EMMA
european mobile media association

Sound Quality Judgebook
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written by
Costas Christopoulos &
Norbert Tyka
special Thanks to
Alex Pleines, Reinier Wolf

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.

4 Introduce yourself in a polite way to the competitor.

Follow the procedures and rules in chapter 9.6 as described in pages 43 & 44 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.

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 center of the sound system.

4.1.3 Channel Verification Track 3

Verify that L & R channels are correct and document it into the according checkbox.
In case L & R channels are reversed, notify the competitor and give him **5 minutes** to correct the problem.
In case that he is not able to do it, it will be his decision to continue the judgment or not.

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 using Track 2.
If the Competitor doesn't suggest a Volume, adjust the volume following these Steps:

4.1.5 Visibility restricted

Check for restricted view due to installations on dash / pillars / doors. The judge sits in the designated listening position and checks if anything of the Audio System's Installation is interfering with the view.
If the view/use is reduced from normal, deduct 4 Points for each component that is not **OK**.
For space limitations in the foot-room on Drivers and/or Passengers side, deduct 2 points. Maximum

deduction is **10 Points**. The point deduction is made in chapter 4.8 „Ergonomics“ in the scoresheet.

Track 2

Human Voice in the Centre counting from 1 to 10.
The voice level of the judge should be as loud as we talk in meetings.
Not like talking to your girlfriend.
The music on musical tracks should sound louder than background music.
It should be loud enough to be able to hear all the details of the music in full body.
Conversations should be **clearly heard**. They are a little louder than normal.
Write the volume level into the checkbox on the score sheet.

4.2 Imaging Characteristics

4.2.1 Imaging - Positions (0 to 25 points)

Tracks 3 to 7

These 5 tracks are to evaluate the dimension of the sound stage, the focus and the correct position of every instrument.
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 a sound stage are relatively easy to score.
Most problems are coming when trying to score the **Center**, **Left center** and **Right center** positions of each instrument.
We use a technique called “panning”. With “panning”, we get 3 sounds of an instrument to score always the position in the middle.
The 2 side positions will always get 1 point, except if they appear in more than 1 place.

A. To detect the correct position of the **Center** we need to know where Left and Right are**.**
The **Center** position should be exactly in the middle of L & R.

B. To detect the correct **Left center** position, we need to know where Left and Center are.
The **Left center** should be exactly in the middle of L & C.

C. To detect the correct **Right center** position, we need to know where Right and Center are.
The **Right Center** should be exactly in the middle, of R & C.

The different instruments appear at each position in the following the same pattern:

Track 3

African Hand Drum 124Hz (main peak frequency)

A. Left – Right – Center - twice
B. Left – Center – Left Center - twice
C. Right – Center – Right Center - twice

Track 4

Acoustic Guitar 300Hz - 1, 5 kHz (main peak frequencies)

A. Left – Right – Center - twice
B. Left – Center – Left Center - twice
C. Right – Center – Right Center - twice

Track 5

Castanet 2,2kHz (main peak frequency)

A. Left – Right – Center - twice
B. Left – Center – Left Center - twice

C. Right – Center – Right Center - twice

Track 6

Mini Ship Bell 8kHz (main peak frequency)

A. Left – Right – Center - twice
B. Left – Center – Left Center - twice
C. Right – Center – Right Center - twice

Track 7

Asian Mini Bell 7kHz & 16kHz (main peak frequencies)

A. Left – Right – Center - twice
B. Left – Center – Left Center - twice
C. Right – Center – Right Center - twice

How to score?

The five instruments on tracks 3 to 7 should be heard on their positions.
The height is **NOT** scored here.
When an instrument can be heard in multiple places score 0 points for that instrument.

Score 1 point for each sound that is at the center of each pattern.

Sound is exactly at the center	**1 point**
Sound is a bit out of center	**0 points**
Sound is way out or in more than 1 place	**0 points**

A

You score L, R and C
Try to detect if the "orange" is in the middle and score 1 or 0.
The "blue" will always get 1 point, except in cases that it exist in more than 1 place.

