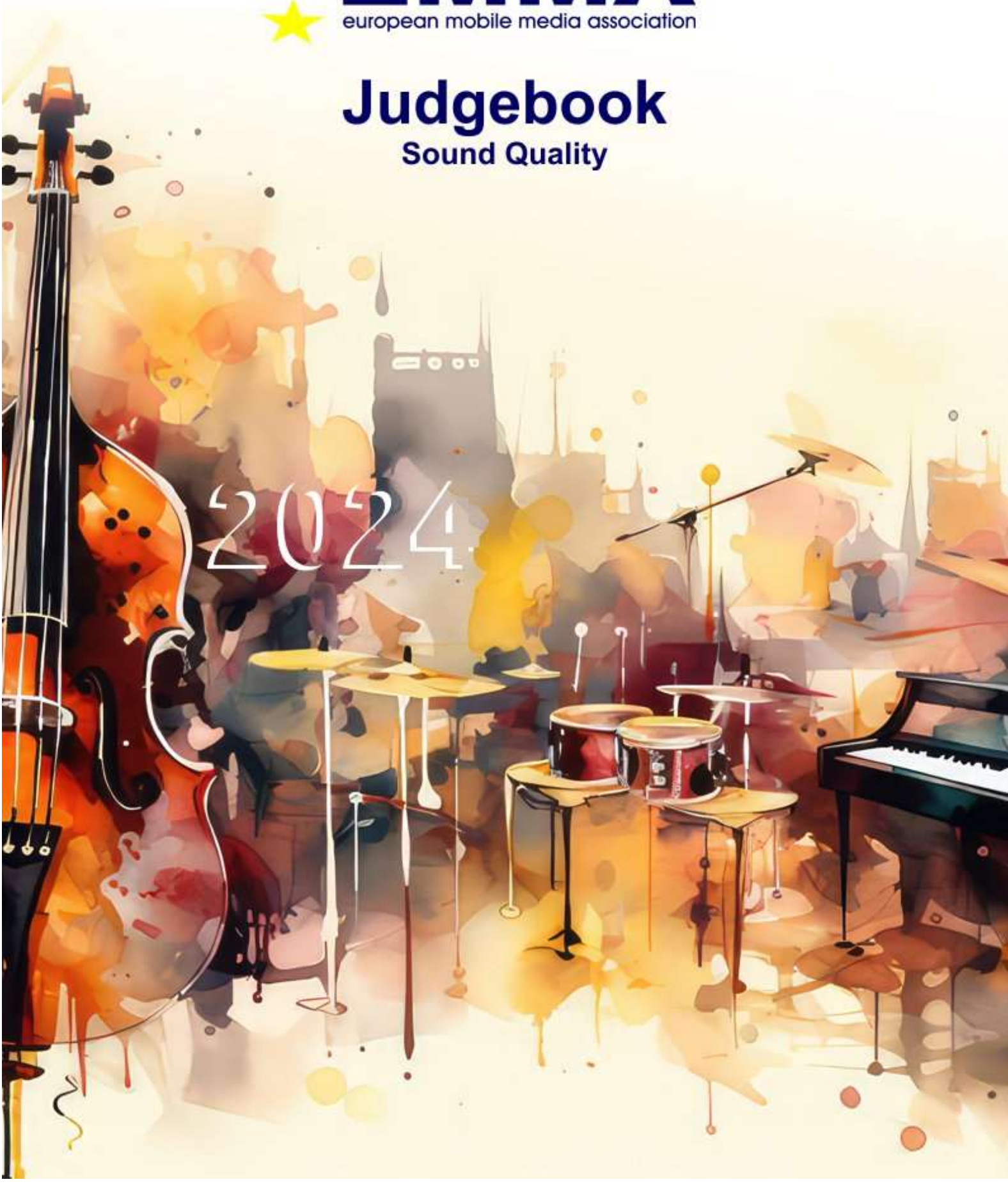
EMMA
european mobile media association

Judgebook

Sound Quality

2024



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 38 & 39 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 Tracks 2 & 3 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!

