

Unofficial SuperMiata Racing Guide

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This is an “unofficial SuperMiata guide to racing. Things that are not in the rule book. Things not discussed publicly. Secrets that are kept from a newbie. Stuff we just don’t talk about, like a fight club....

What is SuperMiata:

<https://racesupermiata.com/>

Official SuperMiata S2 rule is here:

<https://racesupermiata.com/supermiata-rules-regulations/>

This is mostly SuperMiata S2 specific. But also applies to 95% of track Miata. Half of it applies to other track cars. Very little translate to Vette racers, they just are better than everyone else.

The author started autocrossing early 80s in a VW Scirocco, have placed as high as 5th place. W2w raced in a Datsun 510 in the mid-80s. Have gone sub 2 minute at WSIR in the 510. One of the few still alive today to have raced at Riverside International Raceway. Have written numerous race reports, and been published on the internet. Have over 7,000 posts on Trackhq and over 30 likes on one of his Youtube video. Owned NA6, NA8, NB1 and NB2, 50+ cars so far. At one time, owned 4 EVs !!!

Maxxis SuperMiata S2 basic spec:

140whp power cap

Area under power curve cap (Sum of whp# at 5k, 5.5k, 6k, 6.5k, 7k rpm <665)

Single adjustable shocks

2,300LB minimum comp weight

225/45-15 RC1

NA6

90-93 1.6 Miata

Engine = hamster

NA8

94-98 1.8 Miata

Engine = BP05

NB1

99-00 1.8 Miata

Engine = BP4W (non-VVT)

NB2

01-05 1.8 Miata

Engine = BP6D (VVT)

Race Car

Build vs. buy

The answer is always buy instead of building a race car. It is a LOT cheaper (as in 50% less). But racers are not known for making good financial decisions, are we?

(this is Spec Miata specific)

<https://www.miatacage.com/t/build-vs-buy>

Which donor to buy?

1. year doesn't matter, as all 90-05 Miata parts are interchangeable. But buying an NB 5 speed saves you an engine (NB make the most power) and potentially a 4.3 Torsen cost.
2. They are all equalized once built, so whatever floats your boat.

Cage:

Most important part of a race car (all race cars, not just Miata). You can't change (for all practical purposes. No, you can cut out a tube to fix, don't work like that) it while everything else can easily be swapped out.

I recommend dedicated Miata cage builders. I have great personal experiences with TC Cage in Norcal, Black Fabworx, Renderos Racing, and Pit Garage in SOCAL. They are custom cage builders and build around your setup. Pre-fabbed Miatacage is of a good alternative, but they are more generic and won't suit many drivers. It is difficult to explain, but the cage is like a good suit, generic ones never fit well.

If you are buying a caged car, the first thing to check is: make sure the weld is 360 on front and rear legs of the main hoop. This is where most 2nd rate cage builder cheats at. It is also where SCCA and NASA tech first look.

What engine do I need?

With SuperMiata's 140whp cap. You can get away with running any 1.8 engine, provided they are semi-healthy. But NB1 (BP4W) and NB2 (VVT) make more power and are relatively newer.

Barely making power cap:

semi-healthy junkyard NA 1.8 engine, MAF delete, I/H/E, ECU, with E85 will yield ~140whp.

Top of the totem pole of junkyard engines:

healthy junkyard BP4W, I/H/E, square top, with E85 will yield ~155whp (high 140s with 91). You then de-tune (via ECU) to 140whp. Note MSM engine is just a BP4W engine with a different cam.

VVT (01-04) engine has slightly lower peak power than BP4W, but with a fatter torque curve (don't really matter in SuperMiata, because of the area under the power curve limit) and is a little

more difficult to tune. But VVT is widely available and cheaper than BP4W. Good BP4W is difficult to find.

Junkyard or built engine?

Depending on whom you talk to. Emilio of 949racing swears by a built engine. I, on the other hand, despise built engines. I've never had an issue with junkyard engine, and with SuperMiata's power cap, junkyard engine makes plenty. There is one big advantage with the built engine though – built engine (with a forged rod, etc) is more likely to survive if you have a mechanical over rev (so-called money shift) if you suck at shifting ☺

I still wanna to build my own engine

Not too smart, but here is the info you need: <https://trackhq.com/forum/track-cars/mazda-miata-mx5/8790-miata-engine-building-notes> and <http://gwracing.altervista.org/factors-to-consider-when-building-an-engine-sept-2015-.html>

Which transmission?

SuperMiata (and Spec Miata) S2 allows 5 speed only. 5 speed shifts better than 6 speed anyway. 5 speed will handle power up to ~180whp at race pace. 6 speed will handle quite a bit more (up to ~280whp).

When buying a used transmission. NB2 5 speed is best (shift quality), followed by NB1, then lastly NA transmission.

Miata Roadster shifter

It is expensive, but money well spent. Unlike 90% of short shift kit on the market, this really does improve shifting quality on a Miata.

Hardtop

SuperMiata does not require an expensive and heavy OEM top. Sell that for a ton of money and buy a cheaper lighter fiberglass hard top. Renderos Racing and others sell them. Note these are “race” top, it doesn't come with any hardware or rear glasses. The fit is “race fit”, don't buy them for your street Miata.

What mod is needed for reliability

1. **Oil cooler** – I am reluctant to recommend this. I've seen more issues caused by an oil cooler than without. Today's modern synthetic will handle 300F+ without issues (everybody is an expert when it comes to oil. But factory cars won't even set off warning light or cut power till oil temp is well over 300F). Most Miata I track top around 285F without an oil cooler in 100F+ weather. Problem is I've seen a plenty of oil cooler failure, causing the engine to go kaboom. Whether it is an oil cooler getting punctured by a rock or an oil line rubbing against other components. Another issue with oil cooler nobody talks about is oil change - you have that 1/2 quart of old oil that doesn't drain completely. I can never understand people waiting an hour for oil to drain during an oil change, but okay with the 1/2 quart of old oil inside the oil cooler. Most oil cooler mounts in front of a radiator, thus reducing radiator's efficiency. That said, I do have an oil cooler in most of my race cars. It helps with cooling (if not mounted in front of a radiator), plus I just like to be one of the cool kid. Oil cooler thread: <http://www.miataturbo.net/race-prep-75/oil-cooler-tech-80234/>
2. **Hood extractor.** This does work wonder with engine bay cooling and really has no negative (other than rain getting into engine compartment). Some even say it helps with downforce (someone once posted a very convincing math formula online, so it must be true). Just make sure you install vents on a low-pressure area of the hood, see below as to where to install it.

NB hood pressure differential map: <https://www.miataturbo.net/general-miata-chat-9/diy-miata-hood-vents-44277/page2/#post531405>

NA hood pressure differential map: <https://www.miataforumz.com/interior-exterior-37/hood-vents-79/page2/#post1464>

install guide: <http://www.singularmotorsports.com/write-ups/hood-louvers-installation-guide/>

3. **Coolant reroute.** Stupid Mazda design. Read this: <https://www.miataturbo.net/race-prep-75/miata-cooling-system-thread-79930/> and see below on coolant reroute for things NOT in the installation manual. This is a good kit: <https://supermiata.com/supermiata-qmax-coolant-reroute-90-05-mx5-miata.aspx> .Here is a funny Youtube video on Miata coolant reroute: <https://youtu.be/h5IKdkXvRRs>
4. **Brake duct.** This is highly recommended. It helps with the longevity of pads by controlling heat, in turn, saves you a ton of money (heat kills pads life) and helps with pad fade. <http://www.trackspeedengineering.com/Brakes/singular-motorsports-brake-ducts.html>

5. **Skunk2 Throttle Body** - the infamous OEM throttle body screw failure. Caused by engine vibration. OEM throttle body butterfly center shaft breaks and screw gets ingested into the engine. Sometimes you get lucky, it spits out the exhaust valve down the tailpipe. Most of the time, engines go kaboom.... There is no fix for this (yada yada, many claim a fix, but none proven). SuperMiata is more reliable in this regard, as it has a 7,000rpm fuel cut limit (lower than stock 7,200rpm) = less vibration. One fix (legal for SuperMiata, but not Spec Miata and add points with PT) is to replace stock throttle body with Skunkworks. Don't really add power, but prevent the breakage. You MUST locktite all screws and drill return spring hole so it closes fully (QC isn't good with this part).
<https://supermiata.com/skunk2-throttle-body-miata.aspx>
6. **Metal tire valve stem** - Do NOT use rubber valve stems. They fail occasionally from heat (braking). So metal valve stems only, please.
7. **Crossflow radiator** – Big honking radiator using fancy flow path helps when you bump draft at ACS and WOT 35 seconds (yeap, Miata is that slow) straight in 110F weather. Highly recommended. If you HPDE, don't bump draft or are just slow, then any decent aluminum radiator (Toyo is popular) will be fine. Don't spend big money on a radiator fan, once a car is moving, they rarely come into play. If you have a stock radiator, and plastic (top) is brown, do NOT take it to track, it is due to crack anytime.
8. **Undertray** – A undertray is a must. It helps with cooling. You don't want pressure build up inside the engine bay, which makes radiator works less efficient. Do NOT run without some type of undertray, OEM undertray is fine.
9. **Radiator ducting** – minimal work but probably most effective mod. Seal around radiator with foam. Don't overthink it, any foam will work, should take you no more than 5 minutes. If you want to get fancy, you can build a custom duct from spoiler to the radiator and seal everything, so all air entering the radiator duct must go through the radiator.
10. **Hondata intake gasket** – Don't use it, it causes studs to back out. I don't know why, but it does.
11. **Diff bracing** – factory Miata diff housing has a notch built into the casting on the passenger side. It was designed to “give” as a breaking point in an accident. But they often break (at the notch) when bump drafting or taking too much curb. Mazda Motorsports sells a diff brace to fix it: Part No: 0000-02-5160-MC, \$35 racer price. It needs to be welded on.

