FACTORY FIVE CHALLENGE SERIES

2018 EDITION

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Official Rules
Rules Subject To Change

1. Introduction

In 1995 Factory Five Racing was founded and started producing a replica of the legendary 427 Cobra®. In 1998, a two year effort began to design and optimize the roadster as a dedicated race-car. By the end of 1999 the car was complete and NASA created what would become the Factory Five Challenge Series. Building and Racing such an iconic car has been the dream of many and FFR has made that dream an affordable reality.

2. Intent

The intent of the Factory Five Racing Challenge Series is to provide National Auto Sport Association (NASA) members a truly affordable, fun, and competitive spec racing series in an interesting purpose built car. Good sportsmanship is valued more than finishing position. This means clean, well-executed passing is to be a trademark of the series. Punting another competitor, or leaning on them to gain a position will not be tolerated. Car to car contact including bump drafting can result in an investigation and possible sanctions. The following rules are not guidelines for this class, but an actual listing of allowed and required modifications. All cars and drivers must conform to *NASA's Club Codes and Regulations* (CCR). Where different, the information in this publication supersedes the CCR and any preceding publication.

3. Sanctioning Body

The Factory Five Challenge Series is supported and sanctioned by the National Auto Sport Association (NASA). All race events are governed by the rules set forth by the Class/Series Directors and NASA officials. All competitors agree to also abide by the rules set forth in NASA's current Club Codes and Regulations (NASA CCR) and any supplemental rules issued by the Factory Five Challenge Series Directors.

4. ELIGIBLE MODELS

4.1 Definitions

Eligibility is applied in two ways. 1) The eligibility of the actual race-ready car. 2) The eligibility of the Ford Mustang (and/or parts, thereof) obtained for use in assembling the race-ready car.

4.1.1 Factory Five Racing Kit Car Eligibility

The term "eligible model" is used throughout this publication in context only. This is a kit-car or a "home-built" car. Therefore, a "finished car," built according to the Factory Five instructions, these series rules, and other applicable NASA rules, is considered an "eligible model" for the series. This model shall be known as Factory Five Challenge Series Racer. (FFR part #5003)

4.1.2 Ford Mustang 'Donor' Car Eligibility

Parts from a "donor" car are required to assemble the finished race car. The term "eligible model," found within this publication in the context of references to any parts or assemblies that is (or was) found on the donor car, should be considered a reference to the 1987 through 1993 Fox bodied Ford Mustang model with the Ford 5.0 liter (302 cubic inch) high-output 225 horsepower (factory rating) engine, unless otherwise specified.

5. SAFETY

5.1 Conformance to the NASA Club Codes and Regulations (CCR)

All cars and drivers must conform to *NASA's Club Codes and Regulations* (CCR). Where different, the information in this publication supersedes the CCR.

5.2 Cage/Rollover Protection

All cars must utilize the factory rollover protection system. The system may not be modified without written approval from NASA. In any case, all cars are required to maintain the rollover protection structure to the most current standards, unless otherwise specified in writing by NASA. Notation must be made in the car logbook indicating NASA approval of the modifications.

5.3 Drive Shaft Safety Loop

The installation of a safety loop to contain the drive shaft is required.

5.4 Scattershield

The installation of any SFI approved scattershield, SFI approved (specifically for manual transmissions) scattershield blanket or explosion-proof bell-housing is required.

5.5 Master Switch

The installation of an electrical master "cut-off" switch meeting CCR specifications is required.

5.6 Anti-intrusion protection

All cars are required to install anti-intrusion plates on at least the driver's side. Passenger side anti-intrusion plates are allowed. Anti-intrusion plates shall be at least one eighth (1/8) inch thick steel or one eighth (1/8) inch thick aluminum and cover the outside part of the door bars. The plates may be welded in place or u-bolted to the door bars. If welded in place, each weld must be at least three inches long with a minimum of three welds on each of the top and bottom edges. If u-bolts are used, there must be at least two u-bolts installed on opposite edges of each plate.

5.7 Safety Gear

All drivers are required to utilize a closed-face helmet, with a certified shatter resistant face-field. This helmet must conform to all standards listed in the CCR. All drivers must utilize arm-restraints to help prevent injuries to the hands and arms in the event of a rollover. Drivers of vehicles that have window nets must still wear arm restraints.

5.8 Front Body Mounting
To help prevent intrusion of the body into the driver's compartment, the cowl area of the body (the area above and forward of the dash) must be through bolted to the two 3/4 inch steel tubes on the chassis that extend forward from the dash hoop into the engine bay. Two 5/16 inch diameter bolts must be used on each side. Large washers should be used on both the body and chassis sides to prevent bolt heads from being pulled through.

