



Spec Miata

Official 2024 National Rules

(Rules subject to change)
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(Note: Latest revisions are in blue font and all previous revisions are in green)

1. Definition and Claim

1.1. The NASA Spec Miata Challenge™ (SMC) is an affordable racing series, primarily focused on road racing, and shall function as an advertising and marketing tool for the series sponsors, the independent sponsors of each team, as well as the official sanctioning body of the series. The trade name, “NASA Spec Miata Challenge,” and these rules are the property of the National Auto Sport Association, Incorporated® located at 7065 W. Ann Rd. #130 - 43 Las Vegas, NV 89130; 510-232-NASA (6272).

1.2. The marks “Mazda” and “Miata” are recognized as registered to Mazda Motor Corporation with the United States Trademark and Patent Office.

2. Intent

The intent of these rules is to provide mandates to ensure that all vehicles are constructed and modified within clearly established limits, so as to ensure an even platform, in which a contest of driving skill may provide the most talented drivers with great rewards.

3. Purpose

The purpose of this series is to provide an avenue to promote sponsor brand awareness on a national scale. Additionally, this series should provide a stage to showcase driving talent, in hopes that the most talented drivers will advance to even higher-level professional series

The original OEM vehicle identification number (VIN) stamped on the firewall shall correspond with the model year automobile classified. VIN plates or stampings shall remain in place, with the firewall VIN taking precedence.

4. Format

Modifications, addition or removal of parts or material are not allowed, unless specified or approved in these rules. Additional modifications are not permitted. These rules are not intended as guidelines; rather they shall serve as the national set of rules, and must be strictly followed. Each NASA Region is responsible for ensuring that all competitors running in the corresponding regional championship conform to these rules. Replacement parts not specified by these rules must be OEM or the exact equivalent

5. Eligible Manufacturers

Mazda Motor Corporation is the only manufacturer of models that are legal for this series. However, other companies, including Mazda Competition Parts, which should be considered a separate company from Mazda Motor Corporation, may manufacture some legal and/ or required parts and components.

6. Eligible Models

See Appendix A

7. Sanctioning Body

The NASA Spec Miata Challenge™ series is sanctioned by the National Auto Sport Association (NASA). All events are governed by these rules, applicable addendums, prima fascia rules, as well as those found in the latest version of the NASA Club Codes and Regulations © (CCR). All decisions made by the series administration are final, except under certain conditions, as specified by the CCR.

8. Safety

8.1.1 All safety standards not specified herein must conform to the NASA Club Codes and Regulations (CCR). Where conflicts are found between the CCR and these rules, these rules must supersede the conflicting rules found in the CCR. However, in the interest of safety, any participant that determines a conflict exists must immediately report it to the series administration, for clarification. The main hoop diagonal should connect to the top of the main hoop at a point that is no further from the vertical on the driver's side than 50% of the width of the main hoop.

8.1.2 Hardtop may be used, and if used, must be securely bolted in place. Aftermarket hard tops are allowed provided they meet the exact original equipment specifications for both design and weight

8.1.3 Mazda Logos must be placed on vehicles in accordance with current year Mazda Contingency eligibility requirements.

9. Measurements

9.1. Specified Measurement

9.1.1 Whenever the manufacturer specifications or these rules do not specify a measurement, the common average measurement will be used. This common average measurement must be determined by either 1) calculating a mean average of at least three measurements from the corresponding parts found on other vehicles, or 2) measurements taken from an OEM part obtained, to include an unused OEM part from the manufacturer or 3) the series technical administrator will make a determination based on any other reasonable method, providing that the data, system, or logic that was used be made known to the public.

9.2. Tolerances

9.2.1. All published measurements infer a tolerance of +/- one-half (1/2) of the last specified decimal place. All rounding will be done to the nearest decimal place that is specified by the manufacturer or these rules. In a case where a measurement falls exactly on the halfway mark, it must be rounded up or down in favor of the competitor. This section does not apply whenever the manufacturer specifications, or these rules, specify a tolerance.

10. Weight

10.1 Minimum – Vehicle See Appendix A

Minimum weights are subject to change amid the season to adjust for competition.

10.2 Additional Weight

Ballast may be added to the vehicle providing that all of the following conditions are met:

10.2.1 Additional weight must serve no other purpose than to increase the weight of the vehicle. This additional weight shall be known as “ballast.”

10.2.2 Ballast must be made of solid metal, and must be installed securely.

10.2.3 All pieces of ballast must be bolted within the passenger compartment, through the floor pan on the passenger side of the cockpit or ballast may be secured using all 4 Mazda OEM passenger seat mounting bolt holes.

11. Engine

11.1. General

11.1.1 All engines, components, and parts must have been offered for sale in a Mazda Miata, sold by a dealer in the United States of America unless otherwise specified in these rules.

11.1.2 All engines and their internal components must remain stock, except as provided by these rules, and within factory specified tolerances unless otherwise specified within this document.

11.2 Balancing and Lightening

Lightening of engine parts and engine components is not permitted. Balancing of Crankshaft and Flywheel is permitted; minimum weights listed in these rules must be maintained.

11.3 Cooling System

Ethylene glycol-based anti-freeze is not permitted. Other additives, such as Redline Water Wetter, are permitted.

11.4 Radiator

Any radiator (and mounting brackets) may be used, provided that it mounts in the stock location, without any modification of any part of the stock mounting location that is integral to the body. Any additional open areas or holes created by use of a non-OEM radiator may be blocked off, but under no circumstance shall the open areas or holes be used for supplying the air filter with additional air. At least one functional stock OEM cooling fan must be mounted in one of the stock locations. The fan shroud may be modified for installation.

11.4.1 A single layer radiator screen mesh may be added in front of the radiator and contained within the bodywork. Tape or other materials may be added directly to the radiator or mesh.

11.5 Thermostat

Thermostats are optional and unrestricted, providing that they serve no other function than to control coolant flow from the engine to the radiator.

11.6 Seal Plate

Radiator Seal Plate PN NA75-50-0K7A approved for use on all vehicles. Racer tape or similar and insulating foam strips may be used to seal gaps between radiator, radiator core support, and plastic under-tray. Racer tape or similar may also be used in lieu of, or in conjunction with, seal plate to seal the top of the core support. Purpose of this rule is to help direct as much air as possible through the radiator to facilitate engine cooling

11.7 Heater Core

The heater core may be bypassed, but not removed or modified in any way. The rubber hoses that supply water to the heater core may be shortened or eliminated.

11.8 Milling / Surfacing

The engine block and/ or cylinder head may be trued or milled as needed to return the engine to the maximum specified compression ratio. See Appendix A for appropriate compression ratios.

11.9 Camshafts

Camshafts shall comply with the Official NASA Camshaft Specifications and 12.1.10 of this document. OEM cams are required. Cams ground from blanks or reground cams are not acceptable. No mixing of cams between engine models. Cams must be installed in their original location.

11.10 Engine Mounts

Only unmodified Mazda part numbers NC10-39-040 or NAY1-39-040 may be used.

11.11 The use of any painting, coating, plating, or impregnating substance (anti-friction, thermal barrier, oil shedding coatings, chrome, anodizing, REM, isotropic finishing) to any internal engine surface, internal transmission or differential surface, internal or external surfaces of the intake manifold, exhaust manifold or down tube is prohibited.

12. Engine Modifications

12.1 General

12.1.1 No modifications to this engine are allowed, except where specifically authorized within these rules. This includes, but is not limited to, all fuel injection and engine management components, as well as electrical, cooling, and lubrication systems. All systems are subject to test procedures and must conform to OEM specifications as stated in the Mazda factory service manual.

12.1.2 Permitted engine maintenance includes the replacement, but not modification, of external engine and engine systems parts. No balancing, blue printing, lightening, polishing, or other modification of moving parts of the engine is permitted. All parts in the engine must be stock Mazda OEM parts unless specified in this rule set. For all Mazda part numbers in these specifications, superseding part numbers are considered equivalent.

12.2 Block

The engine block may be decked/milled to achieve the factory specified compression ratio for the correct model year as listed. Honing of cylinders is permitted to a maximum standard diameter as shown in the following table:

Model Year	Maximum Standard Diameter (inches)
90-93	3.076
94-05	3.273

12.2.1. The Cylinders may be .010” over to a maximum overbore diameter shown in the follow table

12.2.2 If one or more cylinders is overbored or exceeds the maximum standard diameter specified in paragraph 1, the vehicle shall meet the “minimum weight with overbored motor” specified in the vehicle specifications therefore be required to have a higher minimum weight.

Model Year	Maximum Overbore Diameter (inches)
90-93	3.086
94-05	3.283

12.3 Crankshaft

The stock Mazda Miata crankshaft must be used with no modifications allowed, as shown in the following table, which also displays minimum weights (not including pilot bearing or hardware).

