



Miata MP62 PowerCard PowerJet Installation Instructions

FOR 1994-97 Miata w/Moss MP62 S/C or custom applications

Part # 999-195

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PLEASE READ THE ENTIRE INSTRUCTION SHEET THOROUGHLY BEFORE BEGINNING.

Follow the instructions STEP-BY-STEP, and your installation will be trouble free. If in doubt, please call Moss Technical Support at (888) 888-4079. Be sure to read all notes and warnings before proceeding with each step.

IMPORTANT NOTE #1: *This kit was created for 94-97 Mazda Miatas with Moss' MP62 kit, a TrackDog Racing intercooler and a 63.5mm (2.50") supercharger pulley. The PowerJet card is adjustable, but has been pre-tuned for use on Moss' (999-805) 94-97 non-CARB certified MP62 kit with these components. You will still want to do a final tune with the car on a dyno to assure that you have proper air/fuel and no detonation even under heavy loading and heatsoaked.*

IMPORTANT NOTE #2: *The PowerCard PowerJet kit may also work on 99-00 and 01-05 Miatas, work with different intercoolers and work with different pulleys, but each application will require tuning the car on a dyno for your car's specific configuration. Use of a wideband O2 sensor is recommended.*

IMPORTANT NOTE #3: *The kit requires drilling a 37/64" hole and tapping it to 5/8- 18 threads. This drill size is larger than your average hand drill and you may need a drill press or machine shop to make the hole. Alternatively, you may be able to find a metal bung for an oxygen sensor that has 5/8-18 threads and have that welded into the intercooler tubing just before the dummy throttle body. It will still need to seal against the included O-ring or a copper washer. DO NOT MOUNT THE POWERJET INJECTOR BEFORE THE INTERCOOLER.*

IMPORTANT NOTE #4: *This kit is NOT California Air Resources Board (CARB) certified for use on pollution controlled vehicles in California.*

WARNING: *Use of 91 or higher octane (US rating - RON + MON / 2) gasoline is required.*

TOOLS REQUIRED:

- 14mm socket and ratchet
- pair of pliers
- hose cutter
- medium flat-head screwdriver
- shop towels or several shop rags
- wire crimper/stripper
- teflon tape

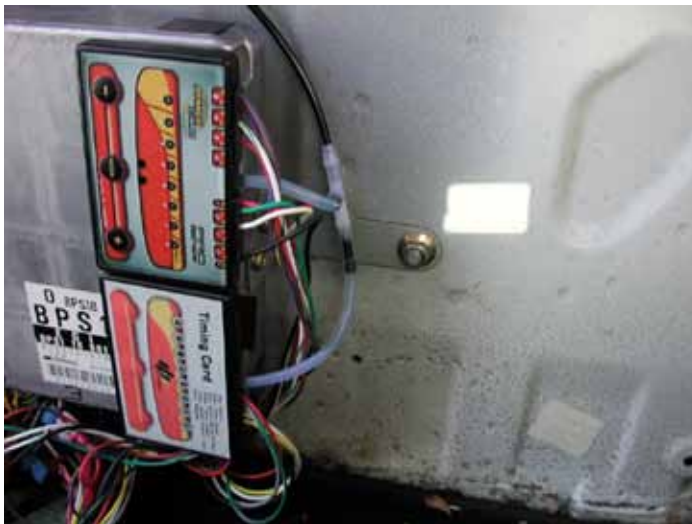
Note: We have provided spade connectors and ttaps for installation, but we recommend soldering all wire connections. You may want to install one set of male/female spade connectors in the white/ red and red/blue wires for the 5th injector so that the PowerJet can be removed in the future without cutting if necessary.

