DIYPNP Documentation for 1994-1995 Mazda Miata

1994-1995 Mazda Miata USDM 1.8L BP MT

Test Vehicle Details:

The vehicle used for drawing up these application docs was a USDM 1995 Mazda Miata 1.8L with a manual transmission. All factory electronics/ignition system components are in place and the factory wiring harness is in perfect condition.

Other notes:
MAF in place

What to buy:

Required:

1- [Discontinued] DIYPNPN76-K Kit. This is the main DIYPNP Kit including the Nippon Denso style 76-pin connector and all components, case, etc.

Optional:
1- Tuning Cable (https://web.archive.org/web/20240530154744/https://www.diyautotune.com/product/megasquirt-tuning-cable-db9-straight-thru/) This is the same DB9 serial tuning cable used in other MegaSquirt applications.
1- USB Adapter (https://web.archive.org/web/20240530154744/https://www.diyautotune.com/product/usb-to-serial-adapter-works-with-tunerstudio/) This is a DB9 serial to USB adapter. The adapter is needed when the laptop or PC you are using does not have a built in DB9 serial port.
1- StimPower (https://web.archive.org/web/20240530154744/https://www.diyautotune.com/product/megasquirt-stimulator-diypnp-power-supply/) This is a power supply that is normally sold to power a stimulator, but another use is it can be plugged directly into the DIYPNP mainboard to power the ECU directly, allowing you to load the basemaps and do limited testing on the ECU prior to installing the ECU in your vehicle. It is particularly nice to be able to flash the firmware and load your configuration on the bench instead of in the vehicle, and allows for less risk of damaging something on the vehicle due to incorrect settings.
1- PNP_IAT-A (https://web.archive.org/web/20240530154744/https://www.diyautotune.com/product/

mspnp-and-diypnp-iat-sensor-kit-aluminum-bung/) or PNP_IAT-S (https://web.archive.org/web/20240530154744/https://www.diyautotune.com/product/mspnp-and-diypnp-iat-sensor-kit-steel-bung/) AFM/MAF Delete kit. This is a simple kit with an IAT sensor, wire pigtail, crimp pins to poke into the AFM Connector to run the signal back to the ECU, and a steel or aluminum bung (hence the -A and -S in the part numbers). Perfect for getting rid of a restrictive AFM/MAF with your DIYPNP install.

What tools you'll need: Soldering Iron, Solder, maybe some desoldering braid in case you make a mistake. Small phillips screwdriver. That's about it.

Startup Maps

Base Configuration .msq files to help you get your car fired up safely and quickly. Ready to tune.

We're including these maps prior to showing you how to jumper your DIYPNP up. There's a reason for that. The base ignition settings contained in these maps should be loaded on your DIYPNP before you power your car up (with the key) with the DIYPNP installed. This is to prevent damage to your ignition system in case the default settings are not correct for your vehicle. Note that you can power up the DIYPNP off the vehicle on a power supply connected to the power jack next to the DB15 connector.

So here's our recommendation — After you complete basic assembly, Power up your DIYPNP one of two ways. Either plug a Stimulator Power Supply (https://web.archive.org/web/20240530154744/https://www.diyautotune.com/product/megasquirt-stimulator-diypnp-power-supply/) into the front panel of the box (the easiest way), or, start the Jumper Section below, but only connect the power and ground wires to start with. That way you can plug the DIYPNP into your factory wiring harness and safely power it from your car. The third option, if you've fully assembled and jumpered your DIYPNP already, is to unplug your coils from their power connectors before plugging the DIYPNP into your factory harness and powering it from there.

Then and only then, you can flash the firmware on your DIYPNP to the MS2/Extra firmware if you haven't already, and then load the startup map provided to help you get your vehicle started.

Click Here to Download Startup Maps for this Vehicle (https://web.archive.org/web/20240530154744/https://www.diyautotune.com/wp-content/uploads/usdm-mazda-miata-9495-18bp-mt.zip)

Once the vehicle is started, you will need to use the MS2/Extra manuals to set the base timing and begin to tune the vehicle! This is critical! Do not drive an untuned vehicle!

DIYPNP Jumper Configuration

This section will cover the standard, basic jumper configuration required to get the vehicle running using your DIYPNP.

