The first car audio competition association was form in 1987 in America, a set of rules was designed, planned by a group of professionals and it will be uses as a standard for car audio competition internationally. Few years back, Europe also follows the American footstep by forming their own competition's rules. Competitors often will choose these fair and unbiased competition associations to compete. With the guidance from the fair and professional judges, many competitors; either installers or car audio enthusiasts will gain lots of experiences and knowledge from these competitions. Audio maker will gain business, installer gain knowledge in tuning and installations, car audio enthusiasts will gain the correct information from these competitions. Besides that, audio maker will also improve their products to meet the standards.

With the technologies improving, new inventions are being developed. Like those old schools complicated systems, a combination of complicated equipments to achieve the competition standards. It is due to during those times, the head unit doesn't equip with processors, EQ, crossovers and time delays functionalities. Just because needed to fulfill the competition requirements, often most of the people feels that competitions is just another luxury big boy toys.

Mobile Audio Challenge Entertainment (MACE) is Asian (MALAYSIA.THAILAND) latest car audio competition. We seriously considering the worries of car audio enthusiasts, been extracting experiences from various competitions. Changes of audio systems architecture, functionality of the head unit and different ways of installations to achieve the competition requirement, we come out with a rule that is well accepted by both professionals and audio enthusiasts.

MACE main objective are car audio technical and modification (including audio modification). Based on the world leading audio electronics, MACE was from by a group of professional technical audio judges. These judges are from audio enthusiasts, world known audio supplier, car audio technician and audio professional. MACE will utilize the world leading competition resources, research, competition held by international car audio association, car electronics, car modification technical forums to help on the growth and technical support for the car accessories, car electronics supplier.

The rule for MACE is specifically design according to the needs and the considerations for end users. MACE follows the international installation standards and competition design, design a few categories targeted mainly to end users. This is because most of the end users are very considering about the installation and sound quality. Often wanted to retain as original as possible after installation of audio equipment and do not feel want to spend extra money in fancy decoration and sophisticated installations. MACE also let the end user have a chance to compete hence exposing them with the correct information of car audio knowledge.

In order to be fair and unbiased competition association, MACE judges are being well trained and tests. They are professional judges that will provide fairness to the competitors and also will explain the judged result to the competitors (that's including system design rectification and on sport system tuning etc).

Technical problems, fair and unbiased competitions, how to upgrade technical knowledge,

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MACE Introduction

Objective

MACE is everything about car audio competition association; MACE is the association helps to upgrade the technical capabilities of the installer and also encouraging, support and award end users to participate in it. Competitors shall completely understand, follow and respect the rules and regulation of SQC (Sound Quality Challenge), MACE emphasize on total unbiased fairness through out the competition and with one mission to bring a valuable experience and technical knowledge to the competitors.

Mission

The rules and regulation sets the standard for the SQC, judging the competitor audio systems based on sound quality, installation, RTA (Real Time Analysis), SPLC. SQC judging criteria are different on each category. There will be sound quality, installation, RTA and SPL in Pro category, where else in Amateur category, it only will measure base on the SQ and RTA. Competitor will got the highest scores in sound quality will be awarded with The Best Sound Quality award, same applied to The Best Installation, The Best RTA and The Best SPL awards.

Rules and Regulations

1. New rules and revision of rules will be updated in the website.
2. MACE competition rules will be MACE referee to decide, then no-fat, outsiders can not do all together, it has nothing to do with the law.
3. Only certified MACE judges will be allowed to judge in the MACE competition.
4. Competitors had to fill up the entry form with the correct information. Any pull out from the competition are needs to inform MACE personnel. MACE can disqualify competitors that incomplete filling in the entry form.
5. Competitors or assistant must always be ready to explain and present the system when needed by the judges.
6. Installation and equipment of the competitor’s car cannot endanger the safety of the spectator and judges.
7. The car and audio system must be inspected by the judges.
8. The car and installation must pass the safety inspection. The safety inspections include integrity of the power cable connections, installation of the amplifier, fuses and etc.
9. If the car failed the first inspection, it shall go through the second inspection. If the judges still feels that it is not safe for compete, it shall be disqualified from the competition. Those which were being identified failed the safety inspection, shall be given 0 points.
10. Rough languages and attitude are not allowed for both judges and competitors. It can lead to disqualification; there is no refund on entry fee.
11. Any competitor if found commit cheating, after investigation, they shall be disqualified.
12. During the competition, there should be no one except the MACE personnel and

judges can see the score sheets. Competitors can see their RTA and SPL scores. If the competitors were caught looking at their score sheet before the competition end, 5 points will be deducted from their score.

