American Racing Club Competition Rules

RACE REVISION 2020.1 Dated 2/1/2020

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Racecar Classes (R1,R2,R3,R4)

**For ARC Wheel to Wheel or Chrono Time Trials*

Intent and BOP

The intent of these rules is to allow a wide variety of cars to race against each other in a competitive environment. This series should not be viewed as a "car builders series". We are not looking to promote a series where loopholes are found and exploited. Creating a "catch all" type rule set will inherently create loopholes due to the wide variety of differences between car makes and models, such as weight balance, suspension geometry, frontal area and aerodynamic drag. NCRC will create chassis specific penalties or allowances (commonly known as a balance of performance or "BOP") in order to balance the performance potential of a given engine/chassis to a reasonable extent. We do NOT encourage "creative interpretation" of our rules. If you find a loophole and exploit it, do not complain about work you have to do to your car when we close that loophole. In conclusion, we are trying to create an exciting race series where most competent club race mechanics can build a car in their garage and be competitive with readily available aftermarket parts, and some garage aerodynamics.

See separately published BOP Index for up to date engine/chassis specific BOP's.

Competitor data collection

All CARS MUST HAVE A MEANS OF LOGGING RPM, SPEED, AND GPS TRACK MAPPING. The easiest way for most cars to do this that do not already have a data logging dash, or ECU that can log this data, is the AIM Solo 2 DL. Plug and play OBDII connection will connect your ECU's RPM, or can be ordered with physical RPM input. NCRC will accept any AIM, Motec, or AEM dash or ECU logs. Logs will be pulled in impound, and be kept confidential for the purposes of BOP adjustment and rules enforcement. Please email NCRC race director for any questions.

At any time NCRC may install a remote data logger in your vehicle for the purposes of BOP data collection. If you have an aftermarket data acquisition system installed, competitors must make available the data logs from any session to series officials. These data logs will not be shared with any other competitor, but will be used to help determine acceleration and cornering capabilities.

On track conduct

A driver is expected to maintain control of his or her vehicle at all times, especially while attempting a pass. NCRC will adopt basic racing etiquette, in that it is the responsibility of both cars on track to not only make a clean pass, but also to give racing room to another competitor to complete a pass. However, NCRC will not tolerate dangerous pass attempts with the passing driver not being in control of his or her car. As a general example, if a pass on the brakes is attempted while no part of the passing car is alongside the car being passed, the excuse of "they should have seen me", or "I had the right to that line" will not be tolerated. Those excuses do not repair either car, and do not replace the car count for the series while those cars are being repaired. Although technically correct and likely deemed a "racing incident" in a pro series, the emphasis in NCRC will be on the passing car to make sure they do not make contact, even if the car being passed "closes the door".

Right to the line

If any part of a passing car is alongside the car being passed at the time of corner turn in, the car being passed must give racing room, defined as ONE car width. Any car not giving this racing room to their competitors will be subject to penalties at the discretion of the race director. Penalties will include, but not be limited to, disqualification from the race and loss of points from the event, disqualification from future events, loss of prize money or any contingency prizes, or in severe repeat cases, expulsion from the series.

1. Power to weight:

1.1) NCRC will exclusively use **DynoJet** 2wd chassis dynamometers to measure the power output of a racecar. AWD vehicles can use a **Mustang** dyno from an approved list of shops, with corrected power output to simulate DynoJet readings.

1.2) Base power to weight (read in pounds per wheel horsepower) will be as follows:
R0 = *Faster than 11.5:1, Unlimited.*
R1 = 11.5:1 (ex. NASA ST4)
R2 = 14:1 (ex. Spec E46, NASA ST5)
R3 = 17.5:1 (ex. Spec Miata, Spec E30)
R4 = N/A, R4 performance cap will be based on lap time

1.3) Base power modifiers:

1.3a) (**R1 Only)** Car with OE dual clutch or equivalent gearbox operated by paddles/buttons on the steering column/wheel or any other manner = +.5
See BOP index for additional modifiers

1.4) The **usable horsepower** of the racecar will be measured and be applied to the power to weight chart (some sanctioning bodies call this the average HP). This is done to attempt to balance engines of different displacement, cylinder numbers, induction method, and those engines that use drive by wire manipulation to create "flat" or artificial power curves. Gearing will also be used to determine the usable power area. Gearing is defined as the ratio of the gear selected inside the gearbox, multiplied by the final drive ratio.

1.4.1) The highest horsepower in a 2500 RPM range will be used to determine the **usable horsepower.** The highest of three dyno pulls will be printed out in 250 RPM increments. Starting at the RPM of peak horsepower, that number and the next 10 highest points (above or below the peak HP RPM) will be added together, divided by 11, to average the power in that range. The resulting number is the cars **usable horsepower**.

