New England Hillclimb Association (NEHA)
2014 Annual Awards Banquet and 2015 Season Rules Meeting

Classification

Submitted: Jamie Melhuish

Section: Part 2 – Unprepared and Street Prepared Cars (at end of Unprepared classification rule)

Proposal:

OEM flexible brake lines may be replaced with aftermarket or motorsport braided stainless steel lines.

Thoughts: Safety item

Submitted: Jamie Melhuish

Section: New rule

Proposal:

Electric Vehicles

Electric vehicles must use only electric power during racing. Motor(s) must be powered only by a charge storage device (batteries, capacitors, other charge accumulators), or by fuel cell. A hybrid electric vehicle (e.g., Toyota Prius) may be raced in electric-only mode.

Unprepared Electric (UEV) class is for unmodified electric vehicles built by a recognized manufacturer. Prepared Electric (PEV) class is for modified, converted, or custom electric vehicles, and must comply with the technical and safety rules for PEV.

Thoughts: Electric vehicles are now (again) being produced, including race cars.

Submitted: Paul Malko

Section: Street Prepared / Class Determination / 3rd paragraph

Proposal:

Replace “Note: Rotary displacement is doubled prior to applying factors.” with "Note: Side-intake-port Wankel rotary engine displacement is multiplied by 1.60 prior to applying factors."

Thoughts:

- I believe the displacement factors for Wankel rotary engines are a too large when compared to modern Otto-cycle engines. Otto-cycle engines take two revolutions to, theoretically, move a volume of air equal to their rated displacement. Wankel engines take three revolutions to displace all combustion chambers. This leaves the correct factor to calculate equivalent displacement as 3/2 or 1.50.
- This factor of 1.50 alone would probably give Wankels an unfair advantage because all of the available street-legal (Mazda) engines have 2 intake ports. I think there is a good argument to apply the existing NEHA 10% adjustment for one valve "more than 2 valves per cylinder"[1]. For Wankel engines with Mazda style side-inlet ports and peripheral-exhaust ports, the factor would be 1.50 + 10% or 1.60[2].
- I specified side-intake-port engines in the proposal wording above because the race-only peripheral-port engines have vastly longer duration and overlap, compared to the street-appropriate side-port engines. An adjustment factor of only 1.60 for peripheral-port Wankels would be too small.

Note 1: Some Mazda Wankels had 3 inlet ports, but I argue that adding another "valve-worth" of adjustment isn't warranted. The passage for the third port is small and it's flow rate is a fraction of the others because it's primary purpose is to expand the RPM range where the intake manifold resonates, not to increase flow.

Note 2: For example, a Mazda 13B would equate to 2158cc. I think there's a good argument that engines with a similar NEHA-equivalent displacement would provide similar performance at NEHA events, such as a modern 1700cc DOHC, 4-valve engine. The 13B would probably make more power, but less torque and over a narrower, and higher, RPM range.

General

Submitted: John Reed

Section: New

Proposal:

To add an opt-out to entry forms, RE: We may share our mailing list with companies who offer organizational support or awards contingent on use of their products. Opting not to share a participant's name for this purpose, or opting to not meet the requirements of such a program. shall make said participant ineligible for any individual awards for such a program.

Thoughts:

http://www.speedwaymotors.com/Info/RaceBanquetSupport/ *and* http://www.contingencyconnection.com/

Technical and Safety Requirements

Submitted: Emmanuel Cecchet

Section: 5. GENERAL / AA. KILL SWITCH / Section 1

Proposal:

"Switch to cut off / isolate electrical power throughout the car, obviously marked with standard lightning bolt symbol and off position is clearly marked."

Thoughts: Discussion about this topic is here: http://www.hillclimb.org/forum/viewtopic.php?f=22&t=1239

In a nutshell, I propose to replace battery with electrical. A cut-off switch only isolates the battery power but a kill switch also has to kill the engine (by cutting power to ignition/fuel pump/injection system/whatever works). We currently have a section called kill switch that actually uses the definition of a cut-off switch. According to the discussions on the forum, we really want a kill switch with the matching definition.

Submitted: Emmanuel Cecchet

Section: 5. GENERAL / G. HORNS

Proposal:

1. A horn (either air or electric) is required on all vehicles.
2. Air horns are mandatory in all cars equipped with a kill switch and must be installed within reach of the driver.