INSTALLATION:

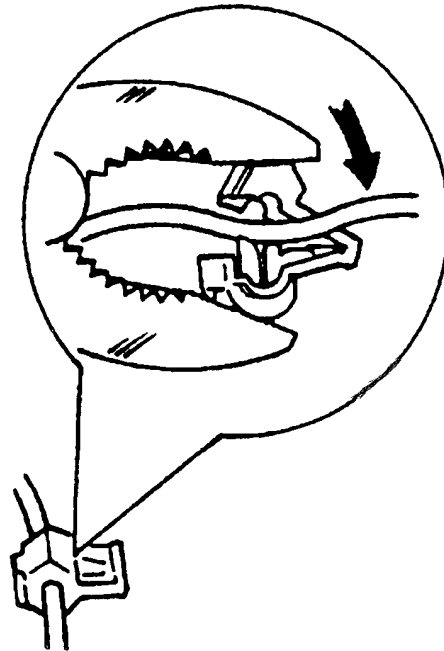
1. Disconnect the vehicle battery.
2. Use a 14mm socket and ratchet to remove the four bolts securing the passenger seat. Then remove the seat from the car. Remove the two push-in fasteners securing the carpet behind the seat. Fold the carpet toward the drivers side of the car to expose the Electronic Control Unit (ECU). You may have to peel back the wiring harness.

NOTE: ALTHOUGH NOT SEEN IN THE FIRST PICTURE, YOUR CAR SHOULD ALREADY HAVE A POWERCARD AND A TIMINGCARD CONNECTED TO THE ECU TO CONTROL THE SUPERCHARGER. THEY WILL MOST LIKELY BE VERY NEAR THE FACTORY MAZDA ECU AS SHOWN IN PICTURE TWO AND THREE BELOW.

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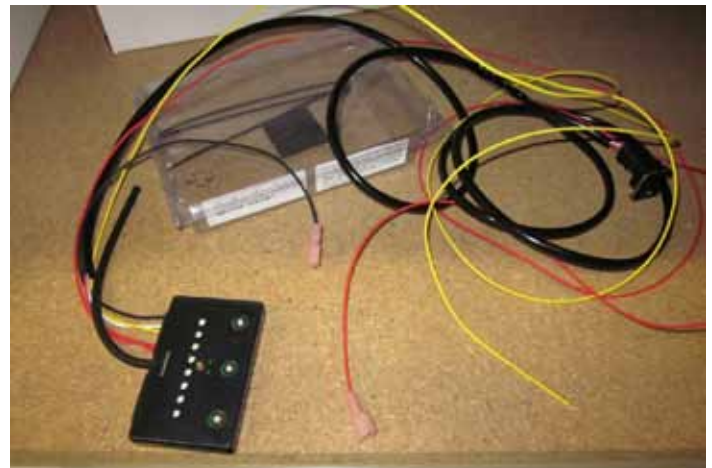


solid red PowerCard Pro wire (This wire connects the already installed PowerCard Pro to 12V+ switched power). Attach a male spade connector to the solid red wire of the PowerJet card. Then connect the male spade connector of the Powerjet card's solid red wire to the t-tap on the PowerCard Pro's solid red wire. This will provide 12V+ switched power to the PowerJet card.



5. Locate the solid black wire leading out of the **already installed PowerCard Pro**. It will be at the far end of the PowerCard Pro next to the white/ yellow (white with yellow stripe) wire. Use the pair of pliers to attach a **red t-tap** from the PowerJet kit to the **solid black PowerCard Pro wire (This wire connects the already installed PowerCard Pro to ground at the ECU)**. Attach a male spade connector to the solid black wire of the PowerJet card. Then connect the male spade connector of the Powerjet card's solid black wire to the t-tap on the PowerCard Pro's solid black wire. This will provide ground to the PowerJet card.

