

## **MACE Installation Rules**

The *MACE* installation judging criteria has been formulated to promote system durability and longevity. The vehicle is a harsh environment for audio equipment; heat, vibration, chemical compounds and other factors are constantly at work undermining the efforts of the most conscientious installer. Scoring must reflect a reasonable approach; if there are elements in a vehicle's installation that are poorly executed or possibly dangerous in nature, they must be recorded on the score sheet, as well as being pointed out to the contestant, orally, upon completion of the vehicle judging. In this section, the sound system is evaluated to determine if it has been installed safely with regard to electrical and chemical protection and overall vehicular safety.

### **Installation Safety**

#### **Proper Fuses**

(Maximum points: 0 or 3 points)

All electronics throughout the audio system installation must be individually fused (a fuse that is in line with each (one) piece of electronic gear) with appropriate value fuses. Chassis-mounted fuses for in-dash equipment. All fuses must be readily accessible within 30 seconds and be able to be replaced within the five minute breakdown period. A Judge may request that this be demonstrated and will not award point if it cannot be done. Custom-Motorized Installation Elements must be individually fused, unless two or more motors are used to operate the same drawer or rack, in which case a single fuse for multiple motors is acceptable. Multiple lighting elements may be fused by single fuse with no deductions. All system power wires connected to any positive battery post must be fused within 18 inches of wire length from battery power and prior to power cable's first pass through any sheet metal or other conductive material. If there is no fuse present or the fusing is located beyond 18 inches of wire length or after the power wire passes through sheet metal, the score is 0.

#### **Power Cabling**

(Maximum points: 0 or 3 points)

Proper sized wire gauge should be used for both positive and negative current requirements. If not, no points will be awarded. There is no deduction for wires bigger than the minimum size specified by the Power Cable Calculation Chart.

## Power Cable Calculation Chart

Amp	Up to 4 ft	4 – 7 ft	7 – 10 ft	10 – 13 ft	13 – 16 ft	16 – 19 ft	19 – 22 ft	22 – 28 ft
0 – 20	14	12	12	10	10	8	8	8
20 – 35	12	10	8	8	6	6	6	4
35 – 50	10	8	8	6	4	4	4	4
50 – 65	8	8	6	4	4	4	4	2
65 – 85	6	6	4	4	2	2	2	0
85 – 105	6	6	4	2	2	2	2	0
105 – 125	4	4	4	2	0	0	0	0
125 – 150	2	2	2	0	0	0	0	0

If the cable chosen are not fall into any of the categories shown in the table above, it means that the ampere of the system larger then the limit, hence the cable length cannot be longer then the length from the chart. Example: What is the length needed where you have a 1000 watts amplifier installed at the trunk of the vehicle? Taking count of the vehicle electrical battery which is 13V normally, if the output of the amplifier is 1000 watts at 50% efficiency, at 13V, the output is calculated as  $2000 / 13V$  will result of 153 A. The closes range that shown in the chart is 150 A. This means that with 0 gauge cable, length within 10 – 28 meters is allowed. The above calculation is suitable for cable resistance less than 0.5V. The length for the cable has taken the resistance of the cable into consideration. High efficiency of the amplifier (not less than 75%), the cable size can be smaller by one size. But the competitor had to proof to the judges with the manual or respective documents.

### All Cables Properly Protected

(Maximum points: 0 or 3 points)

A non-conductive grommet must protect all wires where they pass through any metal panel or against any metal edges. Additionally, a non-conductive protective sleeve (a wire's insulator is not considered as a

protective sleeve) must protect all wires that pass along, by or against any potential hazardous metal. This includes, but is not limited to; all power wires, speaker wires and/or security and convenience option wires. The grommet and sleeve must provide protection against elements common to the area in which it is installed. Examples: Under a vehicle the grommet/sleeve must be water tight and protect against common road debris (salt/sand/dirt/water/rocks etc). In an engine compartment the grommet/sleeve must be able to protect the wiring against common engine compartment conditions (such as spilled engine fluids, water, dirt, heat, etc).

### **All Cables Properly Terminated**

(Maximum points: 0 or 3 points)

All connections of wires at terminations and both positive and negative terminals must be protected from potential shorting and/or corrosion. All wire conductors (copper, etc.) must be insulated and not exposed at all. All Terminations and terminals must be accessible by the Judge; failure in this will result in a zero score being given.

The following examples satisfy this requirement:

Terminals:

- Terminals that is coated or plated
- A complete or partially sealed enclosure surrounding the terminal (battery venting or “vents” that allow gases to escape from the enclosure are acceptable).
- A non-conductive water proof grease covering the termination

Wire Termination:

- A heat shrinkable material that provides no means of fluid penetration
- A non-conductive water proof grease covering the exposed wire (example at the terminal connection end of a crimp connector)

*Note: Waterproof grease should be used to stop corrosion penetrating up the cable.*

### **System Installation Integrity**

#### **Head Unit (Source)**

(Maximum points: 1 to 10 points)

Maximum points are scored by those units that are secured in a fashion that has no detectable movement of the unit is possible. Judges will evaluate how well the source unit is physically mounted in the vehicle. (For a pullout radio, remove radio and check for firmness of basket. Excessive movement should have points deducted accordingly.) The entire dash panel assembly and/or surrounding trim must fit together precisely. Points will be deducted for any of the following:

Loose mounting brackets and gaps or improper fit of any major panels around the source unit mounting area. When multiple source units (as defined below) are present in one vehicle, the Judges will assign a score based on the least well-installed unit. For example, if an in-dash CD player is mounted perfectly, but the changer is loose in the trunk, a score of 1 (one) or more would be given.

