

# **Comments for the draft\* of ASEP measurement and analysis method**

**\* Issued by the Netherlands on 26-9-2006**

**JASIC**

**GRB informal Meeting No. 5**

**8-10 November 2006**

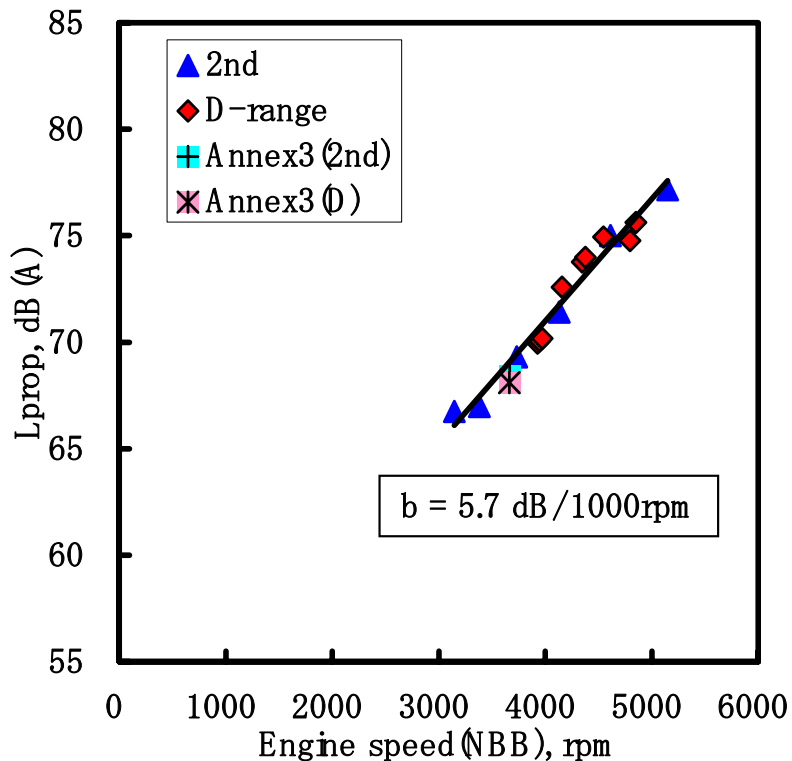
- 1. Sound slope versus engine speed**
- 2. Comparison of four data processing**
- 3. Simplification of test procedure**
- 4. Conclusion**

# 1. Sound slope versus engine speed ‘b’

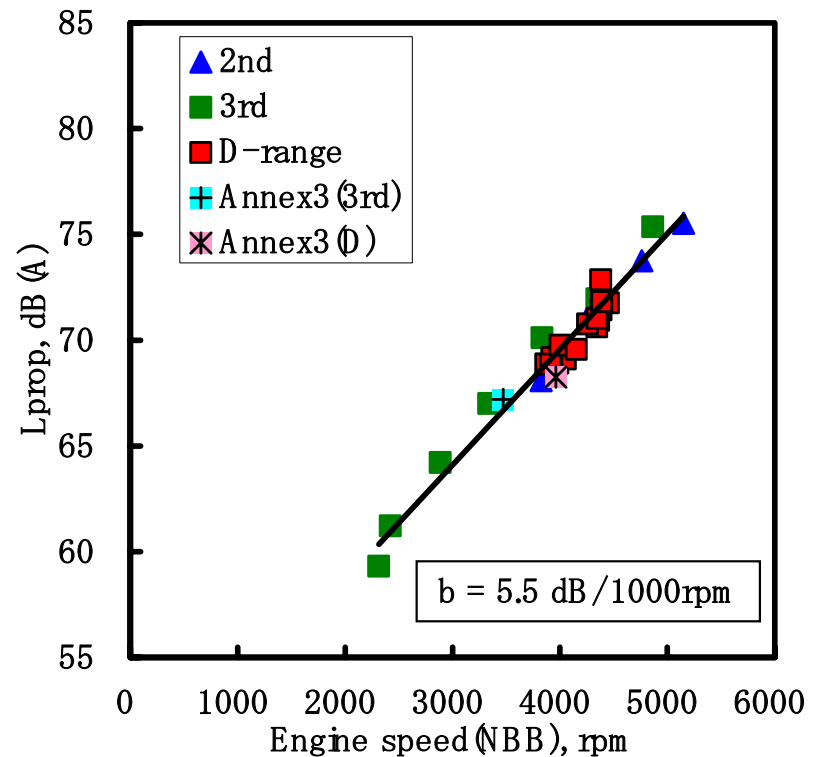
Vehicle	Category	Engine type	PM R kW /t	Maximum power kW / rpm	Transmission	b' dB/1000rpm
Vehicle-A	M 1	Gasoline	77	114 / 6000	A/T	5.7
Vehicle-B	M 1	Gasoline	63	72 / 5600	CVT	5.5
Vehicle-C	M 1	Gasoline	79	107 / 6400	CVT	5.4
Vehicle-D	M 1	Gasoline	58	61 / 6000	M/T	5.4
Vehicle-E	M 1	Gasoline	114	147 / 7800	M/T	4.5
Vehicle-F	N1	Diesel	39	67 / 4000	M/T	5.9