Thoughts: Discussion about this topic is here: http://www.hillclimb.org/forum/viewtopic.php?f=22&t=1239

A kill switch will make an electric horn non-functional as soon as it is triggered (either intentionally or not). Mandating an air horn in all cars that are required to have a kill switch will increase safety in case of a crash. We could also make the air horn mandatory for all cars as horns can quickly become inoperative in case of a frontal impact.

Submitted: Jamie Melhuish

Section: 4.E. "3. Break-out times:"

Proposal:

Change to "(c) Break-out times:"

Thoughts: Change to list this item as (c) to keep it in the same list as the exception that it refers to (i.e., item 4.E.2.).

Submitted: Jamie Melhuish

Section: 4.E.11.

Proposal:

Delete the sentence "Cockpit to be entirely contained within the wheelbase."

Thoughts: This completely outlaws almost all mid-engined tube frame formula cars and sports racers.

Most formula cars and sports racers (e.g., Formula Vee, Formula Ford, Formula 5000, DSR and CSR sports racers, and Jamie's Toyota WSR) have a cockpit that extends past the front axle line,
yet other sanctioning bodies deem them safe enough to race.

I seem to remember the discussion revolving around go-karts. If we wish to disallow go-karts, even ones with adequate front energy absorbing features, then better to explicitly state that, or to institute a minimum wheelbase rule, say minimum 60 inches (which would allow Formula SAE cars, but prevent go-karts).

- BMC Austin Mini (original): wheelbase 2,036 mm (80.2 in) (saloon)
- Fiat 500 (original): wheelbase 1.84 m (72.4 in)
- Formula SAE: wheelbase 61" – 67" approx., minimum 60"
- 250cc Superkart chassis dimensions: The wheelbase must be at least 1000mm (39.4") and not more than 1270mm (50").
- 125cc Shifter kart: wheelbase: 1044mm (41")

Submitted: Jamie Melhuish

Section: New rule

Proposal:

Prepared Electric Vehicles

Competitors wishing to race a Prepared Electric Vehicle (class PEV) should contact the event organizer or a technical committee member prior to entering to discuss their vehicle's safety systems. Vehicles that comply with the Pikes Peak International Hill Climb electric class rules or with 2015 or later FIA Appendix J, Article 253 – Safety Equipment, Section 18, will comply with PEV rules.

Vehicles in the Prepared Electric (PEV) class must have or comply with:

A. Battery System – Each battery cell must be properly cooled to always stay at or below the maximum temperature specified in the manufacturer's specification sheet. All electric cables must be properly sized to expected system currents.

B. Battery Disconnect – A battery system equipped with a manually operated, high-current switch to quickly disconnect the battery from the electrical system. This switch must be capable of interrupting the full load current. The switch must be located as near to the battery as practical and be operable from both the driver compartment and from outside the car. This switch must be clearly marked as the "Battery Switch" and be marked with "ON" and "OFF" positions.

C. Main Fuse – A separate fuse (not a circuit breaker) placed in series with the main battery, the rating must not exceed 200% of the maximum expected current draw. All low voltage taps from the main battery must be separately fused. All fuses must be placed first in series with the battery starting at the positive connection.

D. Electrical Shock Hazards – All exposed conductors operating at greater than thirty-six (36) volts must be properly insulated and marked with "High Voltage" warning signs.

E. Covers and Shields – All revolving parts (except wheels and driveshafts) must be suitably covered to prevent accidental contact or injury should one or more of these parts break or malfunction.

F. Audio Warning – An audible warning system is recommended, generating a minimum of 120 decibels of sound when measured three feet from the vehicle.

[Since the rule conflicts (below) are pretty self-evident, do we bother listing them?]
G. Some rules for Internal Combustion Engine vehicles do not apply.
Electric cars are exempt from:

- 2.BB.1
- 3.A.4
- 5.B
- 5.C
- 5.DD
- 5.E
- 5.FF

Thoughts: Taken from the electric safety rules of Pikes Peak (PPIHC), dropped some sentences to simplify, but kept all the basic requirements.

Submitted: John Reed

Section: 4.E.

