



EMMA
european mobile media association

**Sound Quality Judgebook
2018/2019**



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Welcome to the European Mobile Media Association

4.0 Preface

This manual is designed to describe the exact procedure, used for judging a vehicles sound system, according to EMMA Rules and regulations and will be continuously updated.

Introduce yourself in a polite way to the competitor.

Follow the procedures and rules in chapter 4 as described in pages 41 & 49 in the Rulebook.

4.1 Pre Judging Check

4.1.1 Check Charger Y / N

Ask the competitor to disconnect the battery charger (if any) from his/her system and document it into the checkbox on the score sheet.

4.1.2 Verification of Reasonable Driving Position Y / N

Check the competitor's ability to operate the gear-stick, the steering wheel & the pedals with the given driver's seat adjustment and document it into the checkbox.

4.1.3 Channel Verification

The judge will use Track 2 of the CD to check left and right integrity. If they are reversed, the competitor is given up to 5 minutes to repair the fault.

Intro and Welcome Track 1:

This track is a first impression of the sound, which is fast, clean and full.
The voice sounds clear, warm and direct, placed in the centre of the sound system.

4.1.4 Calibration of Volume

The Competitor suggests the Volume to be listened at by the sound judges.

The Judges should use this Volume!

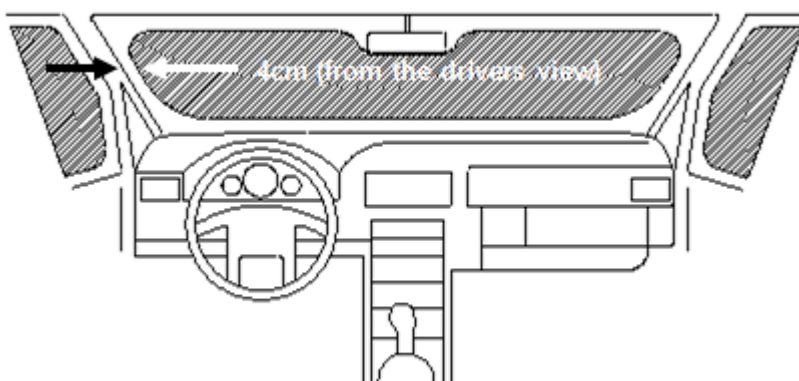
Only in case that the suggested Volume is **too loud** (more than 80dB unweighted slow measurement with pink noise), the Judges have to take a measurement to correct the Volume.

In case the suggested volume is too low, it's the competitor's decision to keep it or ask you to adjust the volume.

Furthermore the equipment used for reproducing the EMMA Sound Quality source will be noted on the score sheet.

4.1.5 Visibility

The judge will sit in the designated listening position and check if anything from the Audio systems Installation is interfering with the view. This rule applies to the windscreen and the two front side windows. Triangular windows within the A-Pillar/ front doors will not be considered as long as the view through these windows is not higher and/or longer than half the height and length of the side window.



If the view is restricted,
the Judges deduct 3 Points
for each not OK Situation.

- the view to the side mirrors should not be blocked (if no passenger side mirror installed, the rear view mirror must allow a full view back)

How to Judge

The measurement will be taken as follows:

- 4 cm perpendicular height taken 90 degrees to the road surface, when checking from the bottom of the screen or the side windows.
- When measuring on the windscreen the measurements are always taken from the edge of any opaque areas which are part of the screen. IE the LAST, smallest black dot
- 4 cm from the A-pillars at 90 degrees to the A-pillar.

Hint:

- This does not include the actual screen used for media playback.
- If the audio build is greater than the 4 cm measurement but is still NOT obscuring the road, (e.g. it is obscuring only the car bonnet), then this is acceptable.

How to score (deduction):

3 points will be deducted per build that obscures the view to a maximum of 6 points.

4.2 Imaging Characteristics

4.2.1 Imaging - Positions (5 to 25 points)

Track 2: Technical Track for Positions and Width

The sound stage is divided to 4 equal distances by 5 positions in the following order:

Left, Right, Center, Left center, Right center

The **Left** and the **Right** positions of the sound stage are relatively easy to score.

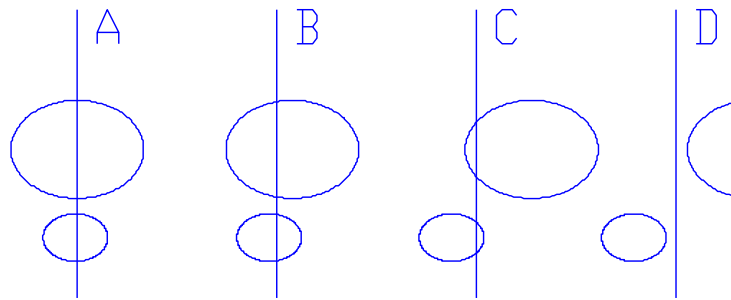
Center, Left center and Right center positions are more difficult to be in their exact place.