What mod do I needed to win?

The Million dollar question. While many have won with less than optimum equipment. Why the hard work?

Diff

4.3 diff is a must. Rule book allows for 3.9, 4.1 and 4.3. But 4.3 is fastest at most tracks. Math is too complicated to list here, just take my word for it.

Max power

Max power cap is 140whp with SuperMiata. There is also a max area under power curve of 665. Add up all whp number at 5k, 5.5k, 6k, 6.5k, and 7k to 665 max. Make sure you are close to 665. When you are dueling out with cars similar in spec. you will feel the 2whp difference while drag racing down the front straight.

Get your ECU tuned at least once per year. An engine will get tired gradually, losing a little bit of power after so many engine hours. SuperMiata rule is beautiful in that it allows you to detune to 140whp initially, and kept adding a bit of timing as the engine gets tired to still meet 140whp. Once the engine is too tired to make 140whp, you can switch over to E85 with just a simple tune (see below for E85), as it adds power.

Tire management

Probably most important of all. That's why there is a whole page on tire management below.

Suspension

While SuperMiata series encourages low budget build. It is very difficult to win with an eBay suspension. You won't be able to jump over curbs like what cool kids do. All top drivers in SuperMiata series are currently on XIDA dampers.

Data Logger

You need a data logger, so you can learn from others (SuperMiata require transparency on all data and video, basically cough up your data and video when requested by any competitor). Compare your data to the fastest driver of the day, you will learn quite a bit. Get something with big predictive in middle of the screen, which will get you 80% there. The other 20% is from data. See below for AIM Solo.

Weight

Minimum comp weight for SuperMiata is 2,300LB. My goal is 2,310LB at zero fuel (fuel stuffer). Even better, is to get to 2,210LB and use 100LB ballast strategically for weight distribution. Unscientific test says extra 200LB will cost you ~1 second on a 2-minute course.

Aero

Make sure you have your front and rear aero installed per SuperMiata rule. Run your rear spoiler at a max angle for those tracks that need downforce (Chuckwalla) and min angle for those that do not (ACS).

Brake Prop Valve

Locking up brakes is not a good thing. Install a brake prop valve to save tires and for max braking power. Different conditions call for a different setting. Even better, have it installed inside the cabin – so you don't waste time getting it perfectly dialed.

If I could charge \$1 every time someone asks me which way to turn a Wilwood prop valve in a Miata !!!

If front locks up, turn prop valve CW

If rear locks up, turn prop valve CCW

ABS brakes

This is a difficult retrofit. I do not have it on most of my Miata race cars. ABS while not an advantage 97% of the time, there are a few instances (wet is obvious, but I am talking about dust, brake duel, etc...) ABS helps greatly. If you don't have ABS, don't worry about it. But if you are buying or building one, take one with ABS all else being equal. Note NB ABS is more modern and works better than NA ABS.

Extended lower ball joint

This makes Miata faster significantly (butt dyno says 1 second). You get more camber front (traditionally difficult to get enough camber on the fronts). In turn, you can raise the car up for more suspension travel and fixes bump steer (if you don't know what bump steer is, just know it isn't a good thing).

<https://supermiata.com/SuperMiata-Extended-Lower-Ball-Joint.aspx>

Flywheel

A lighter flywheel is a good thing, allows faster and cleaner shifting. Better yet, run a 1.6 lightening flywheel and clutch.

Drivetrain

ECU Tuning.

Read the rule on SuperMiata 140whp cap and power area under the curve cap in the rule book linked above. 140Whp is derived on a Dynojet dyno. Dynojet is standardized (though still off by couple percentage) across the country, easiest to get a consistent number and popular everywhere (cheaper).

A secret is that load-bearing dyno (Dynapak) is better suited for tuning than a dumb dyno (Dynojet).....not that Dynojet can't yield good tune, just that Dynapak is better. It can hold an RPM which makes it much easier for tuners.

I recommend Megasquirt ECU for SuperMiata. Not because it is the best (it isn't), but because it is popular among SuperMiata, which means more people to answer your ECU questions.

Clutch

Buy whatever you like. Clutch isn't an issue with naturally aspirated Miata. Quite a few SuperMiata run small 1.6 Clutch/flywheel, even though all SuperMiata is 1.8. 1.6 clutch/flywheel is lighter. I prefer 4-puck design personally.

Header.

Do not buy eBay Miata headers. They crack in just few track days. You save between \$100-\$300 with an eBay header. But 1 crack header will cost you ~\$1,000 track day (see below) and your one and the only monthly hall pass from your wife/husband. Good header lasts many years, so spend it well.

Coating header (inside and out) is recommended. Not for power, but for your right foot. Header sits only a few inches away from your right foot. More than a few Miata drivers have blistered right foot to prove it.

BP4W engine

If you have a BP4W. Bring a couple of spare cam angle sensor, they always go bad. It takes 10 seconds to swap one out. The symptom is an engine misfire at high RPM (~5,000 rpm).. Also, bring a spare coil pack.

BP6D and head gasket and coolant reroute.

If you are installing a head gasket in your BP6D (VVT engine) with coolant reroute. Use MSM's (04-05 turbo Miata) head gasket for optimal flow.

MAF delete

MAF delete on NA8 adds 5-8whp. Add a GM map sensor.

E85

E85 is the best fuel ever. It keeps engine cooler, High octane (EFFECTIVE octane rating is 110+ because of cooling effect). On naturally aspirated Miata engine, they add between 6-8whp.

Internet says you need modern fuel system to run E85, they are wrong. Miata run E85 just fine. Only thing is to change out fuel filter more frequently, especially after first couple track days after switching over to E85. It also smells good !!!

Stock fuel injectors (NB) will work just fine with E85. NB2 injectors flow most of all OEM.

E85 big con is losing ~30% of MPG, so you won't be able to run endurance races. Also, the need to carry more fuel to a track. Finding E85 stations is also tricky depending on your location.

Here is a link for E85 fuel tester if you want to know how pure your E85 is (percentage of ethanol). Basically a glass tube for \$25 !!!

<https://www.amazon.com/Quick-Fuel-36-E85-E-85-FUEL/dp/B007ZJ749O>

Square Top

This is a JDM / EDM NB2 intake manifold. Bolts onto NB heads. It removes all butterflies in the intake and the kink after the throttle body, also offer a much larger plenum. It offers 6-10whp on naturally aspirated Miata 1.8 engines. Skunkworks also make one, costing about the same as Mazda one, and making about the same power.....so buy OEM....

Fuel sock hole issue

Common Miata issue, more so if you run E85 fuel. You will feel engine miss on track out during a left turn, if the tank is less than half full. Good news is your day isn't over, just keep the tank full at beginning of a session. It is a \$10 part, and easy to swap (if you remove the hard top). It is impossible to see the tiny hole, but it is there. Just replace it if you have the symptom.

Do not replace the fuel pump with an AEM

AEM fuel pump draws a ton of current. Burning up the master fuel relay. Either use a Walbro or Deatschwerks fuel pump. If AEM is your thing, install it on a separate electrical circuit. Trackspeed now has a fuel pump re-wire kit for those who insists on running aftermarket fuel pump. <http://www.trackspeedengineering.com/fuel-delivery/trackspeed-fuel-pump-rewire-kit.html>

Heater core/hose

If you still have a working heater core (great for defrosting). Make sure you carry a spare heater hose. You will need it, Heater will eventually fail and hot coolant leaking onto your feet. You will then need to do a heater core bypass on track, which is super easy if you have the hose.

Safety

Steering wheel hub adapter

Miata drivers like to run NRG steering wheel hub adapter. REMOVE the little nub/button that locks the steering wheel. It is dangerous: If you ever need to exit vehicle in a speedy manner. You can't be searching for the little button to release your steering wheel in an emergency.

Which harness should I buy? Can I buy SFI instead of FIA belts?

Although 5 point is legal, 6 points cost a few dollars more and are much safer for man parts. Do NOT buy SFI only harness, because SFI's 2 years expiration whereas FIA is 5 years.

Killswitch

Make sure it is installed correctly (no, cut out just battery is not how you wire it). Minimum is a 4 post design. Standard drill with all race organizations is to rev the engine to ~4k rpm, and hit the kill switch. The engine should die immediately if you have it wired correctly. Try it yourself before you bring it to tech. As of 2019 with SuperMiata, one of the kill switch must be located within 6" of A-pillar, so rescue can access it easily.

