The remaining open issues of ASEP data processing after the 6th meeting

Issued by the chairman
April 2007

Open issues after the 6th meeting

1. How to deal with vehicles which are extra silent under circumstances of annex 3, but have a progressive increase to normal noise behavior under higher engine speeds? (Daimler Chrysler issue from 4th meeting)
   a) If the Limit is used as reference instead of the measured noise; how should this be incorporated into a new anchor point for the ASEP limit curve?

2. How to deal with the separation of tyre noise and engine noise? (D/F proposal)
   a) What is the impact of the merger of the D/F proposal with the J proposal? (see sheet 4 and 5 for how the status of the D/F/J proposal was understood)
   a) What is the impact of this issue on the desired precision of ASEP (3 dB)

3. How to deal with the proposed 6 dB/1000 rpm limit curve compared to the spread in measured vehicles? (OICA presentation GRBIG-ASEP-05-003)

Status of discussion after 6th meeting

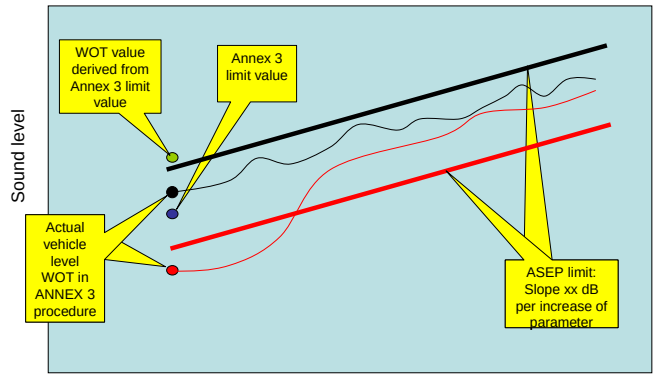
Issue 1: extra silent vehicle

- Starting point: extra silent vehicles should not fail ASEP when they are not louder than normal vehicles in the higher engine speed range.

- Discussed:
  - Potential solution: anchor point in ASEP is determined by limit value instead of measured value $L_{wot,i}$ (ref GRBIG-ASEP-06-008)
  - Question: how to find a new WOT anchor point for the ASEP limit curve

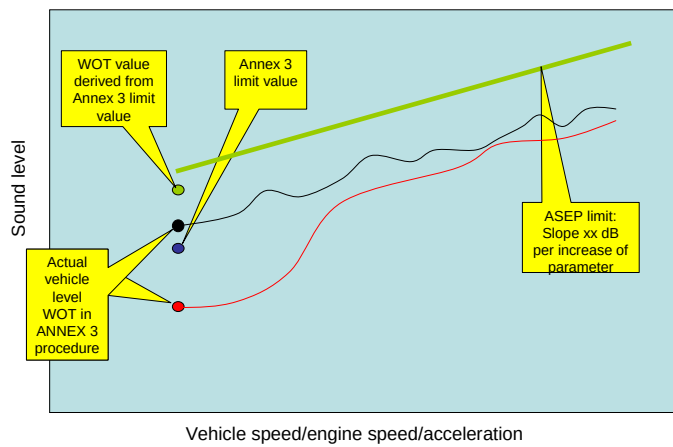
System 1: ASEP based on measured Annex 3 value:

- Black vehicle passes ASEP;
- Red vehicle fails ASEP although it is more silent than the black vehicle



System 2: ASEP based on Annex 3 limit value

- Both vehicles pass ASEP



Status of discussion after 6th meeting

Issue 2: separation of tyre noise and engine noise

- Starting points:
  - separation should improve the accuracy;
  - extra effort should be minimized

- Discussed:
  - Continuous measuring equipment are advised in order to increase the accuracy of L_{tyre} and L_{engine} by 2 to 5 dB(A), depending on the place where L_{max} occurs (ref GRBIG-ASEP-06-007)

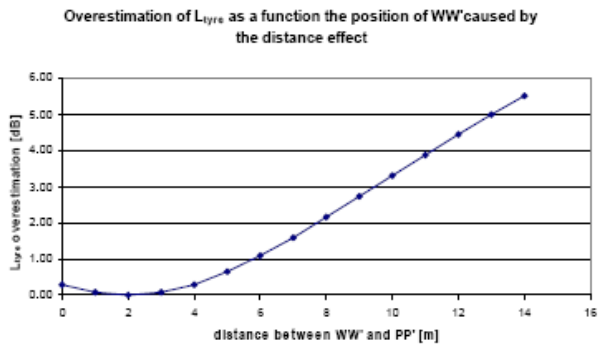


Figure 4: overestimation of L_{tyre} caused by the difference in propagation path length

  - Potential merger of D/F and J proposal (ref GRBIG-ASEP-06-005):
    - Evaluation will be done as function of engine speed
    - Obligation to separate may depend on difference between L_{total} and L_{tyre} (see next sheet)

