

2010 Supplemental National Rules for Formula Car Challenge

SERIES OVERVIEW:

The Formula Car Challenge is a multi-regional series, with a NASA sanctioned national championship. The series features three types of Formula Mazda open wheel racing cars. They are the Pro Formula Mazda (PFM), the Formula Mazda (FM), and the FormulaSPEED2.0 (FS2.0). As a NASA Sanctioned series all participants must operate under current NASA Club Codes and Regulations:

<http://www.nasaproring.com/rules/ccr.pdf>

TECHNICAL

Every car running in NASA events must have a current NASA logbook, and technical inspection and every competitor must be a NASA member and hold a current NASA competition license. Technical details for each type of car are listed in this document.

Everything that is not explicitly authorized in these regulations, or in the technical bulletins which may be issued by the series during the season, is strictly forbidden.

TESTING

Exclusive testing will be available at some events. Drivers competing for points may ONLY run in series sessions during these days or they will be ineligible for points for the following race weekend. Team test days the week of the event are acceptable if they are announced with 30 days notice, and open to all competitors.

POINTS

Points are awarded in the Series based on the finishing order of each race, counting only the Series Competitors starting each event. Series competitors need only take the green flag to earn series points.

SAFETY

In addition to NASA Club safety regulations a HANS device, and arm restraints are mandatory during all sessions. All cars must have an on-board fire extinguisher system.

CAR COUNT

A total of only 35 entries will be accepted per race. This is a total of ALL car types combined. First come first served. Should 2 drivers sign up at the exact same time, the driver who has attended more events will receive the entry.

BLOCKING

Any driver who, in the sole opinion of the Race Director and/or Stewards, alters their racing line based on the actions of pursuing competitors, or uses an abnormal racing line to inhibit or prevent passing may be considered to be "blocking" and may be warned or penalized.

PRE-GRID RULE

If you arrive to pregrid after the first car leaves the grid you start at the back of the entire

Place	Points
1st	29
2nd	25
3rd	22
4th	20
5th	19
6th	18
7th	17
8th	16
9th	15
10th	14
11th	13
12th	12
13th	11
14th	10
15th	9
16th	8
17th	7
18th	6
19th	5
20th	4

field (regardless of class)

QUALIFYING

Competitors should never leave the pit lane until the session is over. Doing so may result in a loss of qualifying times. Series officials will decide who needs to be in tech after the qualifying session is complete. Any cars that have gone back to the paddock may have their times disqualified.

TIRE CARE

Use of tire warmers or cooling methods other than natural air convection or conduction is prohibited.

HARDWARE

Fasteners, links, and rod ends may be either metric or standard threads, but shall be at least grade five (5). No titanium or other exotic materials are permitted in the series.

SERIES PARTNERS DECALS

Cars must install series partners decals in official mandated locations. Cars that are not in compliance will not be awarded points, and may not be permitted on track.

DETAILED CAR TECHNICAL SPECIFICATIONS:

FORMULA MAZDA (FM) –

Manufacturer Moses Smith Racing (msrparts.com)

The Formula Mazda is a 13B powered 5 speed H pattern tube frame car first designed in 1984. The car has been manufactured by Hayashi, Russell Racing, Star Race Cars, Fab Works, and the current manufacturer Moses Smith Racing. Any Formula Mazda from these builders will be allowed to compete if they meet the following rules.

FM.1 Every FM must meet SCCA GCR Technical requirements for the FM class which can be found here: <http://scca.org/contentpage.aspx?content=44>

FM.2 Fuel: Only the Series-designated fuel may be used.

FM.3 Tires: Goodyear 475 compound tires – One marked set per weekend (including doubles) to be used for Qualify & Race sessions. It is the responsibility of the competitor to ensure their tires are marked appropriately for the qualifying and race sessions. Any change of tires during or between a qualifying session shall automatically result in all previous times being disallowed. If a tire is damaged during a qualifying session, the competitor may replace that tire with another tire upon approval by the Chief Steward. If you must change more than one tire you will go to the back of the entire field. Rain tires may be used at any time.

FM.4 Transponder location:

The center of the transponder should be mounted 2.5” from the front bulkhead on the left side skin. There is no height requirement.

PRO FORMULA MAZDA (PFM) –

Manufacturer Star Race Cars (starmazda.com)

The Pro Star Formula Mazda is a Renesis powered 6 speed sequential carbon fiber tub car first designed in 2003. The car is manufactured by Star Race Cars (818) 686-3356.