Use the human voice **for reference** of each position, **and judge the voice & the 3 instruments.**

The 4 different sounds appear at each position in the following order:

Vocal	500 Hz to 8000Hz
Acoustic Guitar	350 Hz to 3000Hz
Bass Tone	70 Hz to 500Hz
Bell	1000Hz to 10 Khz

Please note that these are the main frequencies of the instruments and voices and of course they can be extended to lower and higher frequencies.

**How to score?**

Start from 1 point at each position.

The 4 tones on track 3 should be heard on their positions.

The height is NOT scored here.

When a tone can be heard in multiple places score 0 points for that instrument.

If the initial sound of the same instrument is in the right place but the 2nd or 3rd sound is not in the same place then score 0.

On the diagram above, A is correct and gets full points.

B, C, and D get 0 points.

Hint :

Every sound starts at one small point which indicates its location, and then spreads equally round it.

Score the location that every sound starts.

4.2.2 Imaging - Focus, Correct size of instruments (4 - 25 points)**Track 3: Technical Track for Height, Distance and Focus**

There are 7 different instrument tones, appearing exactly in the center.

Start with 4 points and add on the following scoring system.

Score each tone accordingly

Perfect focus	3 points
Bigger or smaller size	2 points
In more than 1 place	1 point
No sound	0 point

Focus means correct size of each instrument, relatively to one another.

Do not confuse size with volume. Louder does not mean bigger.

Each different sound in each position should be distinct with the correct focus-size.

Relative sizes are:

Drum: big size

Bass: just about the same size, but louder

Acoustic guitar: smaller than above

Cow Bell: quite smaller than the guitar

Small Bell: smaller than above

Cymbal: about same size with cow bell

Triangle: about same size with small bell

Size of each tone should be considered, relatively to one another.
Please note that if the size is not fitting in, the position may be wrong too.

4.3 Sound Stage and Imaging Characteristics Track 3

4.3.1 Sound Stage - Distance to the Soundstage (0 - 15 points)

This is the distance between the listener and where the soundstage begins.

Track 3: Technical Track for Height, Distance and Focus

All instruments are on the center.

Listen to all 7 Instruments.

The instrument that sounds the nearest/closest to you is the instrument that is judged in this section.

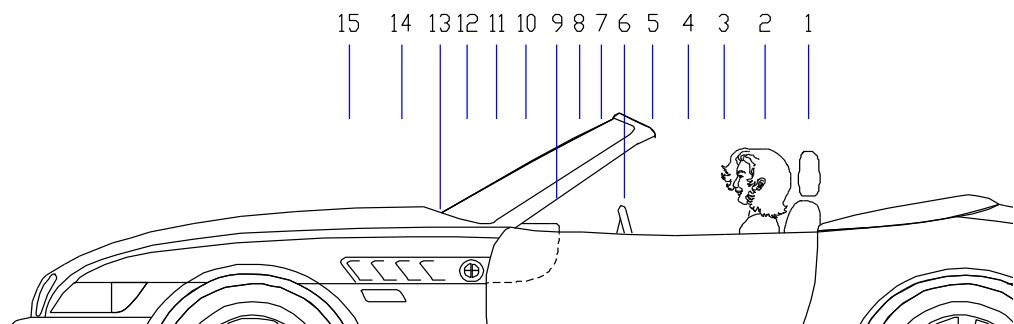
Hint:

If there is a problem in the car and 1 instrument does not sound like it comes from only the center position, this will likely be the instrument that sounds lowest/closest to you and may sound like it is coming from where the speakers are installed.

How to score?

15 points	Is well out of the front windshield
14 points	Is just out of the bottom end of the front windshield
13 points	Is at the bottom end of the front windshield
10 to 12 points	Is between the beginning of the dashboard and the windshield
9 points	Is where the dashboard begins
7 to 8 points	Is between the top of the steering wheel & the beginning of the dashboard.
6 points	Is on top of the steering wheel
4 to 5 points	Is between the top of the steering wheel and the listener's body.
3 points	Is touching the face or chest of the listener.
2 points	Is on the head/body of the listener.
1 point	Is anywhere behind the listener.
0 point	No sound.

Avoid scoring 0 or 1 unless it's absolutely necessary.



4.3.2 Sound Stage - Width of sound stage (2 – 15 points)

This is the distance between the left and the right side of the soundstage.

Technical Track for Positions and Width

This is judged at the beginning of track 2

How to score?