Model Year	Part Number	Minimum Weight (lbs)
90-93 (short nose)	B617-11-300	26.50
90-93 (long nose)	B6S7-11-300A	26.50

94-05	BP06-11-300D	35.60
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12.4 Main and rod bearings must not be modified in any way. OEM and non-OEM bearings must be used from within the standard ranges as allowed in the Mazda factory service manual. The crank triggers must not be altered or modified in any way. The crank pulley/balancer must not be altered or modified in any way.

12.5 Connecting Rods

Mazda part number B6S7-11-210E must be used. Minimum connecting rod weight with cap and bolts and nuts is 537 grams. Connecting Rod bolt may be replaced with p/n: ARP 118-6401

12.6 Pistons

Mazda OEM standard size pistons must be used. Minimum weights less wrist pin and hardware and minimum weights of wrist pins are shown in the following table.

Model Year	Part Number	Maximum Diameter	Minimum weight (w/o wrist pin & hardware in grams)	Minimum weight wrist pin (grams)
90-93 (standard)	B6Z2-11-SA0C	77.974 mm / 3.0698 in	271.5	86
90-93 (.010" over)	B6Z2-11-SB0C	78.217 mm / 3.0794 in	279.5	TBD
94-97 (standard)	BPY11-11-SA0A	82.975 mm / 3.2667 in	280.5	80
94-97 (.010" over)	BPY1-11-SB0A	83.225 mm / 3.2765 in	288.5	TBD
99-00 (standard)	BPZ0-11-SA0	82.975 mm / 3.2667 in	288.0	78
99-00 (.010" over)	BPZ0-11-SB0	83.225 mm / 3.2765 in	296.0	TBD
01-05 (standard)	BPZ3-11-SA0	82.975 mm / 3.2667 in	288.0	78
01-05 (.010" over)	BPZ3-11-SB0	83.225mm / 3.2765 in	296.0	TBD

12.6.1. No modification of the piston is permitted. Modification of the piston ring end gap width is allowed.

12.7 Cylinder Head

The gasket face of the cylinder head may be resurfaced provided the maximum compression ratio is not exceeded and the minimum height of the cylinder heads are maintained. The minimum heights of the cylinder heads as measured in the factory service manual allowed are shown in the following table.

12.7.1 The cylinder head must not be ported, polished, or machined. The original casting must not be modified in any way or polished unless specified below.

Model Years	Minimum Height (inches)
90-93 (1.6L)	5.235
94-05 (1.8L)	5.235

12.7.2 The throat area of the port consists of the 90 degree angle at the very bottom of the cast steel valve seat as it transitions to the aluminum casting below. It is permitted to plunge cut the throats in order to correct for core shift that is commonly found in many cylinder heads.

- The (plunge) cut must be cylindrical and concentric to the valve guide axial centerline, within a tolerance of .005", for the entire length of the cut. The radius tangent to the cylindrical and bottom surfaces shall not exceed 0.375" (from centerline).
- This (plunge) cut cannot extend further than the specified number below from the bottom of the ferrous valve seat. There can be no tooling or machine marks in the head below this point.
- The intersection of the machined surface of the plunge cut to the port casting shall not be altered, except that the area under the short turn radius may be deburred, with the deburring not to exceed 1.5 mm in width.
- 90 degree bend at the bottom of the valve seat and the aluminum directly below it will be measured with a gauge and must conform to the maximum diameters and depths listed below.

Engine	Maximum Intake Throat Diameter (inches)	Maximum Exhaust Throat Dimensions (inches)	Maximum Throat Depth (from bottom of ferrous valve seat (millimeters))
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1.6L	1.095	0.948	12.0
1.8L	1.178	1.020	12.0

12.7.3 No aluminum in the bowl area (other than that specified for the plunge cut) or the ports may be removed, added, or manipulated for any reason. It is understood that heads may look slightly different from bowl to bowl due to casting irregularities. No material may be removed or added from the short turn radius in the port.

12.7.4 Unshrouding of the valves is limited to the dimensions in the chart below. There must be a sharp edge where the valve relief cut meets the chamber. That edge must be present and unmodified. This area is not to be blended by hand, machined, or chemically processed to create a smooth transition. This dimension will be measured with go/no go tooling. The maximum dimensions are listed below, measuring guide centerline to chamber edge.

Engine	Maximum Intake Valve Relief Cut radius (inches)	Maximum Exhaust Valve Relief Cut radius (inches)
1.6L	0.687 Radial	0.600 Radial
1.8L	0.760 Radial	0.675 Radial

12.8. Camshafts must comply with the official camshaft specifications as supplied by NASA. The camshaft and crankshaft sprockets must be as supplied by Mazda. Cam timing must not be altered; the belt must be installed as specified in the Mazda factory service manual.

12.9 OEM Valves must be as supplied by Mazda. Valve location or angle must not be moved. Reshaping of the valves is strictly prohibited. Valve guides may be replaced provided the position of the valve is not changed and the replacement guides are Mazda OEM parts. Valve stem installed height must be per the Mazda factory service manual: Valve stem seals must be Mazda OEM parts or equivalent. Valve seats may be cut provided the valve seat angles are stock Mazda three angle cut, as defined below.

12.10 A valve job will consist of only three flat angles; radius cuts are not allowed. A 45 degree seat angle must be used, which may vary in width from .030 inch to .050 inch. To narrow or correctly position the face angle, a bottom angle of 70 degrees must be used. To narrow or correctly position the face angle, a top cut of 30 degrees may be used. All angles must stay on the cast steel block portion of the seat. The angles must not extend off the seat into the aluminum casting at the top or bottom of the seat. In addition, for the 99-00 models a maximum L dimension of 1.815" is permitted.

12.11 Valve Springs are Mazda OEM as specified in the Mazda factory service manual. Valve spring shims are not permitted except the one standard shim that is used under every valve spring. Only the Mazda shim may be used and the OEM dimensions must be maintained.

12.12 Maximum allowed compression ratios are shown in the following table.

Model Years	Compression Ratio
90-93	9.4:1
94-97	9.0:1
99-00	9.5:1
01-05	10.0:1

12.13 Carbon may be removed from combustion chambers, valves, and pistons.

12.14 Intake Manifold: The intake manifold must be stock Mazda parts, without any material added or removed. Injectors must be stock Mazda OEM parts, correct for the model year of the car. All air entering the intake tract shall pass through the fuel injection air inlet.

12.15 1.6L engine powered may replace the stock air box with a cone style air filter assembly. The air filter element is unrestricted. No ducting or baffling of air to the air filter is permitted. The forward-facing driver's side turn signal indicator and headlight bulb may be removed. The stock plastic air tubes between the AFM and throttle body may be covered or wrapped. May open and adjust, but not modify, the OEM airflow meter. For 1.6L cars, the position of the air flow meter may be moved provided it remains attached to the unmodified factory intake tube.

12.16 1.8L engine powered must use the stock air box, but the air filter element is unrestricted. Mass air flow sensors may not be modified, adjusted or opened. Must use an air restrictor plate. The restrictor plate must be placed between the throttle body and plenum. All intake air must pass through the restrictor plate. An OE (or equivalent) gasket is required; a single gasket must be used on both sides of the restrictor. Restrictor plates must be the proper size as listed in the specification table (located in Appendix A of this document) and may only be from NASA, SCCA Enterprises, or Mazda Motorsports.

12.17 Camshaft Sensor Connection

12.17.1 An electrical pigtail ranging from 3” to 6” in length and terminated with any 3 pin electrical connector may be soldered and potted to the OEM cam sensor for the purpose of correcting a known issue with the factory connection. The factory harness connector may be removed and replaced with the appropriate mating connector.

12.18 Miscellaneous

12.18.1 Auxiliary control of the radiator cooling fan may be added to power the fan independent of the ECU. OEM control of the fan must remain functional.

12.18.2 Except for the addition of a cutoff switch to stop the engine, alteration to the factory charging system is not permitted it must function as intended by manufacturer.

12.18.3 Batteries may be replaced with those of an alternate manufacturer, provided they are of similar amp-hour capacity, size, and are fitted in the standard location. Batteries shall weigh 18.0-28.0 lbs. Additional battery hold-down devices may be used and are strongly recommended.

12.18.4 The use of the following non-standard replacement parts are permitted provided the use does not result in any unauthorized modification of any other component

12.18.4.1 Fasteners – nuts, bolts, screws, washers, studs, etc. (Head bolts, rod bolts, and flywheel bolts must be used as provided by Mazda.)

12.18.4.2 Gaskets and seals, except those specified in the above rules

12.18.4.3 Mechanical tachometer and analog gauges

12.18.4.4 Oil, oil filters, and lubricants

12.19 Electrical

12.19.1 The OBD port must be fully functional. Disabling the OBD port is restricted.

12.19.2 Engine wiring harness must not be modified except where specifically allowed by the rules.

13. Induction / Exhaust / Fuel Systems

13.1 Throttle Restrictor

The throttle restrictor sizes are subject to change amid the season to adjust for competition. Restrictor plate sizes are listed in Appendix A.