PFM.1 Engine: Official motor seals from an approved builder are required. Series approved engine builders are Star Race Cars (818) 686-3356 or Daryl Drummond Enterprises, Inc. 541-761-5520..

PFM.2 Fuel and Ignition:

Fuel Pressure must be 56psi +/-2psi as measured in the fuel line before the fuel pressure regulator with the engine running. Ignition timing is not more than 20 Deg BTDC measured at or below 2000 RPM. Only series specified air filter is approved for use K&N Filter P/N 050-539.

Fuel pressure sensor measured by the ECU must be installed and operational
Sequence of major components is as follows and is not subject to any alteration.

- 1) Fuel Filter
- 2) Fuel Pump
- 3) Bulkhead fitting at top of fuel cell
- 4) Female dry brake coupling P/N 070-526
- 5) Male dry break coupling P/N 070-527
- 6) Secondary fuel rail
- 7) Primary fuel rail
- 8) Fuel Pressure Sensor
- 9) Fuel Pressure Regulator
- 10) Bulkhead fitting for fuel return at top of tank.

Two fuel pumps are permitted for use: Low volume P/N 070-507 with filter P/N 070-522 or High volume P/N 070-530 with filter P/N 070-522. A secondary inline fuel filter may be fitted to the system at any point, however may not be substituted for the above filters. Fuel injectors must be of type and specification for the Mazda RX-8 Renesis engine. For the original 6 injector intake, injectors must be installed in their specified locations as primary P/N 050-522 (Red) and secondary P/N 050-553 (Yellow). For the updated 4 injector intake, the primary injector P/N 050-617 (Green) and the secondary injector P/N 050-618 (Brown) are required. Fuel injectors may be cleaned and flowed using conventional methods by any source. Disassembly, service, preparation or modification to the internal parts of the injectors is prohibited.

PFM.3 Fuel: Only the Series-designated fuel may be used.

PFM.4 Transaxle:

The prescribed gearbox is a Hewland FTR six-speed, sequential shift, non-limited slip differential, with 9/31 final drive and a choice of two sets of gears.

Set "A" shall consist of: 12/29,15/30,15/25,19/27,20/25,19/21

Set "B" shall consist of: 12/29,17/30,19/27,18/22,24/26,24/24

Reverse shall be installed and functional. REM and similar coatings on internal parts surfaces in the transmission is permitted. Blueprinting and polishing components is permitted. The use of Hewland FTR “L” lightweight parts is prohibited. The use of low friction seals is prohibited. Only those seals provided by Star Race Cars or Hewland will be allowed. Any attempt to add a friction surface within the differential is prohibited.

PFM.5 Weight and Dimensions:

- 5.A Minimum weight with driver – 1335 lbs.
- 5.B Ballasting is permitted. Ballast shall be securely mounted to the tub, such that it does not constitute a hazard.
- 5.C Aluminum under trays may be replaced with steel replicas, or multiple under trays may be fitted, if needed for ballast

PFM.6 Electrical and Instrumentation:

- 6.A. Battery shall be securely mounted in standard, left side pod position. Size and type are unrestricted provided it is a 12 Volt rated gel cell. Car may have connections fitted for auxiliary battery. Auxiliary battery is permitted for starting the motor only, and may not be permanently attached to the vehicle.
- 6.B. Alternator shall be unmodified, in working order at all times, with belt tension according to factory tolerance. Any method for defeating the function of the alternator is prohibited.
- 6.C. Any modification to the main vehicle wiring harness, or the engine control unit (ECU) wiring harness, must be reviewed by the Series and approved. Routing of electric lines in unrestricted, provided safety is not compromised.
- 6.D. All ECUs in Series vehicles shall be operated with the designated 4 or 6 injector set of parameters, or map. This will be verified continually by Series officials at their discretion. Discrepancies will result in corrective action, up to and including disqualification. 2009 Star Race Cars map or 2010 Star Race Cars map with 11 position fuel trim are legal for 2010 FCC competition.
- 6.E. ECUs are serviceable only through the manufacturer Star Race Cars.
- 6.F Instrumentation of Series vehicles is generally free, with the following exceptions:
 - 1) No telemetry
 - 2) No strain gauges or load cells anywhere on the car
 - 3) No laser or ultrasonic sensors on the car
 - 4) No infrared sensors for tire or brake temps on the car
- 6.G. Brackets for data acquisition sensors may be purchased from Star Race Cars or custom fitted by the teams. However any bracket that requires the modification of a part in order for the sensor to operate must be approved by the Race Director.
- 6.H. Rain light must be functional at all times. Rain lights shall be illuminated when cars are on track during wet conditions, or whenever instructed by a series or IMSA official to turn them on.
- 6.I. A series compatible AMB TranX 260 transponder must be fitted in the provided location on the outside of the LH rear wing support plate.
- 6.J. An onboard camera system may be installed.
- 6.K. Updated Fuel Cut strategy wiring must be in place such that the fuel pump operation is controlled by the ECU.
- 6.L. 11 Position variable Traction Control is required for all vehicles

