Gauge Kit Installation For The '99-05 Miata

Thank you for purchasing the Track Dog Racing Gauge Kit. There are many options as to which gauges you selected, but the wiring and the installation will be similar. Minor modifications such as clearances may be required to your dash area where the gauge panel will insert depending on the combination of your gauges.

The radio will be reinstalled into the middle section of the console where you may have had a cassette player. This will allow the gauges to be mounted higher for a better viewing. The wiring harness supplied with the TDR kit includes color specific wiring and labels to simplify the wiring. The TDR kit also includes connectors and tie-wraps, but you may require more with your particular installation. The photo below may not resemble you kit.

Here is a list of item and tools you may require for your installation depending on your gauge configuration.

Radio removal tool	Phillips screwdriver
Wire cutters and strippers	Soldering gun
3/16" shrink tubing	Extra wire for sensors, 20-22 gauge
Tee connection for water	Wiring connectors
Electrical tape	Tie-wraps
Dremel tool or other cutting device if needed	Vampire connections

REMOVE THE CONSOLE

1. Empty the console before proceeding. Remove the console as shown below using a Phillips screwdriver. The 1999 model is shown, but the 2001 and newer consoles are similar.

2. The side attachment has a cover over the screw head that can be removed using a small flat head screwdriver as shown in Photo 1-C.

3. Lift the console up at the front and pull the console away from the gas filler and trunk release switches. If you have electric windows, remove the wiring connector under the console as shown in Photo 1-D. Lay the console off to the side.

Photo 1-A: Remove 2 rear screws in the console

Photo 1-B: Remove screw from ash tray

Photo 1-C: Remove side screw on each side of the console and unscrew shift knob

Photo 1-D: Remove light switch connection under the console

REMOVE THE BEZEL

4. Remove the two screws with a Phillips screwdriver at the bottom of the bezel as shown in Photo 2-A. Four spring clips on the sides also hold the bezel in.

5. Gentle pull on both sides of the bezel near the bottom as shown in the Photo 2-B, sometimes a snap action motion will start the release.

6. Remove the air bag wiring connector and the cigarette lighter connector and lay the bezel off to the side as shown in Photo 2-C.

Photo 2-A: Remove the two screws from the bottom of the bezel

Photo 2-B: Remove the bezel using a snap action to release the spring clips

Photo 2-C: Remove the wiring connections from the air bag and cigarette lighter

REMOVE THE RADIO

7. Remove the two clips on the side of the radio or cassette player using your fingernail. In order to remove the radio use the following radio removal tools included in the kit.

8. Insert the radio removal tools into the two holes on the sides of the radio until they bottom out. Press the bars outward to release the spring clips and pull the radio out as shown in Photo 3-B. Disconnect the wiring connectors and antenna plug. Set aside until the gauges are installed.

9. Test the gauge mounting to make sure the gauges will install without any clearance issues as shown in Photo 3-C. The gauge set shown had to be notched on the console above as shown in Photo 3-D. Use wire cutters to cut away a notch for clearances. This modification will be covered by the gauge panel and will not effect any reinstallations in the future.

Photo 3-A: Remove radio side covers

Photo 3-B: Remove radio using the radio removal tool


Photo 3-C: Modify dash as required for clearance


Photo 3-D: Remove hazard warning light connector

PULLING THE CABLES AND VACUUM HOSE

10. Feed the sensor cables through the radio opening and through the driver's side dash area as shown in Photo 4-A. Make sure the wiring connector is accessible. Run the wires safely under the dash making sure they will not interfere with your feet. Use supplied tie-wraps to secure.

11. Cut a small slit in the firewall wiring boot next to the brake booster as shown in Photo 4-B.

12. Bend a coat hanger 180 deg. to make a loop as shown in Photo 4-C and push it through the wiring boot about 4 inches.

Photo 4-A: Feed the sensor wires through the radio opening and toward the firewall

Photo 4-B: Using a knife, cut a slit in the firewall wiring boot

Photo 4-C: Bend a coat hanger and push into the cut

Photo 4-D: Pull the Sensor cables about 12" through the coat hanger loop

13. Before you bring the cables though the firewall, make sure the Sensor cables are in the right place where they will not interfere with your feet. Put the Sensor cables in the coat hanger loop with about 12 in. of extra cable as shown in Photo 4-D and pull though the firewall wiring boot as shown in Photo 4-E.