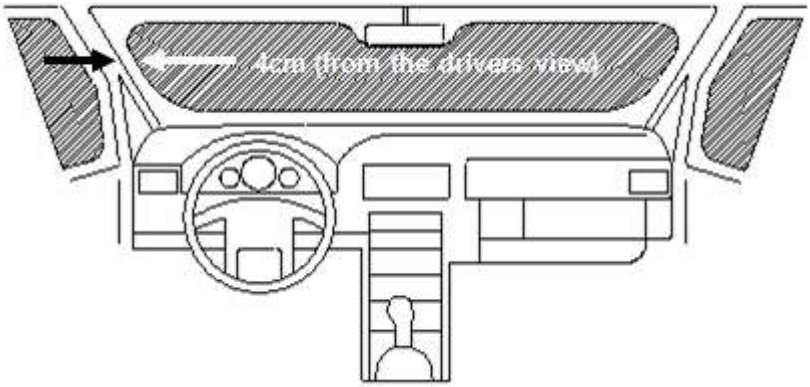
Only in case that the suggested Volume is **too loud** (more than 80dB unweighted slow measurement with pink noise), the Judges have to take a measurement to correct the Volume.
In case the suggested volume is too low, it's the competitor's decision to keep it or ask you to adjust the volume.

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

4.1.5 Limited view

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. Windows within the A-Pillar/ additional windows in the front of the front doors will not be considered as long as the height of the window is not more than half the height of the side window at the highest point (height is measured perpendicular to the road).



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.

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 (0 to 25 points)

Track 2 to 6: Technical Tracks for Positions and Focus

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

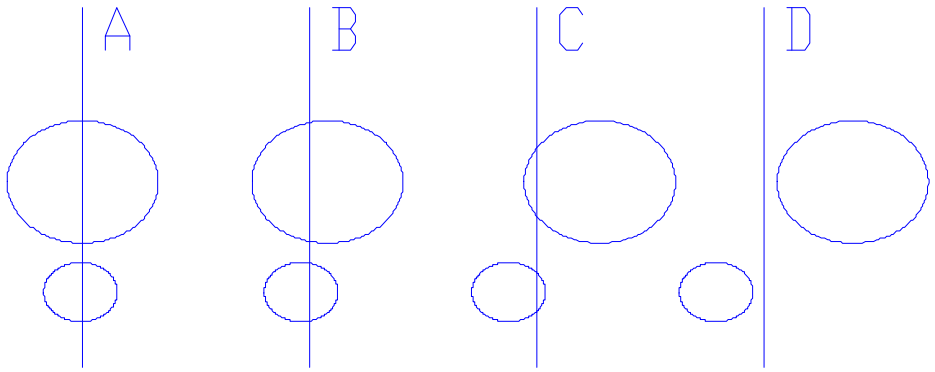
Left, Right, Center, Left center, Right center

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.

The 5 different sounds appear at each position in the following order:

Instrument	Frequency
Electronic Bass	40 – 100 Hz
Electronic Guitar	100 - 250 Hz
Flute	1 kHz - 250 Hz
Celesta	1 kHz - 2 kHz
Triangle	2 kHz – 4kHz plays >20kHz

Please note that these are the frequencies of the instruments and of course they can be extended a little bit to lower and higher frequencies.



How to score?

The 5 tones on tracks 2-6 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.
The attack is for position, the attack with the swing out is for focus determination

4.2.2 Imaging – Focus (0 - 25 points)

Tracks 2 to 6: Technical Tracks for Positions and Focus

The technical tracks 2-6 for positioning and focus will be used to define the five positions. The centre position should be exactly in the middle between the ultimate left and ultimate right. Left centre should be exactly in the middle between ultimate left and centre. Right-centre should be exactly in the middle between centre and ultimate right. This means that all positions should be evenly spaced.

When the sound is not coming from the position where it should appear, less points will be given for that position. For each correct position of each instrument the judges will score 1 Point.

Focus means correct size of each instrument, relatively to one another. The instruments should appear exactly on their designated position. If they are out of focus the judge will note 0 points.

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.
The size of the focus is relative to the size of the stage. If the stage is very small also all focus should be smaller. If the stage is very wide the focus should be bigger in size. In any case all instruments should appear within the boundaries of the stage.