6. MODIFICATIONS

6.1Legal Modifications
Other than those items specifically allowed by these rules and any addendums, no other part or component that could affect performance may be added, modified, removed, or disabled. Addendums include any applicable official publications or parts lists from the NASA National Office.

6.2 Gray Areas and Questions
If there are any 'questionable' or 'gray' area modifications, the competitor should contact the NASA office for clarification and written permission before competition.

6.3 Replacement Parts/OEM Specifications
Replacement parts must be original equipment manufacturer (OEM) or others of equivalent OEM specifications, unless otherwise specified in writing by Factory Five and/or NASA.

6.4 Special Required Equipment
Some equipment may be required to fulfill series sponsor requirements.

6.5 Limited Production Parts
Use of OEM parts, systems, and components that were only made for use in limited production models or prototypes is prohibited.

6.6 Updating/Back Dating
Parts or components may be updated/backdated using any legal parts. When updating or backdating, safety related components shall not be removed. Adding or moving the harness bar is specifically permitted to allow for proper harness installation.

6.7 Non-Conforming Equipment
Any equipment, which does not conform to the rules, must have prior approval. For considerations, approval must be made to NASA, in writing, 30 days prior to the date of competition. It is the intention of this class not to allow any modifications that would increase the cost of competition.

7. Rules/Procedures

7.1 General Vehicle Specifications

7.1.1 Ground Clearance
No part of the car, including the front air dam (spoiler), shall be lower than the lowest part of the wheel rims.

7.1.2 Weight
All cars, as raced including driver, must weigh at least 2400 lbs. Some cars may have higher minimum weights based on horsepower and torque. See table in Appendix A.

7.1.2.1 Ballast
Ballast, conforming to the CCR, may be added to meet minimum weight provided it serves no other function. A steel plate may be welded under the passenger side floor for ballast attachment.

7.1.3 Fasteners
Fasteners are unrestricted provided they serve the same function as originally intended and/or are used in a conventional manner.

7.2 APPEARANCE REQUIREMENTS

7.2.1 Body Specifications
Bodies must be OEM stock from FFR and must maintain stock contours. The main body shell may be cut into no more than two pieces to facilitate mounting and repair. The entire seam between the two body sections must lie between the leading and trailing edges of the door opening when viewed directly from above and the original mounts and fastener types must be retained. FRR may release, from time to time, addendums with optional body cuts.

7.2.2 Required Sponsor Decals
All decals required by the organizers and sponsors must be displayed in their appropriate positions. No decals from any company, organization, or manufacturer may be displayed that conflicts with any series sponsors. Factory Five is considered a sponsor and four Factory Five decals are required to be displayed on the car.

7.2.3 Optional Components

a) A front air-dam (spoiler) may be used. It must be the one provided by FFR or made of aluminum with the same dimensions and thickness as the one provided by FFR. The method of mounting is unrestricted.

b) Hood, trunk, and door fasteners may be replaced provided they securely mount each panel to the body in its intended position and serve no other purpose.

c) Any mirrors may be used.

d) An additional competition windscreen (FFR part # 12040) may be mounted on the passenger side and may be trimmed to match the body contour on that side. Full width windshields or wind screens are not permitted.

e) A bumper may be added to the rear of the car only. The bumper should serve no other purpose than to minimize body damage to the rear of the car in the event of a collision, and may extend no more than 5 inches past the body at any point.

f) The original “Quickjack” style bumpers may be removed from the front and rear.

g) Front and rear splash panels may be removed but not modified.

h) A steel "skid plate" may be **bolted** to the chassis underneath the oil pan. It can be no larger than 12 inches front to back by 25 inches across and no thicker than 1/8 of an inch. The purpose is to protect the sump area where it hangs lowest.

7.3 INTERIOR

7.3.1 Seat/Steering Wheel

The steering wheel and seat may be replaced, providing that it meets with the applicable rules in the CCR. Removable steering wheels are allowed and any passenger seats are allowed.

7.3.2 Pedals

The pedal assembly including brake, clutch, and accelerator pedals may be modified or replaced with any pedal assembly or combination of assemblies provided that the functionality remains only as originally intended. No power assist, anti-lock or any other additional functions may be added. Alternate clutch, brake and throttle pedals are allowed including their mounting systems. The clutch release system must maintain cable actuation. The foot box area may be modified to install the pedal system.

7.3.3 Instrumentation

Any gauges may be used, provided that they do not violate any other applicable rules.

7.3.4 Interior Sheet Metal

All of the interior sheet metal panels must be installed in their intended locations or alternately may be replaced by aluminum or steel panels of equivalent or greater thickness. The interior sheet metal may be altered to fit a larger seat on the driver’s side.

