SAE DETROIT SECTION
FORMULA SAE WORKSHOP

October 22nd 2011

2012 RULES CHANGES
&
TECHNICAL INSPECTION

Michael Royce
Albion Associates LLC

FSAE Workshop 2011

Article A - Administrative

- **Forms** – The standard forms that are required for documentation and submissions at FSAE competitions have been relocated to www.fsaeonline.com

- **A8.5 Web Based Submission – FSAE Michigan and FSAE Lincoln Only** – Many of the required documents must now be submitted online through www.fsaeonline.com.

- **A8.6 Account Signup for Online Submission – FSAE Michigan and FSAE Lincoln Only** – Teams must comply with certain requirements when registering at www.fsaeonline.com and submitting documents online.

Article A8 - Vehicle Documentation, Deadlines & Penalties

A8.1 Required Documents and Required Forms

- The following documents supporting each vehicle must be submitted by the action deadlines posted on each competition website or otherwise published by the organizers.

- B3.8 "Structural Equivalency Spreadsheet (SES)" and Appendix B-1 - Use required form located at www.fsaeonline.com: **or** AF2 "Structural Requirements Certification Form (SRCF)" - Use required form located at www.fsaeonline.com.

- ***Note*** *– Teams must submit an SES unless using the AF Rules in which case the SES is superseded by the SRCF. Submit* ***either*** *the SES* ***or*** *the SRCF as required, but not both.*

- B3.21 "Impact Attenuator Data Requirement" - Use required form located at www.fsaeonline.com.

Article B.3.4 Alternative Tubing and Materials - General

B.3.4.5

If a bent tube is used anywhere in the primary structure, other than the front and main roll hoops, an additional tube must be attached to support it. The attachment point must be the position along the tube where it deviates farthest from a straight line connecting both ends. The support tube must have the same diameter and thickness as the bent tube. The support tube must terminate at a node of the chassis.

Article B.3.4 Alternative Tubing and Materials - General

B.3.4.5

If a bent tube is used anywhere in the primary structure, other than the front and main roll hoops, an additional tube must be attached to support it. The attachment point must be the position along the tube where it deviates farthest from a straight line connecting both ends. The support tube must have the same diameter and thickness as the bent tube. The support tube must terminate at a node of the chassis.

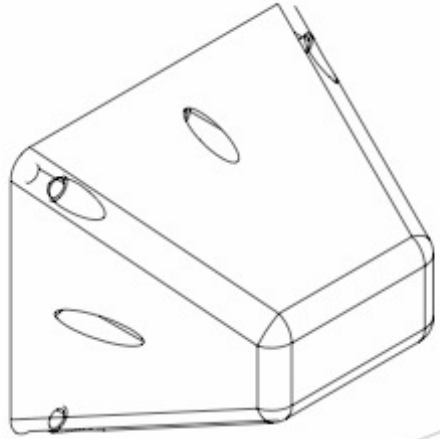
Article B.3.21.11 Standard Attenuator

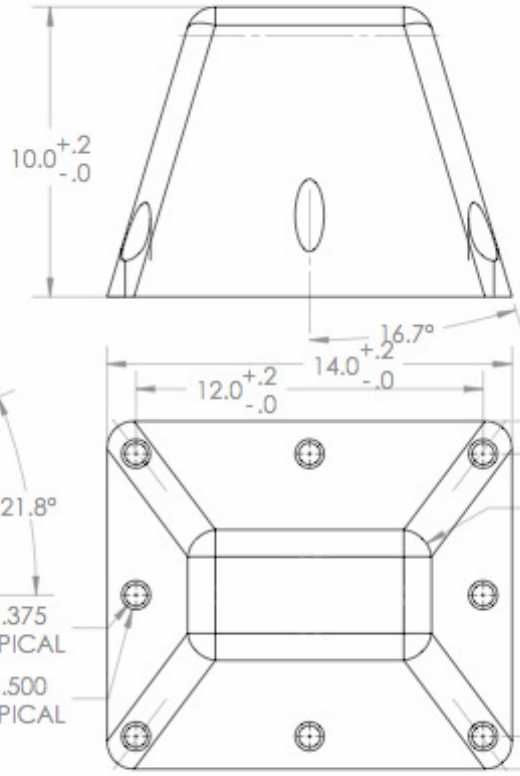
B.3.21.11 Standard Attenuator

- An officially approved impact attenuator can be found at http://www.fsaeonline.com/home/page.aspx?pageid=193613e4-fff1-4ea9-97ec-eb1c07fbe3c0 .
- Teams may choose to use that style of impact attenuator and need not submit test data with their IAD Report. The other requirements of the IAD Report must still be submitted including, but not limited to, photos of the team's actual attenuator with evidence that it meets the design criteria given on the website.