# The sound slope 'b' (without tyre noise)

**Vehicle-A  
(AT vehicle)**

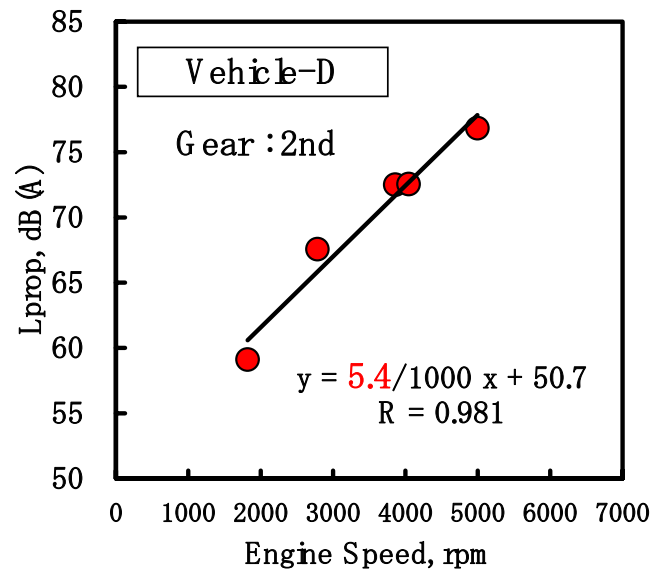
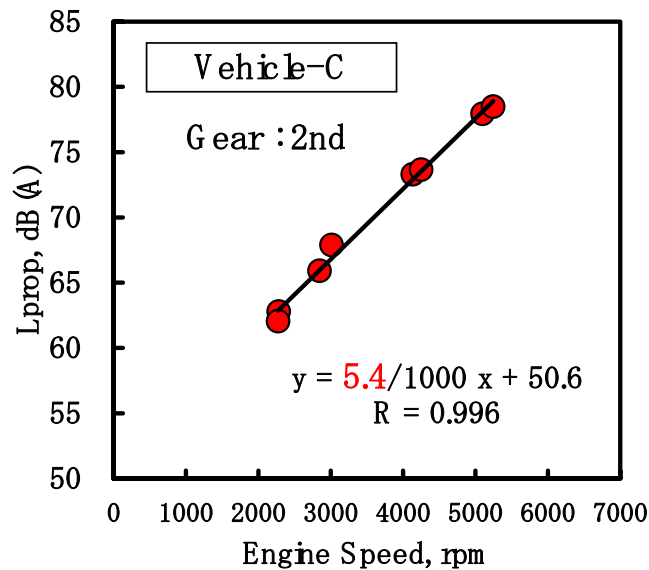


**Vehicle-B  
(CVT vehicle)**

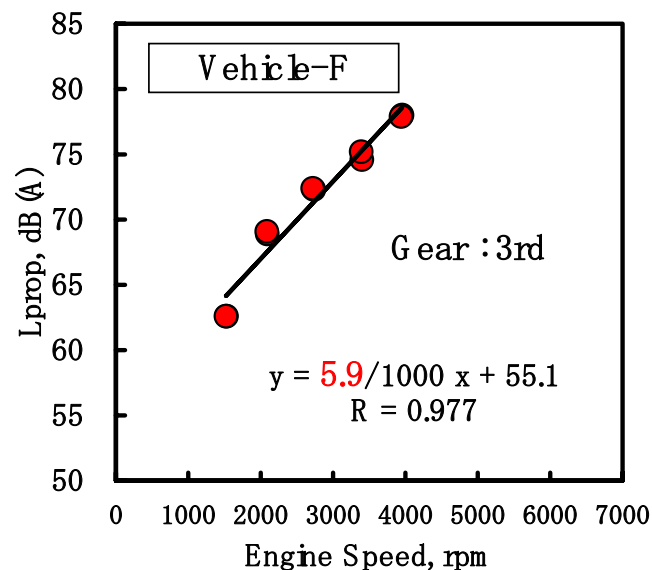
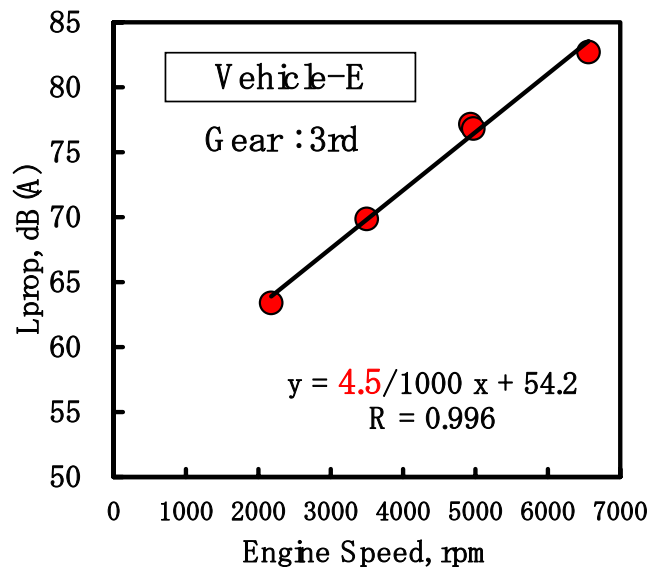