Vehicle Information	
Market:	USDM

Make:	Mazda
Model:	Miata
Year:	1995
Engine:	1.8L BP
Transmission:	Manual
Trim:	

System Information

Main Board:	DIYPNP v1.1
Minimum Code Version	MS2/Extra 2.1.1 beta

Edge Pin Connections

Main	Adapter
IAT	4P
CLT	4Q
TPS SIG	4M
O2 SENSOR	4N
VR IN +	
VR IN –	
OPTO IN +	
OPTO IN –	4E
VR2 IN +	4G
IAC	4W
TACH OUT	4I
FUEL PUMP	4T
INJ1	4Y, 4Z

Main	Adapter
INJ2	4U, 4V
12V	1B
12V	
12V	
VREF	4K
5V	
SG	
SG	
GND	4A
GND	4B
GND	4C
GND	4D
GND	
IGN1	1G
IGN2	1H
WLED	
ALED	

Pull Ups

Connection	Resistance	Voltage
ALED		
WLED		
OPTO+	470 ohm	12v
VR2	470 ohm	5v
IAC	Diode	Banded end to 12V

High Current Drivers

Output	Enabled	To Pin
S1		
S2		
S3		
S4		

Knock Circuit

Enabled	Sensor +	Sensor –

I/O Circuits

Circuit	Input From	Out Pin To	Purpose
Relay 1	Mainboard PA0	ConnectorBoard 1L	Radiator Fan
Relay 2			
Boost			
Input 1	1Q (remove R14)	1J, 4S	A/C Relay & Fan
Input 2			

Miscellaneous Jumpers

	On	Off
OPTO GND		X
BL/TH		X

Notes

Ignition Settings

Spark Mode	4G63
Trigger Angle	10
Main/Return	
Oddfire Angle	
GM HEI/DIS	
Use Cam Signal	On
Ignition Input Capture	Falling Edge
Spark Output	Going High (Inverted)
Number of Coils	Wasted Spark
Dwell type	Standard Dwell
Cranking Dwell	7.5
Cranking Advance	10
Maximum Dwell	4.5
Maximum Spark Duration	0.7
Trigger wheel arrangement	
Trigger wheel teeth	
Missing teeth	
Tooth #1 angle	
Wheel speed	
Second trigger active on	
and every rotation of	

Other Changes/Considerations

This section will cover changes that need to be made to the DIYPNP that go beyond the standard I/O jumpering, such as intake valve butterfly activation, on/off VVT activation, or other customizations to address the specific needs of a vehicle.

Radiator Fan

In the Jumper Notes above we've included a pair of jumpers for radiator fan activation using the 'Relay 1' circuit. You'll notice we suggested using PA0 on the mainboard to drive the fan, and run the output from 'Relay 1' over to 1L on the ConnectorBoard to drive the fan relay. You can configure the fan activation in TunerStudio from the 'Extended > Output Ports Settings' Menu.

A/C Controls

In the Jumper Notes above we've included jumpers for A/C clutch and fan activation using the 'Input 1' circuit. The Input for the AC system comes in from the A/C switch on ConnectorBoard pin 1Q. The output of the "Input 1" circuit gets jumpered to both 1J and 4S on the ConnectorBoard. These two pins will activate the A/C compressor clutch relay and the A/C condensor fan relay. You will need to leave R14 out of this circuit or cut out R14 if you installed it.

VVTuner

If you have swapped in a VVT motor from a '01-'05 Miata and wire the sensors directly to the DIYPNP, sharing them with the VVTuner (instead of using pass through mode), connect the R3 resistor in the 5 volt position instead of the 12 volt. Using the 12 volt may cause sync problems.