3. Locate the PowerCard PowerJet electronic fuel management card included in the kit. Decide where you would like to mount the PowerJet card in the car. These installation instructions will show how to mount the PowerJet card by the 94-97 Miata's ECU.
4. Locate the solid red wire leading out of the **already installed PowerCard Pro**. It will be between the green/grey (green with grey stripe) wire and the boost hose/nipple. It will be on the same side of the PowerCard Pro as the white/yellow wire. **It will NOT be next to the white/green wire**. Use the pair of pliers to attach a **red t-tap** from the PowerJet kit to the



6. The PowerJet card's input wire will need an injector signal from the ECU that has not been modified by the PowerCard Pro. This will be provided by running the signal from the ECU's cylinder #1 output to the cylinder #1 input PowerJet card, running cylinder #1 output of the PowerJet card to factory Injector #1 and then t-tapping the original PowerCard Pro's output wire into the output wire of the PowerJet card.
7. Begin by disconnecting the male spade of the white/yellow (white with yellow stripe) wire coming out of the **already installed PowerCard Pro** from the t-tap on the ECU's solid yellow cylinder #1 wire.
8. Now cut the harness wire going from the ECU to factory injector #1. This will electrically separate what happens at the ECU from what happens at the injector. Use provided male and female spade connectors to connect the ECU side of this cut harness wire to the **solid yellow** (cylinder #1 **input**) wire of the **PowerJet** card. Use an additional set of male and female spade connectors to connect the injector side of the cut wire to the **white/yellow** (cylinder #1 **output**) wire of the **PowerJet** card.
NOTE: You will want to make sure that there is a **male spade on one side** of the original ECU to injector #1 harness wire and a **female spade on the other side** of the original harness wire, so that the PowerJet card can be bypassed if necessary just by reconnecting the ECU side of the cut harness wire to the injector side of the cut harness wire with pliers.
9. Use the pair of pliers to attach a **red** t-tap from the PowerJet kit to the white/yellow (cylinder #1 output) wire of the **PowerJet** card (This wire **now** connects the **PowerJet** (not the PowerCard Pro) card to the solid yellow cylinder #1 wire of the ECU harness, which runs from the ECU to the Cylinder #1 fuel injector).

Connect the white/yellow (cylinder #1 output) wire of the **PowerCard Pro** to the t-tap just installed on the white/yellow (cylinder #1 output) wire of the **PowerJet** card that leads to the factory #1 injector.

10. Locate the injector connector **on the PowerJet card included in the kit**. There will be a red/blue (red with blue stripe) and a white/red (white with red stripe) wire encased in a solid black covering leading to this connector. Cut the two wires and their casing about five inches from the PowerJet card.

Use the 48 inch lengths of white/red (white with red stripe) and **red/black** (red with black stripe) included in the kit to extend the two injector connector wires that are coming out of the injector connector. Do not connect them back to the PowerJet card at this time, as they will need to be run through the firewall first. We suggest soldering the wires and then covering

them with electrical tape, however, we have included two male and two female spade connectors in the kit for this purpose.

11. With the injector connector in the engine compartment, run the two extended wires through the grommet in the firewall as shown.



12. Connect the far end of the two wires to the final five inches of wire at the PowerJet card. Use the two included male and female spade connectors so that the wires can be disconnected if the PowerJet card ever needs to be removed from the vehicle. The wires can then be run under the door sill plate for a clean installation.
13. Use the included velcro sticky pad to mount the PowerJet card on or near the factory ECU.



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14. Use the included vacuum “tee” (T) and black plastic vacuum hose to connect the silicone hose exiting the PowerJet card into the vacuum lines going to the already installed PowerCard Pro and TimingCard. If you have a custom application, there is extra hose included in the kit. You will want to use a hose cutter on the vacuum line to make sure that the end is cut cleanly such that it will provide a tight seal for the vacuum/boost signal.



15. Remove the dummy throttle body from the vehicle. It is an aluminum casting located between the intake manifold and the intercooler outlet pipe. Drill a 3/64” hole in the side of the dummy throttle body and then tap it using a 5/8-18 threaded tap. After thoroughly washing and cleaning the dummy throttle body of any aluminum shavings, dirt or dust, remount the dummy throttle body to the intake manifold.
16. Locate the included threaded 5th injector from the PowerJet kit. Slide the O-ring over the threaded end of the 5th injector. Then thread the 5th injector into the 5/8-18 hole that was drilled into the dummy throttle body. Tighten the injector until it is airtight and snug. Do not overtighten. Now connect the 5th injector electrical connector from the PowerJet card to the 5th injector.
17. Apply teflon tape to the 5/16” hose barb included in the kit. Thread the hose barb into the included fuel injector “hat” and tighten. Use the hose cutters to cut about 12 inches of provided high-pressure 5/16” fuel hose from the hose included in the kit. Slide an included small hose clamp over the fuel hose. Then push the hose barb into the the fuel hose and tighten the small hose clamp. Then mount the fuel injector “hat” onto the fuel injector and insert the retaining clip from the kit.