13. Competitors must show the relevant document (Car registration card) either original or photo copy to prove the ownership of the vehicle.
14. Competitor's vehicle which registered to compete can be register under private or company. If the owner is unable to compete, they shall provide an authorised document and shall be inform the MACE personnel in advance.
15. Each competitor is only having one chance to get their car judged. There will be 2 round of judging. First is the sound quality, and then follow by installation.
16. If the sound system has more then one volume control, the competitor must inform the judges which volume control should be use. During the sound quality judging, only the judge can control the volume of the system. Only when during SPL test, the competitor can control their volume. It is best if there were an external source placed outside the vehicle during SPL test.
17. Whenever there are some problems occur during the judging, the judges shall leave the vehicle and inform the competitor. The competitor shall be granted 10 minutes to rectify the problems. If the problems still cannot be fixing, the judge can be either continue judge or the competitor will have to pull off from the competition. There is only one chance given for rectification.
18. The entire system must be using the on vehicle 12VDC system. Even during SPL and RTA judging, external 240VAC equipment are not allowed.
19. IF there is a tide in the event, the competitor with the highest sound quality score wins, if the still tide, then the highest installation wins. If both still tide, then both of them will share the win.
20. Only 2 persons are allowed to enter the competition lane, the competitor and his assistant. They shall obey the rules and regulation set by the judges and the traffic officer.
21. Extra equipment is not allowed after being inspected by the judges, unless replaced by the same model of equipment.
22. The head judge shall inform the judges and competitors whether the engine shall be started or off during the judging before the judging starts. The head judge will make decision based on the weather of the day and ventilation of the hall. If there were to be judge with the engine on, the air condition should be operate at the lowest position.

Bonus points for MACE members:

An extra 5 bonus points will be given to MACE member. But this point is only temporary. Members that join on the day of the competition will automatically enjoy the 5 bonus point. Members that register them self before the competition will get the bonus on the day while those who register after the competition will get the bonus the next competition.

SQC Categories (No Power Class)

Competitors shall be competing with his respective categories. There are 2 major categories; Amateur and Pro categories.

Amateur categories shall have 2 sub categories; Amateur Stock A and Amateur Modified B.

Pro categories shall have also 2 sub categories; Pro Modified M and Pro Custom C.

Amateur Stock A

Develop for entry level consumer competitors, who are beginning their involvement in car

audio sports while not involving in any retail, distribution in car audio industry. Most systems at this level are very basic, compared to experienced competitor’s systems. Amateurs pay regular prices for equipment and installation, or do the installation work themselves, or with assistance. The Amateur competitors own their system components, and do not borrow equipment for the contest. The installation will be inspected for safety. Judges will judge this class base on only sound quality; imagine positioning and installation is not judge. (Highest score is 115 points)

This class allows competitor to upgrade or modify the car interior for improving sound quality and component performance that can still be returned to stock at any time. Competitor are allowed to modify the original door speaker panel but limited only up to 2 ways component system , allowed to place one pair of tweeters (not more then 2 inches) in a non-factory location i.e. A -pillar. The vehicle must retain most functional components of the vehicle, i.e. centre console, glove box, kick panels, etc.

This class cannot have time alignment (time correction, time delay) equipment, including those who listen to the seat positioning function, not even within the head unit or external processor. However amplifier, equalizer and crossovers are allowed.

Amateur Modified B

Develop for entry level consumer competitors, who are beginning their involvement in car audio sports while not involving in any retail, distribution in car audio industry. Most systems at this level are very basic, compared to experienced competitor’s systems. Amateurs pay regular prices for equipment and installation, or do the installation work themselves, or with assistance. The Amateur competitors own their system components, and do not borrow equipment for the contest. The installation will be inspected for safety. Judges will judge this categories base on only sound quality and imaging positioning while installation is not judge. (Highest score is 170 points)

This class allows competitor to upgrade or modify the car interior for improving sound quality and component performance that can still be returned to stock at any time. Competitor are allowed to modify the original stock speaker panel but limited only up to 2 ways component system (3 ways only for Pro Custom C category), allowed to place one pair of tweeters (not more then 2 inches) in a non-factory location i.e. A -pillar. The vehicle must retain most functional components of the vehicle, i.e. centre console, glove box, kick panels, etc.