However,

The attenuator itself is unchanged from 2011 but requires either the diagonal or an x-brace in the front bulkhead. Teams can use this attenuator and test their front bulkhead without the diagonal, but all the requirements for a student designed attenuator would apply and they would have to submit the IA data submission like normal.





For 2012 the standard attenuator requires the addition of a diagonal tube in the plane of the front bulkhead that connects two nodes. An optional configuration is an "X" brace that connects all four corners of the front bulkhead.

The diagonal tube is required for all cars running the standard attenuator who do not test. Teams may test but must submit test data with the IA data submission.

Note: Attenuators purchased from BSCI will not include optional radii on edges or mounting holes. Mounting holes shown are for reference only - attachment is up to the team to determine.

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±0.015 ANGULAR: MACH ± 0.3 TWO PLACE DECIMAL ± 0.010 THREE PLACE DECIMAL ± 0.003	DRAWN	WBR	3/14/11
	CHECKED		
	ENG APPR.		
	MFG APPR.		
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
MATERIAL: Impax 700 Foam	The Type 12 attenuator is unchanged from the 11 but for 2012 the additional front bulkhead diagonal tube is required, see note.		
FINISH			
NEXT ASSY / USED ON			
APPLICATION / DO NOT SCALE DRAWING			

TITLE: FSAE Impact Attenuator Type 11

SIZE	DWG. NO.	REV
A	FSAE-IA-12	1

SCALE: 1:8 WEIGHT: SHEET 1 OF 1

5 4 3 2 1

B.3.21 - Impact Attenuator Testing

B.3.21.9

- During the test, the attenuator must be attached to the anti intrusion plate using the intended vehicle attachment method.
- The anti-intrusion plate must be spaced at least 50 mm (2 inches) from any rigid surface.
- No part of the anti-intrusion plate may permanently deflect more than 25.1 mm (1 inch)beyond the position of the anti-intrusion plate before the test.

  Note: The 25.4 mm (1 inch) spacing represents the front bulkhead support and insures that the plate does not intrude excessively into the cockpit

Article B.3.24 Side Impact Structure for Tube Frame Cars

B.3.24.3

The locations for the three (3) required tubular members are as follows:

- The upper Side Impact Structural member must connect the Main Hoop and the Front Hoop. *With a 77kg (170 pound) driver seated in the normal driving position* ***all of the member*** *must be at a height between 300 mm (11.8 inches) and 350 mm (13.8 inches) above the ground.* The upper frame rail may be used as this member if it meets the height, diameter and thickness requirements.

- The lower Side Impact Structural member must connect the bottom of the Main Hoop and the bottom of the Front Hoop. The lower frame rail/frame member may be this member if it meets the diameter and wall thickness requirements.

- The diagonal Side Impact Structural member must connect the upper and lower Side Impact Structural members forward of the Main Hoop and rearward of the Front Hoop.

Article B.6.2 Ground Clearance

B.6.2 Ground Clearance

Ground clearance must be sufficient to prevent any portion of the car, other than the tires, from touching the ground during track events. Intentional or excessive ground contact of any portion of the car other than the tires will forfeit a run or an entire dynamic event.

Comment: *The intention of this rule is that sliding skirts or other devices that by design, fabrication or as a consequence of moving, contact the track surface are prohibited and any unintended contact with the ground which either causes damage, or in the opinion of the 'dynamic event organizers' could result in damage to the track, will result in forfeit of a run or an entire dynamic event*

Article B.6.6.2 Jacking Point

B.6.6.2 Jacking Point

The jacking point is required to be:

- Visible to a person standing 1 meter (3 feet) behind the car.
- Painted orange.
- Oriented horizontally and perpendicular to the centerline of the car
- Made from round, 25 – 29 mm (1 – 1 1/8 inch) O.D. aluminum or steel tube
- A minimum of 300 mm (12 inches) long
- Exposed around the lower 180 degrees (180°) of its circumference over a minimum length of 280 mm (11 in)
- The height of the tube is required to be such that:
  - There is a minimum of 75 mm (3 in) clearance from the bottom of the tube to the ground measured at tech inspection.
  - With the bottom of the tube 200 mm (7.9 in) above ground, the wheels do not touch the ground when they are in full rebound.
- *Access from the rear of the tube must be unobstructed for at least 300mm of its length*

Article B.11.4 Batteries

B.11.4.3 The hot (*ungrounded*) terminal must be insulated.