**Both sound level of fixed gear and D range are on the same regression.  
The slope 'b' are larger than 5.**

# The sound slope 'b' (without tyre noise)



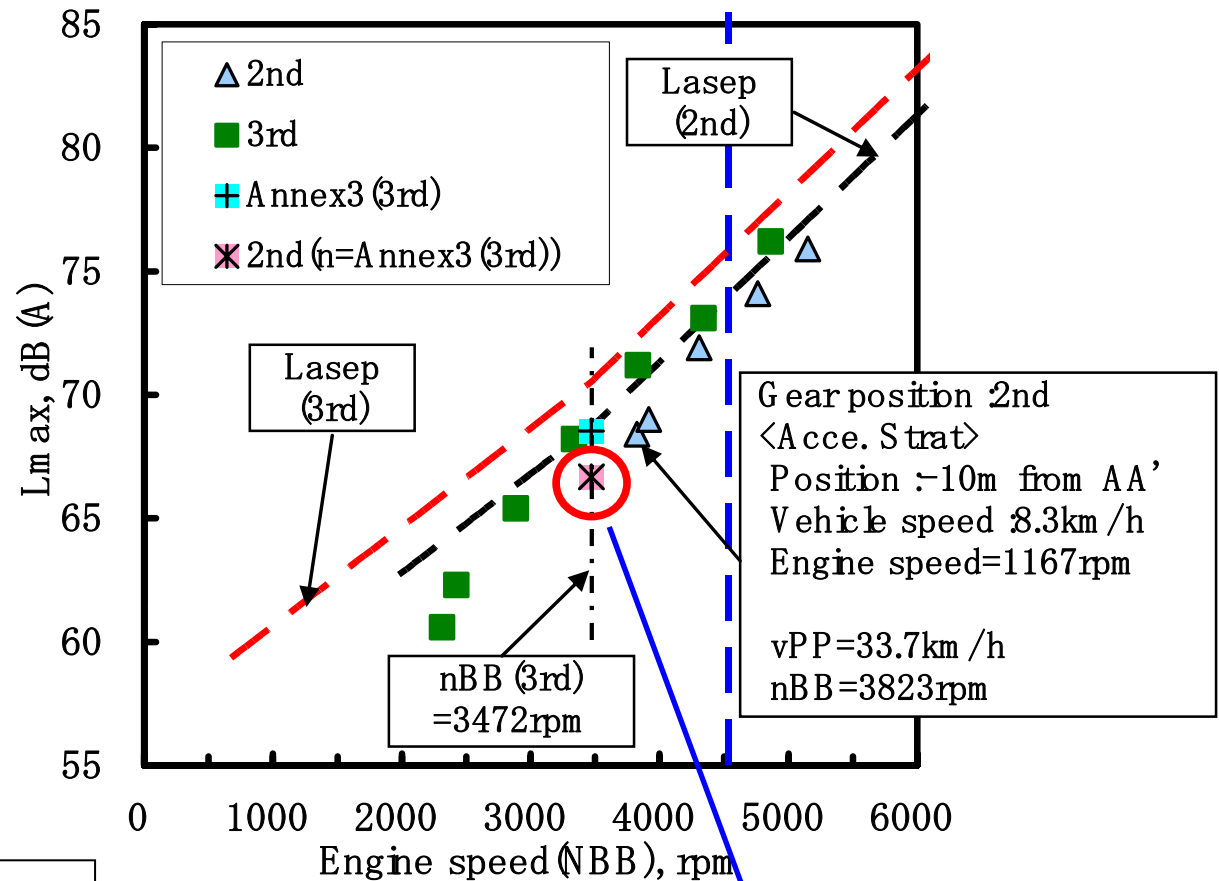
The sound slope 'b' for most of vehicles are larger than 5



## 2. Comparison of the data processing

- ◆ Vehicle speed base (German/French proposal)  
modeling tyre noise and engine noise
- ◆ Vehicle speed \* acceleration
- ◆ Engine speed base
- ◆ Engine speed base (The Netherlands proposal)  
considering gear positions

# Data processing of the Netherlands proposal (Vehicle-B: CVT vehicle)



The reference lines are assumed by ;

$b=5\text{dB}/1000\text{rpm}$  above  $n_{ref}$

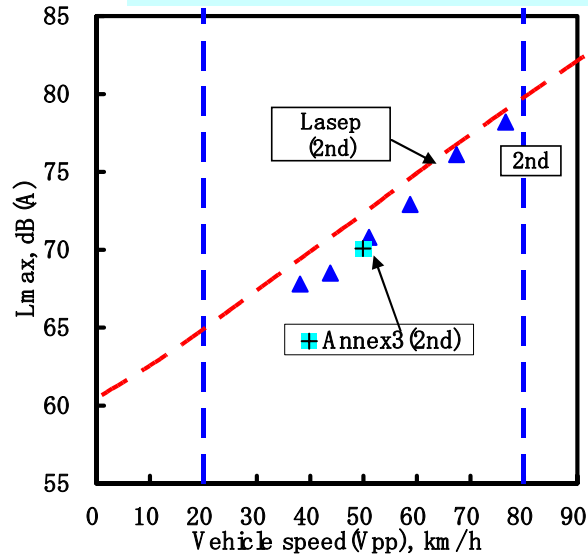
$b=4\text{dB}/1000\text{rpm}$  below  $n_{ref}$

$X=2\text{dB}$ .