Relative sizes are:

Electric Bass: big size
Electric guitar: smaller than above
Flute: smaller than Guitar
Celesta: quite smaller than the flute
Triangle: smaller like a Celeste

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 7

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 7: Technical Track for Width, Height, Distance and Room Information

This is a track with moving instruments!

Instruments in stable position:
Vibra Slap (rattle like sounding Percussion) marking the starting points and endpoints of cowbell and overtone flute movements at 0:26 min, 0:52 min and 1:13

Tuned Glass bottles 0:00 min - 0:22 min , and also from 1:13 min - 1:23 min;being processed with a pingpong like delaying effect and therefore moving quickly from left to right and vice versa

Shaker (Percussiion). From 0:52 min. To 1:23 min

Drumset including Conga and Timbales from 0:20 min to end

Electric Bass

Clean Electric Guitar from 0:31 min. -1:13 min

Piano from 0:31 min to 0:52 min

Distorted Lead Guitar 0:15 min - 0: 31 min tuned lower

Bowed Double Bass Tone dressed with Atmospheric Sound from 8sec to 25 secs

Extra deep Drum from 5secs to 20secs

Clapping wood blocks from 4secs to 20 secs

Spring drum (Thunder sound effect) at the End

Instruments moving:
Cowbell (big), Overtone Flute

Description of moving instruments:

00:26 – 00:52
Cowbell: Moving from left to right for 10 bars

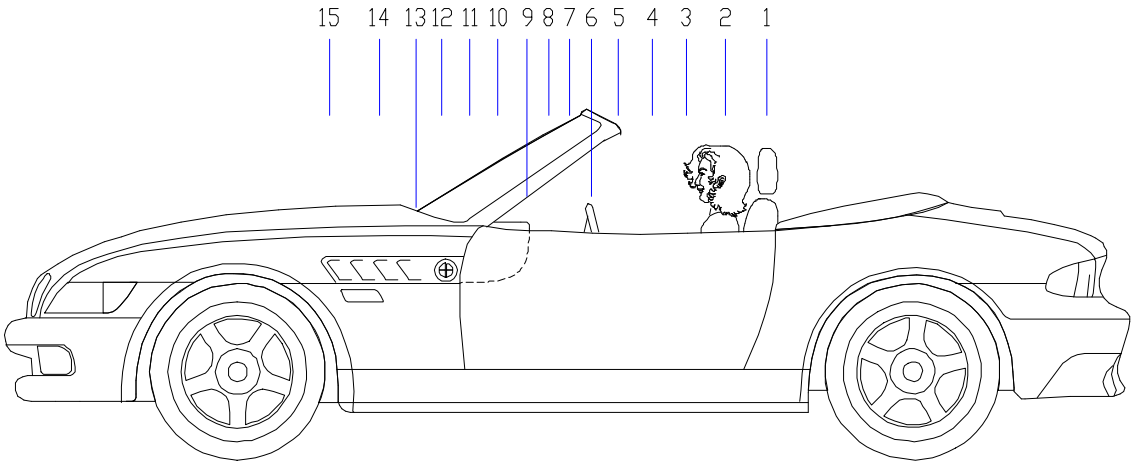
00:52 – 01:13
Overtone Flute: Moving from right to left for 8 bars; starting at 0:52 min an ending at 1:13 min

Listen to all Instruments.
The instrument that sounds the nearest/closest to you is the instrument that is judged in this section.
It can be a moving instrument OR a stable instrument.

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 to12 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 (0 – 15 points)