1.5) The **OE/Stock rpm limit** for the engine installed in the chassis must be used unless otherwise stated in the BOP appendix.

1.5.1) RPM limits may be mandated other than OE for specific engines, or engine and chassis combinations, in order to properly balance car acceleration. If a final drive ratio is used other than OE/Stock for the **ENGINE** installed, it must be the same or higher in number. If a lower final drive ratio is used, a rpm limit lower than OE may be applied.

1.5.2) **Mechanical over-rev and shifting RPM anomalies -** The engine RPM limit may be exceeded in the following scenarios;

a) The clutch is depressed, verified by data logs.
b) On a downshift, verified by deceleration in a data log.
c) If the accelerator pedal, and throttle plates in the case of drive by wire, are below 25%.

1.5.3) ECU's without a soft limiter, or cars with OE ECU's that "bounce" off the rev limit, will not be penalized for exceeding RPM limit.

2. Tires:

2.1) **R1** may use any DOT approved racing semi-slick tire excluding auto-x or soft compound semi slicks including but not limited to Hoosier A6/A7, BFG R1S, Hankook C90/91.
**Tire compound/type balancing WILL be applied once significant data can be gathered*
**A spec tire is also being strongly considered*

2.1.1) One set of new tires allowed per weekend event. A tire signing system will be used and applied to the set of tires on the car in impound **after the first timed session**. Tires used in any non timed or "warm-up" session are free, including the warm up session on the second day of a 2 day event.

2.1.2) Up to two tires can be changed per day, due to cording or flat spot verified by a tech inspection, with a loss of the qualifying time for that day, or loss of the following days qualifying time if changed after the first race of a weekend. The replacement tires must not be new (must be "scrubbed"). If scrubbed tires are not available, sticker tires may be used with the penalty of starting the race from the pit lane if changed after qualifying, or starting the next race from pit lane if changed after the first race of a multi day event.

2.1.3) Up to four tires can be changed due to damage only, including flat spot verified by a tech inspection, from any on track incident during the event. Normal cording of a tire does not apply. This is to stop competitors attempts to game the system by timing the use of their tires to time out during a race or qualify session, so that they can put on 4 new scrubs for the following race. If you need to change more than two tires per day due to cording only, you will start from the pit lane and not be scored during the race.
**The intent of our tire rules is to keep the results of the race weekends from being determined by the amount of sticker tires purchased for a given event. Rule (2.1.2) and (2.1.3) are intended to prevent gaming of the single tire per event spirit of the rule, but allow any racer to complete any race weekend regardless of an on or off track "event" that might damage that competitors tires. Special considerations may be made on a case by case basis.*
2.2) **R2-R4** may use any DOT approved 100 treadwear or higher tire.
*Tire compound/type balancing MAY be applied if needed

2.3) R1 allowed tire sizes are as follows with weight taken post any timed session with driver.

- 3000 lbs + = 275's
- 2750 - 2999 lbs = 255's
- 2500 - 2749 lbs = 235's
- Below 2500 lbs = 225's

2.4) R2-R3 allowed tire sizes are as follows:

- 2750 + = 255's
- 2500 - 2749 lbs = 235's
- Below 2500 = 225's

3. Chassis/Suspension:

3.1) Cars must be a normal production (500 models or more produced) 4 wheel vehicle originally produced for road use. Special manufacturer produced racecars utilizing a street car chassis, but have never been licensed for road use are NOT allowed.
"Tube frame" modifications are not allowed. Tube frame is defined as removal of structural components of the unibody, or removal of any OE part of the car that mounts suspension, engine, gearbox, or differential, and is replaced by any custom fabrication including metal round or square tubes.

3.1.1) Engine mounts are not considered part of the subframe and may be of any kind to facilitate an engine swap, but the OE subframe must not be altered.

3.2) Any plastic fender liners may be cut or modified to facilitate tire fitment.

3.3) Suspension mounting points shall not be moved by way of custom fabrication such as cutting and welding on subframe, car chassis, or knuckle/spindle.

3.3.1) "Bolt on" commercially available geometry correction kits are allowed as long as they do not violate rule (3.3).

3.3.2) Geometry correction kits on the knuckle or spindle side of a suspension arm are allowed as long as they do not violate rule (3.3). Exceptions to be published in BOP Appendix.

3.3.3) Any suspension mounting point may be moved by a maximum of 2" with a bolt on, commercially available piece.

3.4) Spring and shock replacement is free without violating rule (3.3).

3.5) Sway bars are free provided they do not violate rule (3.3).

3.6) Removal of OE glass on the rear and sides of the car is allowed and recommended. Clear plastic polycarbonate is inexpensive and easy to install, and increases the safety of the racecar. Replacement polycarbonate must be ⅛" thick.

