Renesas MCU Car Rally Competition Regulations Version 2.0
- For European MCU Car Rally Competitions

Renesas Electronics Europe GmbH
Industrial & Communications Business Unit
09/07/2015

The following regulations are formulated based on the minimum necessary items extracted from the Renesas MCU Car Rally Competition Regulations (RMCR2010). They include clarifications for European use and supersede any documents published prior to the date above.

1. Competition Regulations

1.1 Definition of Competition

An MCU Car Rally competition is a timed race where completely self-propelled machines ("machines") controlled by Renesas Electronics microcontrollers compete on a prescribed driving course ("course").

1.2 Rules Regarding Machines

(1) The machine must be a completely self-propelled machine controlled by a Renesas Electronics microcontroller.
(2) It must use up to eight AA alkaline batteries (LR6, 1.5V) or AA secondary (rechargeable) batteries (NiCad or NiMH, 1.2V) as a power source.
(3) The maximum external dimensions of the machine are 300 mm wide and 150 mm high to ensure they do not exceed the width of the track and can pass under bridges positioned on the track. Length of the car may be decided by the competitor.
(4) Machines of a construction that may damage or dirty the course are prohibited.
(5) The tyres of the machine must be made of a material that will not damage the course. Adhesive materials cannot be used.

1.3 Rules Regarding Courses

(1) The course must be 30 mm thick and 300 mm wide. (see figure 1)
(2) The surface of the course must be made of a lustreless white acrylic material. (see figure 1)
(3) The driving surface of the course must consist of the prescribed black or grey (Pantone 430c/RAL 7037) seal applied to the lustreless white acrylic material. (see figure 2)
(4) The course consists of straight lines, curves, turns, lane changes, and hills (maximum 10 degrees). (see figures 3 and 4)
(5) Two lateral white lines are set at a point between 500 mm and 1000 mm before a turn as a warning. (see figure 5)
The two lateral white lines are 20 mm wide each and separated by a 30 mm gap.
(6) The lane change section must be 600 mm long and 600 mm wide. (see figure 7)
Two lateral white lines are set at a point between 300 mm and 1000 mm before a lane change section as a warning. The two lateral white lines are 20 mm wide each and separated by a 30 mm gap. They are positioned on the same side of the track as the lane change, either on the left

or the right. The lane change section must have a 200 mm (entrance) and a 400 mm (exit) centre line.
(7) The gap between each piece of the course must be 1 mm or less.
(8) The area 50 mm to either side of the course must be kept clear. Any starting gate is an exception.

1.4 Inspection of Machines ("inspection")
(1) Machines shall be inspected before a competition according to 1.2 Rules Regarding Machines. Machines that do not pass this inspection shall be given a time of up to 30 minutes to make modifications.
(2) After a machine has been inspected, further modifications to the tyres, batteries (except direct replacement) or physical dimensions of the car are prohibited. Software may be further optimised on the basis that all cars must be ready to compete at the required time or that car may be disqualified.
(3) Immediately before a competition, a pre-race inspection consisting of an inspection of the adhesive level of the surface of the tyres and a battery inspection is performed.
(4) The condition of the machine must not be changed after it has passed the pre-race inspection.

1.5 Competition Method
(1) Only machines that have passed the inspection and pre-race inspection can run on the course.
(2) The preliminaries consist of timed races on a prescribed course with a prescribed number of laps, where the car completing the course in the shortest possible time shall be judged the winner. In the event a car leaves the track, or the car needs to be manually adjusted on the track, a ten second time penalty will be applied per occurrence. The final rounds shall be between the racers who had the fastest times in the preliminaries – the number of these having qualified will be advised by Renesas before the race. The final rounds will follow the same format as the preliminaries. The race format is subject to change and Renesas will clarify the exact flow of events in good time before the race.
(3) The racer must place the machine onto the track behind the start line. (see figures 6 and 8)
(4) The racer has a maximum of 90 seconds to place the machine.
(5) The race referee will advise when the car may proceed from the start line using a manual switch on the car.
(6) A timer starts when the car crosses the start line. The timer keeps track of the running time for the course.
(7) The race ends after the machine runs the prescribed number of laps and crosses the start line a final time.
(8) Machines must complete the race within a reasonable time, set at the discretion of the chief referee.
(9) The surface of the tyres may be cleaned and the batteries may be exchanged in the event that a car leaves the track within a reasonable time, set at the discretion of the chief referee.

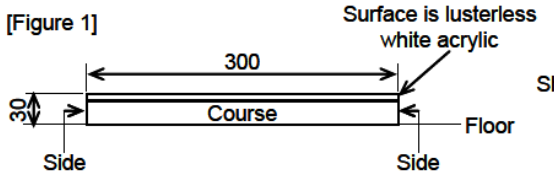
1.6 Competition Flow
(1) A referee team consisting of a chief referee and sub-referees manage the flow of the competition.
(2) Racers who have passed inspection and pre-race inspection must wait in the specified standby area.