This class allowed alignment (time correction, time delay) equipment, even within the head unit or external processor. Amplifier, equalizer and crossovers are allowed.

Amateur 3 Ways

Develop for entry level consumer competitors, who are beginning their involvement in car audio sports while not involving in any retail, distribution in car audio industry. Most systems at this level are very basic, compared to experienced competitor’s systems. Amateurs pay regular prices for equipment and installation, or do the installation work themselves, or with assistance. The Amateur competitors own their system components, and do not borrow equipment for the contest. The installation will be inspected for safety. Judges will judge this categories base on only sound quality and imaging positioning while installation is not judge. (Highest score is 170 points)

This class allows competitor to upgrade or modify the car interior for improving sound quality and component performance that can still be returned to stock at any time. Competitor are allowed to modify the original stock speaker panel but must is a 3 ways system in the front stage, allowed to modify A -pillar. The vehicle must retain most functional components of the vehicle, i.e. centre console, glove box, kick panels, etc.

This class allowed alignment (time correction, time delay) equipment, even within the head

unit or external processor. Amplifier, equalizer and crossovers are allowed.

Pro Modified M

This class will include competitors who from the installers and the professionals or those amateurs who wanted to challenge the professionals who have chosen to make modifications to the vehicle's interior and/or electrical system, for the purpose of improving sound quality and component performance that can still be returned to stock at any time. Kick panels and modified speaker locations will be accepted as long as vehicle integrity is retained and area can be returned to stock integrity. Front component are only limited up to 2 ways component system (3 ways only for Pro Custom C category), allowed to place one pair of tweeters (not more then 2 inches) in a non-factory location i.e. A -pillar. The vehicle must retain most functional components of the vehicle, i.e. centre console, glove box, kick panels, etc. (Highest SQ score is 190 points. Highest installation score is 70 points)

This class allowed alignment (time correction, time delay) equipment, even within the head unit or external processor. Amplifier, equalizer and crossovers are allowed.

Pro Custom C

This class will include competitors who from the installers and the professionals or those amateurs who wanted to challenge the professionals who have put forth the effort to enhance their installation and system performance with major modifications for the purpose of improving sound quality and component performance. 3 ways front component are allowed, allowed placing one pair of tweeters or any component in a non-factory location i.e. A -pillar. The vehicle most functional components of the vehicle, i.e. centre console, glove box, kick panels, etc can be modified. (Highest SQ score is 190 points. Highest installation score is 70 points)

This class allowed alignment (time correction, time delay) equipment, even within the head unit or external processor. Amplifier, equalizer and crossovers are allowed.

MACE Sound Quality Score Sheet Guidelines

Installation

A. Safety Inspection

(0 or 3 points) Amateur and Pro

The verification judge will perform the safety inspection. The following may score 0 if:

1. Improper electrical overload protection, terminations, cabling, or routing of any part of the system that could cause harm to the judge, competitor, passengers, or spectators.
2. Improper mounting of any piece of the system that could cause harm to the judge, competitor, passengers, or spectators.
3. Improper installation that causes the failure or interrupt the safety system of the vehicle. I.e. air bags, front seats, rear mirror and other safety systems in the vehicle.

B. System Noise

(0 to 5 points) Amateur and Pro

1 point will be added when any of the below are not present:

1. Alternator/engine noise (while engine is running and source unit is on, at low levels. If alternator/engine noise is still present with the source unit completely off, point will be given)
2. High-beam lights introduce noise or hum (same criteria as above)
3. When system is turned on/off excess noise is introduced
4. When system is turned on/off there is an audible "thump" or "pop"
5. Interferences from electrical system

6. Excess switching noise when changing source from tuner, CD, etc.
7. Audible source noise can be heard during low listening level (approx. 80 dB)
8. No audible external mechanical noise, equipment cooling fans noise can be heard during low listening level (approx. 80 dB).

The power switch from the head unit should control the power for the whole system. Beside that, there should be a 20 second delay for the system to be turned on after the system is off.

Musical Realism

A. **Low Frequencies (20Hz – 60Hz)**

(Maximum points: Amateur 15 points, Pro 20 points)

1. This frequency range is comprised of the lowest notes of music. These will be immediately recognizable, realistically weighted, having realistic extension, articulate, and free of blurred or exaggerated decay.
2. This frequency range includes the lower harmonics of the bass, organ, bass sax, accordion, harp, kick drum, piano, etc.