B

You score only LC
The "orange" will also score 0, if only one "blue" is out of place.

C

You score only RC
The "orange" will also score 0, if only one "blue" is out of place.

4.2.2 Imaging - Focus, Correct size of instruments (0 - 25 points) Tracks 3 to 7

Focus means correct size of each instrument.
When an instrument can be heard in multiple places **score 0 points** for that instrument
Each different sound in each position should be distinct with the correct focus-size.

Relative size

African Hand Drum	**Displays the biggest size and presence**
Acoustic Guitar	**Displays smaller size and presence than the African Hand Drum**
Castanet	**Displays smaller size and presence than the Acoustic Guitar**
Mini Ship Bell	**Displays a slightly smaller size and presence than the Castanet**
Asian Mini Bell	**Displays the smallest size and presence**

How to score?

Compare focus / size of instruments at each position and not from position to position.
1 point for a perfect focus / size / presence, for each different sound at each position.
Everything else scores 0.

Example of scoring in Imaging:

African Hand Drum	**1 point = correct size**
African Hand Drum	**0 point = smaller than Acoustic Guitar**
Acoustic Guitar	**1 point = correct size**
Acoustic Guitar	**0 point = slightly unfocused**
Castanet	**1 point = correct size**
Castanet	**0 point = in 2 places**
Asian Mini Bell	**1 point = correct size**
Asian Mini Bell	**0 point = impossible to localize**

Please note that if the size is not fitting in, the position may be wrong too.
The focus is always according to the stage width and distance to soundstage.
A narrow sound stage will display a smaller focus which is correct.
A wide and distant soundstage would display a bigger focus.

4.3 Sound Stage and Imaging Characteristics Track 8

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 8

Use this track is to evaluate the **stage Distance**.
All moving instruments are on a straight line.
Bass is constantly in the middle.
Wood Block: moves from Left to Right starting at 1".
Cow Bell: moves from Right to Left starting at 22"
African Hand Drum: moves from Left to Right starting at 22".
Electric Guitar: is on the Right and at 40" moves from the Right to Left.

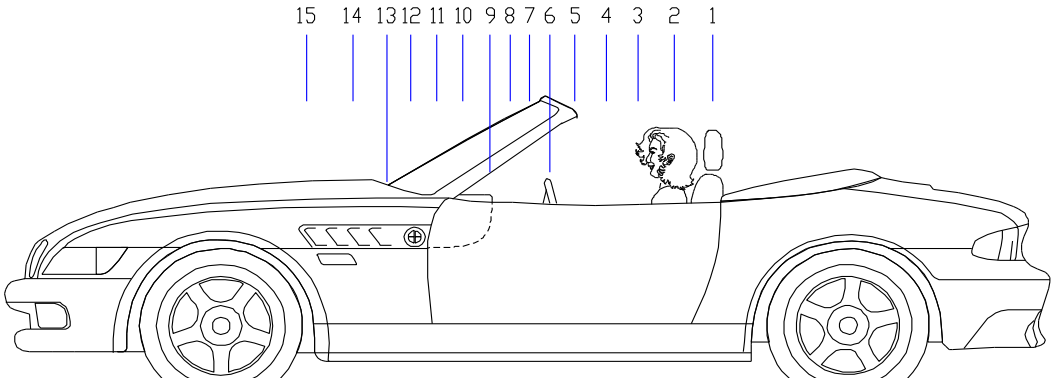
Dirty Guitar solo: moves slowly from Center to the Right.
A 12-string Guitar on the Left Center and a Double Tambourine on Right Center are giving depth to the frequency picture.

The sound of these instruments should not change while moving.
Judge the distance from your position to the moving instruments at the **CLOSEST POINT TO YOU.**

Do NOT judge the stable instruments.

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	Impossible to define.