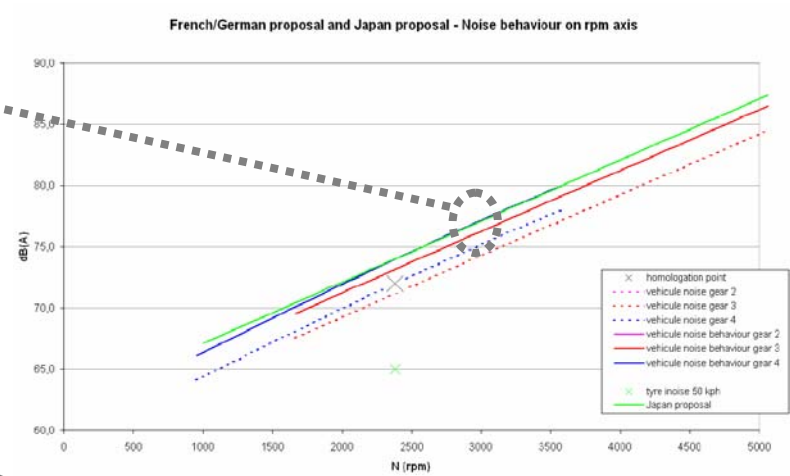
Potential merger of D/F and J proposal

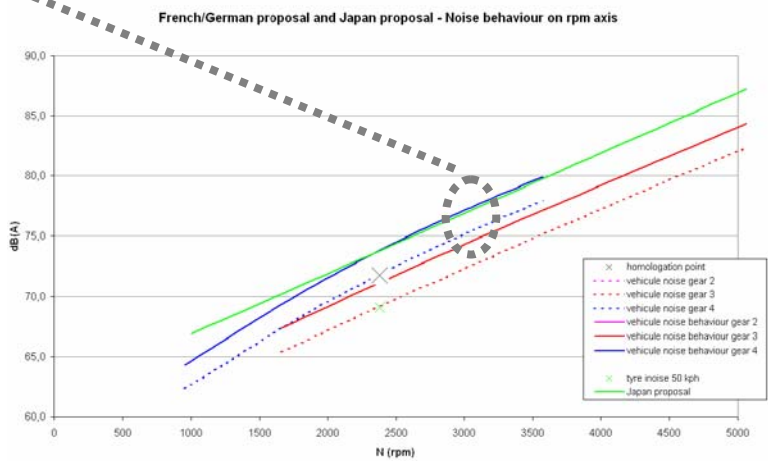
Correction for tyre noise depends on the difference between L_{total} and L_{tyre} (exact boarders yet to be determined)

- If $L_{total} - L_{tyre} > [7\ dB]$:
  D/F curves and J curves are up to 1 dB different: use J proposal; no separation; use L_{total} only

- If $[3\ dB] < L_{total} - L_{tyre} < [7\ dB]$:
  D/F curves and J curves are up to 3 dB different: use D/F proposal with separation of L_{tyre} and L_{engine}

- If $L_{total} - L_{tyre} < [3\ dB]$:
  procedure yet to be determined
  (calculation may lead to instable results)
  - Option heard after the meeting: use
    $L_{engine} = L_{tyre} = L_{total} - 3$
    this gives a relatively too high L_{engine}, but this could be allowed, because L_{engine} for these vehicles is relatively low



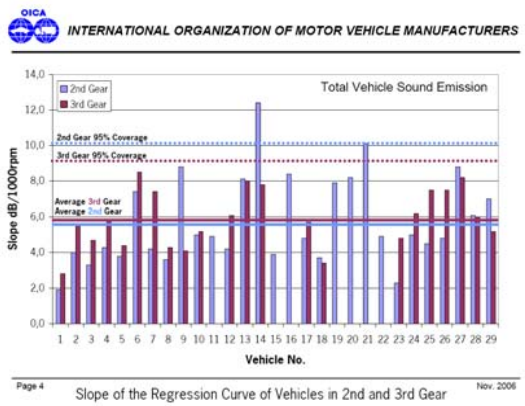


Status of discussion after 6th meeting

Issue 3: spread in x dB/1000 rpm

- Starting points:
  - ASEP should be based on Annex 3
  - Criterion preferably design independent
  - ASEP should describe the behavior at higher utilization of the power train
  - It should be possible to set a limit
  - Normal vehicles should (well) be able to pass this criterion

- Discussed:
  - Handbooks and many measurements (D/F/J) show that circa 6 dB/1000 rpm seems a good criterion
  - OICA measurements show significant spread and many vehicles > 6 dB/1000 rpm (ref GRBIG-ASEP-05-003)
  - Are those vehicles with slope > 6 dB/1000 rpm indeed vehicles of concern?
    - OICA found no explanation for spread yet
    - OICA promised more data on these vehicles
    - Is it the slope or the extrapolated noise at rated speed?
  - Alternative criteria (ref GRBIG-ASEP-06-006)
    - Not to exceed level within ASEP boundary conditions
    - Evaluate noise as function of % rated engine speed instead of absolute engine speed
    - Use vehicle acceleration instead of engine speed eg
      - $L_{pmax} = C_1 + C_2*a + C_3*v$



How to deal with these issues?

- Can we solve these open issues and proceed with fine tuning of the current concepts?

- Or do we need to step back and
  - Give a second change to one of the older concepts (e.g the original German concept)
  - Revise our thoughts in to a new concept?

Question to all ASEP members

- Next meeting in may 2007 we will address these issues. The intention is to draw conclusions.
- Could you all please prepare your technical background information and/or position on these open issues.
- Would you please be so kind to send your documents 10 days before the meeting