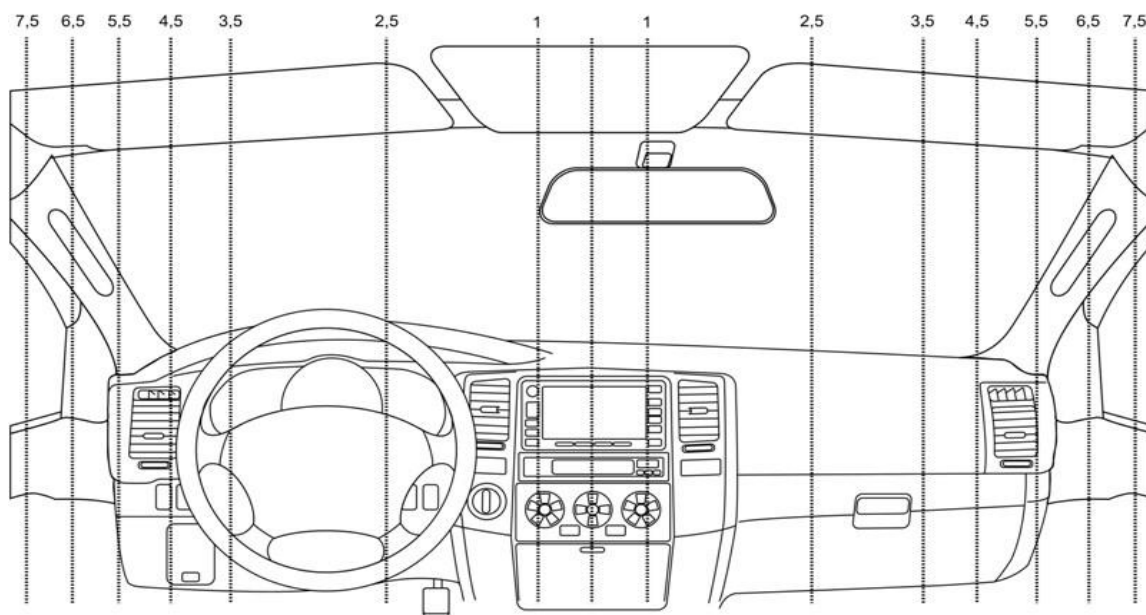
Left: One of the 4 tones that is closest to the center is your point to judge.

Right: One of the 4 tones that is closest to the center is your point to judge

For scoring follow the vertical lines on the diagram.

Add left and right points.

Never score 0 and avoid scoring 1 unless it's absolutely necessary.



4.3.3 Sound Stage - Height of the sound stage (8- 15 points)

Ideally the stage height should be stable at horizon level from left to right, with some vertical spread below and above that level. It means, that some instruments may appear a little lower or a little higher than most of the others who appear at horizon level.

Track 3: Technical Track for Height, Distance & Focus

All 7 Instruments appear at the center.

The 3 first Instruments sound wider to the sides.

The following 4 instruments sound smaller.

They all must appear at the same height, at eye level.

How to score:

Start at 8 points and add on a point for every tone at eye level.

Each Instrument gets 1 point, if there is at eye level.

Each Instrument at any other height gets 0 points.

Score only the height – NOT the positions.

4.3.4 Sound Stage – Room Information (1 to 5 points)

Tracks: 4, 5, 6, & 8

This is the sense of space around the music created by room reverberations (aka echoes), in which the recording took place or created by the engineer.

Either way you should close your eyes and imagine the room size you are listening in.

Imagine the size of the room.

You should sense the size of the room and the reflections of the sound on the side walls, (left-right & front-rear) and the floor - ceiling.

How to score:

Start with 1 point and add on the following points

Track 4: there is bigger room in height & depth.	YES = 1 point	NO = 0 point
Track 5: there is slightly bigger room to the sides.	YES = 1 point	NO = 0 point
Track 6: here is the smallest room.	YES = 1 point	NO = 0 point
Track 8: same room size with track 4.	YES = 1 point	NO = 0 point

A FEW THINGS ABOUT TONAL ACCURACY

PHASE

In the car we can detect phase differences, mostly from the passenger side.

Small phase problems: Most people cannot detect them as they are too small and you have to concentrate on details to spot them.

We can describe these problems in the same way as we do in **Medium**, but the effects described are a lot less hearable.

Medium phase problems: most people detect that something is wrong about the music, but cannot describe or explain what.

The music sounds like as it is coming from further away, creating an ambience as if we were in a small or big church.

Or you feel that an instrument is moving forward or backward depending on the frequency. Some instruments sound natural, but some others sound unnatural, depending on the frequency.

Small or big emptiness in low frequencies are easier to detect.

A phase difference on only one frequency makes instruments sound unnatural on this frequency only.

