



FACTORY FIVE CHALLENGE SERIES



"Gentlemen, start your engines!"

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2004 EDITION

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Dedication



Jenny's 2nd birthday. December 11, 2001

Team Jenny

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1 INTRODUCTION

1.1 Intent

The intent of the Factory Five Racing Challenge Series is to provide National Auto Sport Association (NASA) members a truly affordable and fun spec series in an interesting purpose built car. 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.

1.2 Acronyms Defined

CCR refers to the NASA Club Codes and Regulations

FFR refers to Factory Five Racing

NASA refers to the National Auto Sport Association, Inc.

NASCAR refers to the Nation Association of Stock Car Auto Racing, Inc.

2 ELIGIBLE MODELS

2.1 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.

2.1.1 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 and to these, and other applicable NASA rules, is considered an “eligible model” for the series. This model shall be known as Factory Five 427 Spec-Racer (FFR 5003).

2.1.2 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.

3 SAFETY EQUIPMENT

3.1 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.

3.2 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.

3.2.1 Violation of Cage Rules

Any driver that participates with a car that does not meet with the current standards will be fined a minimum of \$500 payable to a charity chosen by FFR. Other penalties will apply.

3.3 Drive Shaft Safety Loop

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

3.4 Scattershield

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

3.5 Master Switch

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

3.6 Doors

Doors must be ‘glassed’, riveted, or bolted shut, unless otherwise provided for in the original FFR kit.

3.7 Fuel Cell

The factory provided fuel cell must be maintained and must utilize a rollover valve (check valve) or have the filler neck removed and a fill plate installed on the tank to prevent leakage in the event the vehicle rolls over. Recommended rollover valve : [Fuel Safe](#) part number FV290A. The fuel cell vent may be replaced with a larger vent to allow for faster fuel filling. The vent must contain a check valve to prevent leakage in case of a roll over.

3.8 Flammable Material

The interior must be void of all reasonably flammable material.

3.9 Helmet

All drivers are required to utilize a closed-face helmet, with a certified shatter resistant face-shield. The helmet must conform to all standards listed in the CCR

3.10 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 eight (1/8) inch thick steel or one eight (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.

3.11 Arm restraints

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.

4 MODIFICATIONS

4.1 Legal Modifications

Other than those items specifically allowed by these rules and any addendums, no other part or component may be added, modified, removed, or disabled. Addendums include any applicable official publications or parts lists from the NASA national office.

4.2 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.

4.3 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.

4.4 Special Required Equipment

Some equipment may be required to fulfill series sponsor requirements.

4.5 Limited Production Parts

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

4.6 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.

4.7 Non-Conforming Equipment

Any equipment, which does not conform to the rules, must have prior approval. For consideration, 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.

5 GENERAL VEHICLE SPECIFICATIONS

5.1 Ground Clearance

No body part, including the front air dam (spoiler), shall be lower than the lowest part of the wheel rims. Minimum ride height is 3.5 inches, measured at the lowest point of the frame.”

5.2 Weight

All vehicles must weigh at least 2450 lbs., for the entire duration of any qualifying or race session, including the driver.

5.2.1 Ballast

Ballast is allowed; and if installed, it must be securely attached to the passenger side floor. Each ballast piece shall not be taller than three inches nor stacked higher than three inches. Each ballast piece must be made of solid material and weigh at least 2.2 kilograms (225.0 grams tolerance). Ballast must not serve any other function than to add weight to the car. A steel plate may be welded under the passenger side floor for ballast attachment.

5.3 Fasteners

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

6 APPEARANCE REQUIREMENTS

6.1 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.

6.2 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.

6.3 Optional Body Components

- a) An FFR front air-dam (spoiler) may be used.
- b) Hood and trunk pins may be fitted.
- 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.

7 INTERIOR

7.1 Seat / Steering Wheel

The steering wheel and seat may be replaced provided that the replacement part meets the CCR. Removable steering wheels are allowed and passenger seats are allowed.