(3) When instructed by a referee, "Place machine #xx at the starting position", a racer places the machine at the prescribed position. Refer to 1.5 Competition Method (3) for the position of the machine.
(4) After the machine has been positioned, the racer raises a hand to signal to the referee.
(5) The referee confirms that the racer's machine has been positioned, and directs the race to start.
(6) After the race has been completed, the referee informs the racer of the results.

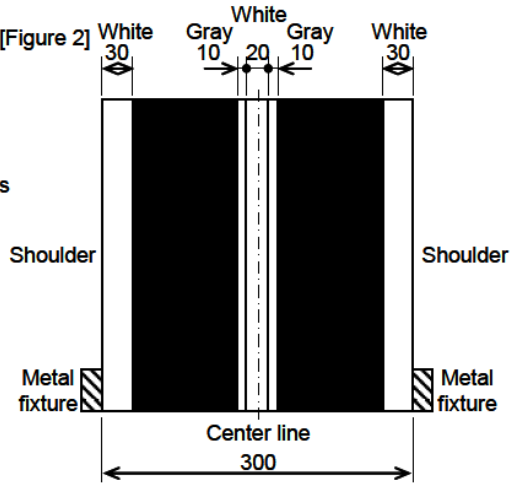
1.7 Possible Reasons for Disqualification
(1) Failure to meet 1.2 Rules Regarding Machines
(2) Failure to pass the inspection
(3) Modifying a machine after passing the inspection
(4) Failure to place a machine in the starting position within 90 seconds
(5) Starting prematurely
(6) Touching a machine without permission of the referee after the machine has started the course
(7) Obstruction or possibility of obstruction of another machine that is running at the same time
(8) Machine comes in contact with the floor outside a course, or the surface of the wall of an overhead crossing
(9) Failure to complete a course within a reasonable time, set at the discretion of the chief referee
(10) Damaging or dirtying a course
(11) Altering the driving mode prior to a retry
(12) Engaging in behaviour damaging the fairness of the competition.
(13) Any car judged by the referee to be making too much noise may be disqualified

Notes:
1.All lengths are expressed in millimeters unless otherwise indicated.
2.Unless otherwise indicated, margins are ±2mm.

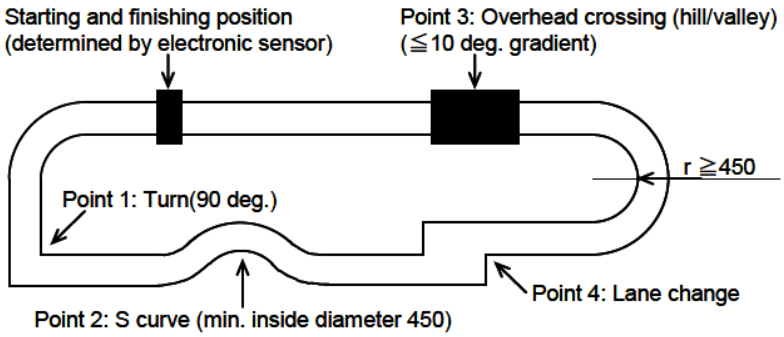
[Figure 1]



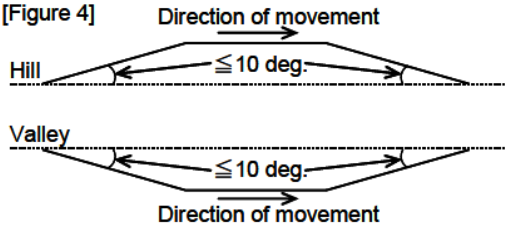
[Figure 2]



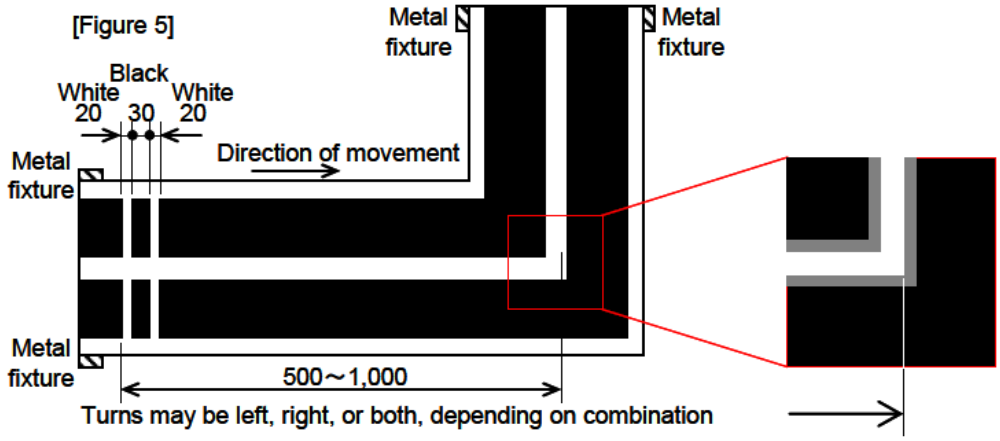
[Figure 3]