13.2 Air Filter

13.2.1 1.6L engine powered vehicles may use a cone-type air filter assembly. The air filter assembly may include integrated or attached components that may serve the purpose of shielding ONLY the air filtration element and air intake tube prior to the AFM from radiant engine heat. Any pieces attached to the air filtration element or intake tube may extend no further than 1.5 inches in any direction from the filtration element or from the air passage within the intake tube and may not shield, overlap or protect the AFM itself from engine heat.

13.2.2 1.8L engine powered vehicles must use the stock air filter housing.

13.2.3 Any filter may be used, providing that it is composed of components and materials other than air cooling systems, cooling chemicals, or cooling chemical compounds. No devices such as ducting or air deflectors are permitted to direct air to the air filter.

13.2.4 Air Flow Meter

1600cc cars may open and adjust, but not modify, the OEM air flow meter. For 1600cc cars the position of the airflow meter may be moved provided it remains attached to the unmodified factory intake tube.

13.2.5 2001-2005 cars may replace air intake tube (p/n BP6D-13-331) with the 1999 air intake tube (p/n BP4W-13-331B)

13.2.6 Definition

13.26.1 For the purposes of Section 12.2, “cooling systems,” “cooling chemicals,” and “cooling chemical compounds” means any system or substance that enables a transfer of heat, by convection, conduction, or radiation that causes the air entering the engine to be cooler than ambient, and / or contain additional chemicals than normally found in ‘air’ as defined by the Handbook of Physics and Chemistry (CRC).

13.3 Fuel Filler

The fuel filler trap door and restrictor plate in the filler neck may be removed. Fuel filler tube venting may be defeated (loop or block vent lines in trunk).

13.4 Ignition System

13.4.1 Any spark plug and/or spark plug wires may be used.

13.4.2 Any initial ignition timing may be used.

13.4.3 For 1999-2005 model years only, it is permitted to alter the ignition timing by elongating the mounting holes of the crankshaft position sensor trigger wheel

13.5 Exhaust System

13.5.1 The stock down pipe must be used. However any single exhaust pipe may be used, providing that it has a maximum outside diameter of 2.25 inches (+ 0.0625 tolerance – measured at least 6” from downpipe flange or muffler). The stock muffler may be retained, discarded, or replaced with any other muffler, providing that it serves no other purpose than to quiet the exhaust. All exhaust must exit aft of the rear sub-frame. Stock exhaust heat shielding may be removed.

13.5.2 A cat replacement tube may be installed. The tube shall not exceed 17.5” in length and have an outside diameter no greater than 2.375”.

13.5.3 The exhaust manifold must be Mazda OEM, without any material added or removed. Heat wraps may not be used.

13.5.3.1 (1990-1993): The exhaust manifold internal factory welds may be ground from the interior of the OEM exhaust manifold up to 1” from the mounting surfaces of the cylinder head and the collector. A bead of weld or braze may be added to the outside of the exhaust manifold inlet and outlet mounting flanges for the purposes of repair only. No coatings are permitted on the exterior or interior of the manifold. Heat wraps may not be used.

13.5.4 The 1999-05 Miatas with California emissions equipment may substitute the Federal OEM exhaust manifold and ECU for the OEM CA exhaust manifold and catalytic converter.

13.5.5 The post catalytic converter oxygen sensor may be disabled, replaced, relocated, or removed; the resulting hole (if present) may be plugged. Original exhaust system heat shields may be removed. However, No portion of the exhaust may be wrapped with any type of insulating tape.

13.5.6 1.8L (1994-1997): A bead of weld or braze may be added to the outside of the exhaust manifold inlet and outlet mounting flanges for the purposes of repair only. No material may be removed. No coatings are permitted on the exterior or interior of the manifold. Heat wraps may not be used.

13.6 Fuel

Fuel usage is restricted to unleaded gasoline commonly found at retail pumping stations (Shell, Chevron, Citgo, etc.). Octane is limited to a maximum of 94 (R+M)/2 as labeled on the pump. Race fuels such as, but not limited to, ERC brand are prohibited. All fuel additives are illegal, per the CCR. Note- event supplemental rules supersede this section. Fuel ethanol content testing shall be no greater than 12%

13.7 Fuel Pressure

Any adjustable mechanical fuel regulator may be used, but it may not be adjustable from the cockpit

14. Transmission / Clutch & Flywheel / Differential

14.1 Transmission

Transmission must be unmodified other than updating or backdating replacement parts. Gear ratios must remain stock for the year of car. Shifters may also be updated or backdated but must remain OE (90-05). Shifter bushing may be replaced with alternative materials not to differ in function of OEM plastic shifter bushing.

14.1.1 Transmission countershaft spacer Mazda p/n M504-17-304 may be replaced with a splined spacer of similar material, OD and length.

14.2 Clutch System and Flywheel

14.2.1 Pressure Plate All cars shall use either the stock OEM pressure plate for the appropriate model year or the following:

- ACT/Mazdaspeed p/n: 0000-02-5401-SS (1.6L cars) or 0000-02-5404-AC (1.8L cars)
- Exedy: MZC581 (OEM 1.6L Cars) or MZC610 (OEM 1.8L cars)
- Exedy: ZC04T (1.6 higher clamping force), and ZC12T (1.8 higher clamping force)

14.2.2 The unmodified pressure plate shall be bolted directly to the appropriate stock, unmodified flywheel. The 94 model year may utilize the flywheel from the 95-05 model years.

14.2.3 The minimum weight of the flywheel (including the pilot bearing) shall not be less than:

- 17.60 lbs for the 1.6L
- 17.00 lbs for the 1.8L

14.2.4 Any clutch disk may be used.

14.2.5 The OEM clutch line may be replaced with a steel braided line.

14.3 Differential

14.3.1 1990 – 1993 (1.6L)

14.3.1.1 The OEM Viscous limited slip (4.30:1) or Mazda Competition Parts; part number QN10- 64-A00 (previously T0Y1-27-200 & 0000-02-5501) in addition the alternate MAZDASPEED #0000-02-5500 limited slip differential is permitted as well.

14.3.1.2 The 90-93 Miata may convert to the 99-05 differential housing and the 4.3 differential gear ratio from the 99-05 model years (this conversion includes the driveshaft and halfshafts).

14.3.2 1994 -1997 (1.8L)

14.3.2.1 The OEM 4.10:1 Torsen limited slip or 4.10:1 open differential is allowed. Optionally, the 4.30:1 rear axle ratio as found in the 99+ cars is permitted.

14.3.2.2 The 4.30:1 gear will be mandated for use during the NASA Championship event.

14.3.2.3 Use of the 90-93 differentials is not permitted.

14.3.2.4 The rubber vibration damper may be removed from the pinion flange on 1994 and newer differentials.

14.3.3 1999 – 2005 (1.8L)

14.3.3.1 Stock Torsen limited slip or open differential is allowed, 4.30:1 gear ratio must remain stock.

14.3.3.2 Use of the 90-93 differentials is not permitted.

14.3.3.3 The rubber vibration damper may be removed from the pinion flange on 1994 and newer differentials.

14.3.4 Reinforcement of the differential housing ears is allowed for the purpose of repairing or reducing breakage at the factory stress riser “notch”.

14.3.5 Mazda Part number NAY1-28-890 is permitted for use.

15. Suspension Components

15.1 Suspension modifications are limited to the addition of the MAZDASPEED Motorsports Development “Spec Miata kit” and those modifications detailed in this area.

15.2 MAZDASPEED Motorsports Development Spec Miata kit

- 1990-93 1.6 DOHC K-SPEC-M5-SUSP
- 1994-97 1.8 DOHC K-SPEC-M5-SUS8
- 1999-up 1.8 DOHC K-SPEC-M5-SUS9

OR

- 0000-04-5720-KT

15.3 The following is a breakdown of components supplied within these kits. All parts numbers are MAZDASPEED Motorsports Development parts numbers. No substitution of parts is allowed. The kits must be used in their entirety.