3.7) Front window must OE glass.

4. Bodywork/Aerodynamics:

4.1) Splitters are free provided they don't extend more than 4" in front of the vertical point at which they attach, or 4" from the furthest forward point of the bumper, whichever is less, and does not extend rearward past the centerline of the front axle. The furthest forward bumper point will be measured using the plumb bob and string method.

4.1.1) Splitters may not extend beyond the widest point of the front tires.

4.2) Bolt on or fabricated canards or dive planes are free provided they do not extend beyond the vertical plane of the splitter, and are limited to two per side. Must be made of composite or aluminum, no dangerous steel objects allowed.
4.3) No underbody or “flat bottom” panels may be fabricated and installed, unless they are OE in type. OE panels must remain OE, no modifications allowed.
4.4) Rear diffusers are not allowed.
4.5) Rear wings/spoilers are free provided they are single element in type, do not extend more than 1” beyond the width of rear fenders, with a maximum of a 10” chord.
4.6) The centerline of the chord of the rear wing cannot extend beyond the vertical plane created by the most rearward part of the rear bumper.
4.7) Gurney flaps or wickers are free.
4.8) (**R1-R3)** All cars must run OE fenders and quarter panels, unmodified except as allowed below:

4.8.1) Fenders and quarter panels may be rolled or stretched for the purpose of tire fitment only.

4.9) **R1** Allowed fender modifications:

4.9.1) Bolt on plastic or composite flares may be added for the purpose of tire fitment only. The covered fender or quarter panel may be trimmed and clearanced. The intent is to allow certain older cars to fit the allowed tire size, not to allow an aggressive increase in track width.

4.9.2) If flares are added, the OE track width of the car cannot be increased by more than 2 inches by way of wheel spacers or wider offset wheels.

4.9.3) Front fender vents are free provided they do not extend past the horizontal plane created by the middle of the wheel/hub. The unmodified fender must remain above this point.

4.9.4) Rear fender vents can be created by trimming the plastic or composite rear bumper cover only, no cutting of metal unibody, and only allowed below the horizontal plane of the center of the rear wheel/hub.

4.9.5) Aerodynamic aids reinstalled into the open area created behind the rear wheel by way of rule (10) are free, provided they do not extend 4” horizontally beyond the furthest remaining OE bumper cover. They may not extend past the edge of the tire. Will be made of composite or .065in aluminium.

4.10) (**R1 Only)** Any body panel that bolts to the car may be replaced with a composite replica of the same size and dimension, for the purpose of weight reduction.

5. Engine/Drivetrain:

5.1) Engine modifications are unrestricted provided it is gasoline powered or E85 ONLY.
5.2) Performance is governed by power output only.
5.3) Forced induction is allowed.
5.4) Cooling modifications are unrestricted provided they do not violate any rule in section (4).

Hood louvers, which can be viewed as a cooling modification, AND an aerodynamic aid, are open provided they do not protrude more than 1" above the OE hood.
5.5) Gearbox must be OE in type, match that of the manufacturer of the engine installed, and be completely "bolt on", with no custom fabrication or special aftermarket pieces required for installation.

5.5.1) Gearbox ratios may not be altered with aftermarket components. OE mix and match ratios are allowed provided no aftermarket pieces are required. This will be verified by RPM vs. speed traces gathered in impound.

5.5.2) Dog ring gearsets are not allowed.

5.6) Clutch and flywheel are open provided flywheel is steel in type, and clutch is metallic or ceramic in type. No Carbon carbon clutches allowed.
5.7) Axles, driveshafts/propshafts are open.
5.8) For RWD, the rear differential case must be OE. Differential case covers, such as aftermarket versions with cooling fins are allowed.
5.9) Final drive ratios or free. If the final drive ratio is changed with a ratio of a lower number, the RPM limit of the car may be altered in the BOP index. Cars with lower than OE final drives not already found in the BOP index must submit via email to the race director for their BOP'ed RPM limit.
5.10) Limited slip differentials are open.

6. Brakes/Wheels:

6.1) Brakes rotors are free provided pad contact area is ferrous metal in type.
6.2) Calipers and pads are free.
6.3) Parking brakes may be removed.
6.4 Brake ducting is free.
6.5) Wheels are free provided they do not violate the track width rule.