Racing seat

Halo seat is required (as of 2019) with SuperMiata. If your seat is expired. You must have a seat brace (connecting seat to the cage) installed. Few racing seats fit a Miata. Here is a list: <http://www.miataturbo.net/race-prep-75/race-seat-thread-91760/> and <https://forum.miata.net/vb/showthread.php?t=368990>

* as of early 2018, Cobra Evolution has changed its shape. It will no longer fit a Miata.

I know I will get flak for this but I do not recommend your typical cheapo aluminum seats. Yes, it can be installed safely, but rarely does. It is just easier if you don't buy them to start with.

Handheld fire bottle and onboard fire system:

If you have a fire while on track. You stop the car and jump out. In this incident, you wish you have the onboard fire system, not a handheld. Onboard system is required as of 2019 with SuperMiata series.

Handheld fire bottles have a few uses. Say in a paddock, you see a fire (your car or another car), you can help put it out. On a track, your car spins and goes off the track. Stalls over dried grass, your hot exhaust ignites the grass, you get to watch your car burn down slowly if you don't have a handheld.

This is a great handheld fire bottle, it weighs 1/2LB, so it won't become a projectile in a crash. It lasts 50 seconds instead of <10 seconds for a regular handheld.

<https://elementfire.com/>

More read:

<http://www.turnology.com/tech-stories/chassis-safety/fire-suppression-systems-buying-precious-time/>

Center net install

Often see confusion about the center net install, many are installed incorrectly: 1. They are installed too high (center of the net should be the height of your shoulder, not your head). 2. Lower 2 straps do not anchor off center part of the cage (only top strap does), they (2 lower straps) need to wrap around the seat and anchor on driver side cage bar. Here is a page from Schroth's instruction. full instruction here

<http://www.schroth.com/.../se.../installation-instructions.html>

The idea behind a center net is to create a halo. It also prevents your shoulder (body) from escaping (while your head is held steady by a halo seat). Another is to support the seat itself in a heavy side impact.

Wear your Nomex socks

Racing organizations love to do surprise inspections. Immediately after you get off the track going into impound. They check everyone's sock if they are Nomex. So don't cheat on safety !!

Tall driver

Even short people need this, as Miata is vertically challenged. Install a "floor drop plate", this plate will drop the seat floor by 1.25".

<https://www.advanced-autosports.com/products/spec-miata-floor-drop>

Brakes

Brake combination

Best combo is for brake bias - Most popular S2 combination is NB2 (also called Sport) front brake, NA8 (also called Standard) rear brake. Another decent combo is NA8 front and NA6 rear. Remember that bigger and cooler pads last longer and handle fades better.

Brake pads

I personally use G-Lok, as well as 50% of Miata racers. They are pricey, but they are famous for easy modulation. That's what you are paying \$\$\$ for. That said, there are other great pads, you have to try them to see if you like them. I've tried a bunch of "enduro" pads, I have yet to like any, as they do not release well. It is a personal preference.

Pads wear accelerate as it wears (first 50% last 4 track days, but last 50% last only 2 track days). So don't get caught out. Replace them well before they are worn, and keep the used ones as spares.

If a manufacturer offers them, buy pre-bedded pads. Yes, it costs \$20 extra. But you are saving that first session (in California, it is often the fastest session where you can go for your personal best !!). It cost over \$1,000 per track day (yes it does, if you don't agree, you are wrong), your bedding in pads at first session just cost you \$200.....

Common G-Loc brake pads combo (for S2 and for Spec Miata) is R12 front/R10 rear or R10 front/R8 rear. Few of us prefer same pad compound front and rear. There are also a few fast SuperMiata running R18 front / R10 rear.

Brake rotors -

Plain > slotted > drilled

Bling bling drilled rotors is for cars and coffee. If you don't believe me, know that Ferrari 360 road car comes with drilled rotors, while 360 Challenge race car does not. You can't bling more than a Ferrari, so if Ferrari is doing it, it must be right.

Some might argue slotted > plain. They are also wrong, but I will say slotted is okay if you have the extra \$\$\$ for it. But drilled is a big NO NO for any track duty.

Brake cooling

Good read: <http://www.singularmotorsports.com/write-ups/tech-article-brake-cooling/>

Cooling

Radiator mesh

For some tracks, a radiator mesh is a must. Chuckwalla Raceway and Springmountain are famous for taking out radiators. One race weekend in 2015 took out 3 Miata radiators with big rocks. Don't forget even the most "open" mesh will block out 25% of radiator surfaces, so careful not to go overboard with tiny hole mesh and overheats your engine. A couple of ideas here:

<https://www.pegasusautoracing.com/group.asp?GroupID=SCREEN>

<http://www.speedwaymotors.com/Honeycomb-Radiator-Protector-15-x-22-Inch,29426.html>

Radiator opening

Something I observed in last few SuperMiata races. Many run a too small of radiator opening. Maybe they saw [Emilio Cervantes's](#) S2 and think what works for a fast driver must also work for them. What most don't know is that Emilio also has a cross flow radiator, Spal fan, e85, custom undertray, oil cooler, extractor hood, ducted and sealed radiator opening.

If you are missing a few of the above mods. It might work in winter HPDE'ing. But highly questionable at 110F weather bump drafting at ACS for 35 seconds straight WOT.

To make matter worse, some of those SuperMiata ran the smallest opening mesh covering up 1/3 of effective area. I know there is science that says all you need for opening is 1/3 of the radiator surface area, but that's using perfect ducting. I know for a fact bigger radiator opening will lower water temp 95% of the time. Point is half of the cars I saw that weekend won't survive a 110F weekend bump drafting. Go big on radiator opening until you got it handled.

Bleeding cooling system

Miata needs its cooling system bled. Either jack up the front of the car very high, or use Lisle 24610 Spill Free Funnel to bleed:

<https://www.amazon.com/gp/product/B001A4EAV0>

Water pressure warning light

No one in w2w ever looks at their gauges more than a couple of times per lap (if they said they do, they are either lying or driving too slow). In a 2 minute lap, that's once every minute. If you have a major coolant leak, you would never have caught it in time. Best I've found Longacre water pressure warning light. If it comes on while on track (it might flicker while in a pit, which you ignore), you have a leak. It is that simple, much better than temp gauge that tells you AFTER it is too late.

<https://www.amazon.com/Longacre-40141-Water-Pressure-Gauge/dp/B003TQ3G62/>

Everything you need to know about cooling in a Miata:

<http://www.miataturbo.net/race-prep-75/miata-cooling-system-thread-79930/>

Suspension / Tires

Pyrometer

If you do not own a pyrometer, immediately go out and buy one. Laser type DO NOT work, don't bother. Laser type is NOT better than nothing, it is worse, as it a waste of money and time. Buy a probe type, use it religiously. Here is a guide to using it:

<http://949racing.com/using-a-tire-pyrometer-949-racing.aspx>

Always start with outside tires as they do the most work. Example: in a CW course, take readings of left side tires first. Tire surface temp cools fast, you need to make sure your in-lap is relatively fast for accurate pyrometer readings. Stick in probe diagonally for more accurate reading, also avoid outer 2" of tire treads. Take track surface temp and ambient temp as part of the reading.

Alignment setting

Just follow this, it will get you 90% there. And better than 50% of w2w racers out there.

<https://supermiata.com/miata-race-alignment-info.aspx>

if you want to take w2w seriously, you need to learn to do basic alignment yourself. I don't mean the full 5 hours corner balancing, string alignment. That I would leave it to an expert. I am talking about brings a couple of toe plates, so you can play with toe and camber. You want to be able to change toe and camber RELATIVELY to your base setup, and according to your pyrometer readings (you didn't forget using a pyrometer, did you ?)

best alignment tool

<http://www.ironcanyonmotorsports.com/icm-miata-alignment-system/>

My car is oversteering (if understeering, just do the opposite)

Larger front bar (or adjust it stiffer) and/or smaller rear sway bar (or adjust it softer)

Stiffer front springs and/or softer rear springs.

Less rake (lower rear ride height and/or higher front ride height)

More rear wing for high-speed behavior

Could be an alignment issue.

Damper settings do NOT alter understeering / oversteering behavior.

Playing with shocks

This is a generalization (like most of my opinion): Softer the suspension, better the mechanical grip. The idea to go as soft as possible, without "wallowing". 80% of track cars I see are set up too stiff: for some strange reason, many think stiffer makes it more like a race car?

is 205 faster (dry) on 8" or 7" wheel?

8" is faster. Whoever told you otherwise is wrong.

is 225 faster (dry) on 9" or 8" wheel?

9" is faster. Whoever told you otherwise is wrong.

Interesting fact:

205 Hoosier is wider than 225 NT01 and 225 RC1

RE71R street tire is faster (most of the time, few exceptions) than R-Comp NT01/RC1/R888R

What tire pressure should I run?

If you ask Emilio of 949racing this question, you get scolded. "Use a damn pyrometer to set your tire pressure !! Every car is different" he says. But I am nice and will give you a starting point.