15.3.1 Shocks

- Front Bilstein 0000-04-5225-BL (and Bilstein Part numbers: B46-1488 or 24-014885) are valid for regional competition use only. This product will not be legal for any Championship Events.
- Rear Bilstein 0000-04-5226-BL (and Bilstein Part numbers: B46-1489 or 24-014892) are valid for regional competition use only. This product will not be legal for any Championship Events.
- Shock Dyno testing will follow the SM on a Scotch Yoke Dyno Testing Procedure in Appendix D

OR

- Front Penske Shock 0000-04-5275. This part number is mandatory for Championship Events.
- Rear Penske Shock 0000-04-5276. This part number is mandatory for Championship Events.
- Top-Mount / Bump Stop Kit 0000-04-5277

15.3.2 Springs

- Front Eibach ERS 700 lbs/6" 0000-04-9700-06
- Rear Eibach ERS 325 lbs/7" 0000-04-9325-07

15.4 Coil-Over Kit

Front / Rear 0000-04-5402AW

15.5 Anti-Roll Bars

15.5.1 K-SPEC-M5-SUSP

- Eibach kit - front / rear bars 0000-04-5302-EB
- Front 24mm Adjustable
- Rear 15mm Adjustable

15.5.2 K-SPEC-M5-SUS8

- Eibach kit - front / rear bars 0000-04-5303-EB
- Front 27mm non-Adjustable or adjustable 24mm front bar from Eibach kit 0000-04-5302-EB may be used. However, the 24mm must be used for the duration of the NASA Nationals event.
- Rear 15mm Adjustable

15.5.3 K-SPEC-M5-SUSP9

- Eibach kit – front / rear bars 000-04-5304-EB
- Front 27mm non-Adjustable
- Rear 15mm Adjustable

15.6 Cars using Bilstein shocks shall use either the unmodified Mazdaspeed bump stop (Part #0000-04-5993AW) included with the Mazdaspeed suspension kit or the Fatcat Motorsports Spec Miata kit FCM-MT-KIT-SM along with the 1999 shock hats specified below. The Fatcat Motorsports kit must be used in its entirety. Cars built with the original procedure of welding a 63.5 mm centering ring to the outside diameter of 58 mm are grandfathered if the logbook was issued prior to 01/01/2003.

15.7 Cars using Bilstein shocks 1999-up cars shall use the bump stops from the Mazdaspeed kit (p/n 0000-04-5993-AW) in conjunction with the 1999-up stock upper mount (p/n: NC10-28-340C), the upper mount bushing (p/n: NC10-28-775) and the upper mount washer (p/n: NC10-28-774). All other OEM upper mounting hardware shall be discarded.

15.8 Cars using Bilstein shocks 1990-1997 cars may use the bump stops from the Mazdaspeed kit (p/n 0000-04-5993-AW) in conjunction with the 1999-up stock upper mount (p/n: NC10-28-340C), the 1999-up lower mount bushing (p/n: NC10-28-776) and the 1999-up upper mount washer (p/n: NC10- 28-774). All other OEM upper mounting hardware shall be discarded. Only Mazda OEM parts sourced from Mazda or Mazdaspeed are acceptable. OEM equivalent parts are not acceptable. The shock hats must be installed as a set of four, one on each shock assembly.

15.9 If the 99 shock hats are in use by 90-97 cars using Bilstein shocks, the addition of “shock hat spacers” between the upper bumpstop perch and the shock hat are allowed. They must be made of aluminum and they must be installed as a set of four, one per shock hat. The dimensions of the spacers are as follows:

- ID: 2.30” to 2.60”
- OD: 3.70” to 4.15”
- Inner Thickness: .300” to .350”
- Total Thickness: .350” to .550”
- Middle Diameter: 3.485” to 3.52”
- (See Appendix C for diagram)

15.10 Subframe braces may be updated to stock 1997 configuration utilizing the MAZDASPEED Motorsports Development Spec Miata kit. 2001-2005 (VVT) model years must remove the additional intermediate underbody/floorpan attached bracing (Mazda part number N067-56-G11A Base plate & part number N067-56-H10A cross member)

15.11 Any front and rear camber is allowed within the normal limits of adjustment. The only modifications to increase or decrease camber allowed are the inner suspension bushings on the front upper control arms and/or the extended lower ball joints listed in 15.11.3.

15.11.1 For camber adjustment only - inner suspension bushings, on the front upper control arms, may be replaced with non- metallic offset bushings. The bushings may use metal (inner and/or outer) sleeve(s). Material and design must be the same in all four positions. The control arm may be modified to allow for pinning the bushing to prevent rotation. Spherical bearings are not allowed.

15.11.2 All other suspension bushings must remain stock unless stated within the rules.

15.11.3 Manufacturer part number BL-ELBJ – extended ball joints with BAUER suspension laser etching. Etching MUST be found on ball joint.

15.11.4 On the [rear](#) upper control arms, the original outer mounting holes may be slotted to obtain additional camber. The max slot size shall not exceed 0.433” X 0.600”. No material shall be added.

15.12 Ride Height

All Models may have any ride height, providing that no metal part of the vehicle touches the ground so as to be hazardous in the opinion of the Race Director.

15.13 Sub-frame connectors

- All 1990-1991 model cars may utilize the 1992-1993 stock Mazda Miata rear sub-frame configuration.
- All 1995 and later model cars may utilize the 1994 stock Mazda Miata sub-frame connectors (front and rear).
- Alternatively, all cars may install subframe braces updated to stock 1997 configuration utilizing the Mazda Competition Spec Miata kit.
- Adjustable sway bar links may be used. One end of the sway bar(s) may be disconnected as a suspension tuning aid. The bar must remain in place and be solidly attached to the suspension on one end. A locating ring for the rear anti-roll bar may be added; it must serve no other purpose. (Since the latest design rear anti-roll bar has incorporated a locating ring a locating collar may be added to existing anti-roll bars.) Metal shims of up to 1/8” total thickness may be added between each anti-roll bar mount shackle and its stock mounting point on the chassis.
- The front shock tower connector/brace is not permitted on the 1999 and newer cars

15.14 All cars are permitted to use the “R” model tie rod ends part # N021-32-280A

15.15 Mazda part number 0000045HUB-ST is permitted

15.16 Front subframes may be reinforced by use of Mazda Part #0000-04-5989 (Subframe Reinforcement). If installed, the Subframe Reinforcement shall be welded around the perimeter only. No other modifications to subframes are permitted.

15.17 NA 90-97 cars may use the OEM Mazda 99-05 (NB) model year rear uprights. NA Cars upgrading to the OEM Mazda NB rear upright must use the NB rear upright on both sides of the car. Mismatching of rear uprights is not allowed.

16. Steering

16.1 Manual or power steering may be used; power steering rack may be converted to manual.

16.2 Steering lock may be removed.

16.3 Steering rack on 1990-97 cars may be shimmed between the rack and subframe at its two mounting locations. Each rack mount utilizes two bolts; both bolts must pass through each shim at that location. Shims must be the same dimensions and be made from aluminum or steel. Total thickness of shims can not exceed 12.70mm (0.50 inch) in thinness/width.

17. Wheel Assembly

17.1 Any fifteen (15.00) inch diameter rim/wheel with a maximum width of seven (7.00) inches, and a minimum weight of thirteen (13.00) pounds, may be used. All four (4) rims must dimensionally match. Other than the stock fifteen (15) inch Mazda steel wheels, all wheels must be one piece. (i.e. No multi piece bolted, riveted, or welded wheels).

17.2 Toyo Proxes RR tires size 205/50/15 must be used for dry weather competition. The Toyo RA-1 size 205/50/15 will remain as the SM legal wet weather competition tire.

17.3 Track Width

17.3.1 The front shall not exceed 1450.00mm.

17.3.2 The rear shall not exceed 1475.00mm

17.3.3 Aftermarket wheel studs, lug nuts, and wheel spacers are permitted. If spacers are used they shall be no greater than 13mm in total and equal per axle.

18. Chassis

18.1 To facilitate frequent lifting of the vehicle without causing damage, steel angle iron or square steel tubing may be added under the rocker panel inboard of the factory pinch weld flange on each side of the car. Angle iron and/or square steel tubing dimensions shall not exceed a net

length of 12". Each piece of support must be at least .125 thick. The added support shall be securely fastened to the car and serve no other purpose.

19. Brake System

19.1 Brake pads are unrestricted.

19.2 Steel braided brake lines may be used.

19.3 Disc brake backing plates may be removed.

19.4 The emergency brake lever and/or cables and associated parts may be removed.

19.5 All anti-lock braking systems (ABS) must be disabled.

19.6 2001 and newer cars must use the 255mm (F) and 252mm (R) brakes. The larger brakes, 269.5mm (F) and 267.9mm (R) are not permitted.

19.7 A single bracket per rear brake caliper for the purposes of keeping the rear brake calipers in place in the event of a rear upper caliper pin failure is permitted. It must be installed under the head of the rear upper caliper retaining bolt and may serve no other purpose.

20. Appearance

20.1 Exterior

20.1.1 Air dams, wings or spoilers are not allowed other than "R" package chin spoiler. The 99 and up car may use the factory OEM chin spoiler available for these cars. Part numbers NC10-V4-900F (99-00) and N067-V4-900G (01-05). "R" package chin spoiler replicas are acceptable provided they match the oem measurements, fitment, and mounting.

20.1.2 Fenders and wheel openings must remain unmodified, except that rolling or flattening of inner fender lip for tire clearance is permitted.

20.1.3 Hood and inner fender plastic trim are optional and may be removed.

20.1.4 OEM exterior mirrors shall be retained. Mirror mounting position may be changed, but must remain within 6" of the original location on the exterior of the door. The OEM interior mirrors may be removed, relocated or replaced by a mirror of any design. Additional mirrors may be added, both interior and exterior.

20.1.5 Body molding, antennas, license plates, license plate frames, license plate lights, and insignias and emblems may be removed.