7. Electronics and Electronic Aids:

7.1) ECU, engine, and chassis harnesses are open.
7.2 Aftermarket traction control is not allowed. If you are running an aftermarket ECU with traction control features, you may be asked to prove that they are disabled. In some cases you may be asked to run a "locked" engine map for the weekend with the features disabled.
7.3) OE ABS is allowed, as well as BMW E46 Mk60 standalone kits due to their affordable cost. All other aftermarket ABS controllers are not allowed.
7.4) Data loggers and number of sensors is unlimited.
7.5) One way telemetry to the pits via cellular is allowed.
7.6 **Map switching of any kind is not allowed**. At any time a competitor must be able to produce the method of which they control their ECU/tuning of the vehicles engine. Example, if

you run Motec, you must have your tuning laptop available with the installed software to edit your map. If you run an OE ECU with a flashing tool, that tool must be available, and you must be able to produce your map on a laptop. The intent is that a tech steward must be able to study your ECU and verify that your ECU does not have multiple fuel, timing, boost, or DBW (drive by wire throttle) maps loaded. Regardless of proof that a button does or does not exist to alter maps while on track, no table that affects the power output of the engine can have multiple options loaded.

7.6.1) Due to the increasingly complex yet affordable ECU and tuning options available today, and the ease of which map switching can be achieved, there will be zero tolerance for this type of cheating. *Competitors caught will be permanently expelled from NCRC Race and Chrono series.*

R4 Class Rules

Intent

R4 is a lap time based class intended for new racers to gain experience in a more relaxed environment, or for cars that aren't competitive in our lowest power to weight class (R3).

Lap Times for Specific Tracks

*Will be published in BOP Index

CHRONO
TIME TRIALS
AMERICAN RACING CLUB

Street Car Classing (C0,C1,C2,C3)

Chrono Series Only

Intent

It is the intent of this series to provide a place where daily driven vehicles can compete in a relaxed environment, but still time themselves against their peers in similar, but not identical performance potential vehicles. These classes will be broken up by OE published power to weight numbers as a starting point. Adjustments can and will be made to inaccurate OE published figures, or to balance performance potential. Competitors who modify their cars beyond these numbers and/or exceed the minimum lap time for their base class will be moved up a class.

Classes

CO = Chrono Open, ie. “super cars” or highly modified street cars
C1 = 7:1 AND fastest lap time Laguna 1:35, Sonoma 1:45, Thunderhill/Buttonwillow 13CW 1:55
C2 = 10:1 AND fastest lap time Laguna 1:41, Sonoma 1:52, Thunderhill/Buttonwillow 13CW 2:02
C3 = 13:1 AND fastest lap time Laguna 1:48, Sonoma 1:58, Thunderhill/Buttonwillow 13CW 2:08

1. Definition of a street car

1.1) A street car is a DMV registered vehicle and cannot violate the following:
1.1.1) Must have full interior from the rear of the driver’s seat forward.

1.1.2) May have any amount of aftermarket roll over protection, but must not violate rule(1.1.1)

1.2) May replace both the drivers and passengers seats with aftermarket racing seats for the purposes of safety and drivers comfort. If OE safety equipment is modified, including replacing the drivers and passenger seats, we highly recommend seeking professional installation or building to modern club racing standards ie. NASA/SCCA tech guidelines.

2. Tires

2.1) All C class cars must compete on a tire with a treadwear rating of 100 or above, or the OE tire as sold with the vehicle. If the vehicle comes standard with a faster tire, that will be taken into consideration when classing.

2.2) All C class cars must compete on a tire size no more than 10mm greater than OE.

2.2.1) Cars with tires more than +10mm from standard will be bumped to the next higher class

2.3) Any C class car competing on a DOT racing semi slick, or any tire below 100 treadwear, will automatically be placed in CO.

3. Suspension

3.1) Modifications to any suspension components is unlimited, understanding that increasing the cars performance past the lap time minimum for the class will result in the car being moved up in class.

4. Bodywork and Aerodynamics

4.1) Rear wings are allowed provided they bolt to the trunk or exterior of the body, and not protrude beyond the widest part of the car.

4.2) Aftermarket splitters are not allowed.

4.3) No other aerodynamic aids other than OE with the car are allowed.

4.4) Bodywork must be entirely OE exlcuding:

4.4.1) Replacement hoods of any material is allowed.

4.4.2) Replacement trunk of any material is allowed.

5. Engine/Drivetrain

5.1) C.A.R.B legal intake kits are allowed.

5.2) Exhaust replacement post catalytic converter are allowed.

5.3) Flashing of the OE ECU to increase horsepower, especially on forced induction vehicles, is not encouraged. The street car classing system is meant to class vehicles by OE power to weight numbers, and provide the competitor to measure their lap times on a somewhat level playing field. Remember that lapping under the class minimum lap time will result in a class bump.

5.3.1) If a competitor wishes to flash their ECU to increase power, we recommend emailing your power figured to the Chrono series leader for car reclassing if necessary.

6. Wheels/Brakes

6.1) Wheels are free provided the tires mounted do not violate tire width rule.
6.2) Brake upgrades are free.