225/45 RC1 on 15x9 – 28 to 34 hot

205/50 RC1 on 15x8 – 32 to 38 hot

205/50 RC1 on 15x7 – 36 to 42 hot

In general, street tires will prefer higher pressure than R-comp tires.

If you have to guess, err high. Higher psi (than ideal) will lose little time, whereas lower psi (than ideal) will lose more time. so always err on the high side with tire pressure.

Whenever you talk about tire pressure, it is ALWAYS hot pressure. It bugs me whenever someone asks if that's cold or hot pressure. Racers don't care about cold pressure !!!

If when ambient temp is low or if the track is damp and cold, that you are having trouble bringing tire up to temp. I prefer running a lower than normal tire pressure to soften side wall. This adds heat into the tires, helps it come up to temp faster.

If the track is so wet that you are hydroplaning, I run a higher than normal tire pressure to help it cut through the water.

Front wheel bearing warning

Read up on this. Some aftermarket Miata front wheel bearings (one with a machined surface) will fail (crack open) on track. Very dangerous.

https://cimg7.ibsrv.net/gimg/www.miataturbo.net-vbulletin/1500x2000/80-fb_img_1472490012993_d776e628020a9ec6aa6506f4cfc861d71d1ff262.jpg

in this picture, the bottom hub (machine surface) is the bad hub, the top hub is good to go. Inspect your wheel bearings, if you have the machine ones, throw them away. Read up on this: <http://www.miataturbo.net/race-prep-75/sm-weekend-failure-wheel-hubs-90331/>

Rear hub Failure

Replace your rear hub every 100 hours. Sooner if you run a Super sticky Hoosier. They do fail in spectacular fashion, very dangerous.

<http://www.miataturbo.net/race-prep-75/when-last-time-you-changed-your-rear-hubs-72613/>

Front sub-frame failure (cracks where front alignment bolts are)

Apparently more common than you think, that Mazda makes a part (Mazda Motorsports part # 0000-04-5989). It is a reinforcement plate that you weld onto sub-frame to prevent cracking.

Repack front wheel bearing/hub

here is a video on repacking front wheels bearings by a smart and handsome man.

<https://youtu.be/Q59HhThSj0k>

Tire models:

Maxxis RC1

SuperMiata official sponsor and tire. Prefers cooler weather. Good with heat cycles

Nitto NT01

on par with RC1, better in warmer weather and worse in cooler weather compared to RC1. Excellent with heat cycles

Hoosier R7

very very sticky. Not street-able. Fair with heat cycles. But do not handle heat cycles as well as RC1/NT01/R888R

Hoosier A7

best of the DOT tires, not street-able..... expensive. but if lap time is what you want, this is it. Handles heat cycles worse than R7. You get ~3 golden laps, then drops off.

Bridgestone RE71R and BFG Rival S 1.5

The so called "super 200tw" tires. Fastest street tires as of 2018. Faster (and wear faster) than NT01/RC1 under most conditions.

Federal 595RS-RR

very cheap street tire, sub \$80 each for 205/50-15 and \$110 for Vette sized. Decent good dry grip for the price. Do not handle heat well, good tire for winter, not so good in warm weather. 1 good lap is you all gonna get, then drops off the cliff. Very loud tires for street use. Not a good tire overall, but it is so cheap, it is worth it for someone on a budget.

Hankook RS4

One of better 200tw street tires for the track. Handles heat better than all other street tires. Bad in rain. Lasts longer than sticky super 200tw RE71R and Rival S 1.5, but not as sticky. Great choice for most HPDE'ers, especially for those in warm climate.

Michelin PS4

Very good overall tires if you don't track much: quiet, comfortable, good in rain and expensive. Loved by Ferrari and Porsche owners who never see track. Not as sticky as RS4, Rival, SUR4G or RE71R.

Michelin PSS

good tire if you live in 2005.

Continental Extremecontact Sport

in the same class as PS4, except it is quiet a bit cheaper, better ride and a notch down on dry grip.

Michelin SC2

What high-end cars use. Good overall 100tw R-comp that can (barely) work on streets. Super expensive.

Nexen N Fera SUR4G

Cheap and sticky. A step below RE71R / Rival S. but as good as NT01/RC1 depending on the condition. One big negative is it feels “mushy”. Difficult to feel what the tires are doing.

Falken 615K+

This is very similar to RS4. It is a great track tire, not as fast as super 200tw tires (RE71R, Rival), but handles heat well, consistent throughout laps and wears well.

Goodyear 3R

This is currently (2018) fastest “street-able” tire you can buy. This is 100tw R-comp that came standard on ZL1 1LE. In the same class as SC2, but cheaper, stickier and don't last as long. Very limited in sizes.

Tire management with 2 sets of tires.

If you watch F1, you know there are “golden laps” where tires are fastest when new. This applies to all tires. Maxxis RC1 is no exception. 225 RC1 is fastest new to ~9 heat cycles. So how do I handle tire management if you are cheap like me (if you got \$\$\$, run a new set every session, guaranteed to be fast)?

Say I have a set of 10 heat cycled RC1 and a set of new RC1. Every race weekend is consist of 3 practice session, 1 qualify, 2 back to back Super Sprint races on Saturday. 3 practice and 2 back to back Super Sprint races on Sunday.

Race weekend 1

Saturday practice 1 – old tire heat cycle 11
Saturday practice 2 – old tire heat cycle 12
Saturday practice 3 – old tire heat cycle 13
Saturday qualifying 1 – new tire heat cycle 1
Saturday super sprint 1 – new tire heat cycle 2
Saturday super sprint 2 – new tire heat cycle 3

Saturday practice 1 – old tire heat cycle 14
Saturday practice 2 – old tire heat cycle 15
Saturday practice 3 – old tire heat cycle 16
Saturday qualifying 1 – new tire heat cycle 4
Saturday super sprint 1 – new tire heat cycle 5

Race weekend 2

Saturday practice 1 – old tire heat cycle 17
Saturday practice 2 – old tire heat cycle 18
Saturday practice 3 – old tire heat cycle 19
Saturday qualifying 1 – new tire heat cycle 6
Saturday super sprint 1 – new tire heat cycle 7
Saturday super sprint 2 – new tire heat cycle 8

Saturday practice 1 – old tire heat cycle 20
Saturday practice 2 – old tire heat cycle 21
Saturday practice 3 – old tire heat cycle 22
Saturday qualifying 1 – new tire heat cycle 9
Saturday super sprint 1 – new tire heat cycle 10

Now the old tires after 22 heat cycles are pretty much done, end of life. Those “new” tire (with 10 heat cycles) now becomes practice tire for next Race Weekend. Then buy a new set of RC1.. This is how I manage my tires. Idea is I always have a sub 10 heat cycle RC1 for every qualifying or race.

Driver

Corner minimum speed

When you are an “intermediate” driver (say first 5-10 track days, 5-10 second off track record), lower corner minimum speed is almost always the cause of your slower lap time.

Corner entry speed

Once you are a “high intermediate” or “low advanced” driver (2-5 second off track record), it is almost always your entry speed that’s slower than a faster driver. See below for “corner entry/brake release”

My first instructor said “slow in, fast out”

They lied to keep you from killing them (they in the passenger seat). They are alive now, aren’t they? Proves that lying was a good thing. Slow in is the main cause of slow lap time in 95% of the drivers.

My first instructor said yada yada

Get many things they said out of your head as you advance. Their job was never to make you a fast driver. #1 job is to keep you safe. So a lot of crap has been said over the years. Not true but kept you alive, didn’t it?

Driving position:

Left foot must be able to fully disengage clutch without moving your hip. Your wrist should be able to reach the top of the steering wheel. Rest is personal preference, lately the trend has been sitting close – like NASCAR drivers.

Heel and toe

You must be proficient with heel and toe, no excuses. Most drivers downshift way too early and upset the car. If you can feel any amount of engine braking, you are doing it too early. You need to learn to be fast and smooth. Just being smooth won’t cut it. It is also easier if you anchor your heel when you heel and toe, adjust pedals accordingly (yes, you can bend throttle pedal by hand).

Shifter

shift with palm (pushing away from you) and 3 middle fingers (pulling towards you). Easy with the shifter, don’t force it. You still need to be fast. Again, fast and smooth.

What sections of a track affect lap time the most

In general, high-speed section matters the most. You can have a big slide at a low-speed section, you might lose a ½ second. But if you did the same at a high-speed corner, you will probably lose 2 seconds. Point is working on high-speed corners first and don’t sweat as much on the low-speed corners.

Obviously, corners that lead to long straights are super important.

Late apex?

Late apex has been drilled into most beginners, that it becomes a hindrance later with driver development. Late apex is safe, that's the reason they teach it in driving 101.

In general, you want to late apex corners that leads into a straight. But it is often better to early apex at end of straight that leads into short corners. You want to extend straight as long as possible, optimizing corner entry over corner exit.

As you exit a corner, if you run out of track and have to lift any point past the apex, you apexed too early. If you are not sliding to the edge of the track as you exit a corner, you apexed too late.

Pick a line that gives me highest speed / rpm?