Avoid to score 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 8

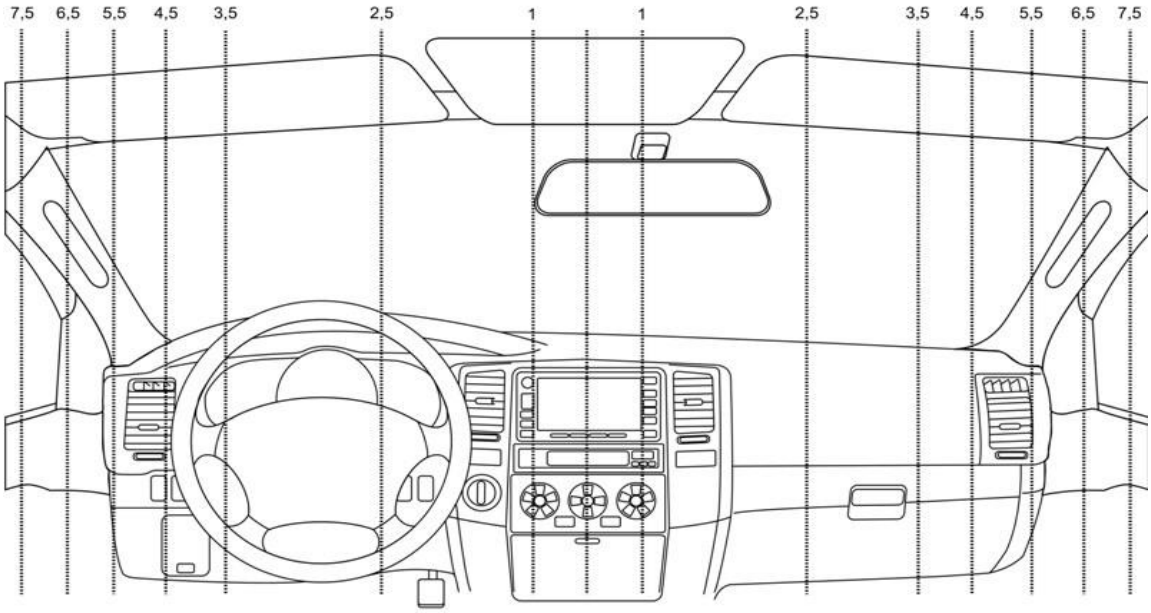
Use this track is to evaluate the **stage width**.
All moving instruments are on a straight line.

Bass is constantly in the middle.

Wood Block: moves from Left to Right starting at 1”.
Cow Bell: moves from Right to Left starting at 22”
African Hand Drum: moves from Left to Right starting at 22”.
Electric Guitar: is on the Right and at 40” moves from the Right to Left.
Dirty Guitar solo: moves slowly from Center to the Right.
A 12-string Guitar on the Left Center and a Double Tambourine on Right Center are giving depth to the frequency picture.

The sound of these instruments should not change while moving.
Judge the distance from center to **the widest left and right** for all moving instruments.
Do NOT judge the stable instruments.
For scoring follow the vertical lines on the diagram.
Add left and right points.

Never score 0 and avoid to score 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 8

Use this track is to evaluate the **stage height**.
In the recording all moving instruments are on a straight line.