18. Slide the factory clamp on the factory fuel hose that runs to the fuel rail up the hose and wriggle the fuel line off of the hard line from the fuel pump.

NOTE: This line will be under pressure, so have rags under the connection and wear safety goggles and/or glasses to block any fuel spray from getting into your eyes.

19. Use the included brass hose barb “tee”, two included small hose clamps, the factory hose barb that was slid up the line in the previous step and a short section of included high-pressure fuel hose to “T” into the factory fuel hose that runs to the factory fuel rail as shown. It must be the supply side because the return side is not under pressure.





20. Slide another included small hose clamp over the high pressure fuel hose running to the 5th injector. Then connect this line to the brass hose barb tee and tighten the small hose clamp.
21. Cover the two wires running from the fuel injector to the firewall with included split loom plastic wire protection. Then cover the section between the firewall and the ECU.



22. Reconnect the battery. Turn the key to ON, allowing the fuel pressure to build. Look over all the hose connections and the fuel hat connection to make sure that there are absolutely no leaks. Observe the connections for a few minutes while feeling underneath the fuel lines and at each connection point just in case there is a non-obvious slow leak. Adjust how the fuel hat sits or retighten clamps and connection points as necessary.
23. Once you have verified that all connection points are not leaking, start the vehicle. There may be a little stumbling while air bleeds out of the fuel line, but the idle should clear up quickly. Observe that the PowerCard Pro & TimingCard light up and operate as before (see your installation instructions for specifics on what your kit's PowerCard and TimingCard lights should be doing if necessary).

24. At Key ON, the PowerJet card should show alternately flashing green and red LEDs. If the PowerJet card doesn't power up after 4 seconds double check your power and ground. One or both may be hooked up incorrectly. Make certain that the spade connectors are inserted properly into the square slot of the t-tap, and not off to the side. If you can see the silver spade connector through the translucent insulation, then you need to disconnect and properly reconnect this connection.
25. Start the engine but **DO NOT drive off yet!** You will first verify that the correct settings are in the PowerJet card, learn what each one does and **then you will be making adjustments to the already installed PowerCard and the TimingCard!**
26. **Once the engine has started**, there should be a steady GREEN LED at position 1 (it may occasionally flash on/off). Under boost, there will also be a steady BLUE LED at position 8. Also, the LEDs at positions 1-8 will light up progressively representing pressure from 0.5psi to 10psi. If you have a flashing green and flashing red together **with the engine running**, the yellow Cylinder 1 injector lead wire may not be connected properly to the ECU. Trace the problematic lead to the injector wire and carefully inspect its connection.
27. Try quickly blipping the throttle to see if the BLUE LED lights up on the PowerJet card. You may find that it doesn't, as the car will have lots of power but isn't under load. It would be dangerous to look away to observe the PowerJet card while driving, so your next step is to head to a dyno to tune the PowerJet card. Do your best to stay out of boost while heading to the dyno. Again, the card is preset with a tune that should be close on a 94-97 Miata running 91 US octane gasoline (RON + MON / 2) with a Moss MP62, TrackDog racing intercooler and 63.5mm (2.50") pulley, but it is best to tune the card to your specific car and components, especially if you have the PowerJet installed on a different year of Miata, are running a different pulley or intercooler, have a high-flow (or no) catalytic converter or are running a bigger non-factory Mazda OEM throttle body.