7.3.5 Parking Brake

The parking brake, its mechanisms, and its actuating components are optional.

7.3.6 Dashboard
The FFR OEM dashboard shall not be altered, except for as provided in these rules. Note: The "instrument cluster" (face) may be modified in order to install gauges and switches. Additionally, the dashboard may be altered to allow for knee/leg clearance.

7.4 ELECTRICAL

7.4.1 Battery
The battery must remain in the stock location on the passenger side of the lower trunk. The battery must be 12-volt and may not be modified in any way. The battery has a minimum weight of 25 lbs.

7.4.2 Wiring
Removal of wiring associated with components that may be legally removed, is permitted. The factory wiring harness may be replaced with an aftermarket wiring harness provided that the new harness functions identically to the OEM harness and in no way alters the signals between the sensors to the Engine Control Unit.

7.4.3 Lights
All vehicles must have a minimum of two functioning OEM rear brake light assemblies. All other OEM light assemblies must remain in place to maintain the stock external appearance, they need not function; and their wiring and bulbs may be removed. The OEM headlight assemblies may be replaced with covers that follow the original contour of the lights and are installed under the factory chrome trim rings.

7.4.4 Ignition
Any spark plugs and ignition wires may be used. All other ignition components and all internal distributor parts must be OEM stock and remain unaltered. Any initial timing is allowed but no re-curving of the distributor is permitted.

7.4.5 Starter
A stock OEM starter from an eligible model Mustang must be used.

7.5 HORSEPOWER/TORQUE/WEIGHT

7.5.1 Horsepower/Torque and Minimum Weight
It is required that every car have an initial dynamometer certification. This certification consists of two parts, a completed FFR Dyno Spec Sheet and Dyno Sheet Readout Graph. All pages must be signed and dated by the dynamometer operator performing the tests.

The FFR Dyno Spec Sheet includes instructions for performing the official dynamometer certification, which must be followed in order for the dyno certification to be valid. The Dyno Spec Sheet is available at www.NASAProRacing.com.

An annual dyno certification is not required but recommended. Re-certification is the responsibility of the owner after any change to the vehicle that could affect horsepower, torque, and weight. (e.g. legal engine modifications, timing, fuel pressure, other)

7.5.1.1 Horsepower/Torque/Weight Table

The Table referenced below will be used to determine the minimum weight for the car based on horsepower and torque. Minimum weight is measured immediately after qualifying and/or race, including driver.

See HP/T/W Table in Appendix A

7.5.1.2 Horsepower/Torque/Weight Documentation

Each competitor will submit the original Dyno Sheet and Spec Sheet to the Region Series Director and keep a copy of both sheets with their NASA Logbook. Current horsepower, torque, and weight numbers shall also be recorded inside the front cover of the Logbook to aid officials in completing tech inspection documentation. i.e. most regions now require tech stickers on the car that include the horsepower, torque, and weight numbers.

7.5.2 Inspection and Testing

To help reduce the cost of competition and provide for simple and fair technical inspections, NASA shall use chassis dynamometer testing as the main means of engine inspection in the FFR Challenge Series.

NASA officials have the right to inspect anything in sight at any time the car is at the track. NASA officials shall have the right to request disassembly or any other procedure required to verify vehicle compliance with these rules including a dynamometer test.

The DynoJet brand is the required type of dyno for testing and inspection.

All dyno readings must be corrected to SAE J1349 Rev JUN90 (29.23 in/hg, 77F, zero humidity) and the dyno's smoothing function must be set to 5.

All Dyno pulls will be made with the hood removed.

Altitude of the dyno shop must be recorded.

At the discretion of the NASA officials, any car may be ordered to report for inspection on a chassis dynamometer at any time. If the result of the dyno test shows a car non-compliant:

1. The competitor will be disqualified for the qualifying session or race for which the test was performed.
2. If it is a random test, the competitor will be excluded from competition until corrections are made.

In either case, the competitor must make corrections before further competition. This may include de-tuning the engine to produce horsepower and torque numbers for a given weight or by adding additional weight to match the horsepower and torque numbers as determined by the table in Appendix A.

Fuel Pressure and Timing checks may be used as an alternative to Dyno Testing. Readings will be compared to the Dyno Spec Sheet to determine compliance.

7.5.2.1 Dyno Compliance Procedure

To ensure fairness, a Challenge Series appointed official or an approved technician will operate any cars being inspected on the chassis dynamometer. Three consecutive "official" dyno pulls must be performed and the average horsepower and torque value from the three measured runs shall be used for power to weight and torque to weight compliance. Should any run result in an erratic or non repetitive result, series officials may dismiss the result or request another dyno pull. NASA, its officers, officials, and assigns are not responsible for any mechanical failures or damage otherwise while the dyno runs are being performed.