B. Lower Midrange Frequencies (60Hz – 200Hz)

(Maximum points: Amateur 15 points, Pro 20 points)

1. These frequencies will be free of resonance; they will be realistically defined and without distortion. Attack and decay of instruments, such as the drum or guitar, are important in this range.
2. This frequency range includes: the French horn, bass, baritone, and tenor vocals, viola, tuba, trombone, bassoon, clarinet, saxophone, timpani, guitar, accordion, harp, piano, etc.

C. Midrange Frequencies (200Hz – 3kHz)

(Maximum points: Amateur 15 points, Pro 20 points)

1. These frequencies will be full, without the present of harshness, dullness, or distortion.
2. The frequency range includes: stringed instruments, woodwinds, brass instruments, drums, most vocals, guitar, piano, etc.

D. High Frequencies (3kHz – 20kHz)

(Maximum points: Amateur 15 points, Pro 20 points)

1. These frequencies will be neither too harsh nor too dull, with the presence of sibilance, resonance, or distortion.
2. This frequency range included the upper harmonics of woodwinds, chimes, xylophone, some stringed instruments, cymbal, high hat, some vocals, piano, etc.

Amateur			**Pro**		
15 pts	□	Perfect	20 pts	□	Perfect
11-14 pts	□	Excellence	16-19 pts	□	Excellence
7-10 pts	□	Very Good	12-15 pts	□	Very Good
3-6 pts	□	Good	8-11 pts	□	Good
1-2 pts	□	Need improvement	1-7 pts	□	Need improvement

E. Linearity

(Maximum points: Amateur and Pro 10 points)

The proportion and relationship of all musical frequencies are examined at soft

listening level (80-85 dB), medium or normal listening level (90-95 dB) and loud listening level (100-110 dB). Bass, midbass, midrange, and high frequencies should be relatively the same, from low to high volumes.

	Realism of Linearity Points Scoring
1-2 pts	Frequencies are not proportional as volume is increased or decreased
3-4 pts	Frequencies are somewhat proportional, but vary as volume is increased or decreased
5-6 pts	Frequencies are somewhat proportional, and vary slightly as volume is increased or decreased
7-8 pts	Frequencies are defined and proportional, and vary only slightly as volume is increased or decreased
9-10 pts	Frequencies are defined and proportional, and do not vary as volume is increased or decreased

F. Dynamics

(Maximum points: Amateur and Pro 10 points)

The reproduction of dynamics is the element of musical expression relating to the degree of loudness or softness of a sound. The dynamic range pertains to the useable range of extremes between loud and soft portions of the reproduction. These differences should be smooth, transient, and accurate. No distortion will occur at either loud or soft portions of the reproduction.

	Realism of Dynamics Points Scoring
1-2 pts	Soft portions lack detail or are not at all apparent; attack is weak; decay is extremely inaccurate; distortion occurs at low to moderate (80-95 dB) levels. Transience from soft to loud levels is extremely unstable.
3-4 pts	Soft portions lack detail; attack is weak; decay is inaccurate; distortion occurs at low to moderate (80-95 dB) levels. Transience from soft to loud levels is unstable.
5-6 pts	Soft portions are not detailed; attack is weak; distortion occurs at peaks of 90-105 dB. Transience from soft to loud levels has peak and/or dips.
7-8 pts	Soft portions are detailed; attack is accurate; little distortion at peak of 105 dB. Transience from soft to loud levels is accurate with very little perception of peaks and/or dips.
9-10 pts	Soft portions are perfectly accurate; attack is accurate, no distortion occurring at peaks of up to 110 dB. Transience from soft to loud levels is accurate and has no peaks and/or dips.

G. Ambience

(Maximum points: Amateur and Pro 5 points)

Ambience is part of the listening environment that is not a direct result of the musical source. The music should appear to originate in front of the listener, yet there should be a sense of space around the listener. The room size, treatment, and room noise all combine as part of the illusion of being in a audience or in the same room where and how the music was originally recorded. The ideal perception will have full detail with no distortion or confusion.