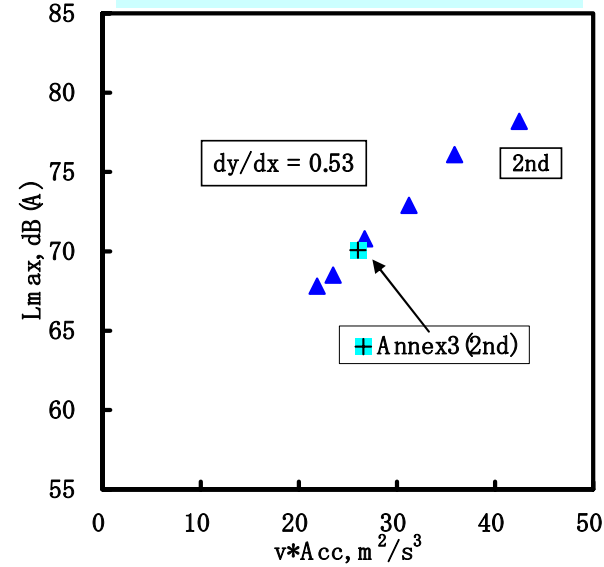
**This condition cannot be tested.**

# Data processing (AT vehicle A; fixed gear )

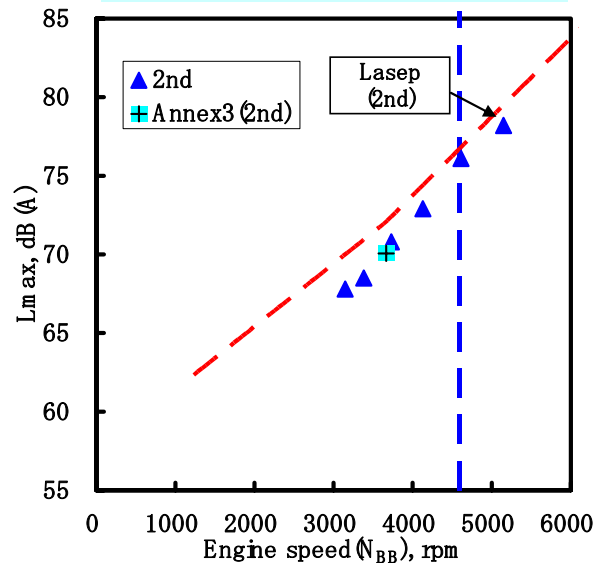
German/French Proposal



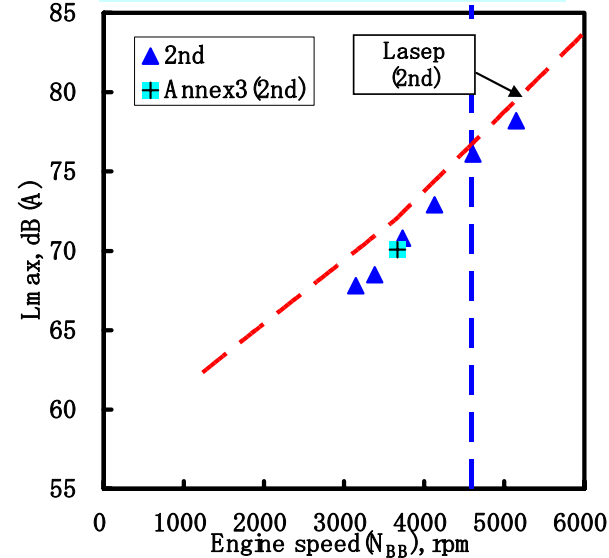
“speed\*acceleration”



Engine speed base

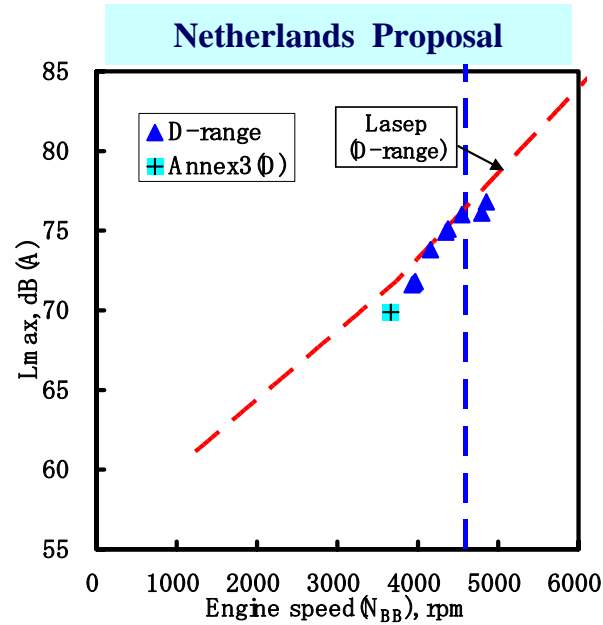
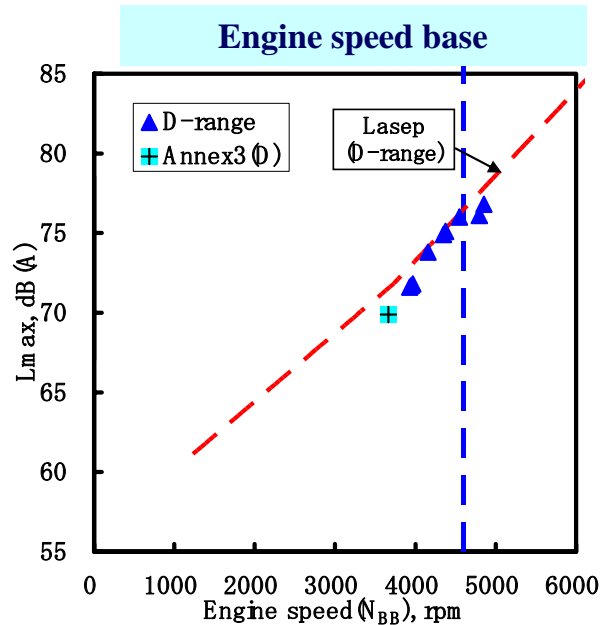
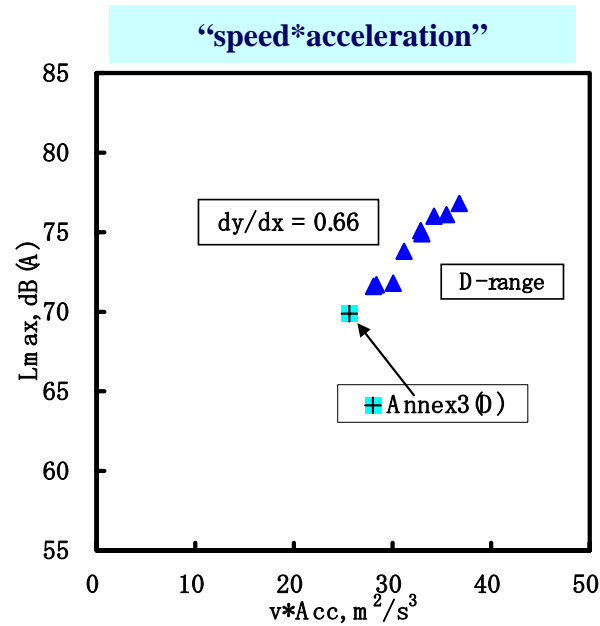
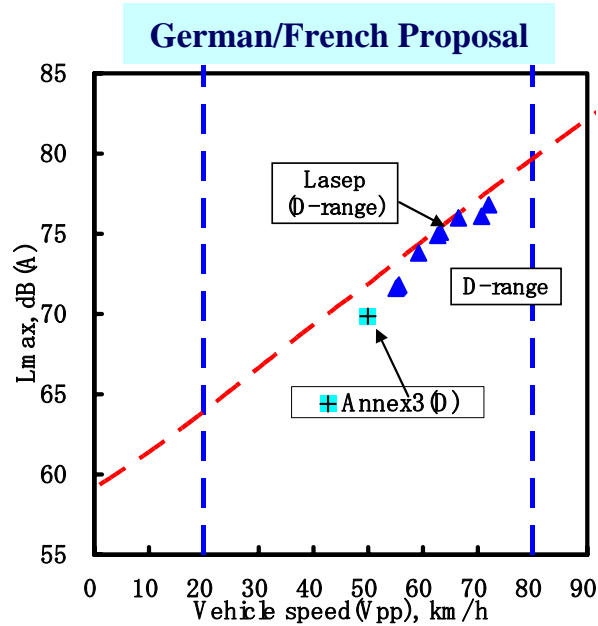