7.5.2.2 Fuel Pressure

The fuel pressure on all cars shall be noted on the Dyno Sheet. A +/- 2psi range is allowed. All fuel pressure readings must be taken with the engine running and the vacuum line on the pressure regulator disconnected.

If fuel pressure is tested in impound and the reading from the first gauge is found to be outside of the range listed on the competitor's Dyno Sheet, a second fuel pressure gauge may be used if available. In this case the average of readings from the two gauges shall be used to determine the fuel pressure readings.

Any car with a fuel pressure reading that does not meet the above specifications in impound shall be disqualified.

7.5.2.3 Timing

A +/- 1 degree range is allowed.

If the initial timing is tested and is found to be outside the allowable range, a second light may be used if available. The reading obtained with the second light shall be final.

Timing will be checked with the "spout" removed. The "spout" shall be in place during all competitions.

7.6 ENGINE

7.6.1 Eligible Models

Any 5.0 liter 1987-1993 Mustang (302ci Ford) V8 production engine, in OEM configuration is legal, providing that it meets with all other applicable rules. Cobra model engines and engine components are prohibited. No parts may be replaced with anything other than OEM or direct OEM replacement parts unless specified below.

7.6.2 Engine Modifications

Stock OEM parts may be replaced with items listed in the table below. The TFS Kit part# TFS- K514-360-SPC, containing the parts listed below can be installed in its entirety or as individual pieces with the following exception. Aluminum cylinder heads, TFS part # TFS-51400004 are required to be fitted with TFS rocker arms part # TFS-51400510(3/8) or TFS-51400520(7/16).

OEM Parts	Allowed OEM Alternatives	TFS Kit Individual Parts
Mass Air Meter	----------	SUM-29051B or SUM-29052B
Throttle Body	----------	TFS- 24570
Upper/Lower Intake Manifold	----------	TFS- 51500003
Cylinder Heads	----------	TFS- 51400004
Camshaft	Melling SYB-51	TFS- 51403001
Rocker Arms	Any 1.7 Ratio Roller Rocker*	TFS- 51400510-20
Pushrods	----------	TFS- 21406700

*1.7 ratio roller rockers are only allowed on OEM iron cylinder heads.

7.6.3 Valve Covers

Any valve cover may be used as long as it functions exactly as the OEM stock covers, serves no other function, and fits under the unmodified intake manifold.

7.6.4 Valve Springs

Any single or dual coil steel valve springs may be used.

7.6.5 Compression Ratio

Maximum allowable mechanical compression ratio is 9.5:1 (measured).

7.6.6 Harmonic Damper

Any harmonic damper may be used as long as it weighs at least 9 lbs. and its outside diameter is 6" or greater.

7.6.7 Crankshaft

Any steel or cast iron crankshaft may be used provided it maintains the same stroke as OEM and weighs no less than 37.0 pounds. Crankshafts may be any static imbalance (i.e. 50oz, 28oz, or 0oz) but must be compatible with all OEM parts including engine block, connecting rods, and bearings. Balancing of the crankshaft is allowed provided the minimum weight requirement is still satisfied. Lightening of any other engine components is not permitted.

7.6.8 Lubrication
Oil Filters, adapters, and lines may be replaced or added. Any oil pan and windage tray combination may be used. A pressure accumulator such as an "Accusump ®" may be used. Any lines that pass through the passenger compartment must be metal or metal braided. All lines must be securely fastened and safely routed. Dry sump lubrication systems are prohibited. Any oil or lubricants are allowed, except as a fuel additive.

7.6.9 Exhaust
All cars may use any exhaust headers provided that they mate with the Factory Five "J-pipe" and do not change the location or function of this pipe. No crossover tubes or balance tubes are allowed. Additionally the Factory Five provided side pipes must be installed in the standard location as a working part of the exhaust system. Mufflers may be required to meet sound regulations and are unrestricted, providing that they serve no other purpose than to quiet the exhaust. The entire exhaust system may be coated or wrapped to retain heat. Additional mounting points may be used to support the exhaust as long as that is their only function. (e.g. j-pipe hangars)

7.6.10 Smog Equipment
Any smog equipment may be removed, including the catalytic converter(s). Any smog equipment not removed must either be disabled or left to function as originally intended by the manufacturer. All disconnected ports and holes must be sealed.

7.6.11 Engine Mounts
Engine mounts must be OEM stock or "Energy Suspension" part # 4.1122G.

7.6.12 Water Pump/Alternator/Accessory Pulleys/Belts/Brackets
The OEM (or direct replacement) water pump must be used.

Alternators are unrestricted provided that they meet all other applicable rules. Other than the main electrical master safety cut-out switch, any type of alternator cutoff switch is prohibited.