It can also be that the same sound e.g. Floor Tom comes from Subwoofer with a time difference than from Midbass.

Big phase problems: are easier to detect as they make music sound completely unnatural and annoying.

We can describe these problems as in Medium, but on a superlative degree.

EMPTINESS IN SOUND

For the low frequency instruments, the Subwoofer and Mid-Woofer, Frequencies are responsible.

For human voices and mid frequencies instruments, the Mid-Woofer and the Midrange Frequencies are responsible.

For human voices and High Frequency Instruments, the Midrange and High Frequencies are responsible.

BASS & BASS DRUM

Most of the time, Bass Drum and Bass, hit at the same time in same or similar tones.

On well-adjusted systems you will be able to distinguish & separate them from one another. They affect the SUB & MIDBASS area.

ATTACK

It is how to describe a speaker making a fast sound onto the soundstage and for the speaker to return to the resting position.

Some sounds come in very fast (snare, cymbal), while others come in, slower (piano, bass).

A good system is able to reproduce all of them very realistically.

DECAY

All sounds, even the most sharp ones after the initial attack/strike have a continuation of sound (decay - ambience) after they finish called Decay.

The slower sounds have bigger decay while the fast ones have smaller decay.

SUGGESTION FOR THE SOUND JUDGES

Judge Tonal Accuracy by using tracks 4, 5, 6, 7, 8

Every instrument & voice should sound very natural & distinct, without affecting the sound of another.

GENERAL THINGS ABOUT RECORDINGS

The Bass Drum, the Bass and the Lead Vocals of all tracks are mostly at center position. The Bass Drum is always behind the Bass.

Bass Drum has a quite big focus; Double Bass has bigger focus in lower tones, but smaller size & more precise focus on higher tones.

Electric Bass is about the same size with bass drum on low tones, & has more focus on higher tones.

When Bass Drum sounds, Bass sounds at the same time. You should be able to distinguish these 2 different sounds very clearly & easily.

Train your ears: Focus on the Bass Drum alone. Focus on the Double Bass alone.

Now focus on both of them.

The Lead Vocals are in front

Track 4: Sugar Lemon

This is good for scoring Mid bass, Midrange and Highs.

Male vocal & whistle are in the center.

Acoustic guitar in the LC

Drum set from L to R

Track 5: Sax o'clock

This is good for scoring Sub, Mid bass, Midrange, Highs & Overall Spectral Balance.

Saxophones at all 5 positions: L, LC, C, RC & R

Bass in the center

Drum set from L to R

Track 6: Gigi (0 to 15 points)

Tonal track for the Subwoofer.

This is good for scoring the Subwoofer, but also for the complete Soundrange. Use this track not **only** for Subwoofer. It is useful for Midbass, Midrange and Highs too!

Use the general rules for Tonal Accuracy and convert the score as below for Subwoofer

Judgement:

A	15 Points
B	14 Points
C	13 Points
D	12 Points
E	11 Points
F	10 Points
G	9 Points
H	8 Points
I	7 Points
J	6 Points
K	5 Points
L	4 Points

Judge the Bass guitar, the bass drum, and maybe the low tones of the female voice.
 If the sub is too low (not enough), it sounds empty.
 If the sub is too much, it sounds bigger and louder than everything else, and in some cases boomy.

Track 7: Cigar Box (0 to 15 points)
Technical Track for Sub-bass

Score according to the following table:

Frequency	Sub Bass Technical Track					
	Audible		No Noise		In Front	
100hz	0	1	0	1	0	1
80hz	0	1	0	1	0	1
60hz	0	1	0	1	0	1
40hz	0	1	0	1	0	1
30hz	0	1	0	1	0	1
subtotals						

Is Audible:

This means it plays the frequency tone and is of a similar loudness to the other frequencies.
 If the frequency tone is A LOT louder or A LOT quieter score 0 points.

No Noise:

This means there are no “nonmusical” noises being made such as door panels rattling or resonances. For each frequency if there is a noise that was not recorded on the CD score 0 points.

In Front:

This means that the sub bass sounds like it comes from in front of the listening position only.
 If some or all of the sub frequency sound comes from around the listener or behind the listener, score 0 points.

Hints and Tips:

The challenge with the bass track is that it will be difficult to reproduce all sub frequencies in phase, at a similar loudness at each frequency whilst in time with the front stage.

The recording of this track has been designed specifically to give the listener “audible timing cues”, this allows any time alignment of the subwoofer to work and allow the sound to arrive at the listener in time with the front stage (like a musical track would).

If the car is producing sounds from behind the listener or are significantly louder or quieter at different frequencies (i.e. not smooth and linear), this indicates that further improvements of your car audio system can be made.

Track 8: Night & Days

This is good for scoring the Midrange and the Highs.