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

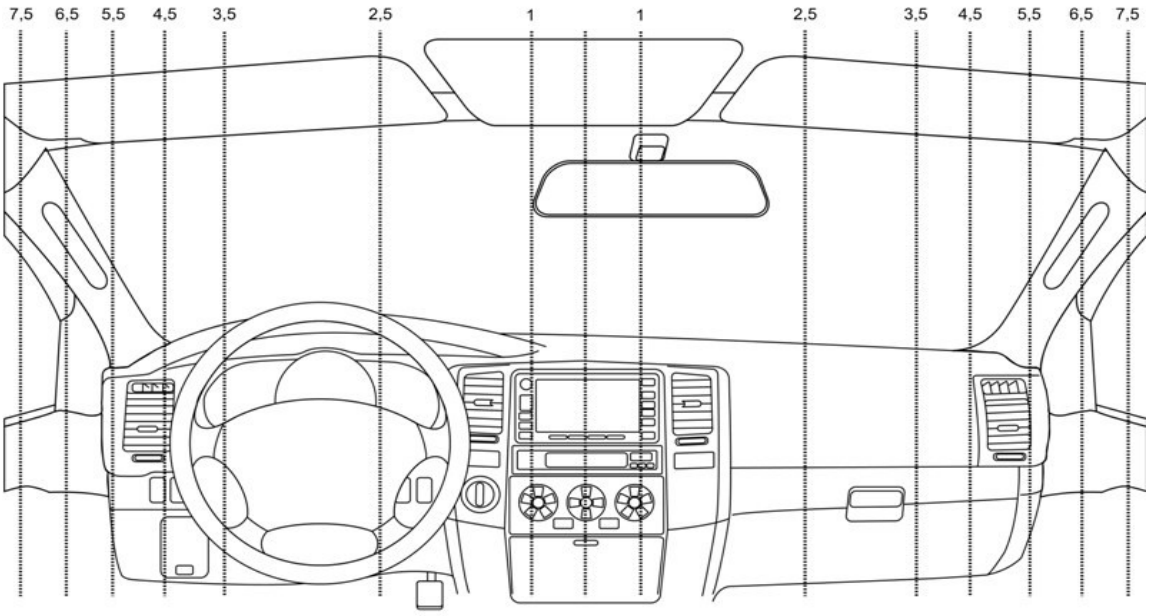
Track 7: Technical Track for Width, Height, Distance and Room Information

How to score?

Left: One of the instruments that is furthest to the center is your point to judge.
Right: One of the instruments that is furthest 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 (0- 15 points)

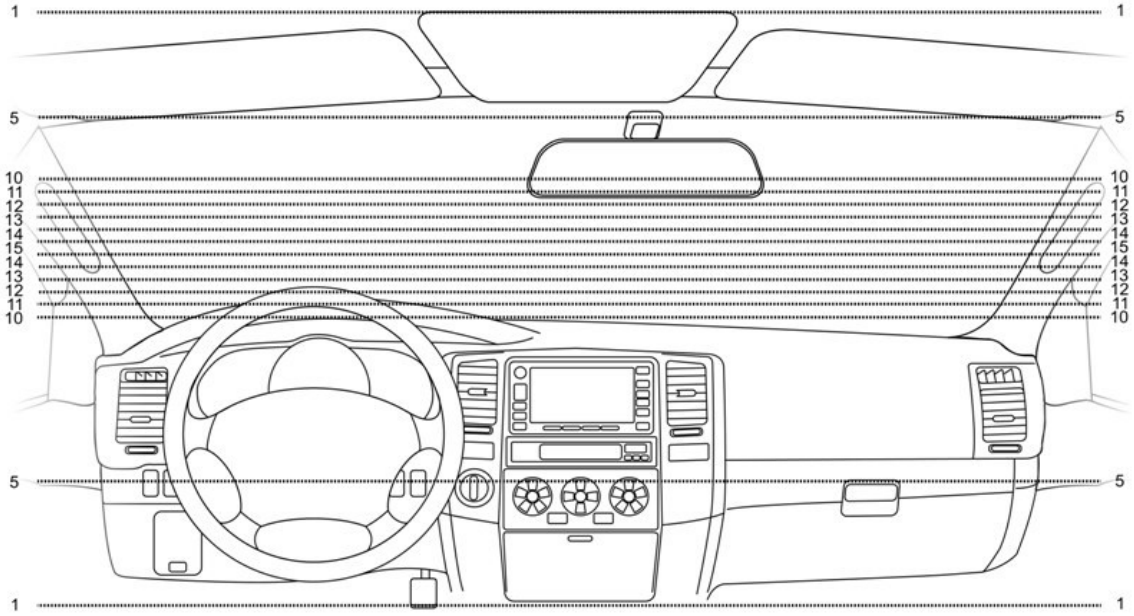
Ideally the stage height should be stable at horizon level from left to right, with some vertical spread below and above that level. It means, that some instruments may appear a little lower or a little higher than most of the others who appear at horizon level.