Accessory drive and driven pulleys may be replaced with alternate pulleys designed for a 6-rib serpentine belt system. A 6-rib serpentine drive belt of any length must be used.

The smog pump and power steering pump may be removed. If the smog pump is removed, all associated plumbing must be removed and disconnected holes plugged.

Any alternator bracket may be used as long as it mounts the centerline of the alternator pulley at or above the top of the engine block. Any power steering bracket may be used as long as it mounts the centerline of the power steering pulley at or above the centerline of the water pump pulley.

7.6.13 Rev Limiter
A rev limiter may be installed so long as it does not interfere with the ECU management of the engine including the ECU's built-in limit for engine RPM.

7.6.14 Engine Rebuilding
Rebuilding a stock engine is permissible with a maximum overbore of 0.060 (inches). Engine gaskets are unrestricted providing they do not increase compression ratio beyond the maximum value allowed.

Replacement pistons, connecting rods, wrist pins, and piston rings must match OEM parts dimensionally (except to match a legal bore size) and may weigh no less than the parts they replace.

All other factory components or direct replacement parts (matching the original OEM parts exactly) must be maintained. Titanium parts are not permitted. Internal engine coatings are not permitted. Grinding, polishing or removal of any material other than as required to mate surfaces in the cylinder heads or intake manifold ports is not permitted.

7.6.15 Engine Block
OEM engine block or direct replacement must be maintained or alternately block may be substituted with Ford racing part# M-6010-BOSS302. Bolt on stud girdles may be added to support main bearing caps provided they meet all other rules.

7.7 FUEL SYSTEM

7.7.1 Fuel Cell
A fuel cell mounted in the factory location and meeting the NASA CCR must be used. The fuel cell must measure within 0.75 inches of the following measurements: 17.5 inches front to rear, 34.0 inches side to side, and 9.5 inches tall. Fuel filling may be accomplished either inside the trunk or via attachment to the stock fuel cap. If using the stock fuel cap, a rollover valve (check valve) must be utilized in the filler line. The bottom surface of the fuel cell may hang no lower than 12.5 inches below the aluminum sheet that forms the trunk floor directly above the cell.

7.7.2 Fuel Cell - Trunk Access
An opening in the trunk floor aluminum may be created to access the filler neck and other fuel cell components. The 3/4 inch tube below the trunk floor above the cell opening may be cut or repositioned to facilitate access. This opening can be no larger than 100 square inches. It is recommended but not required that this opening be covered with a hinged or removable aluminum cover to help reduce the effects of a fuel cell fire. Every effort should be made to minimize the size of this opening. All other trunk aluminum must be installed as intended.

7.7.3 Air Induction
The stock EGR spacer may be removed and replaced with a plate no thicker than 5/16 inch for mounting the throttle linkage. The plate can serve no other purpose.

The stock air induction tube must be retained with no additional tubing used. Heat shielding is permitted so long as it does not act to direct the flow of air. The air filter element, as supplied with the kit or an exact equivalent, must be used and must draw air entirely from inside the engine compartment.

7.7.4 Fuel Delivery System
The factory fuel rail must be used. Any make or size of fuel injector may be used provided they fit in the unmodified fuel rail and intake manifold. The OEM fuel pressure regulator may be replaced with an adjustable fuel pressure regulator. Only one pressure regulator per car is allowed. Any adjustable regulator may be used that fits on the factory OEM mount and has a single screw adjustment and a vacuum port. There must be a stock type Schrader valve for testing fuel pressure. It must be installed in the high pressure side of the system.

7.7.5 Fuel Pump
Any single electric fuel pump, mounted internal or external to the fuel cell, may be used provided it serves no purpose other than fuel delivery to the engine and meets all other applicable rules. The fuel pump should be mounted in a protected location and may not be mounted inside the driver's compartment. Fuel filters, lines, and hoses are unrestricted except that the maximum inside diameter (ID) of all fuel lines/hoses is 1/2 inch.

7.7.6 Fuel Mixture Computer
The Engine Control Unit must be one of the following from a 1989 through 1993 Mass Air Sensor equipped engine: A9L, A3M, 3M1, S0Z, D3D1, A9M, A9P, C3W, C3W1, A9T, A9S, or 8LD. Modifications to the computer (including any reprogramming or add on modules) or fuel injection system are prohibited, unless otherwise specified by these rules. Note: The fuels/ignition computer may be exchanged with any other competitor's computer unit, at the discretion of the Chief Scrutineer or the Race Director.

7.7.7 Fuel Lines
Any fuel lines or hoses that pass through the cockpit compartment must be metal or metal braided as well as securely fastened and safely routed.