Acoustic guitar in the center

Male voice is in the center, but a little higher than the guitar

Tambourine is to the left and lower than the guitar.

The guitar sounds out of tune at 10”.

4.4 Tonal accuracy (0 - 120 points) Tracks 4, 5, 6,7 & 8

Sub-bass - Section 1 10 to 60 Hz (0 - 15 points) Section 2 30-100hz (0-15 points)

Instruments: Double Brass, Tuba, Trombone, French Horn, Woodwinds, Electric Bass, Bass Clarinet, Contrabass, , Bass Violin, Cello, Harp, Big Drums, Piano, Organ, Viola, Harp

Mid bass - 60 to 200 Hz (0 - 30 points)

Instruments: Voices, Bass, Brass, Tuba, Trombone, French Horn, Trumpet, Woodwinds, Clarinet, Oboe, English Horn, Alto Sax, Bass, Bass Clarinet, Contrabass, Tympani, Bass Violin, Cello, Guitar, Viola, Violin, Harp, Piano, Organ, tambourine, Drums, Floor Tom, Harp

Midrange - 200 to 3000 Hz (0 - 30 points)

Instruments : Voices, Bass, Brass, Tuba, Trombone, French Horn, Trumpet, Woodwinds, Flute, Clarinet, Oboe, English Horn, Alto Saxophone, Bass, Strings, Cello, Guitar, Viola, Violin, Harp, Piano, Organ, Piccolo, Bells, Drums, Tambourine, Cymbals, High Hat, Ride, Shaker, Rattle Snake, Tom Tom, Floor Tom, Harp

High Frequencies - 3000 Hz to inaudibility (0 - 30 points)

Instruments: Voices, Woodwinds, Piccolo, Flute, Clarinet, Strings, Violin, Triangle, Brushes, Harp, Piano, Organ, Bells, Tom Tom, Cymbals, High Hat, Ride, Shaker, Rattle Snake, Harp

Use the following scoring guide to score Sub-Bass, Mid-Bass, Midrange, Highs, & Overall Spectral Balance.

- A 29 to 30 points. 98% to 99%** Joyful, amazing, wonderful, shuddering, unbelievable tuneful, substantial, sexy, full of emotion
 Life Like - Completely Natural & Clear, Generate full feelings, emotions, shuddering, warm, inviting, relaxing sound, Voices/instruments breath, with space around them,99%
 Harmonically & Musical,
 All details are there, All Instrument tones are 100% Distinct & Separate, The s,x,f,c sound perfect,
 The hardware disappears; nothing comes between you & the music, completely effortless sound
 Full of endless Energy & Dynamics, All tones start & stop with great precision & energy.
 Perfect Instrument Size, Real Vocals in full body with flesh and blood

- B 27 to 28 points. 95% to 97%** it feels extremely close to, but just a little bit less than the above
 Very Close to Completely Natural & Clear, Generate almost full feeling, shuddering, Extremely close to the above, Almost 99% Harmony & Musicality
 Almost all details are there, All Instrument tones are almost 100% Distinct & Separate, The s,x,f,c sound almost perfect
 The hardware almost disappears, Almost Effortless,
 Almost full of Energy & Dynamics, Almost all tones start & stop with great precision & energy.
 Very close to Perfect Instrument size, Real vocals with almost full body
- C 24 to 26 points. 90% to 94%** Everything is there in very good proportion, but just not good enough
 A great deal of Naturalness & Clarity, generate a lot of feelings, no shuddering, a lot of space & atmosphere, but not enough, a great deal of Harmony & Musicality.
 Most of the details are there, Most tones are very Distinct & Separate, The s,x,f,c sounds a little bit thicker or thinner than normal,
 Wide open window to the sound, the hardware adds tiny coloration, little effort in a few tones,
 A great deal of Energy & Dynamics, Most tones starts & stop with great precision & energy,
 A little smaller or bigger Instrument size, Close to real vocals with close to full body
- D 21 to 23 points. 85% to 89%.** Almost everything is there in good proportion, but something is obviously missing, or is too much.
 Fair Naturalness & Clarity, Generate fair feelings, Space is medium or little larger than normal, Fair Harmony & / or Musicality
 A few details are missing, Most tones are almost very Distinct & Separate, The s,x,f,c sound thicker or thinner than normal
 Almost open window to the sound, the hardware adds little color, Little Effort in a lot of tones.
 Fair Energy & Dynamics, Some tones start & stop with great precision & energy
 Fairly smaller or bigger instrument size, Close to real vocals with little less body.
- E 18 to 20 points. 80% to 84%** Sounds correct, but there are missing things or does not give much music feeling
 Little Naturalness & Clarity, Generate little feelings, little space & atmosphere, little Harmony & / or Musicality,
 A few details are there, a lot of tones are very Distinct & Separate, the s, x,f,c sound a lot thicker or thinner than normal.
 A couple of tones behind a curtain, colorations more obvious, Fair Effort in a few tones, Little Energy & / or Dynamics, only a couple of tones start & stop with great precision & energy.
 A few Instruments smaller or bigger size, Good vocals with half size body.
- F 15 to 17 points. 75% to 79%** Sounds nice but some tracks sound nicer than others.
 Only some tones Natural & / or Clear, Generate feeling only in a few tones, Space & atmosphere only in some notes & / or instruments, Harmony & / or M in a few tones
 Details only in few tones, a lot of tones are almost very Distinct & Separate, the s,x,f,c sound a little blur or whistling.
 Some tones behind a curtain, colorations quite obvious, Fair Effort in a lot of tones
 Energy & / or Dynamics in only a few tones, Acceptable transients.
 A lot of Instruments smaller or bigger size, good vocals with very small or very big body.
- G 12 to 14 points. 70% to 74%** Sounds acceptable, nothing annoying but not so clear.
 Not Natural but clean, generate feeling only in little tones, too much space, Harmony & / or M musicality in little tones,