Netherlands Proposal





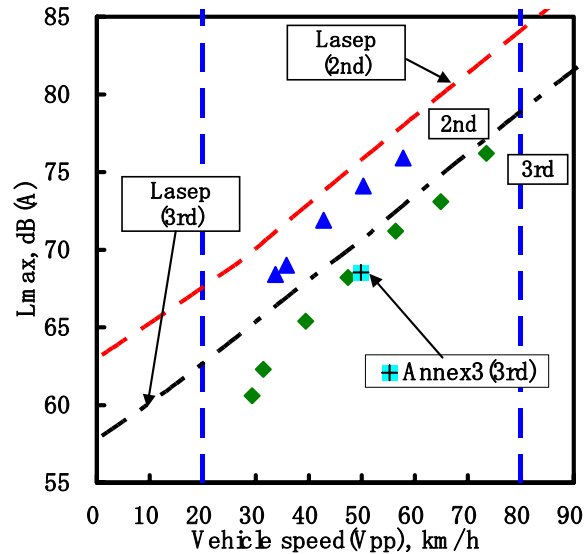
# Data processing (AT vehicle A; D range)



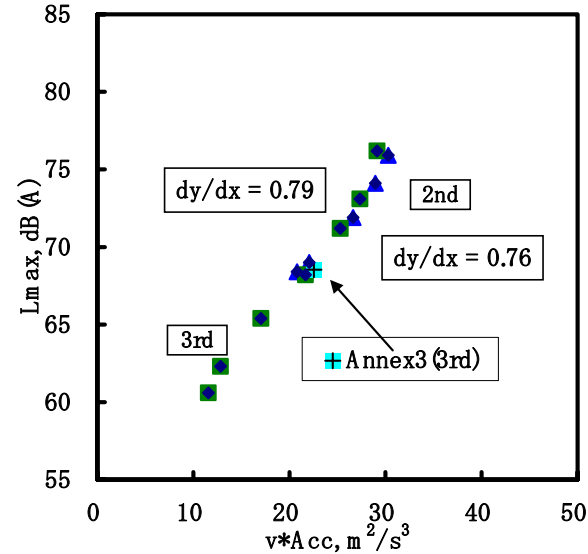
**The measurement below  $n_{ref}$  cannot be carried out.**

# Data processing (CVT vehicle B; fixed gear )

German/French Proposal

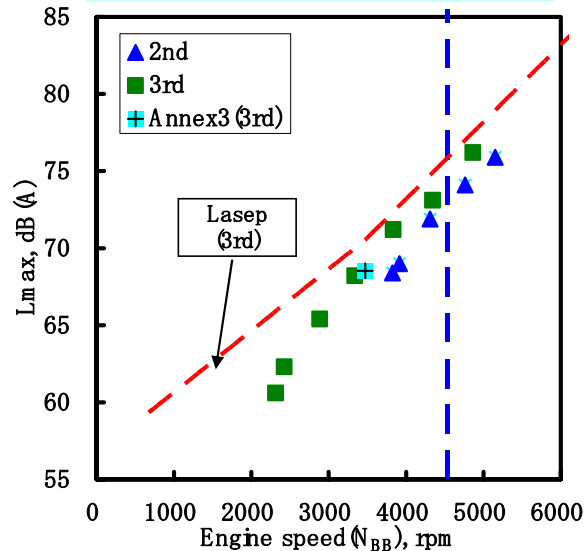


“speed\*acceleration”