6.M. The following ECU sensors must be connected and functional such that they are recorded by the ECU:

- i) Throttle Position
- ii) Airbox Temperature
- iii) Airbox Barometric Pressure
- iv) Oil Temperature
- v) Oil Pressure
- vi) Water Temperature
- vii) Fuel Pressure

Any deliberate attempt to distort the readings of the above sensors is prohibited.

6.N. Lambda Sensor P/N 095-540 That is connected to and monitored by the ECU is optional.

PFM.7 Bodywork and wings:

Bodywork and Crash Structure

7.A. Numbers: Use of Series issued numbers and number panels on nose and rear wing endplates is required, in the Series specified locations. Must be black with white background. 7.B. Heat shielding materials may only be applied to the following locations in the vehicle:

- 1 P/N 030-517, engine frame
- 2 P/N 050-537, heat shield
- 3 P/N 050-557, APV actuator
- 4 P/N 100-501, radiator
- 5 P/N 070-513 and 070-514, fuel lines
- 6 P/N 030-501, chassis
- 7 P/N 060-687, gear change cable
- 8 P/N 050-501, throttle cable
- 9 P/N 110-508, motor cover
- 10 P/N 110-527, RH lower side pod
- 11 P/N 110-529, RH upper side pod
- 12 P/N 020-512, RH lower A-arm
- 13 P/N 040-526, RR brake line
- 14 P/N 100-510, header tank
- 15 P/N 070-503, fuel cell cover

Installation of additional panels in order to apply heat shielding is prohibited.

7.C. Mirror size min 60 cm², shape, and location are free.

7.D. Only factory original bodywork is permitted. Minor repairs are acceptable.

Lightweight fiberglass bodywork is permitted.

7.E. Either the 2004 tub and chin splitter design, the updated 2007 tub and chin splitter design, or the updated 2009 tub, chinsplitter and dash bulkhead design is permitted. No modification to body external dimensions or contour permitted. No openings may be added or reshaped except as provided herein. Intake ducts may be reduced or blocked in any manner along or rearward of the original plane of the radiator screen. Protective screens may be added or deleted inside the side pods, but may not extend outside beyond the original screen locations. It is permitted to trim away the horizontal surface of the rear diffuser, as needed, to prevent interference with the rear tire sidewalls.

7.F. Trimming some fiberglass away from the right side upper half of the side pod is permitted. Do not remove any material from the top surface of the pod or from the vertical face on the side pod shoulder. Any material may be removed below the shoulder in the area of negative wind pressure. The forward limit of any such trimming is a vertical line above the location of the third factory provided fastener, which joins the upper and lower side pod halves, when fasteners are counted from the front.

7.G. A cockpit windscreen may be added, provided it does not exceed 18 square inches of the total surface, does stand more than 3 inches proud of the cockpit opening, is constructed from flat stock with no compound curves, and does not constitute a potential hazard to the driver, emergency crews, or other competitors.

7.H. Any damage to the crash structure, i.e., carbon fiber tub, tail cone, or nose, rollover bar or mounts, shall be evaluated by the Series Technical Director and, as needed, by representatives of a Series approved chassis repair facility, to determine suitable repairs. The competitor prior to these parts being returned into competition must provide proof of proper repairs to these areas of the vehicle to the Series Officials. Series Officials may deem any severely damaged or unrepairable tub, nose, tail cone, or roll bar structure illegal.

7.I. Series will post a drawing of the floor under the tub of the Pro car, showing the locations of the required inspection holes. The holes in the wood are to be 1.25" diameter. The holes in the metal sheet are to be 1.00" diameter. Locations are on the same centers. The objective is to be able to verify that the materials were originally the correct thickness. These inspection holes are required. The outer profile of both the front and rear wood floors must remain intact regardless of thickness. If metal can be observed in any area other than the inspection holes the floor will be considered out of spec. The area behind the skid plates on the rear floor may be removed to form 'u' shaped slots surrounding the area of the skids.