This is a common mistake with high intermediate drivers. Many learned to seek highest minimum speed or highest exit speed when choosing their driving line. Note you are looking for lowest lap time, NOT highest speed, this ain't Salt Flat. Highest speed does NOT equal lowest lap time if you travel a longer distance. A shortest distance is often the fastest (lap time), especially with a lower hp cars. Imagine a string pulled tautly around corners, that is the shortest distance. Point is while speed is important, distance traveled is equally important.

Should I take this corner in 3rd or 4th gear

In our experience, if you have to ask, 9 out 10 times, higher gear is the correct choice. The only reason you asked is when a lower gear that requires an extra shift. Every extra shift cost an extra ¼ to ½ second for most drivers. While lower gear often “feel” faster (due to higher rpm), faster lap time it is not, because of the extra shifts. Sometime it might be say higher corner speed, but overall lap time suffers due to 2 extra shifts. Higher gears also have fewer chances of upsetting car balance during shifts and throttle modulation. Lower gear sometime will cause over-slow.

In w2w, higher gear also means less likelihood of making a mistake. W2w is all about minimizing mistakes. Even if the higher gear choice is 0.2 seconds slower, I often will choose that if I am being chased. They will have a hard time getting around me if I am only 0.2 seconds slower (than them) through a corner, but 1 mistake (at lower gear) often means losing a track position. Being consistent is often more important than being fast in w2w.

Trail brake

Learn how to trail brake. Reason below:

Corner entry / brake release

At corner entry, you control yaw angle by how fast or slow you release the brake. This is why trail brake is a must. Slower you release the brake, more yaw angle (oversteer/rotation). Faster you release the brake, less yaw angle (understeer/less rotation). This is the reason G-Loc brakes are popular, not because they are cheap (they are not), long lasting (they don't), ect.... it is because they are easy to modulate, especially brake release control.

Corner exit / throttle

This is pretty obvious - At corner exit, more throttle makes the car go wide (understeer). Less throttle, more rotation.

The short version is you can control yaw angle of corner entry with brake release and corner exit with throttle modulation.

Weight transfer

You should always treat car control as controlling of weight transfer. Think where you want the weight to go.

Apex throttle point

A very good article to read about apexes, when to early apex and when to late apex. Written by Vivek.

<http://www.beyondseattime.com/the-fallacy-of-getting-on-the-gas-early/>

"The ideal acceleration point, every single time, is at the apex". This contradicts to internet saying about being on the gas as early as possible, but the article gave an in-depth reason why this is.

Apex vs. grip

-More power/grip ratio the car is, the later the apex. 2 exact same cars, 1 with more hp. The more powerful car's ideal apex is later than the car with less hp.

-Less grip the car has, the later the apex car should take. Say you are on all season tires, you should be on an earlier apex than when you have racing slicks on.

-This applies to driving. When you have less grips, say tires overheat, gravel on the track surface, it starts to rain, you should adjust your apex to a later apex.

Apex vs. learning a track

with a new corner, I always start with late apexing it. Gradually go earlier and earlier till I run out of the room (lifting at corner exit), then back off a tad. This is the safe way of learning a corner.

Shuffle steer:

Do not shuffle steer. Probably the most common driver mistakes when we watch a video. One hand should always be at 3 or 9 o'clock position on the wheel at ALL time, not 99% of the time, but 100% of the time.

Never let go of the steering wheel both hand: It is worst sin of all. More than a few drivers let go of the steering wheel (watching too many drift video) when losing control of the vehicle. The driver has no idea if the front wheels are straight or cocked to one side. As car gains traction eventually, it hooks left or right into a wall. Do NOT let go of the steering wheel unless impact is imminent, in which you should grab both shoulder belts and brace for impact.

Walking the track

It will teach you a ton. You will see elevation change, camber change, surface change, curb height that you don't see in 10 years of driving the same track. I guarantee it will make you a faster driver, every time. There is a corner at my local track that I would miss apex by 2 feet to avoid a dip - it is faster according to my data logger.

Wrapping your thumbs around a steering wheel

Do not wrap your thumbs around a steering wheel. Many racers have broken their thumb (yeap, that's a thing. I know a few) in w2w contacts (minor contact usually side by side) or crash.

Mirror setup – if you have a blind spot, you are setting it up wrong.

This works for me, and I am the best w2w blocker there is. You need only 2 mirrors (driver side and center, you do not need passenger side). A wide center mirror with long L brackets. You always want your center mirror as far forward as possible thus the L bracket. The mirror should sit 5-10" in front of the top bar of the cage. 1. Wider coverage 2. no need to lift your head to see what's behind you. 3. Adjust center mirror to covers your passenger side blind spot.

Center Mirror L bracket - Joe's Racing model # 11272-XL

<http://www.joesracing.com/i-21090950-14-rear-view-mirror-kit-w-xl-1-1-2-brackets.html>

or

<http://miatacage.com/rearview-mirrors>

The other mirror is a driver side mirror. Standard Miata mirror location is idiotic. Every modern car outside mirror is next to an A-pillar, whereas Miata's mirror is 10" behind the A-pillar. Move the driver side mirror forward ~8" if the rule allows. It is held down by just 2 bolts. Make sure you mount is secured (mount in an area with double walled door skin). 1. more coverage of driver side blind spot 2. You can now glance driver side blind spot without moving your head. 3. safety – with the mirror in stock location, it is impossible to get my big head with my big helmet and HANS device to exit the vehicle should the need arise. The mirror is in the way.

Have someone walk from side to side behind you. There shouldn't be any blind spot. Remember that if you can see your own quarter panel driver side, your driver side mirror is angled incorrectly.

Here is an article on how to adjust your mirror to avoid a blind spot on a street car, but same idea.

<http://www.caranddriver.com/features/how-to-adjust-your-mirrors-to-avoid-blind-spots>

Aim solo

I have used most of data loggers, but always came back to Aim Solo. Don't need Aim Solo DL (more money) for a Miata, as it doesn't work (OBD part of it). Hardwire (using the proprietary power connector, not the micro-USB to power) your AIM Solo, it will start every time you fire up the car. If you are racing a SuperMiata, AIM Solo is a must, because 90% of data loggers in

the series are AIM Solo. You can compare data easily – SuperMiata requires all competitors to surrender their data when asked by any competitors.

Set your screen to read “+ - Best”. nothing else. All you care about is the predictive, you shouldn't be looking at lap time while on track (it does come on for ~5 seconds after you cross start/finish). For some strange reason, both “+- Best” and “predictive” is on AIM Solo, but you want to use “+- Best”, which is the “real” predictive. Predictive will get you 80% of data logger benefit. For the last 20%, you will need to compare data using a computer.

AIM Solo 2 is shipping as of May 2018. Data is compatible with Solo 1. AIM Solo 2 has a very very short battery life, hard wire it.

How does “predictive” work?

#1 reason for using a data logger is predictive. Say your best lap so far is 2 minute flat. You take T1, and screen shows “-0.32”, it means you just went 0.32 second faster through T1. Now you take T2, and decides to try a later apex. Screen shows “-0.12”, it means you just went 0.2 seconds slower through T2. So try an earlier apex next lap. Experiment with lines, apexes, braking point, and see what predictive says.

You often see people give up rest of the lap, when they get bogged by another car or made a mistake because it won't be a personal best lap and/or they can't learn more from the lap. With a predictive: say you got bogged by a slower car at T1, it now shows “+3.3”. You can still try a different gear through T2, if it shows “+3.0”, you now know 3rd gear is 0.3 seconds faster.... With a data logger, you are optimizing your track time, every corner can be individually studied.

You do have to be careful with predictive. You need to treat corners not just individually but as a combination. Sometimes taking T1 early is faster by 0.2 seconds by making your T2 slower by 0.3 seconds. Because T1 and T2 are connected, you need to treat them as 1 corner when using predictive.

I am ready to race SuperMiata, what do I do now?

1. join the private SuperMiata Drivers Group on Facebook. There is a public SuperMiata Race Series you should also join. Ask questions online, 99% can be answered on FB. Please don't be shy posting up your car pictures on FB, so we can catch most of the things beforehand.
2. if possible, bring your car to an HPDE event like Roadster Cup or regular track day before your first race. [Emilio Cervantes](#) and [Suvachai Sonny Watanasirisuk](#) will likely to be there to tech your car and driver gear. Even if your car is not 100% ready, it is a good idea to let them look at it beforehand.
3. read the rule book 10 times.

HPDE Track Etiquette

Someone is now behind me, but I am faster in the straights, so no need to let them by.

For some strange reason, at every downroad, there are drivers that never understood 5th-grade math. If someone CATCHES you (wasn't there before, but is there now in your mirror), you are SLOWER !!! it doesn't matter if you are faster in straight or corner. 95% of you understands this, but for some weird reason, a few don't.

Should I move offline to let faster car by?

NO, you stay on the racing line. Let faster cars decide how they gonna pass you. A predictable move is your friend. Unless you are going really slow, or have just spun and just re-entered the track – you do not want to drag rocks or mud all over the racing line.

Open passing group

Aaron of Speedventures says it the best: Although this is an open passing group, don't mean this is a w2w group, so no stealing apexes. BUT, BUT, BUT, if you turn into a corner, and got surprised by someone stealing your apex, you do not belong in an open passing group.