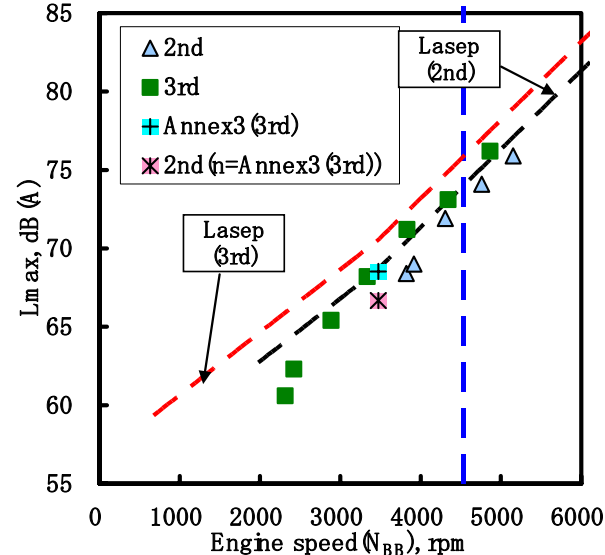


In case of G/F and NL proposal, each gear has to have individual reference line.

Engine speed base



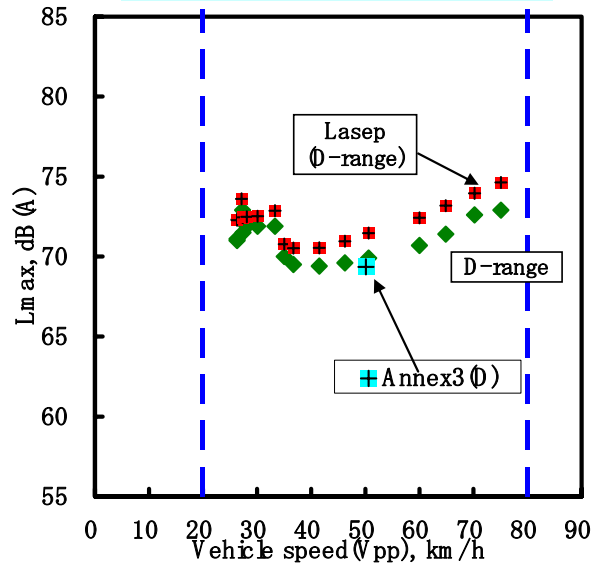
Netherlands Proposal



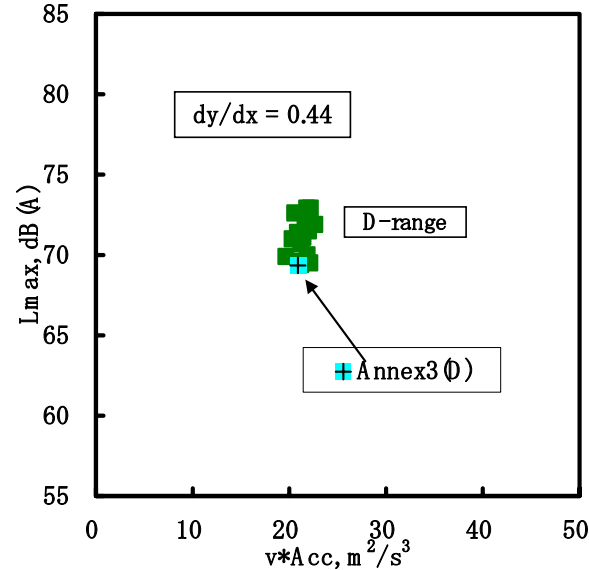
The difference of sound level for different gears (D) is 1.5dB.

# Data processing (CVT vehicle B; D-range)

German/French Proposal

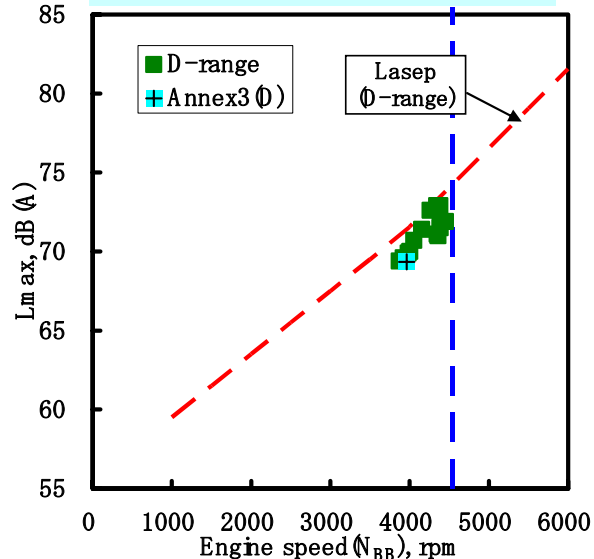


“speed\*acceleration”

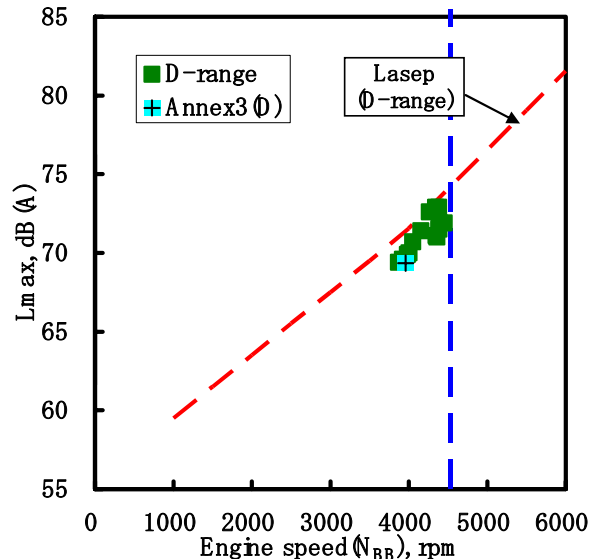


No reference line can be drawn in the case of the CVT vehicle in G/F and  $v \cdot a$ .