Sensor Calibration

- This vehicle does have a variable TPS. You should calibrate it properly from TunerStudio in the 'Tools' menu. Choose 'Calibrate TPS'.
    - Make sure the engine is off, and the key is on.
    - With your foot off of the throttle, click the 'Closed Throttle ADC Count – GET CURRENT' Button.
    - Put the throttle to the floor. With your foot fully depressing the throttle, click the 'Full Throttle ADC Count – GET CURRENT' Button.
    - Click Close.
- Calibrate your CLT Sensor and IAT Sensor.
    - Again from TunerStudio, click 'Tools > Calibrate Thermistor Tables'. Make sure 'Coolant Temperature Sensor' is selected at the top.
        - For the CLT, use the following table with a bias resistor setting of 2490 ohms:

Temperature F / C	Resistance In Ohms
-4 / -20	16150
104 / 40	1150
176 / 80	330

    - Enter these values, and click ‘Write to Controller’.
    - Now you’ll do the same for the IAT. Select ‘Intake Temperature Sensor’ at the top in the drop down box. (NOTE – If you are removing your MAF/AFM as a part of the DIYPNP installation process, do not recalibrate your IAT Sensor now)
        - For the IAT, use the following table with a bias resistor setting of 2490 ohms:

Temperature	F / C	Resistance In Ohms
-4 / -20		16150
104 / 40		1150
176 / 80		330

    - Enter these values, and click ‘Write to Controller’. Now click Close to Exit.
- Finally, you should calibrate your O2 Sensor to the ECU. To do this, click ‘Tools > Calibrate AFR Table’.
    - Choose your O2 Sensor from the list. Choose Narrowband for the stock O2 Sensor. Or select your wideband and the proper configuration of said wideband from the drop-down list.
    - Click ‘Write to Controller’. Once finished writing, click ‘Close’.

Deleting the MAF

The DIYPNP allows you to disconnect the Mass Air Flow meter. When you remove the MAF, you will need to install a GM style intake air temperature sensor in your intake. This sensor connects to the third and forth pins on the IAT connector, as shown in the photos below. IAT sensors have no polarity, so it does not matter which wire you connect to which pin.

IAT Sensor:

Simply wire a GM Open Element IAT Sensor into your factory wiring harness at the AFM connector. You can poke wires into the AFM connector, or you can cut and splice. Wire one lead of the GM Sensor to the Brown Wire at the AFM Connector, and the other lead of the GM Sensor to the Yellow wire at the AFM Connector.

(https://web.archive.org/web/20240530154744/https://www.diyautotune.com/wp-content/uploads/miata-94-95-maf-delete-1.jpg)

(https://web.archive.org/web/20240530154744/https://www.diyautotune.com/wp-content/uploads/miata-94-95-maf-delete-2.jpg)

The wires should then be folded down over the edge of the MAF connector, and the whole assembly firmly and cleanly wrapped in high quality electrical tape sealing it up. 3M makes some good stuff that can handle the temps found in engine bays– read the specs.

Read the Manuals, You are Responsible for your own results!

This Application Doc is intended to assist you in your DIYPNP DIY EFI Installation. We've done a fair amount of research, and actually tested on a similar vehicle to help ensure we can provide the most accurate information possible to make your installation go as smoothly as possible. That said, there are certain things you could do incorrectly, or certain things you could change up, that could cause you to run into issues. Our tech support department will be glad to assist you working through any issues you might have, please contact us and give us that opportunity and we should be able to work things out for you.

Startup Maps included/attached to this Application Doc is intended only to help you get your engine started so that you can properly tune your engine. The map will be setup properly for a stock vehicle matching the year/make/model/trim in the 'Test Vehicle Details' section at the top of this page. If you have made any changes to your wiring, your ignition system, or other related components, this map may not be ideal for your vehicle. You will then need to check and confirm the appropriate settings and properly configure your DIYPNP EMS for your altered vehicle. Some maps offered may be more completely tuned that others, some may be just setup enough to get the car to fire up and idle with a little help from the throttle. That's when the tuning begins.

In short — We've provided you with the building blocks for an incredible EMS. You are however responsible for the implementation and your own successes or lack thereof, but rest assured that we're here for you and we're going to do everything in our power to make sure your project is a success.

For more information on configuring and tuning your DIYPNP EMS, and for information on adding and tuning custom MS2/Extra features, read up athttps://www.msextra.com/ms2extra/ (https://web.archive.org/web/20240530154744/https://www.msextra.com/ms2extra/). In fact, everyone implementing this system should read that manual from front to back if you really want to harness the power of the DIYPNP EMS.

We’d love to hear your feedback on our DIYPNP Application Docs. Click Here to offer feedback/ suggestions! (mailto:websales@diyautotune.com?subject=Feedback%20on%20DIYPNP%20Application%20Docs)