Very little details, A few tones are Distinct & / or Separate, the s,x,f,c sound blur or whistling.
A lot of tones behind a curtain, many colorations, a lot of effort in a few tones
Energy & / or Dynamics only in a couple of tones, acceptable transients only in a specific range.
Quite smaller or bigger Instrument size, Acceptable vocals with no body.

H 9 to 11 points. 50% to 69% Sounds acceptable, almost nothing annoying
Not Natural but almost clean, no Feelings, no Space, or enormous Space, Almost No Harmony & / or Musicality
Almost no details, Little tones are Distinct & / or Separate, The s,x,f,c sound blur or whistling a lot.
The curtain is quite obvious, A lot of effort in a lot of tones,
Almost no Energy & / or Dynamics, Poor transients.
Half or Double size Instruments, almost acceptable vocals with no body.

I 5 to 8 points. 30% to 49% Sounds annoying in only some tones or tunes
Not Natural, some tones clean, some opposite feelings, Space & Atmosphere not easy to detect, No Harmony & / or Musicality
Hard to detect details, Almost no Distinction & / or Separation, the s,x,f,c sound harsh,
The curtain is heavy, Big effort in a few tones,
No Energy or Dynamics, Very poor transients,
Very big differences in instrument size, poor vocals with no or enormous body

K 1 to 4 points. 1% to 29% Sounds annoying in almost all tunes and tracks
Not Natural, bad feelings, Space not detectable, No Harmony & / or Musicality
No details, no distinction & separation, Hard to listen to,
The curtain is very thick & heavy, Big effort in a lot of tones,
No Energy & Dynamics, No transients,
Cannot detect instrument size, cannot detect vocal size.

L 0 points. No Sound 0%

Additional hints:

Mistakes or miss-adjustments in the crossover area should result to lower score on both e.g. Midrange and High Frequency sections
Never score 0 if there is a sound, and avoid going lower than (5 to 8) unless it is absolutely necessary.

4.5 Overall Spectral Balance (0 - 30 points)

Here we judge all the above (Sub, Mid-Bass, Midrange, & Highs) as a whole - as one thing. How all the frequencies - the entire bandwidth - are blended/combined together. How is the sound as a total? Are they well linked together, or not?

Track 5: Night and Days

Well balanced track. All instruments should sound clear and rich. The position of every single instrument is spot on. No effects are used in this track except a little reverb.

Overall Spectral Balance at higher volume (0 - 30 points)

The same as the above, but at 3db louder volume level.

If the sound is better than SB in normal volume, add 1 to 3 points, if not deduct 1 to 3 points. In case of bigger difference contact the head judge.

The suggestion to the judges is to step up the volume by at least 2 to 3 steps.
This may vary from head unit to head unit.

Additional hints:

Although it appears so, Overall Spectral Balance is not a point average, given to Sub-bass, Mid-Bass, Midrange & High frequencies

Small point differences between Sub-bass, Mid-Bass, Midrange & Highs, gives a point result in Overall SB that looks like a point average of the above.

Big point differences between Sub-bass, Mid-Bass, Midrange & High frequencies can give a lot lower points in Overall Spectral Balance

Overall Spectral Balance scoring can never be higher than the highest point in Tonal Accuracy

Overall Spectral Balance scoring can be lower than the lowest point in Tonal Accuracy

Never score 0 if there is a sound, and avoid going lower than (5 to 8) unless it is absolutely necessary.

4.6 Listening pleasure (0 - 30 points)

It's the pleasure and joy that music can generate to the listeners.