7.2 Shifter Assembly

The shifter assembly and/or any components thereof, may be modified or may be replaced, with any shifter assembly and /or components, providing that the functionality remains only as originally intended.

7.3 Pedals

Modifications may be made to the stock brake and clutch pedal, if necessary to improve the comfort, control, and accessibility for the driver. Any cable actuating throttle pedal may be used.

7.4 Instrumentation

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

7.5 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.

7.6 Parking Brake

The parking brake, its mechanisms, and its actuating components may be removed.

7.7 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.

8 ELECTRICAL

8.1 Battery

The battery must remain in the stock location on the passenger side of the lower trunk, per FFR instructions. The battery must be a 12-volt, Group 24 or 24F, and cannot be modified in any way. The battery must be secured with a suitable steel battery hold down assembly.

8.2 Alternator

Alternators are unrestricted provided that they meet all other applicable rules. The alternator must be installed in a stock location. The alternator must be charging according to the manufacturer's specifications (for voltage and amperage, including while under load). Other than the main electrical master safety cut-out switch, any type of alternator cut off switch is prohibited.

8.3 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.

8.4 Lights

All vehicles should 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, however they need not function; and their wiring and bulbs may be removed

8.5 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-curve of the distributor is permitted.

8.6 Starter

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

9 ENGINE

9.1 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. See Rule 2.1.2 Cobra model engines and engine components are prohibited.

9.2 Compression Ratio

The stock compression ratio must be maintained +/- 0.2 mechanical compression units (measured).

9.3 Balancing

Engine balancing is allowed. However, lightening of parts beyond the minimum required to balance is prohibited.

9.4 Lubrication

Oil Filters and lines may be replaced or added. Any oil pan may be used, providing that it conforms to all other applicable rules. 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.

9.5 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. 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.

9.6 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.

9.7 Gaskets

Gaskets are unrestricted, providing that they serve no other purpose than originally intended. Head gaskets must be the same compressed thickness as OEM.

9.8 Water Pump / Accessory Pulleys / Belts

Accessory drive pulleys may be replaced with any other pulley, so long as they are mounted in the manner and location. All accessories (except water pump and alternator) may be removed, along with their associated belts, hoses, and attachments. If any accessory is removed, it must be removed in its entirety. An OEM (or direct replacement) water pump must be used. Any accessory drive belts may be used, providing that they cause the engaged system(s) to function only as intended.

9.9 Engine Rebuild

Rebuilding a stock engine is permissible with a maximum overbore of .030 inches. The stock compression ratio must be maintained. All other factory components or direct replacement parts (matching the original OEM parts exactly) must be maintained. Any car that has an overbored engine must meet a higher minimum weight. Add ten (10) pounds to the minimum weight requirement for each 0.010 inches of overbore.

10 FUEL SYSTEM

10.1 Fuel Delivery System

The factory fuel system including 19 lb. injectors and unmodified pressure regulator must be used.

10.2 Air Induction

The stock air induction tube and stock unmodified mass air meter with screen must be retained with no additional tubing used. 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. The factory intake-manifold, including throttle body and spacer, as well as heads, camshaft, rocker arms etc. must remain stock.

10.3 Fuel Pump

An OEM fuel pump or FFR provided fuel pump is required and must be mounted in the OEM specified location inside the fuel cell. No additional fuel pumps may be used. Fuel filters, lines, and hoses are unrestricted except that the maximum inside diameter (ID) of all fuel lines/hoses is 3/8 inch. The return line must flow freely from the factory regulator to the fuel cell and not affect fuel pressure.

10.4 Fuel Mixture Computer

The Engine Control Unit must be from a 1989 through 1993 Mass Air Sensor equipped engine. 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 Series Steward (i.e. scrutineer) or the Race Director.

10.5 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.

11 HEAT EXCHANGE

11.1 Radiator

Any radiator may be used provided it fits in the stock location.