Track 7: Technical Track for Width, Height, Distance and Room Information

All instruments should be on the same height. All stable AND moving instruments. Ideally on eye level.

How to score:

Follow all moving instruments and use the stable instruments too. Some moving instruments can fall a little bit down on some positions. Deduct 1 point for every instrument that is NOT on eye level at any position.



Be careful: Score only the height – NOT the positions.

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

Track 7: Technical Track for Width, Height, Distance and Room Information

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. Within Track 7 the impression should be created that the rainmaker is far behind the Instruments in the center position and also many of the moving instruments are closer or more far away. This feeling of a room size the source for the scoring.

How to score:
Start with 1 point and add on the following points

2 Points	there is some room audible but not big
3 Points	a room is to feel
4 Points	a big room is audible
5 Points	the impression of an extraordinary big room is audible

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

Describes the feeling that the reproduction speed playing on the soundstage is according to the instrument playing. This means how fast the attack is coming and how fast it disappears and is no longer audible.
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 8, 9, 10 and 11

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 8: Classic Mendelssohn - Narita
Only a Grand Piano Steinway B and a very clear Voice

Track 9: Hungry Bird
Vocals and backing Vocals. Jazz Drums played with Brushes and Sticks, Acoustic Bass, Grand Piano Yamaha C7(sounds different than Steinway B), Harpsichord, Jaw Harp, Percussion, Ukulele, Resonator Guitar, Electric Guitar, Tuba, Trumpets, Flute, Clarinet and Birdy Flute

Track 10: Carero
Vocals and backing Vocals, Grand Piano Yamaha C7, Electric Bass, Electric Guitar, Congas, Bongos, Timbales, Cabasa, Cowbell, Guiro, Organ and Handclaps

Track 11: Mama Nature
Vocals an backing Vocals, Drums, Electric Bass, Electric Guitar, Keyboards, Keyboard Strings, Tambourine and Synth FX

4.4 Tonal accuracy (0 - 120 points) Tracks 8, 9, 10 and 11

Sub-bass - 10 to 60 Hz (0 - 30 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 11: Mama Nature (alternatively Track 10 is also possible)

Well balanced track with some effects. All instruments should sound clear and rich. The position of every single instrument is spot on.

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

The same as the above, but at 6db 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 12: Zero Bit Track

System Noise

A well-executed installation should be free from any noise at all listening levels. Noise is defined as any sound not present on the original EMMA Sound Quality recordings and that has been added by either the cars electronic system or by the audio system.

Some hint how a system should be set up. The head unit should be able to use most of its range before the amplifier is driven into clipping. Again, if the gains are set too low, the head unit won't be able to drive the amplifier to its maximum output level. If the gains are set too high, the amplifier will be driven into clipping at a very low volume level (on the head unit).

An amplifier amplifies what it is given. Your signal cables carry the audio signal, and they also carry "noise" in the system due to grounds, internal components, etc. The noise stays the same, but the signal increases with the volume. So, the higher the volume, the higher the audio signal is above the noise level; hence a better signal-to-noise ratio. Now, the amp is still amplifying the noise, but the level of the audio signal is high enough you don't notice the noise floor.

A system with an improperly set gain structure will exhibit a hiss or “static” sound at full volume playing the noise track.

Keep in mind that this adjustment does not affect the power output of the amplifier — you're simply setting the amount of input signal needed for optimum sound quality from your system.

There will be the following items checked with Track 12:

System Noise check

Listen for noise that is somehow emulated from or by the audio system and that is not recorded on the current official EMMA Media

Potential noises can be:

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

If noises are audible in some listening tracks but not in the dedicated noise track, these tracks can be considered for judging.