Engine speed base



Netherlands Proposal



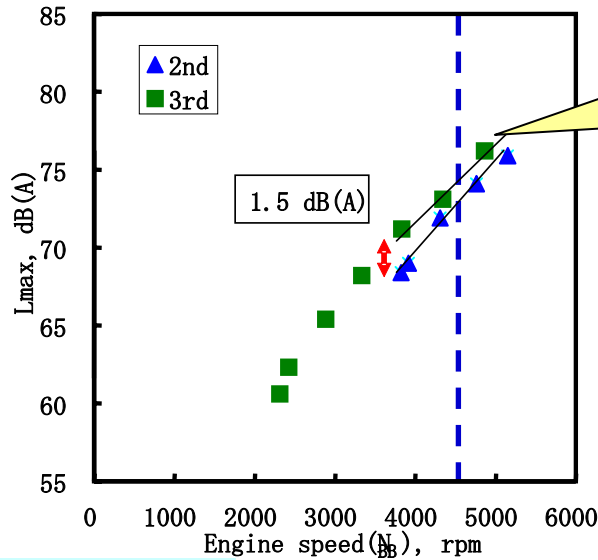
The measurement below  $n_{\text{ref}}$  cannot be carried out.

Is it necessary to measure below  $n_{\text{ref}}$  and four measurements among 500rpm?

# 3. Simplification of test procedure

## Vehicle-B

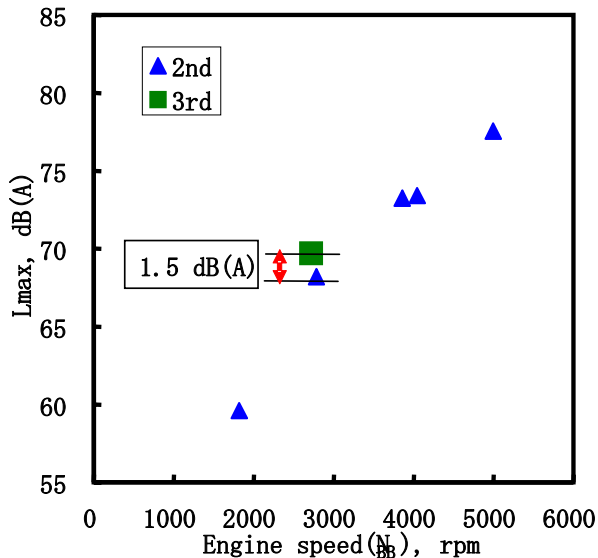
The difference of sound level by the gear position



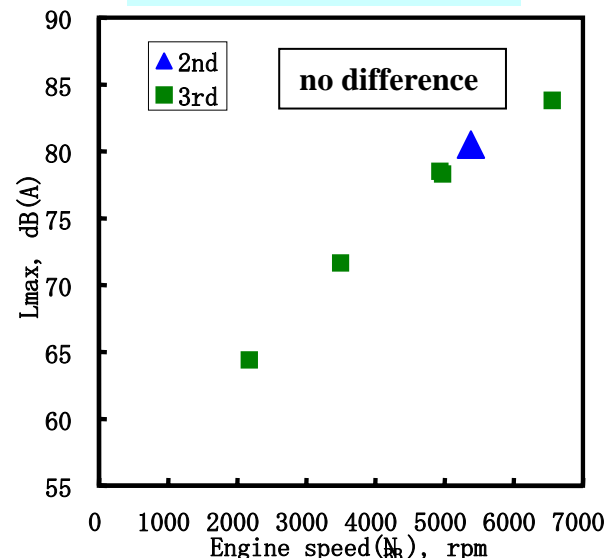
3rd gear test cover up to target engine speed.  
2nd gear test is not necessary.

The difference of sound level for different gear positions (D) is 0~1.5dB.

