

ANNOUNCING THE 1984 FORMULA SAE COMPETITION

The Student Chapter of the SAE at the University of Texas at Austin will host the Formula SAE Competition in 1984. The tentative date for the competition is the 25-26 of May 1984. Formula SAE cars are expected from as far away as Canada and Mexico.

Rules and general information can be obtained by writing the address given below. SAE papers which might be of interest are #831390 and #821092. Copies of these publications may be obtained directly from the SAE. Copies may also be obtained from the student chapter of the SAE at the University of Texas for a \$2.50 charge per publication. A few of the most important rules and regulations are listed below.

1. The scoring will be based upon a linear interpretation of the top 5 finishers.
2. Four events will be held: Endurance, acceleration, maneuverability, and fuel economy.
3. There are strict safety regulations. (roll bars, safety belts, helmets, etc...)
4. Vehicles MUST be designed specifically for this competition, and must include four wheel independent suspension.
5. Vehicles MUST have a Formula or Indy-type body.

A \$125.00 entry fee will be required for all entries. The field will be limited to a maximum of 15 cars. The deadline for submitting your entry will be April 29, 1984.

The student chapter of the SAE at the University of Texas extends this invitation to any interested chapter to attend. If you need further information, contact:

Billy H. Wood 512-471-3108 or
Ron Matthews 512-471-3025

Society of Automotive Engineers
7.142 ETC
University of Texas
Austin, Texas 78712

1984 Formula SAE Student Engineering Design Competition

Because of increasing costs due to inflation, the entrance fee has been raised to \$125. Teams with more than 5 members will be required to pay \$5 for each additional person to cover the cost of the Bar-B-Que. The competition is tentatively scheduled for Friday and Saturday, May 25 and 26. Teams should plan to arrive by Thursday, May 24, by 5:00 PM for technical inspection. There will be an Awards Presentation and Texas-style Bar-B-Que Saturday night.

The following rules are similar to those of the 1983 race, except for a few modifications made in accordance with the suggestions of the Judges.

ENGINES, FUELS, OXIDANTS

Any 4-stroke cycle single carburetor engine may be used. The exit bore of the carburetor casting may not exceed 34 mm. This must be the actual carb exit diameter and not that of an insert or orifice plate. During the tech inspection Thursday night, the carb must be removed for the measurement of the exit bore diameter by the Judges. Turbocharging, supercharging and nitrous oxide injection are allowed. Mufflers are required. Engine modifications are allowed and encouraged, but all modifications must be performed by students. The allowable fuels are gasoline, diesel, gasohol, methanol, and ethanol.

SAFETY

Due to the allowance of engine modifications and to insure the safety of all participants and spectators, the safety aspects of the event are strictly enforced. Race officials are positioned around the track and are the only non-drivers allowed on the track during a race. Two students and one official are also assigned to monitor each car in the pits to ensure safety. If a spillage or accident occurs, the race is stopped, rerouted, then allowed to continue. Each car must pass a safety inspection before it is allowed to compete. The following safety rules are enforced:

- 1) The driver must wear an approved safety helmet and protective eyewear.
- 2) The vehicle must be equipped with a safety belt and shoulder restraints.
- 3) The vehicle must be equipped with a three-point padded roll bar of at least 1 inch (25.4 mm) o.d., .083 inch (2.1 mm) thick steel tubing, or material of equal or greater strength.
- 4) The vehicle must have frame members that protect the legs and feet of the driver in the event of a side or head on impact.

- 5) The roll bar must clear the top of the drivers helmet by at least 1/2". Drivers may not lean outside of the roll bar during the race—the penalty for this infraction will be disqualification from the heat.
- 6) The driver, fuel tank, and brake lines must be protected from any projectile debris that may result from drive component failure (chains, sprockets, etc.) by a steel plate of at least .125 inch (3.175 mm) thickness, or by a shield made of expanded metal if this shield is judged to be adequate in the opinion of the judges.
- 7) The steering wheel, suspension components, oil plug and wheel spindles must be cotter pinned or safety wired. Lock nuts and Locktite may be allowed only if assembled in the presence of the judges and only after approval by the judges.
- 8) Mirrors will be allowed only if it is shown, to the judges satisfaction, that these mirrors cannot become dislodged and fall off the vehicle.
- 9) The brakes must be capable of sliding two tires on dry pavement, or of stopping the vehicle in 25 feet (7.62 m) from a speed of 20 mph (32 km/hr).
- 10) The vehicle must be equipped with an engine kill switch (not momentary type) within easy reach of the driver.
- 11) The vehicle will carry no more than one gallon (3.8 liters) of fuel and must be able to be safely refueled with the engine running. No driver will be in a car while refueling.
- 12) The vehicle must carry a Class B&C fire extinguisher within easy reach of the driver. Minimum capacity shall be two pounds (0.9 kg).