PowerJet Modes

28. The PowerJet card has four adjustments. They all are adjusted up and down in a similar fashion to the PowerCard and TimingCard. If you wish to check the settings, do so as follows. Push the Mode button once. A **green** LED will start **slowly** flashing in the seventh LED position. This represents a setting of "7.0 lights". This adjustment mode controls how much fuel is added at low boost levels (higher settings add more fuel). Push the Mode button a second time and a **red** LED will flash at the 4th and 5th LED positions. This represents a setting of "4.5 lights" (having two lights lit

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together signifies being halfway between two settings, like 6.5 lights for instance would have both the sixth and seventh LEDs lit). This adjustment mode controls how much fuel is added at higher boost levels. Push the Mode button again and this time a **green** LED will be flashing quickly at the first LED position and a **blue** LED will flash at the eighth LED position. This represents a setting of "0.0 lights". (At the Zero setting, the LED flashes faster than at the One setting even though they share the same LED position on the card.) This mode adjusts the lowest pressure (1-3psi) that will result in the PowerJet card adding fuel. Push the Mode button again and this time there will be **red** LEDs lit at the sixth and seventh LED positions as well as a **blue** LED lit at the eighth LED position. This represents a setting of "6.5 lights". This mode adjusts at what pressure (10-20psi) the PowerJet card will add its maximum amount of added fuel. One more press of the Mode button and the sequence starts over. While in any of the adjustment modes, the + and - buttons move the LED's up and down the scale. When untouched for a few seconds, the PowerCard automatically exits its adjustment mode.

Adjustments to PowerCard

29. Adding boost to the Moss MP62 kit also increases how much pulsewidth the already installed PowerCard Pro adds to the factory fuel injectors. Since the settings are adjustable and could currently be set to anything, we will make sure that the PowerCard Pro has appropriate settings that match what the PowerJet card was pretuned for.

With the Key ON (the engine can be running if you like), push the Mode button on the originally installed **PowerCard Pro** four times. There should be a flashing **green** LED at the number five location and a flashing **blue** LED at the number eight position. If not, press the + or - buttons to move the flashing **green** LED to the number **five** position. This mode adjusts how much fuel is added by the main injectors at high boost levels. Press the Mode button again and the **yellow** and **blue** LED's will start flashing. Press the + or - buttons to move the flashing **yellow** LED to the **seventh** LED position. This mode adjusts how much fuel is added when the throttle is opened quickly ("upon the hit of the gas") and works much like an accelerator pump on a carburetor. Scan through the other adjustment modes to make sure that all other adjustment modes should be set to "0.0 lights", which is accomplished by setting the slowly flashing LED at the 1st LED position **and then pressing "-" once more until the LED now flashes quickly instead of slowly, signifying the "0.0 lights" zero LED position.**

Allow the PowerCard Pro a few seconds to save the settings and reset from adjustment mode. The settings can be changed while driving the car and will be

used immediately without waiting for the adjustment mode to reset, but if you turn the power off before the adjustment mode has reset, your setting changes may not be saved.

Adjustments to the TimingCard

30. Adjustments to the already installed TimingCard are made in a similar fashion to those made to the PowerCard Pro. With the Key ON (the engine can be running if you like), press the MODE button once to enter the **green** adjustment mode. You should see a single **green** LED flashing quickly and no other lights (blue, red or otherwise) on the TimingCard. This represents a settings of "0.0 lights". If you hit the button and skip beyond to the **yellow** or other adjustment modes, simply hit the button again until you return to the **green** adjustment mode.

The **green** zone corresponds to boost retard at RPMs of 0 to 2500rpm. Hit the "+" PLUS button and the same LED will flash slowly. Hit it again and the light will begin to move up the scale, representing more and more timing retard (when there is boost). Now hit the "-" MINUS button until the green light goes back to the first position and is flashing slowly, then once again until it is flashing quickly, which represents no timing retard.

Press the MODE button again to move to the **yellow** adjustment mode. The **yellow** zone corresponds to boost retard at RPMs of 2500 to 5000rpm. The display should show the original preset setting of one flashing **yellow** LED **only** at position four. This represents about 7 degrees of timing retard under boost. Press the "+" PLUS button until there are flashing **yellow** LEDs at both the fourth and fifth LED positions, for a setting of "4.5 lights" (about 8 degrees). If you end up moving the LED setting too far, press the + or - buttons until it does.