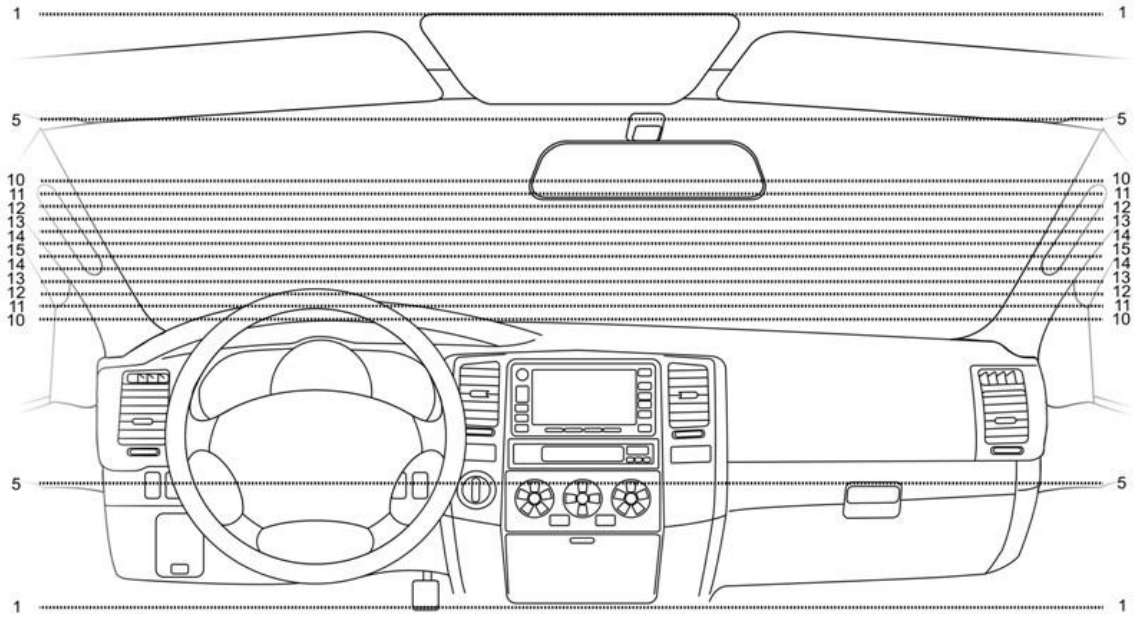
Bass is constantly in the middle.
Wood Block: moves from Left to Right starting at 1”.
Cow Bell: moves from Right to Left starting at 22”
African Hand Drum: moves from Left to Right starting at 22”.
Electric Guitar: is on the Right and at 40” moves from the Right to Left.
Dirty Guitar solo: moves slowly from Center to the Right.

A 12-string Guitar on the Left Center and a Double Tambourine on Right Center are giving depth to the frequency picture.

The sound of these instruments should not change while moving.
Do NOT judge the stability of any instrument.
Everything here is about the **height** of all moving instruments.
For scoring follow the horizontal lines on the diagram.
Judge the **LOWEST** position of the moving instruments only.
How to judge: Close your eyes and imaging the height of the instruments on the horizon.

How to score:

Well over the roof	1 to 5 points
Just over the roof-out	6 points
Clearly overhead to roof	9- 6 points
Just over the head	10 points
Eyes to Head Top	14-11 points
Eye level	15 Points
Chin to eyes	11-14 points
Chin to shoulders	10-8 Points
Shoulders to breast	7-5 Points
Below breast	5-1 Points



4.3.4 Sound Stage - Ambience & Depth TRACK 10

Ambience (0- 5 points)

This is the sense of space around the music created by room reverberations, in which the recording took place or created by the engineers.
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 walls and the ceiling.

How to score the Ambience?

1 point	No Room	- Flat stage
2 points	Just a little bit of Room	- Definitely smaller than the size of the car
3 points	Some Room	- About the size of the car
4 points	Good Room size	- A little bigger than the size of the car
5 points	Extraordinary Room size	- A lot bigger than the size of the car

Depth (0 – 5 points)

Depth is the distance between the distance to stage and the furthest point of sound towards the front of the car.

How to score the Depth?

1 point	No Depth - Flat stage	All instruments sound in 1 vertical level
2 points	Just a little bit of Depth	Some instruments sound barely behind the front ones, but too close to them
3 points	Some depth	Some instruments sound definitely behind the front ones
4 points	Good Depth	You are able to hear 3 lines of instruments in depth
5 points	Extraordinary Depth	You are able to hear 3 lines of instruments in depth with space between them

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 as in **Medium**, but 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 to 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 fast a sound comes into stage.
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 have a continuation of sound (decay - ambience) after they finish.
The slow sounds have big decay while the fast ones have small decay.
Normally low frequencies have bigger decay than High ones.

SUGGESTION FOR THE SOUND JUDGES

4.4.4 Judge Tonal Accuracy by using tracks 9, 10, 11 & 12.

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 in front

Track 9 Return

Perfect for checking MID BASS, MIDRANGE, & HIGH FREQUENCES

This is a live recording of a string quartet. A very good recording with very good separation.
We have a Violin on the Left, a Cello on the Right, and 2 Violins on the sides of Center.
The low frequencies are coming from the Right (Cello).
All other frequencies are coming from Left to Center mainly, and a few from Right Center.
The Cello on the right and the Violin on the Left are more present, followed by the violin on Left Center. The Violin on Right Center is less present.