How long can I hold up faster cars?

There are no set rules, but this is about etiquette. I probably get flamed for this, but my standard is 3 corners (or till a straight). If you don't let me by in 3-5 corners, I will start to make some shady moves. (In endurance multi-class racing: we instruct our drivers not to hold up the faster cars too long, because they will soon run out of patience, and make dicey passes.). There are exceptions: if you are in the middle of a hot lap, and only have a few more corners to go. Go ahead and finish your lap, faster cars can wait.

Why isn't it faster cars' job to get by?

Even in full on w2w racing, slightly faster cars (1-2 seconds) will have a difficult time passing if it is only faster in the corners, but slower in the straights. With HPDE, you definitely don't want dicey passes in corners and stealing apexes. Especially with narrow club tracks. Watch F1 next time, even best drivers in the world have problem passing a slower car. At Monaco, even fastest F1 car can't pass a mid pack, it just isn't possible.

Personal pet peeve

I hate it when a slower car holds me up for more than ½ lap, then decides to let me by at the last corner (leading to front straight) by going through it side by side. That IS the worst corner to do it at. You now messed up your current lap AND your next lap (not getting a run). My current lap is also done for, this also messes up my next lap !! Either let me by before the last corner or wait till you cross the start/finish.

Wave

Wave at corner workers if there is a flag, let them know you see the flag. At cool down lap, wave to them to say thanks. If a slower car lets you by, wave to say thanks.

Spec Miata Conversion

NA6 SM to S2 SuperMiata

A ton of work. This is the minimal mods:

a complete 1.8 engine (preferably NB)
intake, header, and exhaust
standalone ECU and a tune to 140whp
front and rear spoiler
15x9 wheels
225/45-15 Maxxis RC1

NA8 SM to S2 SuperMiata

If you have a strong NA8 SM engine ("pro" head). It will be relatively simple. ECU with intake and exhaust will get you 140whp+. If you have a weaker NA8 (junkyard engine), you will need to go with E85.

Intake and header
Standalone ECU with MAF delete and a tune to 140whp
Front and rear spoiler
15x9 wheels
225/45-15 Maxxis RC1

NB SM to S2 SuperMiata

Easy power. If you have a really tired engine, add a square top and/or E85 will easily get you 140whp

Intake and header
Standalone ECU and a tune to 140whp
Front and rear spoiler
15x9 wheels
225/45-15 Maxxis RC1

Towing

Towing is part of life with w2w. Life sucks when trailer tires or trailer wheel bearing fails. When they fail (and they will), they fail spectacularly !! Because you can't feel a trailer tire pressure drop or trailer wheel bearing going bad. This is also the reason that you should never buy a single axle trailer.

Tire ramp to change a tire

Have you thought how you gonna change your trailer tire in case of a blowout? Do you even have a jack that's tall or strong enough to jack the trailer up? How about unloading your race car when you have to change trailer tire? The best solution is to buy a Trailer-Aid Tire Changing Ramp. Make sure you got the taller model (Plus model).

<https://www.amazon.com/Trailer-Aid-Plus-Tandem-Changing/dp/B001V8UKBO>

As for keeping an eye on trailer tires. You can go with the fancy TPMS system like I did (they also read the temperature inside tires, helping you identifying impending wheel hub bearing failure), typically runs between \$300-\$500 or you can buy these cheap valve stem cap:

<https://www.amazon.com/Quick-Pressure-QP-000065-Chrome-Monitoring/dp/B00XCOQ3ZC/>

Every time you are outside your trailer (at a rest stop, at a gas station, at a Starbucks), walk around and make sure the cap is green, so you know tire pressure isn't low.

Trailer spare tire

You can get away with carrying 1 trailer tire traveling to local tracks. Anytime the track is said 4+ hours away, I always carry 2 spare trailer tires. Btw, a few track tire shop do sell trailer tires (expensive). 7s Only (at BRP) also sell trailer parts.

Trailer tire load ratings

whether it is Load Range (C, D, E or F), # of ply (4,6,8, 10), or max PSI (50, 65, 80, 95). They all basically mean the same thing:

C=6 ply=50psi

D=8 ply=65psi

E=10 ply=80psi

F=12 ply=95psi

Higher the load rating generally better for towing. Not only do they handle more load, many claims you are less likely to get a flat, due to better tire constructions.

Trailer hub/wheel bearing

Carry one COMPLETE spare hub if you have brakes on both axles. If you have brake only on 1 of the brake axles, you need to carry a spare hub for each of the axles (one spare with brakes, one

spare without, they are different). You won't know (unless you have that fancy TPMS system above) of bearing failure until too late. Most of the time your trailer is smoking so badly that other drivers honk. When a bearing fails, it is so spectacular (I've seen fire a few times) you won't know a bearing from axle nut (fused together). You need a COMPLETE assembly to replace. You will also need a wire cutter to reconnect the brake wires also. Next time replace the whole hub preemptively and keep the used one as a spare.

What type of tow vehicle should I buy?

No idea, but one important tip I can give as a married person is: A pickup truck comes out of you "racing budget". An RV or SUV comes out of your "family budget".....RV easily disguised as a happy family vacation vehicle. A 3500 diesel dually trucks, not so much....

If you lived in SOCAL, you need more towing capacity than if you live in Kansas. Here in SOCAL, 9 out of 10 California tracks requires us to travel through 1 of 10 highest incline mountain pass in the country. So what tow vehicle you need depends on where you live.

How much does it tow?

A very general statement here: Towing a 5,000LB enclosed trailer is equivalent to towing a 7,500LB open trailer. If your tow vehicle is rated for 7,000LB, do not tow a 7,000LB enclosed (unless your tow vehicle is an RV, where trailer aero wouldn't matter).

Tow vehicle's wheelbase is as important as its tow rating. Longer the wheelbase the better it tows.

Should I get a weight distribution hitch?

Yes, if you are towing a comparatively heavy trailer vs. your tow vehicle. It helps a ton.

What generator do I need for my trailer AC?

If you have an air conditioner on your trailer, this is the cheapest one you can get away with and still be relatively quiet (quiet is relative, anything other than Honda/Yamaha is not quiet):

If you race a Corvette, then you got the money for a Honda EU3000i (2000i won't run AC)

If you have no air conditioner, but still want to run a Mazda hair dryer (or water kettle, or microwave) – go with a Honda EU2000i gas generator or get a Goal Zero Yeti 1000 lithium Portable Power Station (\$1k at Costco) powered by solar.

SuperMiata Race Format

Standard super sprint race format

No guarantee on super sprint race format. Sometimes we run with another w2w group (starting in 2018, we run with Spec Corvette group), and they just want 1 longer race per day.

On a typical SuperMiata race weekend:

Saturday

Practice 1

Practice 2

Practice 3

Qualifying

Race 1 and race 2

BBQ immediately after Race 2. Free to all drivers. Usually \$10 per crew.

Sunday

Practice 4

Practice 5

Practice 6

Race 3 and race 4

Each race is a super sprint (short 4-8 lap race, depending on track). Race 1 grid is set by qualifying (which is scored). Race 2 grid is a reverse grid of Race 1 finish. Race 3 is a reverse grid of Race 2 finish. Race 4 is a reverse grid of Race 3 finish. Better you finish, further back you start the next race ☺

Out lap formation

Race 1 grid set by qualifying. During out lap (80% speed, you need speed to warm up the tires), it is single file until last 3 turns. Pole sitter needs to CLEARLY signal which side he will be on for the start. The whole field needs to be side by side with 2 corners to go, bunched up. Do not leave more than a couple of car length between you and the car in front of you. When you come to stop, do NOT hunt for gear “am I in first gear?” “Am I in first gear”, do it once, and forget.

Standard starting format is a standing start (exception is ACS, due to banking on front straight).

As you come to a complete stop for the standing start. Pick the spot early, and stick to it. Do NOT creep, trying to get a perfect spot. If you got it wrong, don't worry about it. The whole field behind you is waiting for you to come to a stop, so they can do the same.

Make sure the spot you stop at, you can SEE the starter. This is a common rookie mistake.

If you are starting on pole (rookies starts on pole 75% of the time in SuperMiata due to inverse gridding), make sure you are 100ft back from the Starter. A common rookie mistake is to park too close to the starter, and can't see the starter because of HANS Device restricting head movement.

Starter

In the meantime, the starter will have a yellow flag out (standing), as cars coming to a stop. Once the last car has stopped, the yellow flag will drop (this is NOT the signal to GO). A green flag will fly 2-8 seconds AFTER the yellow flag fell.

Common noob error is watching for the green flag itself before launch. You should watch for body parts connected to the flag. The moment shoulder / upper arm moves, you launch.

A race is 4-8 laps (white flag will signal 1 lap to go). Once you take chequered. A front-runner should slow down, back marker still needs to go at 90% pace to catch up. All pull up to a back straight (designated during prior race meeting), and leapfrog (P2 passes P1 and stops. P3 passes P2 and stops, so on). The last placed driver will keep going (arms raised to signal) at a slow pace and we form up again for the 2nd race of the day. See this for demonstration:

<https://www.youtube.com/watch?v=S2FnRE3ZoXA&ytb=>

We race again on Sunday. Except there is no qualifying on Sunday. Sunday's first race is a reverse grid of Saturday's 2nd race finish.