Considering all musical tracks, score the following:

Naturalness	0 to 3 points
Harmony & Musicality	0 to 3 points
Atmosphere & Emotions	0 to 3 points
Clarity	0 to 3 points
Effortless sound	0 to 3 points
Dynamics & Energy	0 to 3 points
Distinction & Separation	0 to 3 points
Body of Voice & Instruments	0 to 3 points
Transparency	0 to 3 points
Details	0 to 3 points

How to score:

0 points for no Naturalness at all

1 points for little Naturalness

2 points for fair Naturalness

3 points for perfect Naturalness

Hints:

The scoring here seems to have a connection with the Overall Spectral Balance scoring. These 2 scorings are not directly connected, but the actual scorings cannot be far away from OSB under normal circumstances.

You must score listening pleasure from a different point of view.

Do you get pleasure from the music you are listening to? Or you do not?

Under most cases listening pleasure will score proportional to Overall Spectral Balance points at higher level. E.g. SB=20 points LP=18 to 20 points

It can be that a system not so good in SB gives some listening pleasure & can score proportionally a little higher. E.g. SB=18 points, LP=20 to 22 points

It is not realistic to score 18 on the Overall Spectral Balance and score 25 on listening pleasure.

It is not realistic to score 28 on the Overall Spectral Balance, and score 12 on listening pleasure.

A sound system that sounds very good or excellent, should be able to show it throughout the whole score sheet.

On a sound system that does not sound so good, you have to point this out in detail throughout the score sheet.

Never score 0 and avoid scoring below 5, unless it is absolutely necessary.

Even a bad (not a very bad) sounding car should score around 10 points.

4.7 Adjustments

Track 10: Zero Bit Track

Engine-off Testing - Switching Noise (-6 - 0 points)

Potential noises can be:

Turn-on / turn-off noise, switching pops -- a popping, thumping or clicking noise, that is heard through the system's speakers when the system is powered up by the source unit's on/off switch or switching pops - a clicking or popping noise that comes through the speakers when adjustments are made to the audio system's volume or track selection controls. Zipper, digital search, or stepper noises, which are inherent in some digital volume control designs, are beyond the scope of being corrected by proper installation techniques, but are not considered acceptable and will result in point deduction.

A noise that is emulated from or by the audio system, the vehicle or the vehicle environment and that is not recorded on the EMMA Sound Quality CD.

Potential noises can be:

Rush, hum, hiss, cracks, floor noise, rattling panels, loud fans, mechanical noise etc.

Points are not to be deducted for mechanical noises such as relay clicks or automatic motorized covers being activated.

How to score:

0 points	No audible noise
1 to -2 points	Barely audible noise
3 to -4 points	Audible noise
5 to -6 points	Disturbingly audible noise

Engine-on Testing (-6 - 0 points)

Turn off system. Turn on engine. Turn on system.

Noise that is generated by the mechanical/electrical system of the vehicle that is reproduced through the speakers with the audio system turned on / off.

Track 14 is used. The judges will adjust the volume level from medium to maximum. If the noise increases the judges may deduct maximum 6 points.

Possible noises are:

Alternator whine, ignition noise, PWM-noise created by control boxes, etc.

How to judge:

1. Turn off the system
2. Turn on the engine
3. Turn on the system
4. Turn on and off the lights, alarm lights, air condition, brakes, electric windows, etc.
5. Accelerate the engine

How to score:

- | | |
|----------------|----------------------------|
| 0 points | No audible noise |
| 1 to -2 points | Barely audible noise |
| 3 to -4 points | Audible noise |
| 5 to -6 points | Disturbingly audible noise |

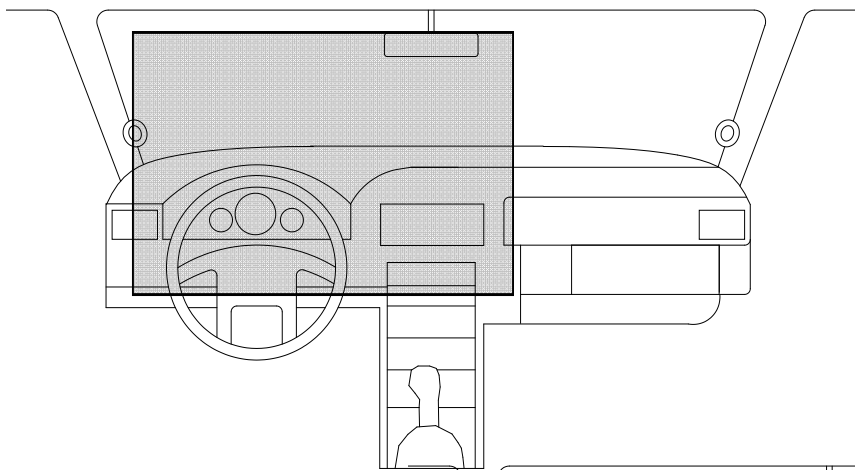
If noises are audible in some listening tracks (such as Track 7) but not in the zero-bit-track (noise gate), these other tracks can be considered for judging.