20.1.6 Windshield clips and rear window straps are permitted and recommended.

20.1.7 Hood clips are permitted. Stock hood latches may be disabled or removed.

20.1.8 Horn and its wires may be removed.

20.1.9 Fog lamps may be removed. If fog lamps are removed, lamp openings in the front fascia must be blocked to not allow air flow through the opening. Any means of blocking air flow shall not serve any other purpose.

20.2 Interior

20.2.1 The driver's seat must be replaced with a seat suitable for competition, including a racing-type bucket seat. Factory seat tracks may be modified, reinforced or removed to facilitate replacement mountings provided they perform no other function. For safety, 1 side reinforcement point may be added to allow the seat to be attached to the cage. This attachment point will serve no other purpose than to provide extra safety to ensure the seat is affixed to the rollcage. All driver seats must conform to the CCR.

20.2.2 The transmission tunnel may be modified for the purpose of installing a competition driver seat.

20.2.3 Gauges may be added, replaced, or removed. They may be installed in the original instrument(s) location using a mounting plate(s) or any other location using a secure method of attachment.

20.2.4 Other than modifications made to mount instruments and provide for roll cage installation, the remainder of the dash board and instrument panel must remain intact.

20.2.5 Any steering wheel and attachments may be used except wood rimmed type steering wheels.

20.2.6 Any shift knob may be used.

20.2.7 The air conditioning system may be removed. Modification or removal of the heater core and blower fan assembly is not permitted.

20.2.8 The carpet, center console, cargo bins, driver's seat belt, radio system, headliner, dome lights, and grab handles may be removed.

20.2.9 The driver's side floor mat must be removed.

20.2.10 All insulating material may be removed from the interior and trunk.

20.2.11 Other than to provide for the installation of required safety equipment or other authorized modifications, no other driver/passenger compartment alterations or gutting is permitted.

20.2.12 Removal; or substitution of driver compartment panels is not permitted.

20.2.13 Any removable covers used to cover spare tires, tools, bins, etc. may be removed along with attaching hardware and brackets.

20.2.14 Carpets, mats and their insulating or attaching materials may be removed from the floor and recesses of the cargo/spare tire area.

20.2.15 Ducting may be added to provide fresh air to the driver/passenger compartment, providing that no modifications of windows and body structure are made to accommodate this addition. The "wing window(s)" may be removed to accommodate the addition of legal driver cooling devices such as hoses, vent tubes, or air-inlets.

20.2.16 The passenger seat, mounting hardware, and seat belts may be removed. Spare tire and tools must be removed from trunk.

20.2.17 The foot pedals (i.e. brake, clutch, gas) may be modified for driver comfort and accessibility. Additionally, modifications for strengthening are allowed provided that those modifications serve no other purpose.

20.2.18 The door window glass, window operating mechanism, and inside door latch/lock operating mechanism may be removed and the inner door structural panel may be modified, but not removed. The stock side impact beam and the outside door latch/lock operating mechanism shall not be removed or modified. This gutting of the door shall only be made if roll cage incorporates NASCAR-style side protection extending into the door.

20.2.19 To improve driver exit through the window area, the driver vent window and vent window supports may be removed. If removed, ducting may be in the passenger side vent window only.

20.2.20 Air bag systems shall be disarmed and may be removed.

20.2.21 The driver's side floor pan may be modified to accommodate larger/taller drivers. All modification shall be contained between the transmission tunnel, driver's side rocker, rear bulkhead and no more than 24" forward of rear bulkhead. The modification shall not extend below the factory floor stiffener/frame rail. The steel used in the modification shall be no thinner than .058". All modifications shall be welded in place. This modification shall serve no other purpose other than seating position.

20.2.22 Roll cage attachment points shall be welded to the base plate.

20.2.23 Roll cage may extend one tube per side from the door bars down to the rocker panel. The attachment point may be not larger than 25 square inches and no longer than 8" in any direction. The tube shall not exceed door bar diameter and thickness. The attachment points shall be approximately centered longitudinally in the door openings.

21. Updates

21.1 Obsolete Parts

21.1.1 When part updates are needed, because of reliability, supply or obsolescence, testing of parts from alternative, updated sources may be used in sanctioned events. Any testing done during sanctioned events will require the driver/car to forfeit any points, finishing position, and/or contingency.

21.2 BOP Testing

21.2.1 For purposes of maintaining a healthy future for Spec Miata specific to balance of power (BOP) and overall parity, parts or software identified for testing may be used in sanctioned events. Any testing done during sanctioned events will require the driver/car to forfeit any points, finishing position, and/or contingency.

APPENDIX A

Throttle restrictor sizes and minimum weights are subject to change amid the season to adjust for competition OR Alternate with allowed overbore

Spec Miata Specification Table

	Bore x Stroke (mm) / Displ (cc)	Valves IN & EX (mm)	Restrictor Size (mm)	Comp. Ratio	Wheelbase (mm)	Gear Ratios	Final Drive	Drive Brakes (mm)	Weight (lb)
Mazda MX-5/Miata (90-93)	78.0 x 83.604 1597 Or Alternate 78.25 x 83.604	31.1 (I) 26.3 (E)	N/A	9.40	2266.00	3.14, 1.89, 1.33, 1.00, 0.81	4.3	(F) 235 Vented Disc (R) 232 Solid Disc	2275.00 OR Alternate Or 2290.00 with Alt. Bore
Mazda MX-5/Miata (94-97)	83.0 x 85.004 1839 Or Alternate 83.25 x 85.004	33.1 (I) 28.2 (E)	N/A	9.00	2266.00	3.14, 1.89, 1.33, 1.00, 0.81	4.1	(F) 255 Vented Disc (R) 252 Solid Disc	2400.00 Or 2415.00 with Alt. Bore
Mazda MX-5/Miata (99-00)	83.0 x 85.004 1839 Or Alternative 83.25 x 85.004	33.1 (I) 28.2 (E)	38mm	9.50	2266.00	3.14, 1.89, 1.33, 1.00, 0.81	4.3	(F) 255 Vented Disc (R) 252 Solid Disc	2400.00 Or 2415.00 with Alt. Bore
Mazda MX-5/Miata (01-05)	83.0 x 85.004 1839 Or Alternative 83.25 x 85.004	33.1 (I) 28.2 (E)	40mm	10.00	2266.00	3.14, 1.89, 1.33, 1.00, 0.81	4.3	(F) 255 Vented Disc (R) 252 Solid Disc	2450 Or 2465.00 with Alt. Bore

APPENDIX B

VEHICLE: 90-93 Mazda Miata

Lobe(s): Intake	LIFT	DUR.	OPEN	CLOSE	AREA
	0.010	219.41	9.42 BTDC	29.98 ABDC	21.49
	0.020	209.30	4.52 BTDC	24.78 ABDC	21.26
	0.030	202.58	1.24 BTDC	21.35 ABDC	21.16
	0.040	196.91	1.55 ATDC	18.45 ABDC	21.05
	0.050	191.74	4.09 ATDC	15.83 ABDC	20.92
	0.060	186.92	6.49 ATDC	13.41 ABDC	20.78
	0.070	182.31	8.78 ATDC	11.09 ABDC	20.62
	0.080	177.81	11.01 ATDC	8.82 ABDC	20.45
	0.090	173.36	13.22 ATDC	6.58 ABDC	20.25
	0.100	168.93	15.43 ATDC	4.36 ABDC	20.03
	0.150	146.32	26.73 ATDC	6.95 BBDC	18.56
	0.200	120.91	39.43 ATDC	19.66 BBDC	16.28
	0.250	90.28	54.77 ATDC	34.95 BBDC	12.86
	0.300	37.86	81.01 ATDC	61.13 BBDC	5.51
	0.309	--- PEAK CAM LIFT ---			

Lobe(s): Exhaust	LIFT	DUR.	OPEN	CLOSE	AREA
	0.010	231.18	34.76 BBDC	16.42 ATDC	22.73
	0.020	220.34	30.00 BBDC	10.34 ATDC	22.47
	0.030	213.54	26.70 BBDC	6.84 ATDC	22.37
	0.040	207.72	23.83 BBDC	3.89 ATDC	22.25
	0.050	202.43	21.22 BBDC	1.21 ATDC	22.13
	0.060	197.45	18.74 BBDC	1.29 BTDC	21.98
	0.070	192.64	16.34 BBDC	3.69 BTDC	21.82
	0.080	187.95	14.00 BBDC	6.05 BTDC	21.71
	0.090	183.32	11.69 BBDC	8.37 BTDC	21.42
	0.100	178.70	9.39 BBDC	10.68 BTDC	21.19
	0.150	154.89	2.52 ABDC	22.59 BTDC	19.65
	0.200	128.03	15.94 ABDC	36.03 BTDC	17.44
	0.250	94.08	32.93 ABDC	52.99 BTDC	13.35
	0.300	38.83	60.32 ABDC	80.85 BTDC	5.65
	0.309	--- PEAK CAM LIFT ---			