Proposal:

4. Roll cages consist of horizontal and vertical bars above, ahead, behind, and to the sides of the plane of the drivers' helmet. Main hoop (or equivalent) must be braced front and/or back, and have diagonal member(s) or equivalent within the hoop if spanning more that 36".
5. Headrest, maximum of 3" behind driver's head as seated, must be padded Any rollcage member reachable by the driver's head must incorporate high-density shock-absorbing material in padding.
6. Rollcage must be of adequate construction**. Material within the cockpit (including tubular framerails) must be steel mechanical tubing meeting commercial standards ASTM a500, a513, or a519, SAE xx16 – xx30, >50000 psi tensile, >36000 psi yield, >10% elongation*. (ref. Rb >60)1018 CDS or 1020 DOM are preferred. Material used is ultimately the responsibility of the entrant. Members of the cage, (as in sec. 4, above) must have a minimum diameter and wall thickness of:**
   1.25" x .120" or 1.38" x .090" under 1500 lbs.
   1.38" x .120" or 1.50" x .090" under 2500 lbs.

1.50" x .120", 1 5/8 x.109or 1.75" x .090" over 2500 lbs.
Other components of the rollcage, tubular chassis, and collision protection features may differ in size and wall, but be of comparable material.

7. **Within our tubing specifications, ASTM a500 Type A, A513 Type 1, Schedule 40 pipe, and tubing with Carbon <.12% (ref. Rb <60) (i.e. 1010, "A36") are considered marginal, and acceptable principally for existing cars. Prior good practice has been to increase wall or diameter ~20% when using these. Low grade material – butt-welded tubing, "schedule 10" aka "railing" pipe, 1005 hydraulic tube, (1008)exhaust pipe, and similar – is not allowed as rollcage members.**
8. **Current applicable FIA specification cages with documentation are acceptable. (*British "4T45" tubing is = to SAE 9620, ASTM a519)** *(Note: we may wish to take discussion on the section in bold as a separate item)*
9. All fabricated construction should exhibit reasonable standards of workmanship, i.e.: Plating, brackets & gussets in proportion to tubing wall. Distortion of section within bends (i.e. ovality) limited to 10%. No evident kinks or buckles in bends, any evident seam to be correctly oriented. Welded joints in the basic cage not containing a continuous tube section (i.e. "butt" or "lap") must be reinforced with gussets, sleeves, or diagonals, so that weld equals 2x tube circumference. Cast, forged, or "junk" metals are not acceptable in the cage. Welds must be fully penetrated, all around the tube, and equal tubing wall. Welds must be visually inspectable. Alloy tubing must be maintained in "condition (n)" (normalized). (Ref. Rb <100)
10. 4" minimum of weld on each welded belt/harness mount.
11. Roll cages must be mounted to the structure of the car at 6 points minimum. Welded mountings must be socketed, gusseted, or plated to equivalent of tube wall.
    Bolted foot plates must be at least 3 x tube areas, and use at least 3 grade 5 (or better) bolts each with large washers or "sandwich "plates.
12. Cars must have at least 2 sections of side protection. Roll cages must have at least one bar in the door area. Stock door beam found in most cars is acceptable as a section, as is a substantial outboard frame rail or rocker panel.
13. Protection for the foot well area, and from "drive train intrusion", (as in 3. AA.1)
    must be incorporated into the chassis/roll cage structure.
    Full, continuous (stamped, OE) steel floor is considered adequate.
14. Energy absorbing features must be incorporated into the chassis structure ahead of the driver's feet, and to the side of the driver.
15. **Driver to be entirely contained within the wheelbase**. *(subject to amendment, discussion separate)*

Ea. Recommendations for collision protection

1. Bend radii at least 3x tubing diameter, and continuous main hoop(s)
2. Mechanical tubing, as specified above is recommended for all collision protection and energy absorbing structures.
3. Tubing larger than specification, and /or additional diagonals & supports, are recommended.
4. 4 door bars are recommended, as are additional vertical supports, "intrusion" plating, and reinforcements of "X" joins, (i.e. "FIA" gussets) in the door bar area, 2 continuous bars, and reinforcement to rocker or framerail, lateral reinforcement of rollcage mountings, framerails, or rockers (i.e. cross-members), and engagement of seat mountings in this reinforcement.

5. Windshield post support is recommended, as is a diagonal member in the roof, a vertical bar in the center of the windshield area, an anti-intrusion bar in the driver's "window", as well as 45 deg. sections in front frame rails and down tubes.
6. Cage installation should include significant structural enhancements and tie-in (i.e. seam welding, gusseting, "fish" & floor plating, subframe connection, seat mount reinforcement, sill bars) to the cockpit area.
7. Cages should be tied in at as many points as possible (our rules specifically exempt safety equipment from class restrictions, but, other sanctions may specifically restrict this)
8. Entrants are urged to research specifications relevant to their particular car, and to it's eligibility for other series, and to build to or above the highest specification available.