Press the MODE button again to move to the "RED" adjustment mode. The RED zone corresponds to boost retard at RPMs above 5000rpm. The display should the original preset setting of one flashing **yellow** LED **only** at position five. This represents about 8 degrees of timing retard under boost. If your TimingCard does not show one flashing yellow LED only at position five, press + or - until it does.

Finally, press the MODE button again and you should see a **green** LED flashing AND a **blue** LED flashing. This "GREEN WITH FLASHING BLUE" mode represents timing being retarded in relation to boost. The display should show the original preset setting of a **quickly** flashing **green** LED only at position one. This represents 0 degrees of timing retard per psi of boost. If it shows a **slowly** flashing Green LED at

position one or a Green LED at any other position, hit the “-” **button until the Green LED at position one flashes quickly.**

Allow the TimingCard a few seconds to save the settings and reset from adjustment mode. The settings can be changed while driving the car and will be used immediately without waiting for the adjustment mode to reset, but if you turn the power off before the adjustment mode has reset, your setting changes may not be saved.

PowerJet Tuning - Settings and Strategy

31. The PowerJet kit comes already preset with conservative settings for a Miata with the components listed on the front page. However, every car is different. If you have a different exhaust, catalytic converter, header or intake on your car, you may need to add fuel or change the timing retard settings. Listen for “pinging” or detonation when using heavy throttle until you have got your custom application tuned. Note: It’s better to leave a little timing on the table just in case you are in hot weather going up a hill in traffic one day. Because of the nature of adding fuel with a single 5th injector, there will be slightly different amounts of fuel going into each different cylinder from the single injector. So, to be safe, we then need to overfuel slightly, so that the cylinder that gets the least amount of fuel from the 5th injector (usually cylinder #1) still is always at a safe air/fuel ratio no matter what the condition. This results in slightly less potential power, but keeps things safe in the event of heat soak, high temperatures and repeated heavy use.

In the Miata’s case, although one could run an intercooled Miata at 11.8-12:1 air/fuel, we aim for about 11.0-11.2:1, measured with a wide- band O2 sensor **BEFORE** the catalytic converter. That would measure out to 11.5 to 11.7:1 if measured after the catalytic converter.

Also, although an intercooler should allow you to run less timing at the same boost level, our pretune is setup for a car running **higher** than stock boost levels of ~10psi. If you are using 93 or 94 US octane (RON + MON / 2), you may find that you can use light settings closer to two lights of **yellow** and **red** instead of four. **However, each car will be different and we suggest getting the fueling right BEFORE attempting to reduce timing retard.**

For tuning strategy, we suggest installing a wideband oxygen sensor and a boost gage. **IF YOU EVER HEAR DETONATION, STOP IMMEDIATELY AND PUT MORE TIMING RETARD INTO THE TIMING CARD (+) IN THE RPM ZONE THAT YOU HEAR DETONATION IN. YOU CAN ALWAYS TAKE IT BACK OUT LATER ONCE THE AIR/FUEL IS RIGHT.**

Monitor the wideband as you accelerate at 2 to 3psi from from 3500rpm to 5000rpm in third and fourth gears and adjust the **green** “low boost fuel per psi” setting on the PowerJet card. Aim for the mid-12:1 range. This will get your highway passing and light hill air/fuel squared away. Be ready to lift the throttle at any sign of detonation or lean air/fuel.

Next, monitor the wideband as you accelerate at 6 to 8psi from from 3500rpm to 5000rpm in third and fourth gears and adjust the **red** “high boost fuel per psi” setting on the PowerJet card. Aim for the low 12s. This will confirm that your low- and mid-rpm heavy throttle air/fuel is in the ballpark before going to wide open throttle at high rpm.