7.7.8 Fuel
Any unleaded gasoline is allowed. Fuel additives are not permitted.

7.8 HEAT EXCHANGER

7.8.1 Radiator
Any radiator may be used provided it fits in the stock location. A shroud may be added to direct the air across the radiator.

7.8.1.1 Radiator Shielding
A screen may be mounted in front of the radiator and oil cooler to prevent damage to these components. The screen must allow air to flow through freely and cannot be used for aerodynamic purposes.

7.8.1.2 Hoses / Filler
Stainless steel hoses are allowed as well as any in-line "T" filler neck.

7.8.1.3 Fans/Thermostats
Cooling fans and thermostats are unrestricted.

7.8.2 Oil Cooler
Oil coolers, including power steering, transmission, rear end, and engine oil may be replaced or added. All lines must be securely fastened and safely routed.

7.8.3 Catch Tanks-Oil
All engine oil breathers must vent to a catch tank of at least one U.S. quart capacity. Catch tanks shall not be mounted in the passenger compartment.

7.8.4 Fuel Cooling System
Fuel cooling systems, of any kind, are prohibited.

7.9 TRANSMISSION

7.9.1 Eligibility
An OEM T-5 transmission that was originally offered in a model year 1987-1993 V8 Mustang must be used, unless otherwise specified by these rules. Standard ratios must be maintained. Alternatively, a Tremec T5Z (part #M-7003-Z) or a Tremec (part#3550 or TKO500) with the following ratios: 1st gear 3.27, 2nd gear 1.98 or 1.97, 3rd gear 1.34, 4th gear 1.00, 5th gear .68, may be used. Transmissions must be unmodified and gears may not be shaved, polished, trimmed, or otherwise changed.

7.9.2 Disallowed/Alternative Transmissions
Automatic and semi-automatic transmissions are not allowed. Cars originally equipped with an automatic transmission may convert to a legal manual transmission.

7.9.3 Clutch/Flywheel
Any OEM diameter single disc clutch and steel pressure plate may be used. Flywheel must be OEM dimensions, be made of cast iron or steel, and weigh no less than 19.5 lbs.

7.9.4 Shifter Assembly
The shifter assembly and/or any components thereof, may be modified or may be replaced with any mechanical linkage shifter assembly and/or components, providing that the functionality remains only as originally intended. The transmission housing may be modified or swapped to accommodate different types and locations of shifter mechanisms as long as the modifications serve no other purpose.

7.9.5 Transmission Mount
The stock transmission mount may be replaced by any rubber or polyurethane mount that maintains the stock transmission location and tail height.

7.10 DIFFERENTIAL/AXLES

7.10.1 Differential/Gear Ratio
The OEM stock 8.8 differential from the eligible model must be maintained. Those using C-clip eliminators and 31 spline axles may use the differential from a Ford truck as long as it is the same Ford "Trac-Loc" differential. The use of Ford clutches and increasing the preload on the limited slip is permitted provided that no machining is done. A 2.73:1, 3.08:1, or 3.27:1 differential ratio must be used in all cars. No modifications are permitted including shaving, polishing, or trimming.

7.10.2 Rear Axles
Any commercially available replacement type steel or alloy steel axles may be used. Full floater axles are prohibited. "C-clip" eliminators are allowed, however competitors should check with the "C-clip" eliminator manufacturer as to the ability of their "C-clip" eliminator to withstand the side loads associated with road racing. **Notice: Many of the "C-clip" eliminators are designed for street or drag strip use only and are not necessarily adequate for use in road racing.** A catch can to catch overflow from the rear axle is permitted. Negative camber measured on either rear wheel must not exceed 0.5 degrees.

7.10.3 Drive Shaft
The drive shaft must be made of steel.

7.10.4 Traction Control
Traction or launch control of any type is not permitted.

7.11 CHASSIS/SUSPENSION/STEERING

7.11.1 Chassis- Repairs
All chassis and structure repair must be done as close as possible to a FFR factory original configuration.

7.11.2 Chassis-Strengthening
The frame must be maintained as stock and made of mild steel. Alterations made to the roll cage must function to enhance safety and must be approved by NASA. Alterations made solely for the purpose of stiffening the chassis will not be approved.

7.11.3 Suspension Mounting Points
Suspension pick up points (mounting points) shall not be altered in any way unless updating an older car to newer specifications. In the case of an update, the new pickup points must meet with existing factory specifications exactly (within specified tolerance). In a case where no factory tolerance is listed, the mounting point must be within +/- 1.0% of the listed (or common, if not listed) measurement.