Don't worry if this is confusing. We go over this at every race meeting (usually right after qualifying on Saturday and midday Sunday).

Standing start launches

Don't listen to your engine for a launch. All you hear is engine revving from the car (who is running super loud Springfield dyno exhaust) next to you. Idea is to rev to ~3-4k rpm and drop the clutch. Do not try to modulate, it is too dangerous in a standing start.

Rolling start

SuperMiata only does rolling start a couple times a season (WRL might differ). This is pretty standard rolling start format. Pole sitter is allowed to set any speed he/she wishes, but is not allowed to be wide open throttle and needs to maintain a constant speed before the green flag fell.

What if a car leaves track during race start formation (a turbo car dives into pit due to mechanical)

With most race sanction, it is take up the spot if still behind a pace car. Once the pace car peels off or if there is no pace car: Do not take up the spot, treat it as if the car is still there. We don't want cars to criss-cross the track seconds before race start.

Passing

Read up on an official SuperMiata rule. But here are some pointers:

In SuperMiata, you must leave minimum 1 car width (1.5 car width for certain sections, see below) for your competitors, you may NOT shut the door (causing them to go off track to avoid contact) in any circumstances. Any overlap and you must leave room.

If you lost track of the cars behind you briefly to see where they are. You must leave room at the apex and at the track out (if you still have no idea where they are. This means you need to setup your mirror properly, see above).

1 move rule on blocking

Watch F1.....You are allowed 1 blocking move. If the car behind is close, Do NOT wait until last second to block, it is dangerous. Yes, this rule makes it easy for the passer, but it also makes it easy for you to pass them back. As a passer, it is a good idea to make a fake pass move early (make sure no one behind you), and come back to your line for over and under and/or steal an apex.

Is it 1 car or 1.5 car width?

It is 1 car width everywhere, except for the followings. We always go over at race meeting where these corners are on a particular track.

1. Concrete walls – if there are walls close to track surface, Even if there are few feet of grass/dirt between wall and track. Examples would be front straight at BRP, Laguna Seca, ACS, SOW, Sonoma, WSIR....basically every track we race at.
2. If the curb is tall enough to bend wheels/suspension. An example would be Laguna Seca T6, ACS Chicane (T7), WSIR T9.
3. If going off means damaging the car....An example would be outside Omega at WSIR.. Outside Phil's Hill at BRP.....
4. Basically, it is anywhere that going off is not a good thing, so leave 1.5 car width. Nobody is that good at gauging what 1 car width is exactly.

Race tire management

When the weather is warm, tires will get greasy and fall off. Learn to pick your fight. if you are defending against a slightly faster car. Take it easy on corners that are difficult to pass, so you have enough tires left to fight where it matters.

Hit your apex

Easier said than done when fighting w2w while watching your mirror. But if you hit your apex and track out, 90% of the corners are impossible to pass (in spec car series). But if pushed to 101% and/or missed an apex, you are an easy target. Sometimes slow down a little (95-99%) ensures you not making a mistake and thus getting picked off.

Contact avoidance

Whether you have the right to a position or not. If you can avoid contact, you HAVE to make an effort. Otherwise, you will still be ruled at fault. Right to a line does not give one's right to hit another car, contact avoidance should always come first. Example: At ACS T2, a competitor may turn in on you at the apex and that they did not give you 1 car width. You should back out

of it to avoid contact. You can file a complaint immediately after the race, SuperMiata official will give your position back. On the other hand, if you did not try to avoid contact, and punted the car off the track at 120mph, you can be sure you will be penalized even though you have the right to the line and they are the one that turned down on you.

Bump draft

Miata racers all bump draft, if you don't, you will get passed.

If you want to get bumped, wave your arm front and back.

If you do NOT want to get bumper, wave your arm left and right.

Closing speed should be walking speed. Any faster you should NOT be bumping.

Only bump draft on a straight, and needs to be straight on, fully behind the other car.

Test and practice session

When you are in a practice session, test track surface. Drive offline and see how much grip it has. Go outside (20ft off apex) to see how it feels. Brake offline and see how much distance changes. You need this information when you are brake dueling down the straight or side by side through a corner. Find out where the braking point for T1 when you are going 80% of the speed, because, at the start of the race, you will be slower into T1.

T1 incident

Another reason why Turn 1 at the start of a race is where most contacts happen: In practice, say you arrive at T1 braking point at 120MPH, brake at the "100-yard" marker, just like most of the field as this is a spec class. At race start, P1 goes WOT near the starter (where green flag waves) and reaches T1 at 80MPH (hopefully P1 practiced that during practice and knew where to brake at 80MPH) and brakes at "60-yard" marker. P20 starts WOT way way back and reached T1 at 100MPH, P20 sees P1 braking at 60-yard marker and does the same. So P20 piles into 5 cars at T1..... The lesson is people starting from the back will arrive at T1 at higher speed, thus cannot use the same braking marker as the cars in front of you.

Watching flags

This is a golden rule that also applies to life experiences: If you passed 1 car, you are a good racer. If you passed 2 cars quickly, maybe you got lucky. If you passed 3 cars quickly, you ARE the village idiot. I can GUARANTEE that you have missed a yellow or chequered flag. Watch your flags !!!

Misc

Transponder –

Basically a highway robbery. I recommend old style AMB TranX 260 transponder, but you can only buy them used. They are ~\$500+ used on eBay. You pay once, and they work forever. AMB now only sell new X2 transponder that requires subscription..... They suck, you got to pay them till the end of time.

Where do I mount the transponder?

Mount it as far forward as possible. SuperMiata use transponder (instead of photo finish) to determine finishing position. Twice in last 3 years of SuperMiata racing, a car behind was declared winner due to transponder position. We only care whose transponder cross the finish line first.

Wheels and lug nuts are a wear item?

Yes, they are. Wheels get bent from those curb jumping and offs. Lug nuts get impacted 5-10 times a weekend. Replace lug nuts every 1-2 year. I recommend aluminum lug nuts, they are softer than steel lugs. If you do cross a thread, stud wins, which is a good thing. Check your wheels often for bends and cracks.

I want to go for a personal best, when is the best condition?

Cooler the ambient temperature, with ~70-80F track surface temp is ideal for fast lap time. In summertime, this usually means PB is set during the 1st session when the weather is still cool. In winter time, idea condition is when the sun is out, heating up track surface temp with low ambient temp.

Can I powder coat my wheels

NO. Standard powder coating procedure involves heat which weakens wheels. Yes, there is some high-end shop that can properly powder coat wheels. But if you can afford those, you wouldn't be racing a Miata.

No window on my race car and it is raining !!!

Home Depot Motorsports or Lowes Motorsports, get carpet shield self-adhesive film (in carpet dept). Use it while you transport your vehicle in the rain.

<https://www.lowes.com/pd/Carpet-Shield/4129492?>

Aero DIY:

Ideas for fabbing your own front and rear aero.

<http://www.miataturbo.net/race-prep-75/post-your-diy-aero-pics-63769/>

Material for front spoiler:

Use 0.100" plastic. Allstar 22461 is in black (choose a faster color if you like).

<https://www.amazon.com/Allstar-ALL22461-Performance-Plastic/dp/B003TPEO7S>

How to install ballast:

See here: <https://nasaspeed.news/toolshed-engineer/installing-ballast/>

Turn signal intake

Not recommended for track use. It raises air pressure inside the engine compartment. Makes your radiator less efficient.

Springfield Dyno exhaust

Very popular. They are cheap and make great power. But if you want to make friends or not lose hearing after a session, you do NOT want to an SD exhaust. They are LOUD, not loud, but LOUD. You will lose the ability to think on a track, guaranteed. SuperMiata will very likely to ban SD exhaust soon and you won't be invited to SuperMiata Saturday evening BBQ.

Improve shifting quality

Use synthetic 75w-90 GL4 for transmission to improve shifting. Note "GL4". Many have their own secret sauce, but popular track choice is Redline MT90 or Amsoil MTG. Redline MTL and Motorcraft XT-M5-QS are a bit too thin for track use.

Fancy number sticker/decals

You can download number decal graphic files on FB's SuperMiata Drivers Group, and send it to your local decal shop. As for those required Maxxis stickers (x1 windshield banner, x1 24" sticker at the rear bumper, x2 20" stickers on the fenders, you can pick them up at your first race at 949racing trailer, no charge).

Improve heel and toe

Bend (yes you can bend them by hand on a Miata) throttle and brake pedal closer to fit your style of heel and toe.

Spare parts to bring to a track

Absolute minimum: heater hose (if you still have working heater core), clutch slave cylinder, front wheel bearing (including the nut and socket tool), spare brake pads (used is fine), spare cam angle sensor and coil plug if you have a BP4W, spare brake light bulb (you will get black flagged without a working brake light), eccentric bolt, spare race tires (mounted).

My right foot is burning !!