	Realism of Ambience Points Scoring
1 pts	Reproduction of room size is inaccurate and/or ambience is either completely lacking, or overly manipulated

2 pts	Room size is somewhat defined but inaccurately reproduced
3 pts	Room size is defined but inaccurately reproduced
4 pts	Room size is very defined but somewhat inaccurately reproduced
5 pts	Room size is extremely defined and reproduced in an extremely accurate manner

Staging Realism

H. Front Stage

(Maximum points: Amateur and Pro 10 points)

This encompasses the defined presence of front stage. Ideally, no distractions will be noticeable from behind the listener; stage placement will be accurate.

	Realism of Front Stage Points Scoring
1-2 pts	Stage is completely neutral or dramatically set to the rear of the listener
3-4 pts	Stage is neutral, but biased and biased to the rear of the listener
5-6 pts	Stage is in front of the listener, or confused, and placed in a very inaccurate manner
7-8 pts	Stage is in front of the listener, but somewhat inaccurately placed
9-10 pts	Stage is accurately placed in front of the listener

I. **Stage Height**

(Maximum points: Amateur and Pro 12 points)

The realism of height will be judged based on the spatial vehicle area. Stage height should be correct in relation to the horizon, placed between the top of the dashboard and rear view mirror, and not too high or too low.

	Realism of Stage Height Points Scoring
1-2 pts	Is well below dash top level, unstable and undefined to the far limits of the stage
3-4 pts	Is well below dash top level, somewhat stable, and defined to the far limits of the stage
5-6 pts	Is above or below horizon level, unstable, and undefined to far limits of the stage
7-8 pts	Is above or below horizon level, somewhat stable and defined to the far limits of the stage
9-10 pts	Is close to horizon level, stable and defined to the far limits of the stage
11-12 pts	Is at the horizon level, extremely stable, and defined to the far limits of the stage

J. Stage Width

(Maximum points: Amateur B and Pro 15 points)

The realism of depth will be judged in relation to the spatial area of the vehicle. Ideally, it will reach beyond the limits of the vehicle, from A-pillar to A-pillar or beyond, and not be hindered by the vehicle area in relation to the A-pillars to side glass.

	Realism of Stage Width Points Scoring
1-2 pts	Its has no sense of width (like mono)
3-6 pts	Its has a bit sense of width but very narrow
7-10 pts	Its has sense of width but falls within inside A- pillar to A-pillar
11-14 pts	Its has good sense of with and it is at the edge/within A-pillar to A-pillar
15 pts	Its has excellence width and it is beyond the limits of A-pillar to A-pillar

K. Stage Depth

(Maximum points: Amateur B and Pro 10 points)

The realism of depth will be judged to the spatial area of the vehicle. Ideally, it will reach beyond the limits of the vehicle, beyond the glass or apparent constraints of the vehicle, and not be hindered by the vehicle area in front of the listener.

	Realism of Stage Depth Points Scoring
1-2 pts	Its has no sense of depth
3-6 pts	Its has some sense of depth but is undefined and unstable
7-10 pts	Its has good sense of depth, define and stable

L. Stage Placement – Left, Right and Center

(Maximum points: Amateur B and Pro 10 points)

The stage placement will be judged based on the horizontal plane on which it sits, equidistant from the physical boundaries of the vehicle (A-pillar, side glass, etc). It will not be too far left or right in relation of the original recording. It will be correctly sized in relation to the original recording. Movement will be produced accurately.

	Realism of Stage Placement Points Scoring
1-5 pts	Placement cannot be determined and is completely undefined and unstable
6-9 pts	Placement is somewhat accurate and slightly unstable, and movement is somewhat accurate. Definition is lacking and size is not accurate
10 pts	Placement is accurate and stable, and movement is highly accurate. Definition is apparent, stable and accurate

MACE test CD TAGMCLAREN reference

Left/Right Channel Verification
Track: 7. 10
Sub Bass
Track: 1. 2. 5. 6. 8. 10. 11
Mid bass
Track: 6. 9. 10. 12
Mid range
Track: 2. 3. 4. 5. 10. 11
HIGH
Track: 1. 2. 5. 7. 9. 10
Linearity
Track: 7. 9
Dynamics

Track: 5. 6. 9. 12. 13

Ambiance

Track: 1. 2. 12

Front Stage

Track: 2. 7. 8. 9

Stage Height

Track: 2. 5. 9

Stage Width

Track: 2. 6. 7. 8. 9

Stage Depth

Track: 5. 7. 9. 11. 12

Center Image

Track: 3. 4. 8

Left Image

Track: 6. 7. 8

Right Image

Track: 6. 7. 8. 9