7.J. Additional Holes.

1. Holes no larger than 3/16" may be drilled in the inner skin of the chassis cockpit to facilitate secure attachment of optional parts via rivet or threaded insert. Examples include radio boxes, data sensors and ballast. Holes to the outer skin may only be drilled in the areas contained by the side pods, nose or shock cover to facilitate secure attachment of optional parts via rivet or threaded insert. Exceptions are as follows:

i) Two holes no larger than 3/16" may be drilled in the outer skin on each side of the tub to accommodate ride height gauges.

ii) Holes may be drilled and filled in order to inject reinforcing material filler into the tub as a field repair to cracks in the crash structure until suitable permanent repairs can be made, provided safety is not compromised.

2. Holes may be drilled in the fiberglass bodywork to accommodate the following:

i) Mounting of on board video camera

ii) Mounting of Radio Antenna

iii) Accommodation of body fasteners

iv) Accommodation of data acquisition hardware

v) Accommodation of jumper battery plug

7.K. The matching surfaces at the front of the tub and the rear of the nose may not have a gap larger than 1mm between them.

7.L. A 1" Radius semi circle may be cut in the lip of the tub behind the steering wheel to accommodate the installation of Dash displays.

7.M. Rear skids P/N 030-564 beneath the adapter housing may be omitted.

PFM.8 Star Mazda Series Updates:

The following car configurations are legal in the FCC series.

- 1) Original 2004 design wings front and rear, original 2004 rockers and shocks
- 2) New 2009 wings front and rear, original 2004 rockers & original shocks
- 3) Original 2004 wings front and rear, updated 2009 rockers & updated shocks
- 4) New 2009 wings front and rear, updated 2009 rockers & updated shocks
- 5) Original 2004 wings front and rear, updated 2009 rockers & 2010 shocks
- 6) New 2009 wings front and rear, updated 2009 rockers & 2010 shocks

2006 rear attenuators are optional but highly recommended

PFM.9 Cooling: As delivered. Optional additional volume World Speed Inc. pipe kit is permitted.

PFM.10 Suspension:

10.A. Parts must be original, unmodified, and as delivered.

10.B. Static adjustments only within the range of adjustment provided. (ride, height, caster, camber, toe in/out, bump steer) It is permitted to disconnect the sway bars (anti roll bars) and remove any parts necessary to safely accomplish this.

10.C. Manufacture and construction of spherical bearings and rod ends is unrestricted, provided suspension geometry is not altered beyond original adjustment range. A minimum thread engagement of 1.5 times the rod end shank diameter must be maintained inside suspension links at all times.

10.D. Springs must be Series issued and approved, Hyperco 4" free length by 36mm ID. Only 600, 700, 800, 900, or 1000 lbs/inch rates may be used. Any four springs may be used in any position on the car. 400 or 500 lbs/inch springs are permitted with P/N 000-578 and 020-544 rockers only.

10.E. Shock Absorbers (Dampers): Ohlins ST-44 or Ohlins TTX36, serviced, serial numbered, and sealed by Series only. The shock absorbers have the Series specified set of parameters or build that shall not be altered. Shock absorbers must be installed in the positions supplied. Front part number: 000-503 (VDD5C001 Stamped on the shock body) or P/N 000-577 Rear part number 020-504 (VDD6C001 Stamped on shock body) or P/N 020-543 Adjustment is free, within the range provided. No sealastics or packers permitted. Shock absorbers may only be serviced through Star Mazda Championship. Service includes changing of internal fluids but not reservoir pressure. Each car must be fitted with all ST.44 or all TTX36 dampers only.

10.F. Only one suspension pick-up point has an optional location. The rear, lower wishbone, may be located in either of the forward, inboard mounting point provided on the transmission adaptor case. If updated suspension rockers P/N 000-578 and P/N 020-544 are used they must be used in complete sets only. Either optional sway bar pickup provided may be utilized. Also P/Ns 120-518, 120-519, 000-582, 020-545, 020-546 and 020-547 are permitted. If original rear suspension rockers are fitted with P/N 020-547 Pivot Pin, Spacer P/N 020-550 must be utilized. The spacer (P/N 000-549) that resides between the tub and the lower pin (P/N 000-529) must be in place at all times. Roll centers and suspension geometry are only adjustable via the rod ends

attached to the wishbones. Any attempt to alter any pick up location using shims, spacers, washers or any other method is prohibited.