B.11.4.5 Battery packs based on Lithium Chemistry other than LiFePo:

a. must be commercially manufactured items

b. must have over voltage, under voltage, short circuit and over temperature cell protection

B.11.4.6 All batteries using chemistries other than lead acid must be presented at technical inspection with markings identifying it for comparison to a datasheet or other documentation proving the pack and supporting electronics meet all rules requirements

Article B.15 Transponders

B15.1.3

All vehicles must be equipped with at least one MYLAPS Car/Bike Rechargeable Power Transponder or MYLAPS Car/Bike Direct Power Transponder.

Note:

Except for their name, AMB TranX260 transponders are identical to MYLAPS Car/Bike Transponders and fully comply with this rule. If you own a functional AMB TranX260 it does not need to be replaced.

Article B.17 Driver's Equipment

B.17.2 Helmets

A well-fitting, closed face helmet that meets one of the following certifications and is labeled as such:

- Snell K2000, K2005, K2010, M2000, M2005, M2010, SA2000, SA2005, SA2010
- SFI 31.2A, SFI 31.1/2005
- FIA 8860-2004
- British Standards Institution BS 6658-85 Type A/FR rating (Types A and B are not accepted)

Article B.17 Driver's Equipment

B.17.5 Suit

- SFI 3-2A/5 (or higher)

QuickTime™ and a
decompressor
are needed to see this picture.

Article B.17 Driver's Equipment

B.17.5 Suit

- SFI 3-2A/5 (or higher)

QuickTime™ and a
decompressor
are needed to see this picture.

This picture is of the label for a single layer 3-2A/1 suit!

B.6.8 Skid Pad Scoring

D6.8.3

- The following equation is used to determine the scores for the skid-pad event:

SKID PAD SCORE = (47.5 x (*Tmax*/Tyour) -1) / ((*Tmax*/Tmin) -1) + 2.5

Where:

Tyour is the average of the left and the right timed laps on your best run including penalties.

Tmin is the elapsed time of the fastest car

Tmax *is 125% of Tmin*

D.13.1 Vehicle Movement

D.13.1.2

- Off track vehicles must be pushed at a normal walking pace by means of a "Push Bar", *(See D13.2) and with a driver in the cockpit and with another team member walking beside the car.*

- *The team has the option to move the car either with*

  (a) all four (4) wheels on the ground or with

  (b) the rear wheels supported on dollies, by push bar mounted wheels, or other means as long as the person in the cockpit has full control of vehicle movement and can steer and brake normally. The external wheels supporting the rear of the car must be non-pivoting so the vehicle travels only where the front wheels are steered. The driver must always be able to steer and brake the car normally.

Article B.18 Possible Future Rules Changes

The following changes proposed for 2012 **have been dropped.**

B2.3 - Wheelbase – Proposed Reduced Minimum

The proposal to reduce the minimum wheelbase from the current 1525 mm (60”) to 1400 mm (55”) has been withdrawn. The minimum wheelbase will remain at 1525 mm (60”).

B4.1 - Cockpit Opening – Proposed Smaller Template – The proposal to reduce the size of the cockpit opening template has been withdrawn. The Committee has decided that the size of the cockpit opening template will not be changed.

Article B.18 Future Rules Changes

Two Year Rules Cycle

- The Formula SAE Rules Committee has decided to revise Part B "Technical Requirements" on a two year cycle.
- The technical portions of the 2013 Rules will remain in effect for the 2014 FSAE Series and be revised for the 2015 FSAE Series.
- The Committee will continue to make editorial corrections and update references to documents & standards issued by third parties as appropriate.
- Part A "Administrative Regulations" dealing with competition policies and procedures will be updated as required.

Article B.18 Possible Future Rules Changes

Probable future rules changes:

B.3.9.3 & 3.9.4 - 95th Percentile Male Template – Proposed Addition of Legs
Possible wording:

> The lower 200 mm circle will be placed on the seat bottom, with the center of the circle ("Percy's" hips and buttocks) no less than 91.5 cms (36 inches) from the rear face of the pedals in their most forward position.

B.10.2 Sound Measuring Procedure – The Rules Committee is investigating alternate sound measuring procedures and may adopt a new sound test. This study is not complete and a specific alternate test has not been proposed at this time.