11.1.1 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.

11.1.2 Fans / Thermostats

Cooling fans and thermostats are unrestricted, except as where prohibited by applicable rules.

11.2 Oil Cooler

Oil coolers may be replaced or added. Oil coolers must be securely mounted forward of the firewall. All lines must be securely fastened and safely routed.

11.2.1 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.

11.3 Fuel Cooling System

Fuel cooling systems, of any kind, are prohibited.

12 TRANSMISSION

12.1 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. Transmissions may be modified to improve durability but the standard ratios must be maintained. Alternatively, a [Tremec \(part#3550\)](#) may be used, but only with the following ratios: 1st gear 3.27, 2nd gear 1.98, 3rd gear 1.34, 4th gear 1.00, 5th gear .68.

12.2 Disallowed / Alternative Transmissions

Transmissions shall not be modified and no alteration to OEM stock transmission ratios is permitted. Automatic and semi-automatic transmissions are not allowed. Cars originally equipped with an automatic transmission may convert to a legal manual transmission.

12.3 Clutch/Flywheel

Any single disc clutch and steel pressure plate of OEM stock diameter may be used provided that it bolts directly to an unmodified OEM stock flywheel.

13 DIFFERENTIAL / AXLES

13.1 Differential/Gear Ratio

The OEM stock 8.8 inch differential from the eligible model must be maintained

A 2.73:1 gear ratio must be used in all cars.

13.2 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.

14 CHASSIS / SUSPENSION

14.1 Chassis- Repairs

All chassis and structure repair must be done as close as possible to the FFR factory original configuration.

14.1.1 Chassis-Strengthening

The frame must be maintained as stock and made of mild steel. Alterations made to the rollcage 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.

14.2 Suspension Components

The rear suspension must utilize either the eligible factory Mustang parts or the FFR kit parts. Any FFR supplied rear suspension part for the series cars may be replaced with the corresponding OEM part, at the option of the car owner. Under no circumstances shall any parts for the rear suspension be used other than the OEM parts, and/or the FFR supplied parts, unless other 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.

14.3 Wheels / Tires

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

14.3.1 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.

14.3.2 Tires

Unless otherwise specified the spec tire is a 17" diameter Kuhmo 700Victoracer, with a maximum width of 275 mm. Shaving of the tires is allowed. Tires shall not extend past the body (when viewed from above the car) at the highest point of the fender. Any wheels and DOT approved tires may be used in the rain, unless otherwise specified. The Race Director will determine whether rain tires will be allowed at any given time.

15 BRAKING SYSTEM

15.1 Pads / Shoes

Brake pads and shoes are unrestricted. Brake lining material is unrestricted.

15.1.1 Fluid

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

15.2 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.

15.3 Master Cylinder / Associated Hardware

Any non-power assisted brake master cylinder or multiple cylinder assembly is permitted, providing that it is mounted in the stock location and actuated by the stock brake pedal assembly.

15.3.1 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.

15.4 Brake Calipers and Drums

Unless otherwise specified, stock Mustang 5.0 (1987-1993) front disc brakes and rear drums must be used. Alternatively, the rear drums may be replaced by four or five lug disc brakes with a rotor diameter of no greater than 10.5 inches and a single piston caliper. The axle length may be changed to accommodate the brakes, however the rear track width shall not exceed 58.5 inches as measured from the center of the rear tires. A common source of rear disc brakes is found on any 1987-88 Ford Thunderbird Turbo coupe or 1994 and later GT model Mustang, and the entire rear axle housing can be used from either of these vehicles.

15.5 Disk Brake Modifications / Cooling

Disk brake backing plates may be removed or modified. Air ducts may be fitted to the brakes (maximum diameter three (3) inches) provided that no changes are made in the body and / or structure.

15.6 Prohibited Brake Components

Antilock braking systems (ABS) and power brake systems are prohibited.