Next, monitor the wideband as you accelerate at wide open throttle from from 2200rpm to redline in third gear (and fourth gear on a dyno) gear and adjust the **red** “high boost fuel per psi” setting on the PowerJet card. Aim for high 11s (measured pre-catalytic converter) at 5000-7000rpm.

Now go back and recheck light throttle highway passing and mid-throttle mid-range air/fuel. If you are slightly richer than suggested that is okay. Low 11s at light throttle is probably too much and for custom applications like the later 01-05 Miatas, as they tend to prefer to run leaner (12s) with more timing retard at low rpm (<3000rpm) in medium boost rather than overly rich with less timing retard.

Finally, although the “hit of the gas” accelerator pump setting is adjustable on the PowerCard Pro, you will find that too much of it can have a negative affect on throttle tip-in/tip-out driveability. Optimally, any rise in air/fuel at heavy throttle tip-ins will be minimized, while avoiding bogging or black smoke or popping sounds in the exhaust from unburned fuel (especially with free flow catalytic converters & mufflers).

ECU Carpet and Seat Reinstallation

32. Recover the ECU location with the carpet and secure with the push in fasteners. Use a 14mm socket and ratchet to reinstall the passenger seat.

Idle Adjustment

33. The installation of the intercooler and its piping may have an affect on idle droop. If your idle droop is excessive, the idle airscrew can be adjusted to compensate.

Using the idle airscrew on your throttle body (now on the back of the supercharger), adjust your idle speed to 950 rpm after the engine is warm. This is done by backing the adjustment screw out a half turn at a time until the correct speed is achieved (counter-clockwise rotation increases idle speed). Next, turn your headlights on BRIGHT and put your heater fan

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on HIGH. Leave the air conditioning off. Rev the engine briskly in neutral to at least 2500 rpm and release. Notice if the idle stops at 900rpm. If it dips below this level and feels like it will stall, then recovers to 950 rpm, open the idle airscrew (counter-clockwise rotation) one tenth of a turn at a time until most of this "droop" disappears. A slight droop of 100 rpm or so is acceptable and normal. More than that may create a stalling problem during driving. Turn off the lights and heater fan and double-check that your idle speed is 950 rpm.

each of the ribs on the inside run of the belt. Replace your belt when you can count six cracks within one inch of length (six cracks total from all ribs combined).

37. Please see MossMiata.com for all of your Miata performance and maintenance needs!

Final Suggestions

34. If you are unsure of the tune that you have set or if you make a change to the hardware components on your car, we suggest having the car retuned on a dyno. Seemingly small changes like a high-flow catalytic converter can result in large changes to air/fuel because they affect the amount of boost measured by the PowerCard and PowerJet card, thus affecting the fuel added versus actual airflow. If you have a wideband oxygen sensor installed, you may be able to accomplish these adjustments yourself, but be mindful of the slight cylinder to cylinder variation of adding fuel with a 5th injector that was mentioned earlier in the instructions and aim for slightly richer than usual intercooled supercharger air/fuel ratios.
35. Start your engine as you would a standard Miata. Remember to bring the engine up to operating temperature before running it hard. Full boost on a cold engine will greatly increase your engine wear.

Use of premium gasoline is a must at these elevated boost levels. Also, be aware that a tune that works well with "summer" gasoline may need adjustment to work well with "winter" gasoline, as changes to oxygenated fuels can affect the tune. Also, heatsoak from desert climates and track driving require keeping an ear out for detonation and making appropriate adjustments if the car moves or takes a trip somewhere significantly different than the area/altitude where it was tuned.

Belt Tension

36. The smaller pulley on your supercharger will require you to pay attention to the belt tension more often. If there is slip, your boost output will be low and the belt may squeal. If you have a tension gauge for a serpentine belt, the tension is to be 90 pounds. Without a gauge, look for less than 1/2" deflection on the long run of the belt. If you see a large accumulation of belt dust on your supercharger, it is an indication that your belt is slipping. A slight amount of belt dust is normal. CHECKING YOUR BELT FOR WEAR: As the belt wears, small cracks will form in