regulation).
Why we always choose rear axle drive?

1. Nice price!
   - (only 5,000-6,000 USD per mini-truck, tax-included)
2. Carrying more goods and more economic!
   - Kerb mass 1,000kg, bus can always carry more than 1,000kg goods.
3. Climb higher mountains!
Thanks for your attention

- The sub-category is a global problem, so it’s very difficult to make every-sides satisfied, any kind of decision can not cover all vehicle types.
- We will respect the final decision of GRB no matter what kind of result we get.
- Thanks for the hard work of experts from GRB, ISO, OICA, other countries and organizations.
- Hope the GRB meeting can be a bridge that make China one part of the global market.