EVENTS AND AWARDS

The 1984 Formula SAE Competition will consist of four events: acceleration, fuel economy, maneuverability, and endurance. First, second, and, third place performance trophies will be awarded based upon points accumulated in these 4 events, with the endurance event counting twice as much as any other event (because it is traditionally perceived as the Big Event).

Additionally, plaques will be awarded for "Best Appearance" and for "Excellence in Engineering and Design Creativity", as judged by a team of professional engineers selected by the Race Director. To be eligible for the excellence in Engineering and Design Creativity Award, the student team must give a 10-15 minute (no more, no less) technical presentation to the Judges and any interested students. This presentation will be given

Thursday evening and will be a discussion of the engineering aspects of the design of the vehicle.

Each heat of the fuel economy event will cover a distance of approximately 5 miles. Each team must provide its own fuel, but the Judges will fill the fuel tank before and after each heat. Points will be awarded based upon the volume of fuel used. Each fuel economy heat must have a different driver. Each vehicle will participate in two separate heats (attempts), with points awarded only for the better of the two attempts.

Points for the acceleration race will be based upon elapsed time over a 100 yard straight track from a standing start. Each vehicle will run in 4 heats (attempts), and there must be at least 2 different drivers for the event. The cars will race 2 on the track at a time, with match-ups for the first attempt based on random selection and succeeding matchups assigned by the Judges in an effort to provide close races. The vehicle will receive points based solely upon the best elapsed time of the 4 attempts.

The maneuverability race will consist of two laps from a standing start over exactly the same course as that used in the endurance race. Only one car will be on the track at a time. Three attempts (or fewer if a team does not have 3 members, since each attempt must have a different driver) will be made and the lowest elapsed time will be counted. Because this is an engineering design competition and not a test of driver skill, a 2 second penalty will be assessed every time a tire is lifted off the ground during a turn. Any car that leaves the track must reenter at the same point at which it exited.

The endurance race will be held on a tight, rigorous paved course. Each heat will be approximately 14 miles in length with a mandatory driver change period at the halfway point (about 7 miles). No vehicle may leave its assigned pit space after the driver change until approval has been received from the assigned Judge. Points based on lowest elapsed time of 2 heats. Since each heat must have 2 drivers, then a total of 4 different drivers is required for both endurance heats. If the judges believe that the field should be divided to avoid overcrowding of vehicles on the course, then it will be entirely up to the Judges to assign vehicles to heats and to decide how many vehicles should be on the track at a time.

Scoring will be based on a linear scale for each event. The lowest elapsed time (or fuel volume used) will receive 100 points and the 5th best elapsed time (or fuel volume consumed) will receive 20 points. Points for 2nd, 3rd, and 4th places will be computed from the linear equation defined by the performance of

the first and fifth place vehicles. Any car that completes at least one heat of an event but does not finish in the top 5 will receive 10 points. Points for the endurance race will be multiplied by the two and then added to the points for the other 3 events to yield the total performance score.

GENERAL

- 1) All vehicles must have 4 wheel independent suspension and must have a minimum wheelbase of 65 inches and a maximum wheelbase of 100 inches. Entrants are encouraged to recognize that the suspension must be functional since the course will include driveway-type onramps and offramps that must be negotiated at significant speeds. The vehicle must have a ground clearance of no more than 6 inches (without driver).
- 2) 8-13 inch (20-33 cm) wheels must be used. (this is not to be misinterpreted to mean "tires".)
- 3) Each vehicle must be capable of carrying one person 6 ft (1.83 m) tall and weighing 200 lbs (888 N).
- 4) All vehicles must have a body that resembles a formula car. The Judges may assess a points penalty if they believe that there has not been a sincere effort to provide a reasonable body. No body panels may be removed for the race unless the Judges decide that such panels should be removed for the sake of safety.
- 5) All vehicles must be designed, constructed, and driven by students.
- 6) The total project cost, excluding student labor, must not exceed \$2000. In the case of donated parts, a reasonable estimate of the value is acceptable. The necessary cost documentation must be presented to the Judges on Thursday evening during the tech inspection.
- 7) The Judges will decide what total length of time is available for each event. Any vehicle still running when time is up must proceed to the pit area.
- 8) Because this is an engineering design competition, no vehicle may compete that was not originally designed specifically for this competition.

- 9) No driver may compete in more than two events. Since there must be at least two drivers for the endurance race (per heat), then a team with less than 3 drivers would have to forfeit at least one event. However, a team with an insufficient number of drivers may borrow a driver (or drivers) from another team that has an excess number of driver, as long as no driver competes in more than two events

Enforcement and interpretation of the rules is up to the discretion of the Judges. Written protest of rules violations may be submitted to the Judges only if accompanied by a \$20 Protest Fee. After consideration by the Judges, the Protest Fee will be refunded unless the protest is judged invalid.