7.11.4 Suspension Components

7.11.4.1 Front Suspension
The front suspension must utilize the FFR provided front upper and front lower control arms, and front lower control arm bushings. Stock 1987-1993 Mustang spindles may be replaced by Factory Five front spindles part# 33043 and 33044 along with Factory Five steering arms part# 14848 and 14849. Spindles may not be bent to alter suspension geometry. Upper control arm sleeves and clevises may be trimmed or replaced to allow for more camber adjustment but otherwise no modifications are permitted to any control arm.

7.11.4.2 Front Sway Bar
Installation of the front sway bar, Factory Five part# 15406, is optional.

7.11.4.3 Rear Suspension
The rear suspension must utilize the FFR "3 link" supplied parts, including mounting brackets, control arms, control arm bushings and panhard bar, unless otherwise specified by these rules. Travel limiters in the form of rubber bump stops and/or cables may be added to or removed from the suspension, provided that they serve no other purpose than limiting total suspension travel in compression or droop.

7.11.4.4 Spring Rates
Front and rear coil-over spring rates are unrestricted. The source of these replacement springs is unrestricted.

7.11.4.5 Shocks
Shocks must be used as specified by 1Factory Five and cannot not be re-valved or modified in any way. The spec front shock is Koni #30-1720 (FFR#14622). The spec rear shock is Koni #30-1721 (FFR#14623). Alternatively, the Bilstein 274SR rear shock may be used on the rear. **NOTE - The use of Bilstein 273SR front shocks is strictly prohibited.**

7.11.5 Track Width
Rear axle track width shall not exceed 68.75". Track width is measured “as raced” at the outside edge of the tires. The track width measurement will be taken at a point three inches from the ground by using two metal plates similar to the Longacre #7950 toe plates placed flush against the tires. The measurement used for compliance will be the average of the measurements taken in front of and behind the tire after accounting for the thickness of the plates.

7.11.6 Steering Rack
The steering rack from any 1987-1998 mustang may be used along with the power steering pump from any 1987-1993 Mustang. The steering rack may also be replaced with a manual unit providing it is a direct bolt in and there is no change in the steering geometry. The steering rack may be mounted in either location provided for in the FFR assembly instructions. Inline pressure reduction valves are permitted and the pressure may be adjusted on any allowable power steering pump.

7.11.7 Wheels and Tires

7.11.7.1 Wheels
Rims must be 17 inch in diameter with a maximum width of 9 inches and weigh no less than 20 pounds each.

7.11.7.2 Wheel Studs
Wheel studs and lug nuts are unrestricted. However, they must be made of steel and be no smaller in size than the OEM part.

7.11.7.3 Tires
The Toyo Proxes RR or RA-1, size 255/40/17, must be used for qualifying and competition. Toyo model RR is the preferred dry weather tire and model RA-1, full tread, is the preferred wet weather tire. Shaving and/or grooving of the tire is permitted.

7.12 BRAKING SYSTEM

7.12.1 Pads/Shoes
Brake pads and shoes are unrestricted. Brake lining material is unrestricted.

7.12.2 Brake Hoses
Rubber brake lines/hoses may be replaced with suitable metal braided lines. Brake lines/hoses may be relocated and may be given additional protection providing that it serves no other purpose than to protect the brake line. All brake lines/hoses must be securely fastened and safely routed. Brake fittings, adapters, and connectors are unrestricted.

7.12.3 Master Cylinder/Associated Hardware
Any non-power assisted brake master cylinder or multiple cylinder assembly is permitted.

7.12.3.1 Fluid
Brake fluid is unrestricted, provided that it only serves its intended use, as stated by the manufacturer.

7.12.3.2 Associated Hardware
An adjustable brake-proportioning valve (one) may be used. The original proportioning (or biasing) valve shall not be modified, but may be removed. However, if it is removed, it must be removed in its entirety.

7.12.4 Brakes

7.12.4.1 Front Brakes
Cars equipped with stock Mustang 5.0 (1987-1993) front spindles must retain OEM or direct replacement calipers; however, front rotors may be replaced with 5 lug rotors that are otherwise identical. Cars fitted with Factory Five part# 33043 and 33044 spindles must use OEM or direct OEM specification replacement front calipers, rotors, and hubs from a 1994-1998 "Cobra" model Mustang.

7.12.4.2 Rear Brakes
Stock Mustang 5.0 (1987-1993) rear drum brakes may be replaced with four or five lug disc brakes with metal rotors with an outside diameter no greater than 10.5 inches and a single cast iron single piston caliper per side. A common source of rear disc brakes is found on any 1987-1988 Ford Thunderbird Turbo Coupe or 1994-1998 Mustang GT and the entire rear axle housing can be used from either of these vehicles. The axle length may be changed to accommodate the brakes; however the rear track width shall comply with rule 15.5 Track Width.