B.10.3 Maximum Sound Level – Proposed Reduction – The proposal to reduce the maximum sound level to 107dbA has not been accepted. The maximum sound level will remain at 110dbA

B.17.6 Undergarments - The Rules Committee is considering making fire resistant underwear a requirement starting with the 2013 competitions.

Article B.18 Possible Future Rules Changes

Changes to the Scoring for:

- **Cost Event**
  - Proposal to allocate 80 out of the 100 possible points to the final adjusted cost.
- **Design Event**
  - Proposal to increase the maximum score in the Design Event from 150 to 200 points, and reduce the maximum score in Acceleration from 75 points to 50 points and in Endurance from 300 points to 275 points.
- **Fuel Economy**
  - Proposal to replace the present Fuel Economy with Fuel Efficiency.

Article B.18 Future Rules Changes

Part E Electric Rules

- The FSAE Rules Committee is working with representatives of the competitions which already host electric FSAE events, Formula SAE Australasia, Formula SAE Italy, Formula Student and Formula Student Germany, to develop a set of uniform rules for electric competition vehicles including their inspection and operation. These uniform rules will be released as a “draft for comments” in the spring of 2012 and will **become effective with the 2013 Formula competitions.**

- The Formula Student Electric and Formula Student organizers have been working on a compatible set of regulations for 2012. A summary of these regulations will be published in October to give you an idea of what you can expect for 2013.

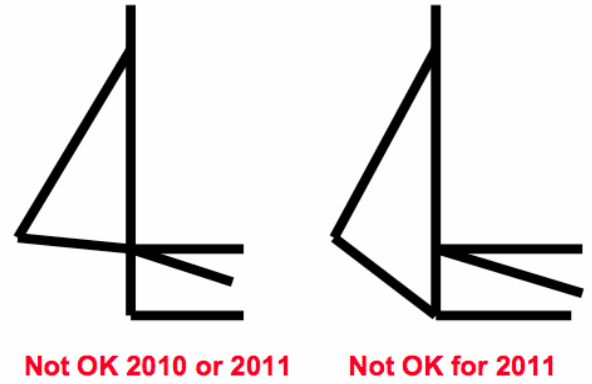
Questions?

B.3.12.6 - Main Hoop Bracing

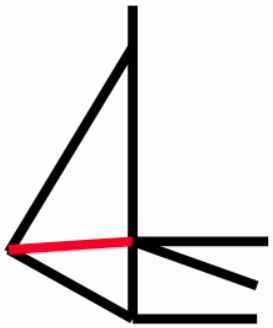
- B.3.12.6 The attachment of the Main Hoop braces must be capable of transmitting all loads from the Main Hoop into the Major Structure of the Frame without failing.
- From the lower end of the braces there must be a properly triangulated structure back to the lowest part of the Main Hoop and the node at which the upper side impact tube meets the Main Hoop. This structure must meet the minimum requirements for Main Hoop Bracing Supports (see Rule B.3.3) or an SEF approved alternative.
- Bracing loads must not be fed solely into the engine, transmission or differential, or through suspension components.

B.3.12.6 - Main Hoop Bracing - Cont'd

- From the lower end of the braces there must be a properly triangulated structure back to the lowest part of the Main Hoop and the node at which the upper side impact tube meets the Main Hoop. This structure must meet the minimum requirements for Main Hoop Bracing Supports (see Rule B.3.3) or an SEF approved alternative.



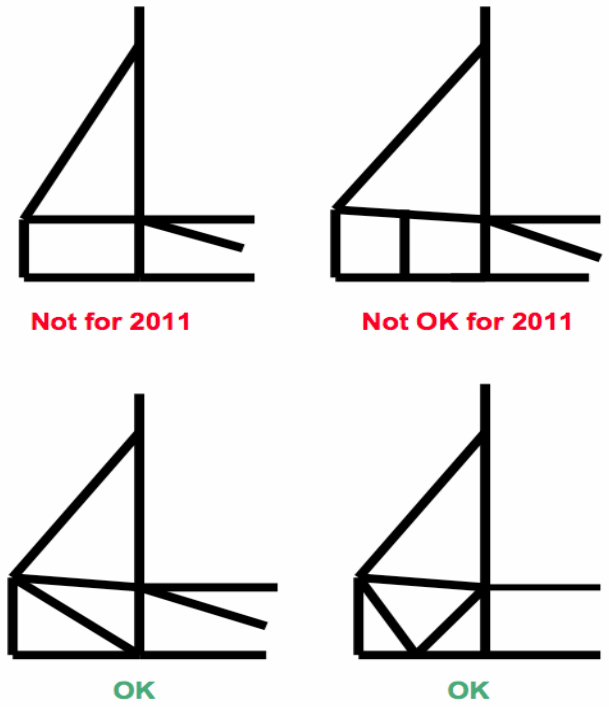
Not OK 2010 or 2011 Not OK for 2011



OK for 2011

B.3.12.6 - Main Hoop Bracing - Cont'd

- From the lower end of the braces there must be a properly triangulated structure back to the lowest part of the Main Hoop *and the node at which the upper side impact tube meets the Main Hoop*. This structure must meet the minimum requirements for Main Hoop Bracing Supports (see Rule B.3.3) or an SEF approved alternative.