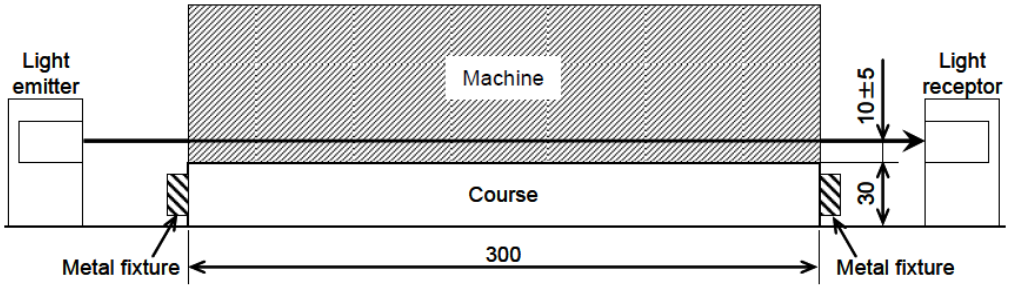
[Figure 4]



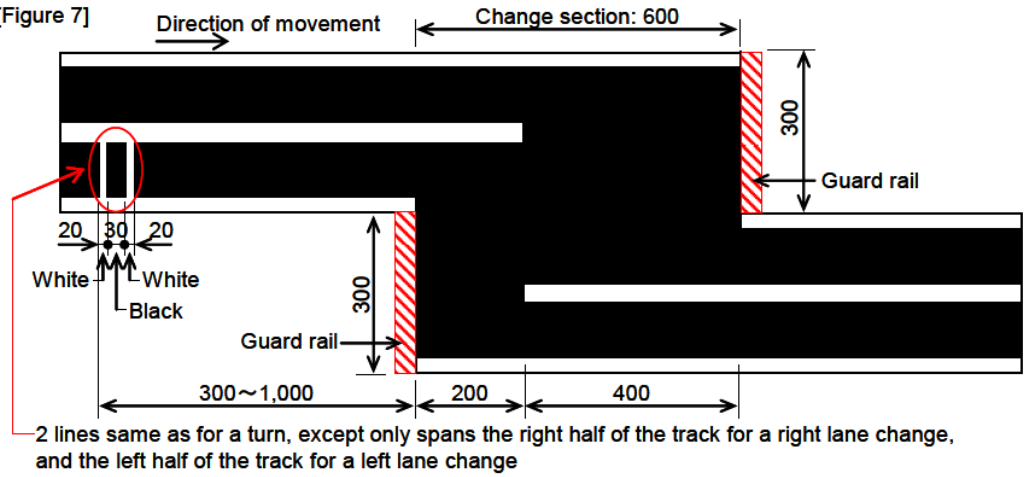
[Figure 5]



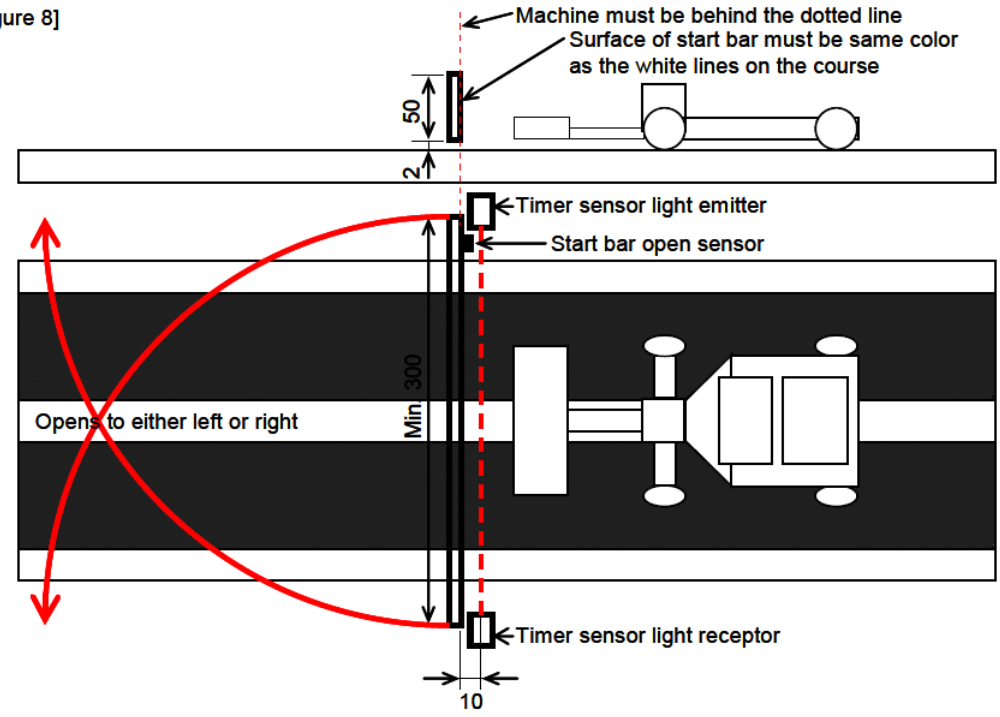
[Figure 6]