The following rules apply to judging noise:

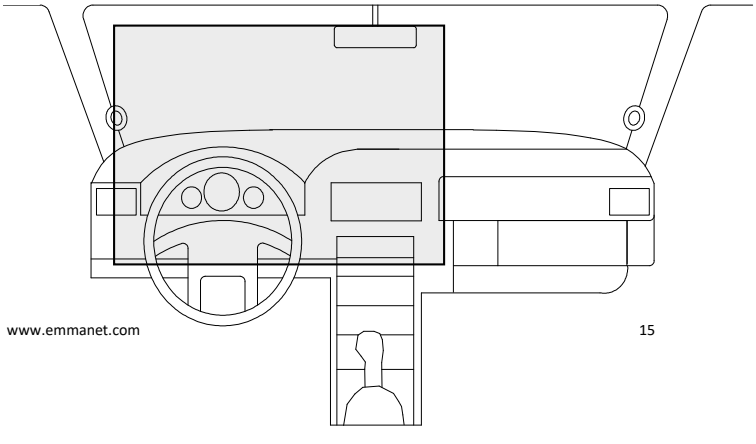
1. Each system is listened to using the “Zero Bit Track” on the current official EMMA Media for the absence of noise, if noises are heard during the regular judging, points can also be deducted.
2. The judges must listen for every specific type of noise for which a deduction of points occurs on the score sheet.
3. The judges will determine the audibility of noise from a normal seated listening position.
4. The judges should briefly note what caused any adjustment to the score in the comments section of the score sheet.
5. Electrically powered cars may compete in EMMA competitions. EPV’s must be self-powered during the judging process.
6. The judges must carefully determine whether the noise is actually coming from the system itself.

4.8 Ergonomics

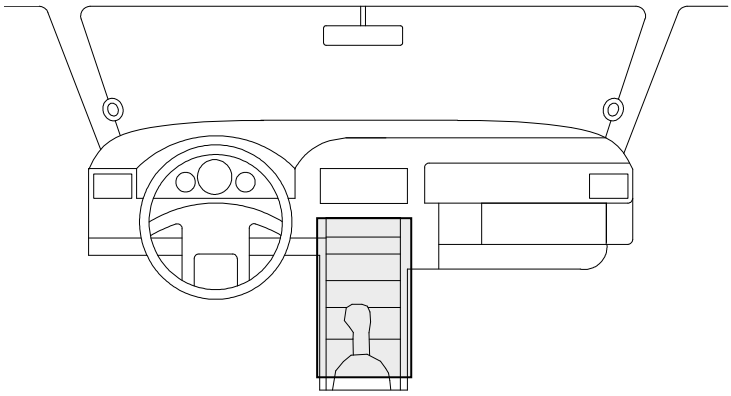
System Handling (0 - 6 points)
System Handling – Visibility (0 - 3 points)

All relevant information about the music track must be in the same area. Even if it is more then one display all Informations like, Track Title, Volume etc. have to be clearly visible for the judge.

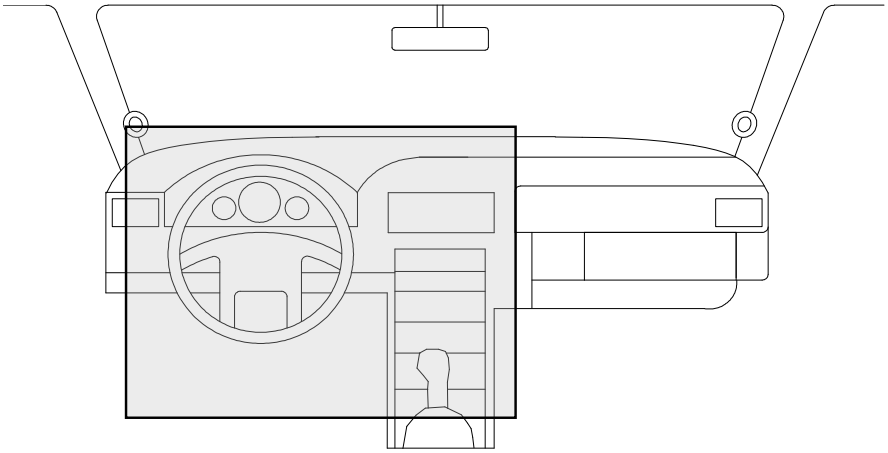
3 points when in this grey area



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!