15.7 Brake Pedal / Lever

The brake pedal may be modified to provide more leverage on the master cylinder, providing that the modification serves no other purpose. See Section 7.3 ([click on 7.3](#))

16 SUSPENSION / STEERING

16.1 Control Arms / Bushings

Stock FFR control arms and bushings (polyurethane) must be used.

16.2 Spring Rates

Front and rear coil-over spring rates are unrestricted. The source of these replacement springs is unrestricted as well.

16.3 Shocks

Shocks must be used as specified by Factory Five and cannot not be re-valved, nor modified in any way.

16.4 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) measurement.

16.5 Steering Rack

The steering rack provided from [Factory Five](#) may be replaced with a power-assisted rack and steering pump from a 1987-1993 Mustang. The steering rack may be mounted in either location provided for in the FFR assembly instructions.

17 REFERENCE LIBRARY

Factory Specifications (for reference only)

Note: Actual data might vary. Utilize this resource for reference only.

Engine

Configuration
Bore x Stroke
Displacement
Compression ratio
Engine Control System
Maximum Horsepower
Maximum Torque
Maximum Engine Speed

Dimensions/Capacities

8 cylinder iron block, iron heads
4.00 x 3.00 in.
302 CID
9.0:1
Ford EECIV multiport fuel injection
225bhp @ 4800 rpm
305lb-ft @ 3200 rpm
6250 rpm

Drivetrain

Transmission
Rear Differential Gear
Clutch
Bellhousing

Borg Warner T5 5 speed
2.73:1 limited slip
Stock Mustang 10"
Lakewood Scattershield

Suspension

Front Suspension Type
Rear Suspension Type
Shocks-Springs
Steering
Brakes

Independent unequal length upper and lower A-arms
Solid axle 4 links
Aluminum Coil-overs w/ ride height adjustment
15:1 Manual rack and pinion
11" front disks and 10.5" rear disc brakes or 10" drums

Wheels

Size
Type
Tires
Dry Weight
Weight Distribution F/R
Wheelbase
Length
Track F/R
Height
Width
Min. Ground Clearance
Fuel Capacity
Oil Capacity

Dante 5 Spoke, 4 Lug
9.0 x 17.0
Cast Aluminum
275/40/17 Kumho V700 Victoracer
2305 lbs
45.1/54.9 (%)
90 in.
160 in.
56 in./ 58.5 in.
46.5 in.
72 in.
4.00 in.
22.0 gal
5.0 qt.

Construction

Vehicle Type
Frame
Roll Cage
Body Material

Front engine, rear wheel drive, 2 passenger, 2 door
Tubular steel space frame with aluminum shear panels
6 point cage with side impact ribs integral to frame
Hand-laid Vinylester resin composite (3/16" nom.)

Interior

Seat
Restraints

Aluminum Kirkey Racing seat
Simpson safety harness

18 FACTORY FIVE PERFORMANCE TEST

Acceleration Data

0-60 mph 4.80 sec
0-100 mph 13.9
Standing 1/4 mi. 13.6 sec at 99 mph
Roadholding (1at G) 1.01 g
Braking 70-0 181 ft.
Best 1/4 mile 12.85 sec*
Top Speed (est.) 134 mph

19 FACTORY FIVE CONTACT INFORMATION

Factory Five Racing

automotive design and engineering

Factory Five Racing, Inc. 9 Tow Road, Wareham, MA 02571 (508) 291-3443

General Information (508) 291-3443 info@factoryfive.com
FFR event questions Mark Weber markw@factoryfive.com

Shipping/Transport Information
Picking up your own kit Alicia Mello alicia@factoryfive.com
Order Shipping Status Joe Camire joe@factoryfive.com

Technical Support Joe Camire tech@factoryfive.com

Click here for answers to [Frequently Asked Questions](#) or go to this URL:
<http://www.factoryfive.com/table/ffrkits/427/faquestions/faquestions.htm>