[Figure 7]



[Figure 8]

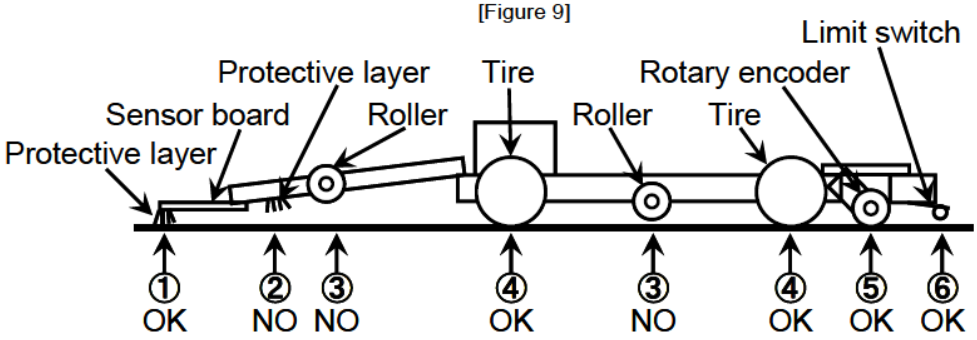


2. Supplementary Explanation

2.1 Contact Between Machine and Course

As shown in figure 9, the only parts of the machine that are permitted to come in contact with the surface of the course are the protective layer on the underside of the sensor board, the tyres, the rotary encoder, and the limit switch.

[Figure 9]



2.2 Procedure for Inspecting Tyres at Inspection and Pre-Race Inspection
50 mm x 50 mm squares of a prescribed inspection paper are placed on the table with the backside (rough side) face up. The tyres of the MCU car are placed on this paper for at least 3 seconds. After 3 seconds have elapsed, the MCU car is lifted. If all the inspection papers fall within 3 seconds, the tyres pass the inspection.

2.3 Ground Lead for Removing Static Electricity

A machine may include a ground lead for removing static electricity, but if the referee team determines that it may damage the course, the ground lead must be removed.

2.4 Lighting

Competitors should be aware that the event may take place in a partially or fully naturally lit location, meaning light conditions, lack of sunlight, the intrusion of sunlight and the movement of the sun should be accounted for before the race. Competitors should also be aware that flash photography may take place during a race. Renesas has no control over, and cannot be held responsible for, any interference from external light sources.

2.5 Track Condition During Race

The track will be cleaned regularly to remove dust, and be inspected regularly to ensure the surface is clear of obstruction and no movement or damage has occurred. Teams may also request additional cleaning or inspection before they race.

2.6 Advance Information

In the interests of fairness, Renesas will not provide exclusive or preferential information that may provide competitive advantage to any one team requesting it. Where additional information requested is deemed appropriate to be shared, and does not provide any competitive disadvantage to the team requesting it, it will be shared with all teams.

3. FAQ

3.1 Are there any restrictions on the microcontroller that can be used?
No. Any Renesas Electronics microcontroller may be used.

3.2 Can more than one microcontroller be used?
Yes.

3.3 Is it against the rules to use CPLD or FPGA?
It is permitted as long as a Renesas Electronics microcontroller used for the main control of the machine and CPLD or FPGA is used as an auxiliary.

3.4 Are there any rules regarding the motors that can be used?
There are no rules regarding the number, manufacturer, or type of motors that can be used.

3.5 Are there any restrictions on the number of tyres?
No, as long as the tyre design meets 1.2 Rules Regarding Machines (4) and (5).

3.6 Is it against the rules to input course information into the program beforehand?
It is permitted to input information such as the type and length of the course into the program beforehand based on the information provided to all competitors by Renesas.

3.7 Can a MCU car emit sound or light?
Yes, both are permitted, but the event is taking place so please be respectful and keep sound to a minimum. Any car judged by the referee to be making too much noise may be disqualified (rule 1.7.13).

3.8 Are there any rules regarding the weight and length of the machine?
No.

4. Disputes & Liability

In the case of any dispute, the judge’s decision is final and not open for negotiation. Renesas accepts no responsibility for any loss that may occur as a result of the judge's decision.