2706 Nueces #213
Austin, Texas 78705

To: Formula SAE Competitors
From: Longhorn Racing Team
Don Glover, Secretary

Date: January 25, 1984
Re: Carb Rule Change

As you recall, our first attempt to write a new carb rule to limit the engine power output to a safe level was to require a one inch throttle plate diameter. However, this rule unintentionally made the use of a slide valve carb impossible. Therefore, to allow use of a slide valve carb of reasonable size, we modified the carb requirement to a 34 mm exit bore. We failed to recognize that this rule gave a downdraft carb a large advantage. For example, a 250 cc Honda XR (9000 rpm) uses a 34 mm (exit bore) slide valve, while a 1600 cc VW (5200 rpm) uses a 34mm (exit bore) downdraft, and a 1600 cc MGB (6000 rpm) uses two 38mm slide valve carbs. This is a result of the different expansion ratios for these different types of carbs. Accordingly, we have rewritten the rule for the last time this racing season. The new rule is:

A 34mm carb exit bore for a slide valve or a 25.4 mm exit bore for a downdraft may be used.

We do not believe that this will cause any difficulty since few small displacement engines use downdraft carbs. If you have picked an engine with a large downdraft carb, then you must place a 25.4 mm diameter square edged orifice directly between the carb and the intake manifold. We are sorry for any inconvenience this may cause, but we believe that this modification is mandatory in the interest of safety. If you decide to host a Formula SAE race in the future, you will be free to rewrite the rules any way you wish.

Paid Competitors for the 84 race are:

- 1) Milwaukee School of Engineering
- 2) University of Portland
- 3) Lawrence Institute of Technology
- 4) University of Texas at Arlington
- 5) University of Texas at Austin #1
- 6) University of Texas at Austin #2
- 7) Cal Poly Pomona

In addition, the following schools have expressed a strong interest:

- 8) McGill Univ
- 9) Cal Poly San Luis Obispo
- 10) USC
- 11) Penn State
- 12) Thomas Moore College
- 13) U of Missouri at Columbia
- 14) Univ of Minnesota
- 15) Univ of Maryland
- 16) U of Wisconsin - Milwaukee
- 17) US Naval Academy
- 18) Texas A&M
- 19) University of Houston
- 20) University of Arkansas

Because we will only allow 15 entries, if you not already sent in your 125\$ entrance fee, you should do so as soon as possible.

We look forward to seeing you at the 1984 Formula BAE Race in May.

To: Potential Entrants, 1984 Formula SAE Competition

From: Don Glover, Secretary, University of Texas SAE

Re: Rules, Entrance Fee, etc.

Thank you for your interest in the 1984 Formula SAE Student Engineering Design Competition. A copy of the 1984 Rules is attached.

You may be interested in obtaining copies of at least two SAE Technical Papers:

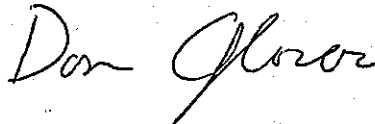
- 1) SAE Paper 831390, "The 1983 Formula SAE Championship Competition," by R.D. Matthews, R.K. Morton, and B.H. Wood; presents technical data concerning the vehicles entered in the 1983 race.
- 2) SAE Paper 821092, "Design of a Formula SAE Race Car: Vehicle Dynamics and Performance," by C.D. Carter, C.B. Sherman, and R.D. Matthews; presents relevant governing equations.

Other SAE papers of potential interest are 830810, 821093, and 810916. Copies of these papers may be obtained for \$1.75 each from SAE. Alternatively, we will send you copies for \$2.50 each (to cover duplicating and postage charges) upon request.

We encourage you to send your \$125 entrance fee as soon as possible because only 13 entries will be accepted (UT will enter 2 cars, making a total field of 15).

If you need any further information, please feel free to write or call Professor Matthews or Professor Wood.

Hoping to see you in May,



Don Glover
SAE Secretary

To: Past Formula SAE Competitors

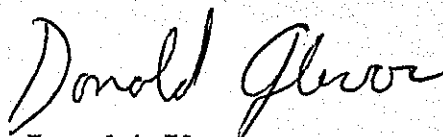
Enclosed are the rules for the 1984 Competition to be hosted by UT Austin in May, 1984. These rules have been modified from the 1983 rules in compliance with the suggestions of the judges.

Only 15 entries will be accepted and 6 of these slots have already been taken. Thus, you are urged to send us an entry fee for \$125 as soon as possible. Make check payable to "University of Texas SAE."

We have moved into a new ME building and are trying to get a large parking lot near this building for the 1984 race. If we are not successful, then we will probably use the same track that was used in 1983.

If you have any questions, please feel free to contact Prof. Ron Matthews at 512-471-3108.

Sincerely yours,



Donald Glover
SAE Secretary