Dowel Pin location:

	Cylinder 1 lobes	Cylinder 2 lobes	Cylinder 3 lobes	Cylinder 4 lobes
Intake	83.0 degrees BTDC	7.0 degrees ATDC	7.0 degrees ABDC	83.0 degrees BTDC
Exhaust	79.5 degrees ATDC	10.5 degrees BBDC	10.5 degrees BTDC	79.5 degrees ABDC

Base Circle Radius:

	Minimum	Maximum
Intake	1.285 inches	1.302 inches
Exhaust	1.285 inches	1.302 inches

Tolerances:

Duration at the seat (0.0" - 0.02")	2.5 degrees
Duration on flank (0.021" lift - 0.1" before max. lift)	1.5 degrees
Duration over nose	3.5 degrees
Peak lift	0.003 inches
Dowel pin location	2.0 degrees

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VEHICLE: 94-97 Mazda Miata

Lobe(s): Intake	<u>LIFT</u>	<u>DUR.</u>	<u>OPEN</u>	<u>CLOSE</u>	<u>AREA</u>
	0.010	215.41	7.30 BTDC	28.11 ABDC	21.37
	0.020	205.84	2.83 BTDC	23.01 ABDC	21.30
	0.030	198.92	0.65 ATDC	19.57 ABDC	21.21
	0.040	193.07	3.47 ATDC	16.54 ABDC	21.11
	0.050	187.91	6.01 ATDC	13.92 ABDC	20.99
	0.060	183.14	8.37 ATDC	11.52 ABDC	20.86
	0.070	178.59	10.62 ATDC	9.22 ABDC	20.71
	0.080	174.16	12.82 ATDC	6.98 ABDC	20.55
	0.090	169.82	14.98 ATDC	4.80 ABDC	20.36
	0.100	165.53	17.12 ATDC	2.65 ABDC	20.16
	0.150	143.95	27.89 ATDC	8.17 BBDC	18.81
	0.200	120.14	39.80 ATDC	20.06 BBDC	16.72
	0.250	90.97	54.40 ATDC	34.63 BBDC	13.42
	0.300	46.47	76.69 ATDC	56.84 BBDC	7.24
	0.316	--- PEAK CAM LIFT ---			

Lobe(s): Exhaust	<u>LIFT</u>	<u>DUR.</u>	<u>OPEN</u>	<u>CLOSE</u>	<u>AREA</u>
	0.010	232.13	35.34 BBDC	16.71 ATDC	24.21
	0.020	220.43	29.94 BBDC	10.48 ATDC	24.06
	0.030	213.07	26.41 BBDC	6.66 ATDC	23.95
	0.040	206.97	23.44 BBDC	3.53 ATDC	23.83
	0.050	201.56	20.77 BBDC	0.79 ATDC	23.70
	0.060	196.55	18.29 BBDC	1.73 BTDC	23.56
	0.070	191.84	15.96 BBDC	4.12 BTDC	23.39
	0.080	187.28	13.70 BBDC	6.42 BTDC	23.21
	0.090	182.84	11.50 BBDC	8.67 BTDC	23.01
	0.100	178.47	9.33 BBDC	10.86 BTDC	22.80
	0.150	156.89	1.40 ABDC	21.71 BTDC	21.40
	0.200	133.78	12.93 ABDC	33.28 BTDC	19.32
	0.250	106.65	26.49 ABDC	46.86 BTDC	16.20
	0.300	70.03	44.80 ABDC	65.16 BTDC	11.09
	0.337	--- PEAK CAM LIFT ---			

Dowel Pin location:

	Cylinder 1 lobes	Cylinder 2 lobes	Cylinder 3 lobes	Cylinder 4 lobes
Intake	81.0 degrees BBDC	9.0 degrees ATDC	9.0 degrees ABDC	81.0 degrees BTDC
Exhaust	79.5 degrees ATDC	10.5 degrees BBDC	10.5 degrees BTDC	79.5 degrees ABDC

Base Circle Radius:

	Minimum	Maximum
Intake	1.402 inches	1.419 inches
Exhaust	1.408 inches	1.425 inches

Tolerances:

Duration at the seat (0.0" - 0.02")	2.5 degrees
Duration on flank (0.021" lift – 0.1" before max. lift)	1.5 degrees
Duration over nose	3.5 degrees
Peak lift	0.003 inches
Dowel pin location	2.0 degrees

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Revision Date: 9/3/09

VEHICLE: 99-00 Mazda Miata

Lobe(s): Intake	LIFT	DUR.	OPEN	CLOSE	AREA
	0.020	223.26	11.01 BTDC	32.25 ABDC	23.78
	0.030	214.89	7.13 BTDC	27.76 ABDC	23.68
	0.040	209.04	4.28 BTDC	24.76 ABDC	23.57
	0.050	204.06	1.82 BTDC	22.24 ABDC	23.46
	0.060	199.44	0.48 ATDC	19.93 ABDC	23.34
	0.070	194.91	2.75 ATDC	17.66 ABDC	23.19
	0.080	190.41	5.01 ATDC	15.41 ABDC	23.02
	0.090	185.91	7.26 ATDC	13.17 ABDC	22.83
	0.100	181.41	9.51 ATDC	10.92 ABDC	22.61
	0.150	158.66	20.91 ATDC	0.43 BBDC	21.19
	0.200	133.76	33.62 ATDC	12.62 BBDC	19.00
	0.250	103.77	49.06 ATDC	27.17 BBDC	15.62
	0.300	61.02	71.12 ATDC	47.86 BBDC	9.39
	0.324	--- PEAK CAM LIFT ---			

Lobe(s): Exhaust	LIFT	DUR.	OPEN	CLOSE	AREA
	0.020	233.13	35.67 BBDC	17.46 ATDC	26.01
	0.030	222.30	30.90 BBDC	11.40 ATDC	25.88
	0.040	215.79	27.76 BBDC	8.04 ATDC	25.72
	0.050	210.69	25.25 BBDC	5.43 ATDC	25.65
	0.060	206.06	22.95 BBDC	3.11 ATDC	25.52
	0.070	201.54	20.69 BBDC	0.85 ATDC	25.38
	0.080	197.04	18.44 BBDC	1.40 BTDC	25.21
	0.090	192.53	16.18 BBDC	3.65 BTDC	25.02
	0.100	188.03	13.93 BBDC	5.90 BTDC	24.70
	0.150	165.61	2.71 BBDC	17.10 BTDC	23.40
	0.200	142.71	8.80 ABDC	28.49 BTDC	21.39
	0.250	116.27	22.16 ABDC	41.56 BTDC	18.41
	0.300	82.10	39.43 ABDC	58.47 BTDC	13.69
	0.348	--- PEAK CAM LIFT ---			

Dowel Pin location:

	Cylinder 1 lobes	Cylinder 2 lobes	Cylinder 3 lobes	Cylinder 4 lobes
Intake	80.0 degrees BTDC	10.0 degrees ATDC	10.0 degrees ABDC	80.0 degrees BTDC
Exhaust	80.0 degrees ATDC	10.0 degrees BBDC	10.0 degrees BTDC	80.0 degrees ABDC

Base Circle Radius:

	Minimum	Maximum
Intake	1.402 inches	1.419 inches
Exhaust	1.408 inches	1.425 inches

Tolerances:

Duration at the seat (0.0" - 0.02")	2.5 degrees
Duration on flank (0.021" lift - 0.1" before max. lift)	1.5 degrees
Duration over nose	3.5 degrees
Peak lift	0.003 inches
Dowel pin location	2.0 degrees

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Revision #: 3

Revision Date: 9/3/09

VEHICLE: 01-05 Mazda Miata

Lobe(s): Intake	LIFT	DUR.	OPEN	CLOSE	AREA
	0.020	226.81	12.96 BTDC	33.84 ABDC	26.42
	0.030	218.60	9.09 BTDC	29.51 ABDC	26.32
	0.040	212.75	6.25 BTDC	26.50 ABDC	26.22
	0.050	207.82	3.81 BTDC	24.00 ABDC	26.05
	0.060	203.23	1.52 BTDC	21.71 ABDC	25.98
	0.070	198.69	0.76 ATDC	19.45 ABDC	25.83
	0.080	194.16	3.03 ATDC	17.18 ABDC	25.66
	0.090	189.64	5.29 ATDC	14.92 ABDC	25.47
	0.100	185.16	7.54 ATDC	12.70 ABDC	25.26
	0.150	162.74	18.78 ATDC	1.52 ABDC	23.86
	0.200	140.26	30.02 ATDC	9.72 BBDC	21.89
	0.250	116.96	41.70 ATDC	21.34 BBDC	19.26
	0.300	88.91	55.81 ATDC	35.28 BBDC	15.39
	0.350	46.96	76.92 ATDC	56.12 BBDC	8.52
	0.369 --- PEAK CAM LIFT ---				