### **Wiring**

(Maximum points: 1 to 10 points)

Any wires in the passenger compartment that are not part of a visual display should be hidden from view while sitting upright in any seat of the vehicle or standing upright outside of the vehicle. All system wiring should be routed neatly and secure (must be tighten with cable tie every 5 or 6 inches) . If some wires are not accessible, scoring will be based upon wiring that is visible and in the competitor's photo logs. Photos of cable runs through the vehicle must be available upon request. If photos are not available the judge will deduct points from the overall score.. The wire from the power amplifier need at least a foot away no casing is allowed.

### **Amplifier**

(Maximum points: 1 to 10 points)

Amplifier/s must be solidly mounted in areas that promote ease of access, proper cooling/ventilation, and ease of replacement or servicing. Thought given to amplifier mounting architecture, which promotes an obvious logic in wire routing, theft resistance and in promoting self-cooling, will score higher points. Amplifier/s mounted in areas which inhibit cooling, and/or, which are improperly secured to the vehicle may create a safety hazard and will have points deducted.

### **Speakers**

(Maximum points: 1 to 10 points)

Speakers must be mounted using methods and locations that promote component longevity, system reliability, and proper acoustical performance. In this category, Judges will evaluate the installation integrity of all speakers. The entire speaker system must be well secured to the respective mounting surfaces (the mounting surface may be a door panel, rear deck, speaker enclosure, etc.), exhibit reinforced surfaces or well executed enclosures, use the correct mounting hardware, be located in safe and logical locations of the vehicle, and use the proper grille or protective measures appropriate for the particular installation. Points are to be awarded based upon all speakers readily accessible to the Judges; if some speakers cannot be accessed, photographs of those speakers must be presented. The overall

score will reflect the installation integrity of the speakers that are accessible and the photos presented.

### **Other Devices**

(Maximum points: 1 to 6 points)

Maximum points are scored by those devices that are secured in a fashion that promotes component longevity, system reliability, and ease of replacement or servicing. In this category, Judges will evaluate the installation integrity of any audio system component not covered by a previous category. This includes pre-amps, equalizers, electronic and/or passive crossovers, DSP processors, center channel devices; surround sound processors, noise gates, bass reconstruction processors, line drivers and any other device through which the audio signal will pass once it leaves the source unit until it reaches the speaker. When multiple devices (as defined above) are present in one vehicle, the Judges will assign a score based on the least well-installed unit. If there is no equipment in the vehicle that would be considered as Other Devices, a score of 3 points will be given

### **System Presentation**

(Maximum points: 1 to 12 points)

Vehicle should be cleaned and polished. Cleanliness of the entire vehicle (including interior, exterior, trunk, and engine compartment) and the attention to vehicle re-assembly will be evaluated. Damage to interior trim panels will be taken into consideration. The Judge/s will check all compartments - engine, trunk, and passenger - for trash, dirt, fingerprints, etc; which may affect the overall presentation of the vehicle. The competitor will be 5 minutes to explain and point out any special elements of the vehicle's mobile electronics installation - such as hidden components, installation techniques, special efforts in system enhancement, operation of the system, precautions, etc.—that may affect the judging. The presentation may include, but shall not be limited to, photo logs, videotape, schematic drawings, or any other form of documentation.

### **Create Aesthetic rules**

#### **Cabling □ 1 to 5 points □**

Judges will find additional wiring system of the modifications, including a comprehensive system of security and display systems assembly and wire cabling. If there are no ways to improve the audio systems of the wiring associated with the installation of wires do not distinguish, all wires will be installed that it is associated with the sound system. If the installation of some wires were not receiving, scoring will be based on the wiring is installed can see.

### **Head Unit (Source) [1 to 3 points]**

In the installation of audio equipment, to highlight its attractive appearance of the target, and the barrier surrounding its board should not be competitive. Panels installed audio equipment, components and hardware color and texture should be consistent with the other branches. This can be increased appearance of the theme of consistency, audio equipment and the light source to the same color of the car dashboard, audio equipment and the physical appearance should be installed in the dashboard and other equipment consistency (not too awkward, and should correct the load its opening)

### **Amplifier (1 to 15 points)**

Amplification of the fixated to the installation and installation revealed the appearance of the theme, and enhance the appearance of accessories can be used to expand the power of the prominent appearance characteristics. Amp to take into account the installation of replacement fuses and parts convenience. Modeling complex glass fiber, **woodworking**, appearance design and construction method of such.

### **Speakers (1 to 15 points)**

Install speakers in a manner that attention to the principle. Speaker of the net or in front of the speaker or special cloth covered network must be without prejudice to the acoustic transmission, and in the colors decorating the car with the installation of reconciling the speaker should be able to Baffle attention, and follow the installation of the appearance of the overall theme of modeling complex FRP mould or carpentry, or other design and construction method of such.

### **Other Devices (1 to 5 points)**

Install other equipment, and installation still with the appearance of the theme. Installing other equipment, to facilitate the replacement of fuse and retain users adjust the path button, and follow the installation of the appearance of the overall theme of modeling complex FRP mould or carpentry, or other design and construction method of such.

### **Creativity (1 to 7 points)**

Automation systems, in particular the display, full or partial internal reconstruction, high-performance charging system, and detailed wiring display, additional system control, system or modified door frame, innovative glass fiber, made of special fabric, the anti-conversion kick panels, cooling systems, modified line (timer, automatic execution system, lighting). Will spare tire into the system, the design personality of the dashboard or other design and construction method of such.