The sound of all 4 Instruments comes in full body and do not sound empty at all.
The sound is nice and natural, covering from deep Mid-Bass Frequencies to Medium and High Frequencies. There is not any annoyance at all.
The **Violin**s are sounding crystal clear and warm without any annoyance in full body.
Cello is covering relatively lower tones and sounds a lot bigger than violins.
It stands on the right but the size of its sound extends a bit to Right Center.
You can sense the size of the instruments & some small movements of the players.

The sound of up & down movements of the **bows**, especially on the Violin and Cello, differs.

Track 10 Nam Herbert sei Bolandi

Live recording of a Jazz Trio. The main sound comes from the direct microphones.
Piano: Steinway B. Recorded with 2x Neumann KM 84 and 2x Neumann TLM 170 microphones.
Double Bass is recorded with Neumann U 47.
Drums are recorded with 2x Beyer MC 740 for overheads, Km 84 for Hi-Hat, 2x Sennheiser MD 421 for Toms, AKG D12 for Bass Drum and Beyer M 88 for snare.
Room information is coming from a stereo pair of Sony C800 G.
The Double Bass is recorded behind walls.
Minor tweaks in mix down, mostly leveling the single instruments in the stereo picture
This track will also be used to evaluate the stage depth and ambience.

This is an exceptional recording with exceptional separation and sound.
It sounds as if the musicians are alive in front of you and playing only for you.
All instruments are in place, and sound alive and natural.
All frequencies are crystal clear. No frequency or instrument is interfering with another.
The rhythm is followed by all instruments in a perfect way.
Everything you hear is not too much or too less. Everything sounds exact.
Whatever the level you are listening to, you should get the feeling to turn up the volume.

Perfect for checking SUB BASS, MID BASS, MIDRANGE, & HIGH FREQUENCY

The Double Bass: is in the Center, thick, clear and solid. You can hear that it is a big Instrument made of wood and the fingers are touching and moving the metal strings.

Drum set: is from Left to Right. Every hit on the drums is in place, producing the right sound.

Cymbals: in the beginning they start on the left side very soft but crystal clear and they come a little bit more forward after a while. They sound airy, soft, clear, solid and alive.

Piano: it extends to the whole stage, but most of the time, is more present near the Center. The deeper tones are on the left side. You will get the impression that the sound is produced by a big wooden instrument and it's metal strings, are hit by small wooden hammers wearing soft fabric cushions. String vibration on 22' in low frequency near the Left. The sound of this track is warm natural and solid

Track 11 I Found Success

An easy listening country/pop song. It should sound smooth and clear. All instruments were played separately and one after the other. Only little reverb and delay was used in the mix. Good for MID BASS, MID RANGE, & HIGH FREQUENCIES.

It sounds different than track 10, especially in the beginning, with fewer ambience, which makes it sound somehow more shallow.

Female voice: in front at the center, sounds somehow straight, and from 2' to 22' she sounds as if she is trying harder to make it. Her voice has small body and sounds somehow thin.
Electric Bass: is solid and clear in the Center

Drum set: nice thick and clear is from Left to Right

Saxophone: on Left center thin, but nice at 1:27

Electric guitar: is on Center moving a bit to Right center

String guitar: is on Left center

Piano: near Center

Track 12 Soul Express

This track should sound quick and dry. Every instrument should be clearly audible in its own spot in the mix.
All instruments were played separately and one after the other. Only little reverb was used in the mix.
This track will also be used to evaluate the overall spectral balance of the sound system.

Using this track, make sure that you can hear everything (all instruments) clearly. Without interfering or covering one another. This is more common at the lower frequencies.
A not well tuned system will confuse instruments in certain frequencies.
You can sense a small emptiness mainly at the SUB BASS aria.
This track will give you a little noisy sense when the wind instruments are blowing at Higher tones.