## Vehicle-D

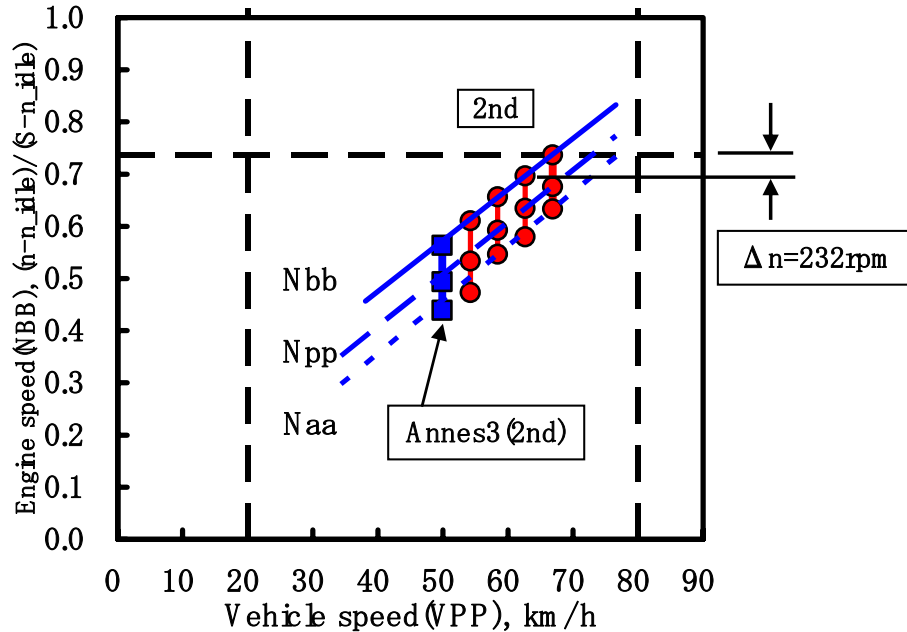


## Vehicle-E

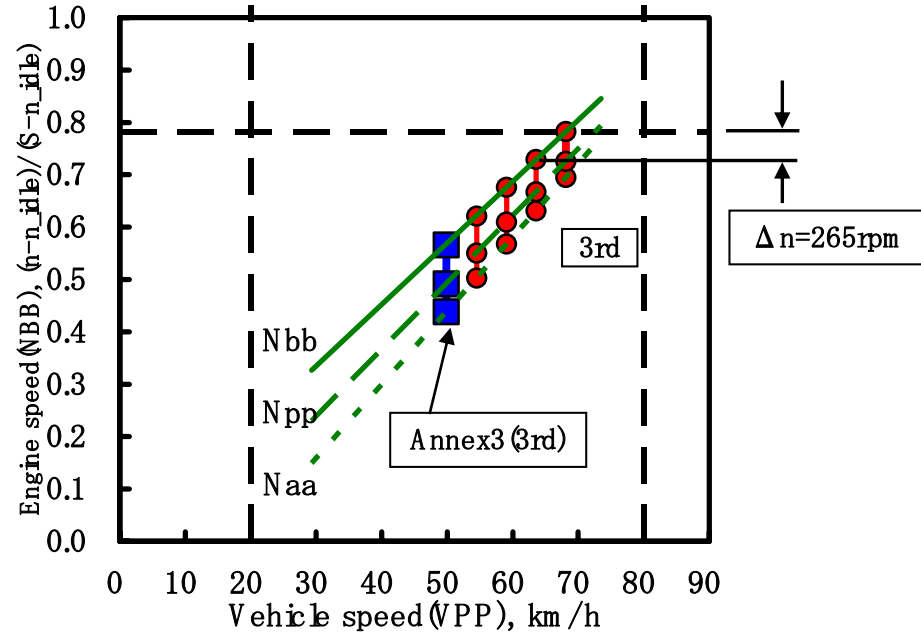


# Number of Test Runs

AT vehicle



CVT vehicle



When four measurements shall be carried out at  $n_{ref}$  to the target engine speed, every 250rpm measurements have to be done.

It seems that one or two runs are enough to cover to the target engine speed.

# Time needed for tests

Test method		Running conditions	Manual mode					D-range				
			Number of measured data				Time [hours]	Number of measured data				Time [hours]
			Gear position [A]	Measurement / condition [B]	Conditions [C]	Total [D=A*B*C]		Gear position [A]	Measurement / condition [B]	Conditions [C]	Total [D=A*B*C]	
Annex3		acceleration	$\frac{2}{\text{Gear}(i+1)}$	4	1	8		$\frac{1}{\text{D-range}}$	4	1	4	
		Constant speed	$\frac{2}{\text{Gear}(i+1)}$	4	1	8		$\frac{1}{\text{D-range}}$	4	1	4	
		Total				16	1.3				8	0.7
ASEP	Germany /France proposal	acceleration	$\frac{2}{\text{Gear}(i+1)}$	1	8	16		$\frac{1}{\text{D-range}}$	1	8	8	
		Coasting	$\frac{1}{N}$	1	4	4		$\frac{1}{N}$	1	4	4	
		Total				20	1.7				12	1.0
	[v*Acc] method	acceleration	$\frac{2}{\text{Gear}(i+1)}$	1	8	16	1.3	$\frac{1}{\text{D-range}}$	1	8	8	0.7
	Engine speed base											
	Netherlands proposal	acceleration	$\frac{2}{\text{Gear}(i+1)}$	1	8	16		$\frac{1}{\text{D-range}}$	1	8	8	
		acceleration (Lwot,jnBB',iref)	$\frac{1}{\text{Gear } i+1}$	4 (?)	1	4						
		Total				20	1.7				8	0.7

**We should still consider time reduction for measurements, but also should consider measurement uncertainty. The data which are measured by one run per one condition have measurement errors.**

# Summary of comparison of four data processing

	Test for CVT with D-range	Time for measurement	Comments
German/French proposal	△	×	Cannot evaluate with a common reference line in case of CVT vehicle Time needed for test is more than that for Annex3 test
V * a	△	△	Cannot evaluate with a common reference line in case of CVT vehicle
Engine speed base	○	△	
Netherlands proposal	○	(△)	Some vehicles cannot run with specified condition.

# 4. Conclusion

## ◆ Data processing

The data processing by engine speed base is better for evaluation of ASEP.

The Definition of 'D' in the Netherlands proposal should be revised.

## ◆ Outstanding issues

- Need more investigation for sound slope versus engine speed
- Reduce time for measurements

Reduce number of runs

no test below  $n_{ref}$

one gear test, if it covers up to target engine speed

- Consider measurement uncertainty
  - one run per one condition?

## ◆ Vehicle speed at BB

80km/h at BB is not available on some test sites. We recommend that the vehicle speed which is possible on a test site is allowed, if 80km/h is not available.