Notes:

Picture of the used Instruments:

Cabasa

Caxixi(left) - egg shaker

Spring Drum

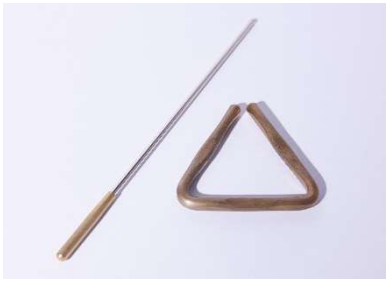
Conga

Bottles

Glockenspiel

Pocket-Trumpet

Birdy Flute



Triangle

Jaw-Harp

Cowbell-big

Tongue Drum Wooden

Tambourines

Grand Piano

Drumset

Acoustic Bass

Addendums and updates to the rules will be published at www.emmanet.com

EMMA thanks it´s national and international Partners for supporting the global Network

Celesta

Clarinet

Eletronic Guitar

Flute

Bongos

Overtone Flute

Tenor Saxophon

Resonator Guitar

Vibra Slap

Ukulele

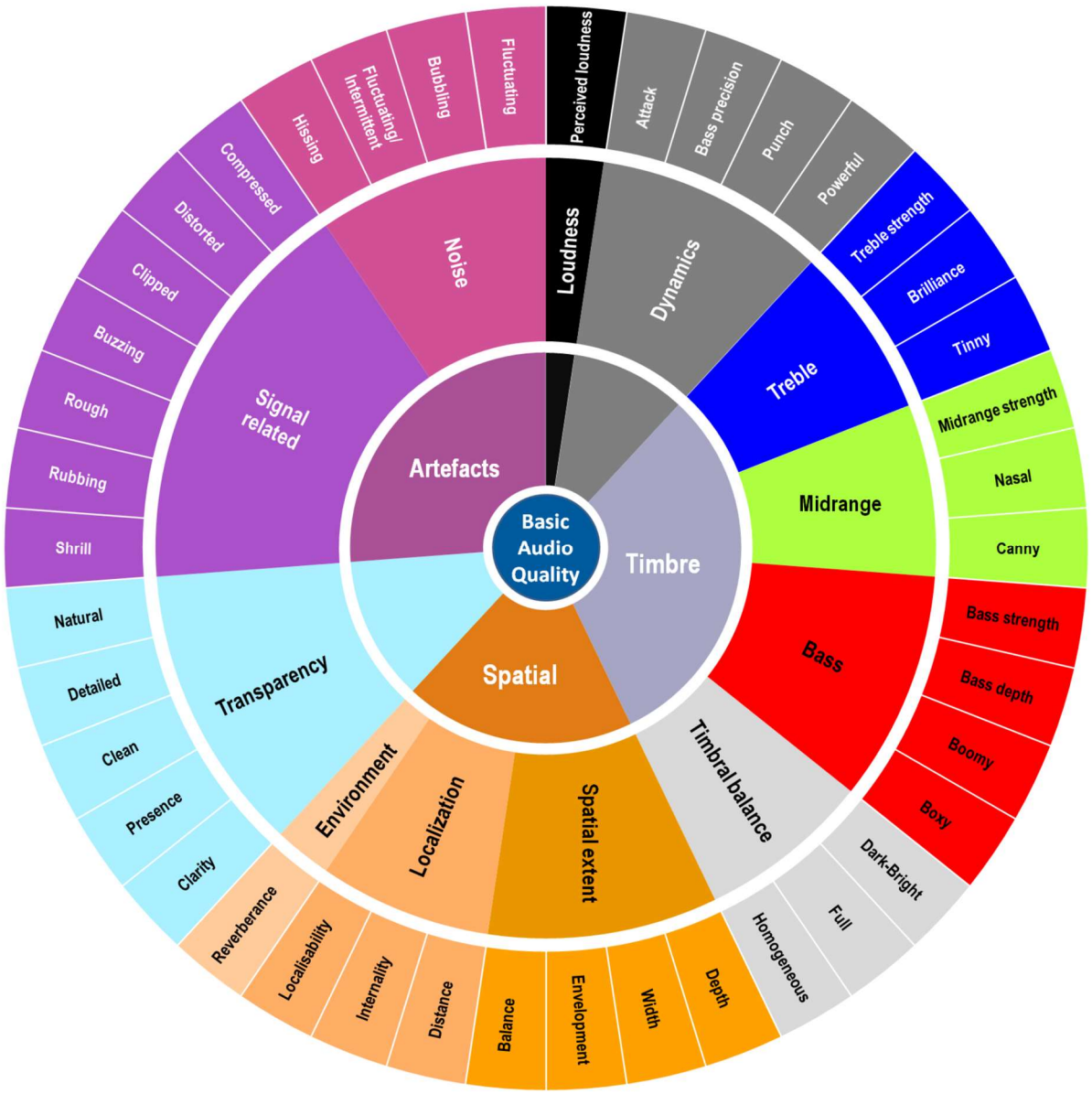
Electronic Bass

Thoughts about Music Reproduction

Reference: ITU-R Report ITU-R BS.2399-0

The complete paper can be found at the following link

https://www.itu.int/pub/R-REP-BS.2399-2017



Explanations of the terms for the judge to the participant

Attack	Transient response. Specifies whether the drum beats and percussion, etc. are accurate and clear i.e. if you can hear the actual strokes from drumstick, the plucking of the strings etc. it is also expressed as the ability to reproduce each audio source transients cleanly and separated from the rest of the sound image. Imprecise Attack is understood as unclear or a muted impact. Scale: Imprecise – Precise
Bass Precision	Are instrument impacts from the bass drum and bass precise, crisp and without distortion, are the impacts tight and well defined? Bass precision may be defined as Attack in the bass region. Imprecise means that the attack speeds in time and the peak of the impact is softened. Scale: Imprecise – Precise
Punch	Specifies whether the strokes on drums and bass are reproduced with clout, almost as if you can feel the blow. The ability to effortlessly handle large volume excursions without compression (compression is heard as level variations that are smaller than one would expect from the perceived original sound). Scale: A little – A lot
Powerful	The ability to handle high sound levels, especially when striking the drums and bass. Indicates whether the Punch, Attack and Bass precision are maintained at high volume. Scale: A little – A lot
Localisability	The degree of precision to which the position and extent of a source or ensemble can be identified. This attribute is typically associated with sources or ensembles, rather than scenes. For a spatially imprecise sound the listener may be unable to identify the position (and extend) of the source or ensemble For a spatially precise sound, the listener can confidently state the position and extend of the source or ensemble. Scale: Imprecise – Precise A clap in a dry environment may be spatially precise. Listening to rain fall in a forest maybe spatially imprecise.