Male Voice: in front of everything at the center

2nd Male voice chorus: at the Left

Electric bass: at the center

Saxophone: at Right center closer to Center

Electric guitar: at Right center closer to Right

4.4.4 Tonal accuracy (0 - 120 points) Tracks 9, 10, 11 & 12

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.
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 to go lower than I (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 12 Soul Express

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 to go 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

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=20p LP=18 to 20 p

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

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. Avoid scoring below 5, unless it is absolutely necessary.

4.7 Adjustments

Track 14: 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 judge:

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

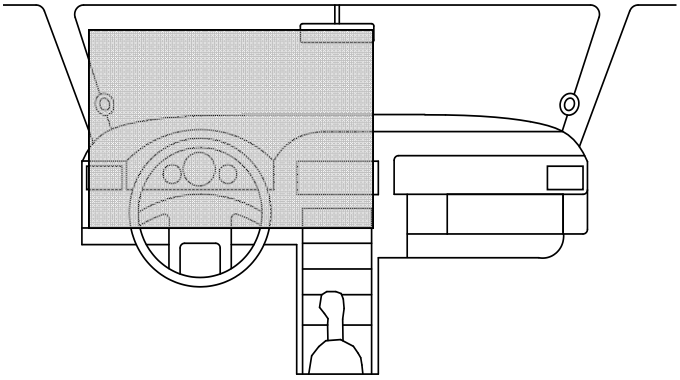
How to score:

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

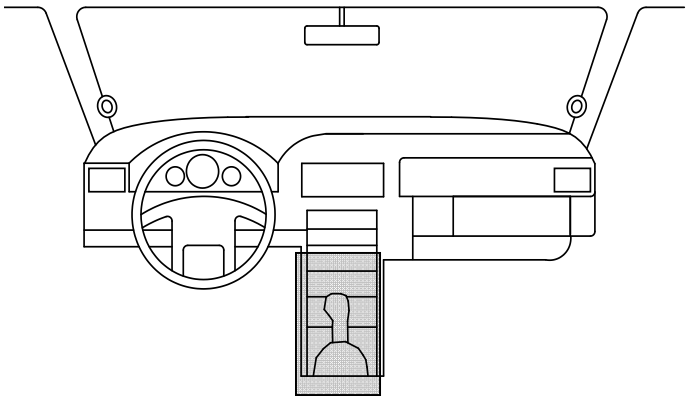
4.8 Ergonomics

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

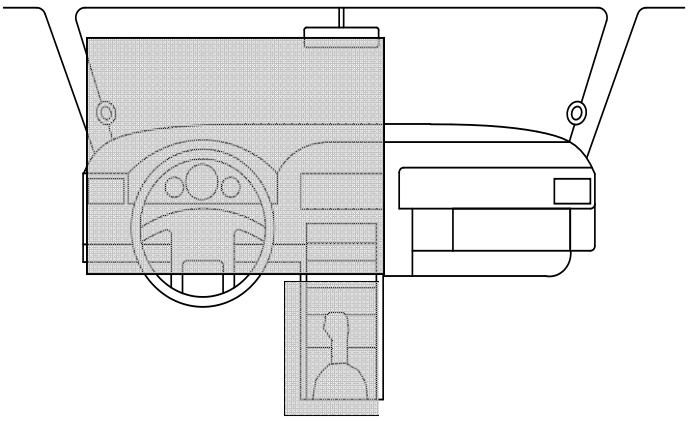
3 points when in this grey area



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).