4.8 Ergonomics

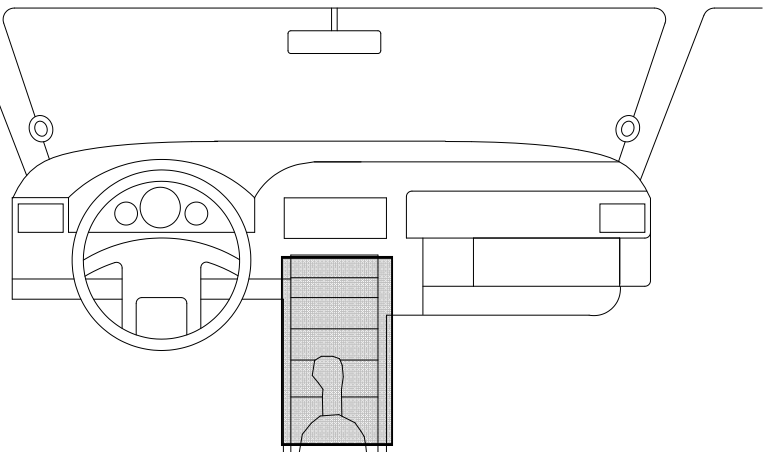
System Handling (0 - 6 points)

System Handling – Visibility (0 - 3 points)

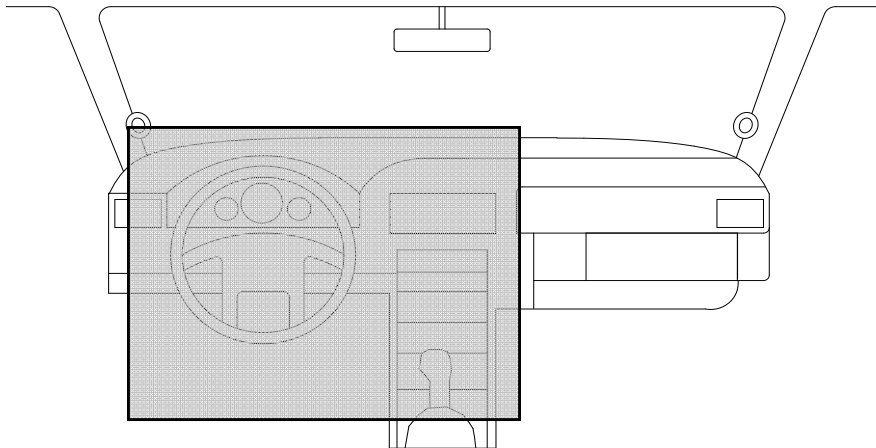
3 points when in this grey area



2 points when in this grey area



1 point when outside of this grey area



0 point for very bad visibility or NO display

System Handling - Control (0 - 3 points)

3 Points - Very easy to access and operate the system. (Extra Remote) Controls can be adjusted with hands on the steering wheel. (Extra Remote) control unit should be proper mounted (should not move when adjusting).

2 Points - Easy to access and operate the system. (Extra remote) control is installed and properly mounted (should not move when adjusting). A loose handheld remote control is not accepted.

1 Point - Easy to access and operate the system. No remote control

0 Points - Hard to access and operate the system. Source unit out of reach

LAST BUT NOT LEAST EXPLANATIONS TO THE COMPETITORS

The competitor will always receive a realistic description of the quality of his/her sound by the judges

Your conversation with the competitor should be done in a very kind & polite way.

Please choose your words in such a way that are not offensive for the competitor or his equipment.

The Judges should explain in a simple & fast way, the points that you gave for his system.

Your explanations should be done in a way that the competitor is able to understand the meaning.

The competitor may not know what a phase difference is and how many points deductions that causes. Never use brand names or installer's names while explaining.

But you can recommend them to listen to another car - **NOT FROM HIS CLASS** - that sounds good in order to hear the difference. Never tell the competitor that the system sounds very good by scoring only 15 points in Tonal Accuracy.

Sounds very good = for the competitor means close to the top.

So please choose your words very carefully!

Picture of the recording situation and of some Instruments as well as the main Microphones:

Track 2: 5 Positions



Track 3: 7 Instruments center





Track 4: Sugar Lemon



Track 5: Sax o'clock



Track 6: Gigi



Track 7: Cigar Box



Track 8: Nights and Days



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