Lobe(s): Exhaust	LIFT	DUR.	OPEN	CLOSE	AREA
	0.020	233.13	35.67 BBDC	17.46 ATDC	26.01
	0.030	222.30	30.90 BBDC	11.40 ATDC	25.88
	0.040	215.79	27.76 BBDC	8.04 ATDC	25.72
	0.050	210.69	25.25 BBDC	5.43 ATDC	25.65
	0.060	206.06	22.95 BBDC	3.11 ATDC	25.52
	0.070	201.54	20.69 BBDC	0.85 ATDC	25.38
	0.080	197.04	18.44 BBDC	1.40 BTDC	25.21
	0.090	192.53	16.18 BBDC	3.65 BTDC	25.02
	0.100	188.03	13.93 BBDC	5.90 BTDC	24.70
	0.150	165.61	2.71 BBDC	17.10 BTDC	23.40
	0.200	142.71	8.80 ABDC	28.49 BTDC	21.39
	0.250	116.27	22.16 ABDC	41.56 BTDC	18.41
	0.300	82.10	39.43 ABDC	58.47 BTDC	13.69
	0.348 --- PEAK CAM LIFT ---				

Dowel Pin location:

	Cylinder 1 lobes	Cylinder 2 lobes	Cylinder 3 lobes	Cylinder 4 lobes
Intake	86.0 degrees BTDC	4.0 degrees ATDC	4.0 degrees ABDC	86.0 degrees BTDC
Exhaust	80.0 degrees ATDC	10.0 degrees BBDC	10.0 degrees BTDC	80.0 degrees ABDC

Base Circle Radius:

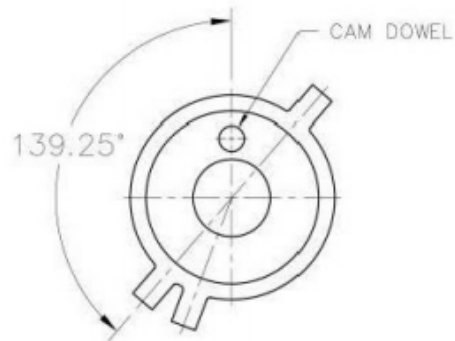
	Minimum	Maximum
Intake	1.402 inches	1.419 inches
Exhaust	1.408 inches	1.425 inches

Tolerances:

Duration at the seat (0.0" - 0.02")	2.5 degrees
Duration on flank (0.021" lift - 0.1" before max. lift)	1.5 degrees
Duration over nose	3.5 degrees
Peak lift	0.003 inches
Dowel pin location	2.0 degrees

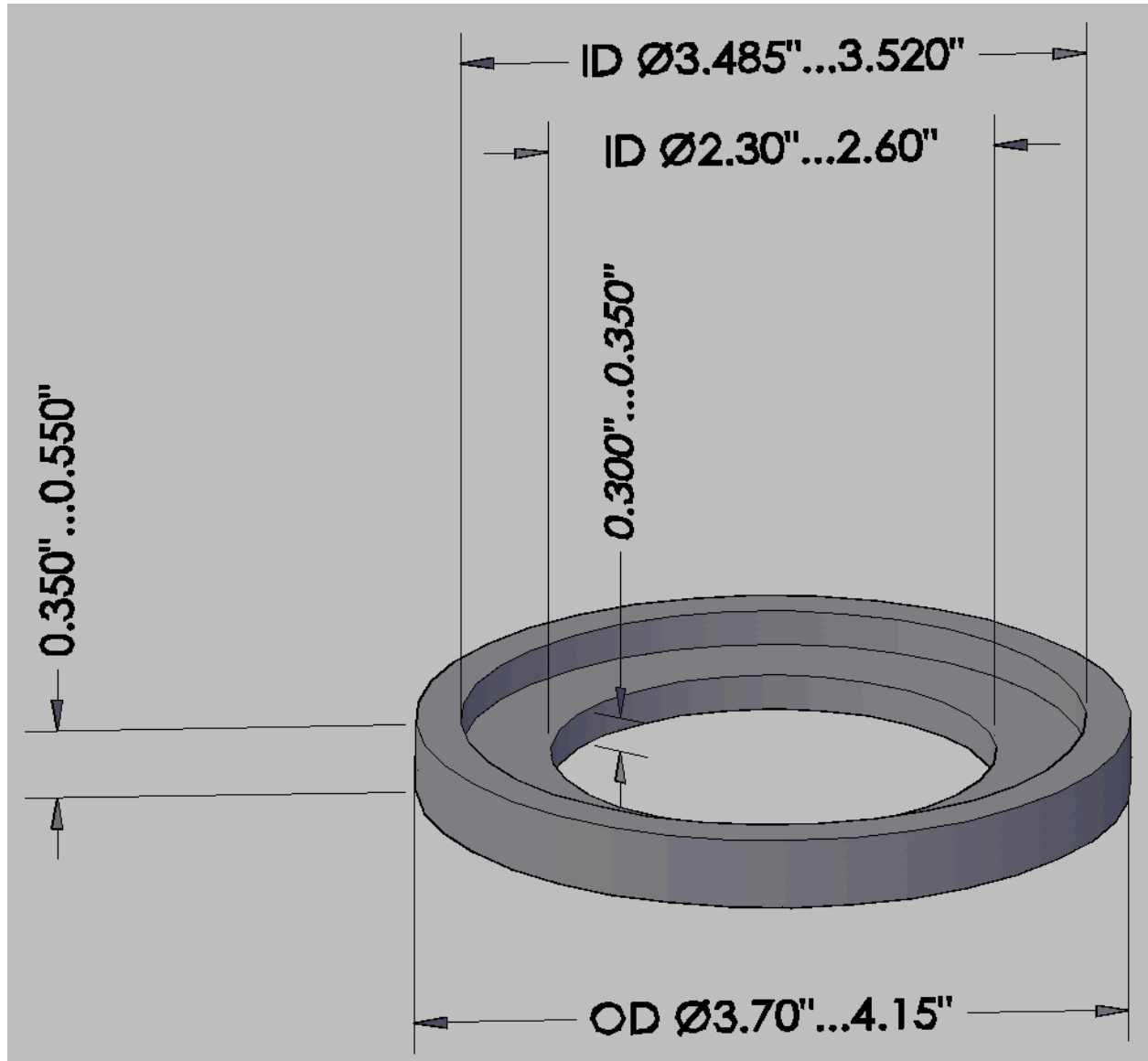
Date Issued: 6/16/06 Revision #: 3 Revision Date: 9/3/09

Reluctor Wheel Location	139.25 degrees
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APPENDIX C

Shock Hat Spacer Dimensions



APPENDIX D

NASA TESTING PROCEDURE FOR SPEC MIATA SHOCKS ON A SCOTCH YOKE DYNO

(Developed in association with NASA, Roehrig Engineering and Stewart Development)

1. When you are ready to collect data, click on “Test” in the pull down menu and then click “Perform test”. This will bring up the “Perform Test” window.
2. Select your test profile and click edit if you wish to make any changes.
3. At this time be sure the dyno is at bottom dead center.
4. Hang the shock damper from the upper clevis so that it is not touching lower clevis.
5. Click the "Zero Load Cell" button to zero the load cell and take the weight of the shock out of the data. You can verify the results by looking at the live force reading.

1.1. This is done to eliminate any difference in the damper weights; the weight of the damper would be interrupted as a compression force.

6. Lower the cross bar and connect the damper to lower clevis.
7. Tighten the clevis handles by turning clockwise until brass button in clevis seats against shock eye. This is done to remove any free play in the damper ends, do not over tighten.
8. If pin type clevis are used in rubber bushing dampers care must be taken to tighten clevis exactly the same amount. Preload on rubber bushed dampers can have a large effect on the data. It is recommended to use a C-Clamp type clevis to eliminate any bushing deflection.
9. Pull cross bar down a minimum of ¼ inch to pre-load damper and tighten clamps, this is done to prevent the damper from bottoming out in extension.
10. The program, by default, is set to do an automatic gas test to measure and record the gas force in the shock. If you have changed this setting to do a manual gas test, click "Gas Test" record the gas force.

1.1. Gas test should be run on all dampers so the test is consistent

11. Connect the temperature sensor to the damper body. Skip this step if you have a non-contact (IR) temperature sensor.

1.1. All dampers should be warmed up to a consistent temperature.

12. Click "Start Test" to begin the test.

SPEC MIATA SHOCK SPECIFICATIONS

Front Shock Specs		
Static Max Rod Force (lbs.): 50		
Velocity (in/sec)	Bump Force (lbs)- Max.	Rebound Force (lbs)- Max.
0.5	49	-48
1	56	-62
1.5	60	-79
2	60	-102
2.5	60	-134
3	61	-169
3.5	62	-204
4	64	-244
4.5	66	-289

Rear Shock Specs		
Static Max Rod Force (lbs.): 50		
Velocity (in/sec)	Bump Force (lbs)- Max.	Rebound Force (lbs)- Max.
0.5	53	-47
1	60	-61
1.5	63	-79
2	63	-100
2.5	63	-133
3	63	-167
3.5	65	-202
4	66	-241
4.5	67	-284

Rev. 7/20/11

APPENDIX E

NASA SPEC MIATA PROCEDURES FOR USING THE WHISTLER COMPRESSION RATIO TESTER

Description: The Whistler measures combustion chamber size using acoustic principals. This measurement is combined with the number of cylinders and total displacement of the engine to calculate the compression ratio.