B.3.25.1 - Inspection Holes

B3.25 Inspection Holes

- *B3.25.1 The Technical Inspectors may check the compliance of all tubes. This may be done by the use of ultra sonic testing or by the drilling of inspection holes at the inspector's request.*

Presenter's comment:

- Drill inspection holes in the Main and Front Hoops to the requirements of the 2010 Rules in case the ultra sonic equipment is not available or is malfunctioning.

B.5.6 - Head Restraint

B.5.6.2 The restraint must:

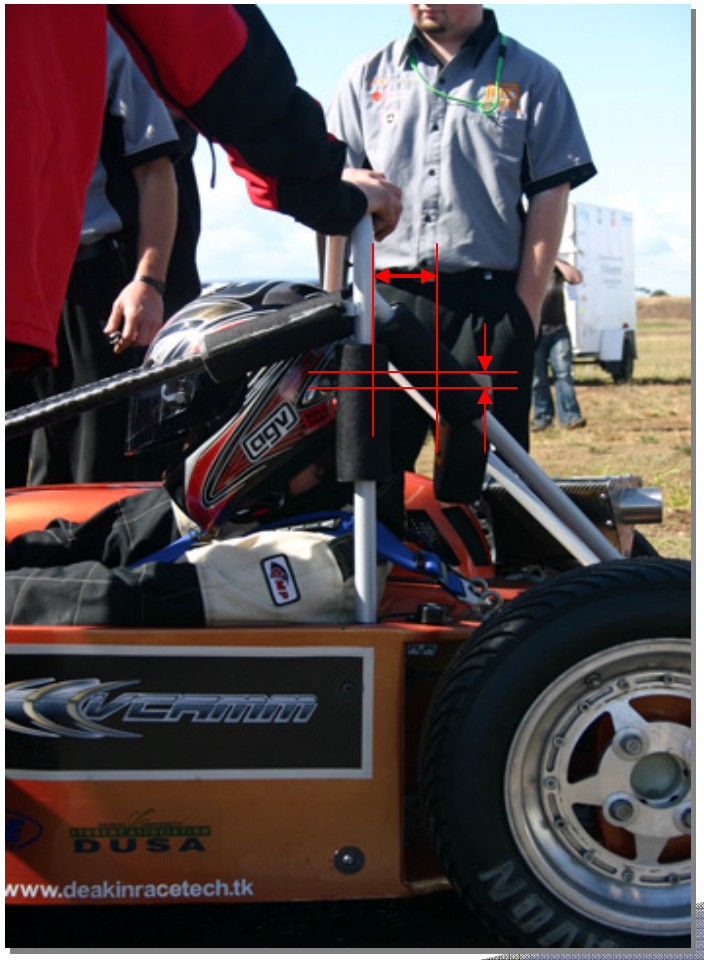
- Be vertical or near vertical in side view.
- Be padded with an energy absorbing material such as Ethafoam or Ensolite with a minimum thickness of 38 mm (1.5 inches).
- Be located so that:
  - It is no more than 25 mm (1 inch) away from the back of the driver's helmet in the uncompressed state, ***with the driver in his/her normal driving position.***
  - The contact point of the back of the driver's helmet on the head restraint is no less than 50 mm (2 inch) from any edge of the head restraint.

Notes:

(1) The head restraint must meet the above requirements for all drivers.

(2) Head restraints may be changed to accommodate different drivers

(See B.1.2.2.d)



B.8.11 - Catch Cans

- B.8.11.4 Any catch can on the cooling system must vent through a hose with a minimum internal diameter of 3 mm (1/8 inch) down to the bottom levels of the Frame.
- B.8.11.5 Any crankcase or engine lubrication vent lines routed to the intake system must be connected upstream of the intake system restrictor.
- B.8.11.6 Crankcase breathers that pass through the oil catch tank(s) to exhaust systems, or vacuum devices that connect directly to the exhaust system, are prohibited.