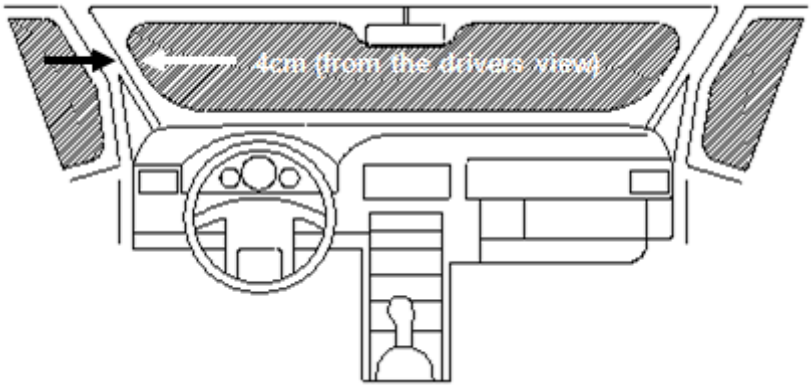
2 points - Easy to access and operate the system. (Extra remote) control is installed and properly mounted (should not move when adjusting). A loose handheld remote control is not accepted.

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

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

4.1.5 Visibility & Seating

If the view/use is restricted, the judges deduct 4 points for every not OK situation.
For restriction in use within the foot-room on Drivers- and/or Passengers side, 2 points will be deducted. Maximum deduction is 10 points



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 deduction that causes.
Never use brand names or installer's names while explaining.

But you can recommend 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:

Recording Situation Track 9

Band of Track 10

Drum Recording Track 10

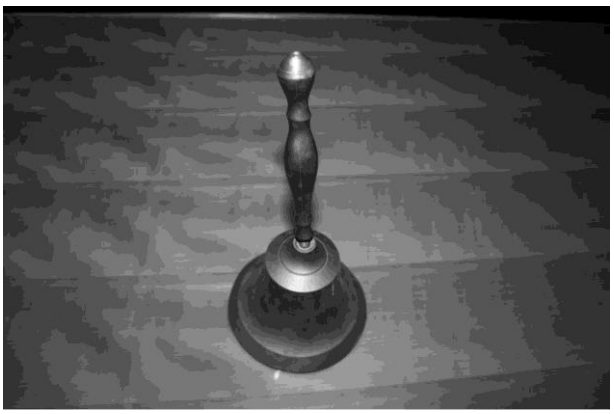
Double-Bass Recording Track 10

Piano Recording Track 10

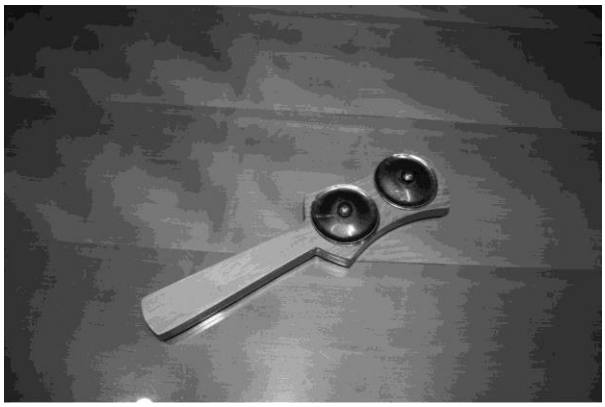
Some used Percussion Instruments

Bell

Castanet



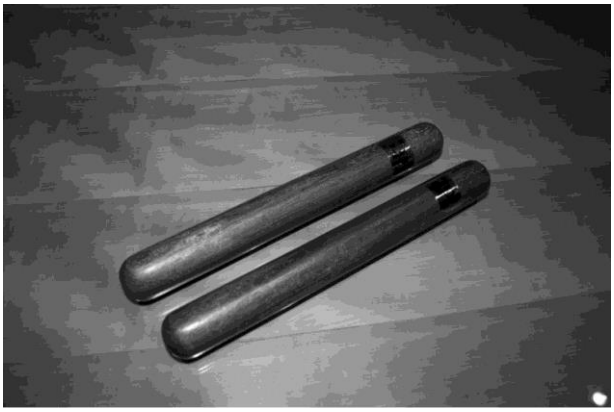
Mini Ship Bell



Asian Mini Bell

African Hand Drum

Mini Bells



Woodsticks

Please Note:

This judge book might be updated according to the needs of the EMMA judging procedure. Always the last version available online under www.emmanet.info/rules is the valid basement for any SQ judging.

Neumann U 67

Neumann U 67 Stereo Recording

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