What is included: The Whistler, threaded spark plug adapters, whistle probe with air tubes, power transformer, and calibration bottle.

Additional Equipment Required: The Whistler requires a 120 volt power source, a compressed air source and an accurate instrument to measure engine temperature (through a spark plug hole if possible). An air blower nozzle is needed to eliminate gasoline vapors from the combustion chamber. Appropriate tools are needed to rotate the engine slowly.

Procedure

1. Remove the lid from the Whistler box.
2. Remove the spark plug adapters, whistle probe with air tubes, power transformer, and calibration bottle from the box.
3. Position the Whistler near the engine.
4. Connect the power cord and whistle probe tubes to the Whistler. Note: the tube with the black marking connects to the fitting with the black washer.
5. Confirm the Whistler calibration with the supplied calibration bottle.
 - The calibration bottle simulates the combustion chamber of a 350 cubic inch V8 engine. The inside of the bottle must be clean and dry. Each bottle is marked with the effective Compression Ratio (CR) reading that should be displayed by the Whistler (not all bottles have the same effective CR). The steps to confirm calibration are the same as those to measure an engine except that some input values are supplied by the user. Refer to the engine test steps below:
 - Set the number of cylinders to 8 (power-on default) as described in step 8 Measure the air temperature (Fahrenheit) inside the bottle and enter it as described in step (For calibration, ambient temperature is adequate if the bottle is also at ambient.)
 - Set displacement to 350 (power-on default) as described in step 10
 - Perform steps 11-13.
 - Insert the probe into the top of the calibration bottle so it seats against the “cork” and hold it without obstructing the back of the probe or severely bending the hoses. (minor kinks are not a problem as long as the air supply is not cut off)
 - If everything is setup and entered correctly the Whistler should display the CR indicated on the bottle. It is normal for the reading to fluctuate between two adjacent values. If the

display does not match the CR for the bottle, recheck the air flow indicator and all input values carefully. If the reading is still off by a tenth or two, the temperature measurement is the most likely source of error. If necessary, adjust the input temperature up or down by as much as 5 degrees to achieve the correct CR reading. Note the adjustment amount and direction so it can be applied when testing engines. If calibration is still off, the testing cannot proceed until the cause is found and corrected.

6. Prepare the car for measurement:

- Remove any convenient spark plug (removing several will make it easier to rotate the engine precisely)
- Rotate the engine to about 10 degrees before Top Dead Center (compression stroke) for a cylinder with spark plug removed.
- Purge any remaining gasoline vapors in the combustion chamber with compressed air and the air blower nozzle. (Several manual rotations of the engine should expel the vapors if an air nozzle is not available.)

7. Determine correct spark plug adapter and install it in place of the spark plug (minimal torque is required). In some cars, especially overhead cam vehicles with spark plugs well down in the engine, remove the valve cover to get an accurate reading on an Spec Miata.

8. Set the leftmost switch (4, 6, 8) to the correct number of cylinders. (Engines having a different numbers of cylinders is possible with simple calculations to scale the displacement up or down)

9. Set the center switch (CR,TEMP) to the down position (TEMP) and enter the temperature using the rightmost switch (UP, DN). The temperature should be measured inside the cylinder.

Note: Temperature is critical and can change quickly in a hot engine. After step 13 below, it may be necessary to insert the Whistler probe and allow the air temperature to stabilize for a minute or two. Then, remove the probe and measure the temperature again and adjust the Whistler input accordingly.

10. Set the center switch (CR, TEMP) to the middle position and enter the displacement of the engine in cubic inches using the rightmost switch (UP, DN). Values are the following:

- NA6 = 98
- NA8, NB1, NB2 = 112std / 113 first over

11. Set the center switch (CR, TEMP) to the upper most setting (CR).

12. Connect air supply to Whistler.

13. Adjust the SCFH as indicated in the glass tube to 20. The large black knob is the main regulator for course adjustments. Use the small knob to fine-tune and maintain a reading of 20 SCFH.

- **Note:** The Whistler must be level during this adjustment with the column perpendicular to the ground. If the number deviates 20 by more than + or - 1.5 during sampling, the Whistler calculations will be incorrect. Adjust the air flow and repeat the test.

14. Insert whistle probe into spark plug adapter so it seats firmly.

15. The engine should already be close to TDC on the compression stroke. Rotate the engine very slowly towards TDC. The CR reading should start to increase. As TDC is approached, pause briefly after each small movement to let the CR reading stabilize (piston motion will distort the reading). The CR display will peak at TDC then start to fall again. Record the highest reading as Compression Ratio. Note: Do not assume the timing marks on the engine are correct; they rarely are.

Notes

- Be sure the whistle probe is contacting the spark plug adapter while taking readings. This can be difficult to know with some engines but is critical to accurate readings.
- Do not block air exiting from the back of the whistle probe or severely kink the lines.
- Rotate the engine very slowly and pause while taking readings. The largest reading displayed indicates top dead center.
- The most accurate readings are obtained from a cold engine since there is less chance of error in determining ambient cylinder temperature compared to that in a 160-200 degree cylinder.
- Make sure the air flow ball stays at 20 while testing. Use the small knob to fine tune if the air supply fluctuates.
- If the reading is still suspect, low or high, repeat the calibration check.

Troubleshooting

- Very low or no reading from the Whistler:
- Make sure the engine is at Top Dead Center with the valves in the closed position (compression stroke).
- Valves may be stuck open or bent: try another cylinder
- Check whistle probe tubes for severe bends or kinks

APPENDIX G

SPEC MIATA ENGINE PERFORMANCE SPECIFICATIONS

To verify compliance and to provide maximum parity in the class, NASA may employ chassis dynamometer testing as an additional means of identifying the need for further engine inspection for the Spec Miata Series. The results from the dynamometer are not to be used to disqualify a participant. However, failure to comply with power capacities or producing power results 5% greater than the average sample of dynamometer runs from the event may result in an invasive vehicle inspection. Taking into account allowable builds and tolerances, a maximum allowable horsepower value for the class is set according to the vehicle engine.

Engine	Horsepower
90-93 1.6L	125
94-97 1.8L	127
99-00 1.8L	127
01-05 1.8	126

Engine Dynamometer Testing Procedure

To ensure objectivity, a Spec Miata Series official, an 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 highest of the three pulls will be used for test compliance. NASA, its officers, officials, and assignees are not responsible for any mechanical failures or damage otherwise while the dyno runs are performed.

1. The DynoJet brand is the required type of dyno for testing and inspection. All dyno readings must be corrected to SAE J1349 Rev JUN90 and the dyno’s smoothing function set to 5.
2. Prior to the chassis dynamometer inspection the competitor may top off any fluids needed to ensure the engine and drivetrain are not damaged during testing.
3. All dyno pulls will be made with the hood open.
4. Prior to the official run, an official or technician will confirm that the accelerator pedal opens the throttle completely.
5. Dyno pulls will be made in fourth gear (1:1 ratio)
6. During an official dyno test, the car must be fitted with the tires used on the car in the previous session with the rear tire pressures set at 40 psi.
7. Dyno runs shall be made with the water temperature in the normal operating range of 170F-210F and drivetrain fluids up to normal running temperature. All pulls shall be made within the vehicle’s normal operating temperature, not to exceed 210 degrees.

Should the temperature exceed 210 degrees, that pull is void and shall be repeated once the engine has cooled enough to operate within the specified range. Water temperature may be verified using external temperature measurements such as an infrared temp gun at the thermostat housing.

8. Three consecutive runs shall be made under full power. The RPM range shall be consistent for all three runs. Starting RPM shall be no higher than 3000. Ending RPM shall be when the rev limiter engages. (90-93 = 7200 ; 94-98 = 7000 ; 99-00 = 7050 ; 01-05 = 7000)

9. Should any run result in erratic or non-repetitive results, series officials may dismiss the result or request another dyno pull.

10. The NASA Series Director or Compliance director may also make adjustments to the official maximum horsepower if he/she feels that the dyno is reading unusually high or low.

11. Additional runs may be performed using NASA compliance parts such as ECUs and AFMs.

12. Compliance dyno results are the property of NASA and may be published, presented, or displayed to competitors for review at any time.

APPENDIX H

SM Teardown Supplemental

1. Competitors who are brought to impound are expected to bring all necessary tools to impound.
2. Competitors who fall under final inspection must be prepared for engine extraction. It is up to the competitor to supply/have access to an engine hoist and engine stand for compliance inspection.
3. Competitors are required to bring fluid drain pans for safe disposal of all used fluids.