Clarity	The impression of how clearly different elements in a scene can be spatially distinguished from each other. Scale: Unclear-clear A singer and a piano performing a duet in a dry acoustic, may be perceived as clear. When listening to a choir from the rear of the church, the sound of the individual signers maybe unclear.

Presence	Does it sound as if the sound sources are present and not distant or absent? Scale: A little – A lot
Clean	It is easy to listen into the music, which is timbral clear and distinct. Instruments and vocals are reproduced accurately and distinctly. The opposite of clean: dull, muddy. Scale: A little – A lot
Detailed	A well-resolved sound rich in detail. Instruments, voices etc. can easily be separated. The music has many details, details that cannot be measured, details that give the music "soul". It may be small audible nuances: Breathing from a singer, fingers wandering across the guitar strings, the flaps from the clarinet, embouchure sound of the saxophone, the impact from the piano's hammers when they hit the strings. Scale: A little – A lot
Natural	Sounds reproduced with high fidelity. Acoustic instruments, voices and sounds, sounds like in reality. The sound is similar to the listener's expectation to the original sound without any timbral or spatial coloration or distortion, "Nothing added – nothing missing." The soundstage is clear in space and brings you close to the perceived original sound experience. Scale: A little – A lot
Shrill	Treble Distortion. Very sharp s-sounds, cymbals etc. Scale: A little – A lot
Rubbing	As the sound of something scraping on a (rough) surface. Scale: A little – A lot
Rough	A hoarse off-sound unintentionally accompanying the reproduced sound. Bass distortion. Scale: A little – A lot
Buzzing	A zzz-like, undesirable sound typically in the low and midrange frequencies. Scale: A little – A lot
Clipped	The harmonics are to pronounced and sharp. Scale: A little – A lot
Distorted	Additional and undesired sounds that add a sharpness to the reproduction. Scale: A little – A lot
Compressed	Limited dynamic range leading to a lack of natural peaks. Dynamic compression may be heard as a pumping effect. Scale: A little – A lot

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