7.12.5 Disk Brake Modifications/Cooling
Disk brake backing plates may be replaced, removed, or modified. Air ducts may be fitted to the brakes providing that no holes are made in the body.

7.12.6 Prohibited Brake Components
Antilock braking systems (ABS) and power brake systems are prohibited.

8. Factory Five Challenge Series Directors/Website

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9. Appendix A

FFR Challenge Series Horsepower/Torque/Weight Table

HP/TQ	<=310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325
<=315	2400	2403	2405	2408	2410	2413	2415	2418	2420	2423	2425	2428	2430	2433	2435	2438
316	2408	2410	2413	2415	2418	2420	2423	2425	2428	2430	2433	2435	2438	2440	2443	2445
317	2416	2418	2421	2423	2426	2428	2431	2433	2436	2438	2441	2443	2446	2448	2451	2453
318	2423	2426	2428	2431	2433	2436	2438	2441	2443	2446	2448	2451	2453	2456	2458	2461
319	2431	2433	2436	2438	2441	2443	2446	2448	2451	2453	2456	2458	2461	2463	2466	2468
320	2438	2441	2443	2446	2448	2451	2453	2456	2458	2461	2463	2466	2468	2471	2473	2476
321	2446	2449	2451	2454	2456	2459	2461	2464	2466	2469	2471	2474	2476	2479	2481	2484
322	2454	2456	2459	2461	2464	2466	2469	2471	2474	2476	2479	2481	2484	2486	2489	2491
323	2461	2464	2466	2469	2471	2474	2476	2479	2481	2484	2486	2489	2491	2494	2496	2499
324	2469	2471	2474	2476	2479	2481	2484	2486	2489	2491	2494	2496	2499	2501	2504	2506
325	2477	2479	2482	2484	2487	2489	2492	2494	2497	2499	2502	2504	2507	2509	2512	2514
326	2484	2487	2489	2492	2494	2497	2499	2502	2504	2507	2509	2512	2514	2517	2519	2522
327	2492	2494	2497	2499	2502	2504	2507	2509	2512	2514	2517	2519	2522	2524	2527	2529
328	2499	2502	2504	2507	2509	2512	2514	2517	2519	2522	2524	2527	2529	2532	2534	2537
329	2507	2509	2512	2514	2517	2519	2522	2524	2527	2529	2532	2534	2537	2539	2542	2544
330	2515	2517	2520	2522	2525	2527	2530	2532	2535	2537	2540	2542	2545	2547	2550	2552
331	2522	2525	2527	2530	2532	2535	2537	2540	2542	2545	2547	2550	2552	2555	2557	2560
332	2530	2532	2535	2537	2540	2542	2545	2547	2550	2552	2555	2557	2560	2562	2565	2567

9. Appendix B

Factory Five Racing Challenge Series
Dyno Test Data and Vehicle Specification Sheet

Owner: _____ Car#: _____ NASA Log Book # _____

Items to be certified:

1. Ignition Timing: _____ deg. adv. @ idle with spout removed.

   Idle RPM: _____

2. Fuel Pressure: _____ psi.

3. Performance Modifications:

   _____ None

   _____ Adjustable Fuel Pressure Regulator

   _____ Roller Rockers

   Brand/Part Number/Ratio _____

4. Altitude of dyno shop: _____ ft

5. Dynojet set to correct to SAE J1349, smoothing 5 ____ Yes

6. Engine in normal operating temperature range 180-210 degrees ___ Yes

7. Peak Readings: _____ HP ____ Torque

_____ _____
Owner's Signature Date Dyno Operator's signature Date

_____
Name

FFR Dynamometer Inspection Procedures

1. Only perform dyno runs on DynoJet brand dynamometers

2. All dyno readings must be corrected to SAE J1349 Rev JUN90 (29.23 in/hg, 77F, zero humidity) and the dyno's smoothing function must be set to 5

3. Car must be in "ready to race" configuration with regards to engine and drivetrain. All engine components that are not stock (roller rockers, adjustable fuel pressure regulator) and/or are adjustable and affect power (fuel pressure, timing, etc.) must be written down in section 1-3 of the inspection sheet.

4. All certification and inspection pulls will be completed with the hood removed.

5. Altitude of the dyno shop must be recorded. **Dyno runs made at locations with elevation greater than 1,500 feet higher than the track will not count as being valid at that track.**

6. Starting RPM shall be no higher than 2000. Ending RPM shall be no lower than 5500.

7. The highest peak horsepower and torque of any run in the noted final configuration will be recorded on the inspection sheet.

8. These horsepower and torque numbers are what must be used to determine the vehicle's required minimum weight.