10.G. Pushrods: Front pushrods as originally supplied on the cars and must measure between 20 ¼ inches overall and 21 3/16 inches overall. Any length may be used, but both sides must be of the same length. Exceptions:

i) Unequal length front pushrods may be used on oval tracks, provided the length of each pushrod is within the permitted range of dimensions.

ii) Pushrods with turnbuckles per Series bulletin dated 9 Dec 08, P/Ns 000-581, 000-579, 000-580 are permitted and may be used within the safe range of adjustment provided.

10.H. Front sway bar/blade: Updated sway bar blade p/n 000-551 must be used at all times, with either the 19mm front sway bar or the 20.5mm sway bar. For oval track events, the Series shall require the 20.5mm front sway bar, unmodified.

10.I. The lower rear wishbone clevis on the LH rearward leg (P/N 030-505) may be modified for the sole purpose of facilitating removal of the gearbox side cover.

10.J. The use of one spring abutment bearing per spring is permitted. (P/N 000-562)

10.K. Uprights: Uprights must be unmodified. No blueprinting of the uprights is permitted. The use of shims, washers or spacers between the mating faces of the hub (P/N 000-521) and either Front tooth wheel (P/N 000-543) or the outer drive cup (P/N 060-531) in an effort to relieve pressure on the wheel bearing is prohibited. Rear uprights must use the 12 point Mil spec hub bolts (P/N 060-652) and 12 point Mil spec nuts (P/N 060-653) as delivered for safety.

P/Ns 020-530 and 020-531 Rear upper camber blocks are optional.

D.10.I) Wheel bearings: The only authorized wheel bearings are as follows:

i) SNR P/N 140-501

ii) SKF P/N 140-517

Repacking of the bearing grease is permitted and grease brand and type are free. No other alterations can be made to the bearings.

PFM.11 Wheels:

Front: Series approved BBS 9" wide x 13" diameter

Rear: Series approved BBS 11" wide x 13" diameter

PFM.11 Tires: Goodyear 430 compound tires – One marked set per weekend (including doubles) to be used for Qualify & Race sessions. It is the responsibility of the competitor to ensure their tires are marked appropriately for the qualifying and race sessions. Any change of tires during or between a qualifying session shall automatically result in all previous times being disallowed. If a tire is damaged during a qualifying session, the competitor may replace that tire with another tire upon approval by the Chief Steward. If you must change more than one tire you will go to the back of the entire field. Rain tires may be used at any time.

PFM.11 Clutch and Brakes:

11.A. Clutch may only be replaced with Star Mazda Championship approved type, size, and brand. Permitted clutches are:

Star Part# 060-539 5.5" two-plate metallic, or

Star Part #060-694 Clutch pack, 2 Disc Gear Drive + premium friction.

11.B. Calipers must be used in their intended locations. Rear calipers must be installed in the forward location on the upright. Approved rotors are LH Alcon P/N 040-503 or PFC P/N 040-552 Performance Friction, RH Alcon P/N 040-504 or PFC P/N 040-553 Performance Friction.

11.C. Brake pads: Performance Friction PFC01 or PFC05 or Cobalt CRB.XR2.AP1

11.D. Brake and clutch master cylinder sizes are unrestricted.

11.E. Minimum brake rotor thickness is 0.53 inches for Alcon, 0.679 inches for Performance Friction. Modification of the brake rotor is prohibited.

11.F. Temperature bands P/N 040-557 may be used around the minor circumference of the rotor vanes to increase brake temperature.

11.G. Quick disconnect fittings are permitted for the clutch and brake lines provided they are designed for and meet motorsport specifications.

11.H. Anti knock back springs (P/N 040-551) must be installed inside the calipers, behind each piston.

PFM.15 Exhaust

All cars must be fitted with World Speed Inc. or Star Mazda club muffler system with a Supertrapp flange. The series will determine if plates will need to be used on a race by race basis. Competitors are encouraged to have 18 plates and an end cap available should noise abatement be deemed necessary.

FormulaSPEED2.0 (FS2.0) –

Manufacturer World Speed, Inc. (FormulaSPEED.us)

The FormulaSPEED2.0 is a Mazda powered 6 speed sequential car built by World Speed Inc. 707.935.9761

FS2.0 technical rules are still under development and will be added in a future bulletin.

Everything that is not explicitly authorized in these regulations, or in the technical bulletins which may be issued by the series during the season, is strictly forbidden.