Because the header is sitting 3" away. Few fixes:

1. Header coating (usually not enough by itself)
2. Koolmat – <http://www.ironcanyonmotorsports.com/kool-mat-spec-miata-floor-kit/>
3. Shielding – Building some type of shields underneath the car. This isn't easy, but it is the best solution. <http://www.miataturbo.net/race-prep-75/heat-shields-90059/>

My windshield cracked again !!

Drive faster !!! if you in the lead, you wouldn't have to worry about cracked windshield. There are 3 ways to prevent this if you are slow like me:

1. Polycarbonate windshield. This is the best, but expensive and require more maintenance. Plastic scratches easily. <https://supermiata.com/Miata-Polycarbonate-windshield.aspx>
2. Get a tear off for the windshield. Not cheap, you replace them once or twice a year. [Www.racetearoffs.com](http://www.racetearoffs.com)
3. Get a "screen protector" for the windshield. Ask your local tint shop, I use this shop <http://coolitwindowtint.com/> about \$100 installed (it must go on a clean un-pitted windshield, or they bubble badly). There is a windshield shop right next door. So they can put the screen protector onto a brand new windshield before installing. This is basically a clear bra for a windshield. It is also a safety thing.... it also scratches easily.....

Dash cam – camera

Every w2w race organization now requires a working camera in the race car. ½ of the time, you hear excuses from drivers:

Forgot to turn the camera on

Camera ran out of battery

Ran out of SD space

Forgot to put in an SD card (because they took it out to watch earlier)

Can't see crap out of my GoPro Hero (because newer GoPro don't have Spot Metering)

Buy a dash cam !! you wire it to ignition (or any power source, race car use kill switch anyway), so it starts recording every time you fire up the car. It also records in a loop (overwrite old files), so you will always have the latest video (last few hours) !! You can still buy that fancy 4k GoPro Hero that rarely works, but have a dash cam as a backup.

GoPro – If you haven't purchased your camera yet, do NOT get a GoPro. It is expensive and is not designed for motorsports. Yes, GoPro owner race car in NORCAL, but he races an open wheel, probably explains why his own product doesn't work in 97% of tracked cars. Last couple generations of GoPro no longer have "Spot Metering" for all practical purposes (technically yes, but you have to do it through touch screen, which is impossible to do in a race car, and it can't save the setting once you turn it off), so everything outside the car get whitewashed. Smartycam is excellent, comes with data (speed, G-force, etc...), but \$\$\$\$\$. A good alternative is Garmin Virb Ultra 30 (as of 2018), which is \$400, that also comes with data. You can buy a \$15 OBD2 reader (not for your old Miata, but works with most modern cars), and it ties into the Garmin camera.

Gauge orientation:

If you are one of those that has 10 analog gauges.....or just 3 gauges in the car. Orient your gauge so "normal" is at 12 o'clock. Example: your water temp gauge – orient your gauge so

220F is pointing straight up. Take a quick glance while racing, make sure everything is pointed north, AM not PM. If not, there is an issue that requires additional monitoring.

Cool suit DIY

<https://trackhq.com/forum/the-equipment/safety-gear/3636-diy-cool-suit-ice-box>

Here is a write up of a Cool Suit ice box DIY. You can build one for under \$100. Very reliable. You still got to buy a cool shirt.

If you are lazy, you buy a used medical box off eBay for ~\$75 shipped. They work without modification, but the box is small (require frequent ice change) and flows less.

Ultrachiller.com also has a DIY section, and a video you can watch.

<https://www.youtube.com/watch?v=OpHGBLwo1f4&ybChannel=UltraChillerCoolSuit>

Few tips:

- Do not use crushed ice. Freeze those 1-gallon water jug, one big chunk of ice lasts longer
- A big DIY box is better for endurance races, it also flows more. A smaller medical box is fine if you don't mind replenish ice more often and only have short sessions.

Dyno Conversion Factor

This is the list I started compiling for California Dyno. All below data from early 2018.

7's Only at BRP (SPM standard) - 140

Lucky 7 - 131

Engineering Concepts (Gabe) dyno - 135

Lawrence Built (Norcal dyno) - 140

FS Works - 140

Rocket Dan (Bakersfield) - 139

Guerro (El Monte) – 138.5

California track information:

Every track has a shower facility except for WSIR and LVIS

WSIR

Gate locks up at 9 pm (sometimes 10 pm) on weekend

\$10 at the gate

\$\$\$ fuel on site. Pay with a credit card

Wind almost always picks up from the southwest in the afternoon. Lower hp Miata sometime struggle to hit 5th gear in the afternoon.

Fast lap in a SuperMiata

<https://www.youtube.com/watch?v=DjvgCw1yHkE&ytcChannel=VagaXt>

Streets of Willow at WSIR

gate locks up at 9 pm (sometimes 10 pm) on weekend.

\$10 at the gate

Wind almost always picks up from the southwest in the afternoon.

Race in a SuperMiata, CW

https://www.youtube.com/watch?v=xzP_o0ARKtw&t=100s&ytcChannel=Anthony%20Bedegi

Race in a SuperMiata, CCW

<https://www.youtube.com/watch?v=S2FnRE3ZoXA&ytcChannel=949%20Racing%20-%20SuperMiata>

ACS

Gate locks up 6-8pm. Securities here are very strict and weird, making up rules as they like.

No charge at the gate, but organizer usually charges a fee to enter.

A ton of RV parking with 240v plugs, free of charge.

Garages often have compressed air that you can use.

\$\$\$ fuel on site, but is on top of the hour only. Also a weird rule about not selling you 92+

octane fuel for street-legal cars: track won't sell you 100 octane fuel if you have a street car (you can purchase 91 octane). This is cash only for fuel.

SuperMiata race Roval

<https://www.youtube.com/watch?v=s5R8hY4BTB0&t=3s&ytcChannel=william%20chen>

Buttonwillow

Gate opens 24 hours on weekends. NOT on weekdays.

Free entrance for SCCA member. Otherwise \$10 at the gate.

\$\$\$ fuel on site. Pay with a credit card

SuperMiata pad is always the concrete pad next to the Tire shop.

There is a 7s Only shop on-site, they have many parts in stock. Dyno pull is \$125.

Fast lap in a SuperMiata, 13CW

<https://www.youtube.com/watch?v=ZQFdkkZL82E&ytcChannel=VagaXt>

Fast lap in a 94whp 1.6 Spec Miata 13CW

<https://www.youtube.com/watch?v=JuC2ofI8flw&t=68s&ytcChannel=bellwilliam>

360-degree camera of a SuperMiata race. Watch it on your phone and spin around a chair for 360 action !!

<https://www.youtube.com/watch?v=1QTbPC2uVnA&t=512s&ytcChannel=bellwilliam>

Chuckwalla

Now 24 hours on most weekends. Call to verify.

You can rent nice cabins on site. Negative is they are next to track entrance (3/4 mile from the paddock).

\$15-\$30 for entry (RV pays more, but has free RV dump)

\$\$\$ fuel on site. Pay with a credit card

*Big rocks everywhere. It will puncture your radiator/oil cooler, get a screen mesh. Same rock also like to crack windshields.

* T2 exit curb is a header killer. It cracks header collector. Don't run over T2 curb. (Track have been doing a better job maintaining T2 exit curbs as of early 2018, but don't count on it)

Race in a SuperMiata CW

<https://www.youtube.com/watch?v=nr1ya6Hgu0M&ytcChannel=949%20Racing%20-%20SuperMiata>

fast lap in a SuperMiata CCW

<https://www.youtube.com/watch?v=7Z4WCJAntkM&ytcChannel=bellwilliam>

Springmountain

Gate is open 24 hours. In order to access the pit area with a big RV or a tall tow vehicles (those that won't fit in the tunnel to access pit area, the height limit is ~9' 10"), one must cross track surface. That means big vehicles can access or leave the pit area only certain hours of the day.

\$10 at the gate

\$\$\$ fuel on site.

Huge rocks everywhere. It will puncture your radiator/oil cooler, get a radiator mesh. Also cracks windshield, consider getting a "clear bra" for your windshield.

•

Fast lap in a SuperMiata

<https://www.youtube.com/watch?v=5o6LaMf2yK0&ytcChannel=VagaXt>

Las Vegas Speedway (outside course)

Call for gate hour.

No charge at the gate

\$ fuel. A regular gas station is just ½ mile away. Cheap fuel.

* This is a low speed track. Think Streets of Willow, but track is 50% longer. This track will tax power steering and diff.

Laguna Seca (Weathertech)

Call for gate hour.

No charge at the gate

\$\$\$ fuel on site. Pay with a credit card

* have excellent camp sites, has free RV dump

* knock back (brakes) is a possibility with this track. Due to “washboard” curbing. Don't be alarmed.

Infineon / Sonoma

Gate: 9-10pm. You can still enter after that, just no unloading after that.

No charge at the gate

you can easily fit 2 cars per garage space.

\$ fuel on site. No need to bring fuel to this track (but no E85 onsite), fuel is cheap. Pay with a credit card.

Track has an awesome race store on-site. Everything from nomex sock to racing seat.

Race in a SuperMiata

<https://www.youtube.com/watch?v=e65j9V0d0OQ&ybChannel=savington>