14. If you already have a vacuum hose being used for the JR Powercard or FM Voodoo fuel management unit then you can "T" into the existing vacuum tube. If not pull the vacuum tube in the same method as the sensor cables as shown in Photo 4-F.

Photo 4-E: Pull the coat hanger out along with the Sensor cables

Photo 4-F: Sensor cables and vacuum hose pulled through the firewall wiring boot

WIRING POWER TO THE GAUGES

15. The lighting power source will come from attaching two YELLOW wires to the hazard warning light connection. Remove the hazard warning wiring connector as shown in Photo 5-A above.

16. Open up the sleeving using a knife to give you more access to the wiring as shown in Photo 5-A. Locate the GRAY with RED STRIP and the RED with the BLACK STRIP wires on the connector, these are your power and ground source for the lighting.

17. If you are using the TDR Gauge Kit, use the two YELLOW wires from the TDR wiring harness. Cut off any unnecessary length of the YELLOW wires before attaching. The preferred attachment is by soldering, but vampire connectors can be used. There is no polarity in the light wiring.

18. Power source for the gauges will come from the cigarette lighter lead wires as shown in Photo 5-B.

19. Feed the wires down the side of the dashboard area. You may need a coat hanger to pull the wires through. Keep the leads long enough so that the harness connector will be easy to attach later to the gauges. In this picture the cigarette lighter connectors are removed for another purpose.

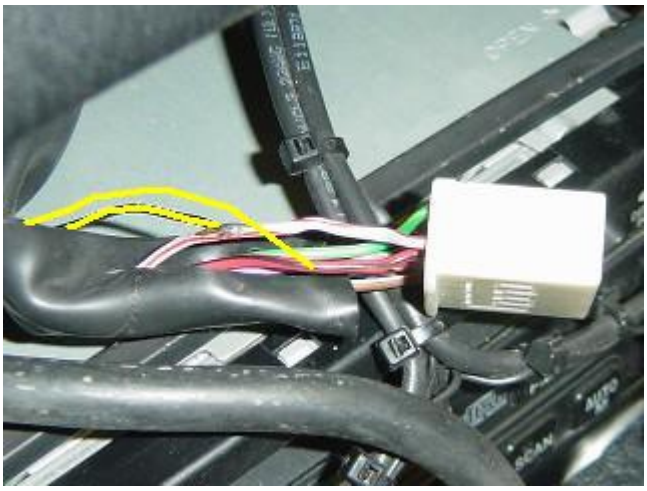

Photo 5-A: Attach the gauge light wire to the hazard warning light connector

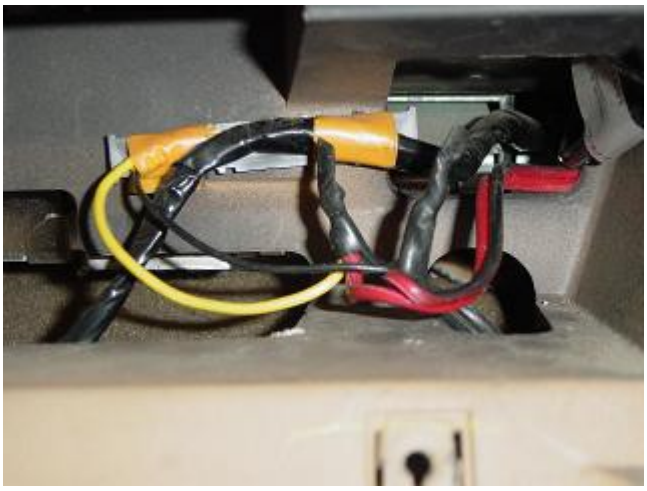

Photo 5-B: Attach power wires to the cigarette lighter leads

20. Attach the RED power wire from the TDR Gauge Kit to the YELLOW cigarette lighter lead wire; this is the 12V Positive as shown in Photo 5-B.

21. Attach the BLACK ground wire from the TDR Gauge Kit to the BLACK cigarette lighter wire; this is the 12V Negative. The preferred attachment method is to solder the wires and use shrink tubing for best connections, but vampire connectors can be used.

WIRING THE O2 SENSOR

Photo 6-A: Oxygen sensor connection at the ECU

Photo 6-B: Close up of the blue lead wire

22. Disconnect the battery before wiring to the ECU.

23. The O2 sensor wiring will require you to run your wiring under the dash over to the factory ECU on the driver's side foot well. We would suggest at this time you remove the drivers seat to simplify wiring in this area. There are 4 bolts holding the seat in. Remove the panel under the steering wheel to also help in your access under the dash.

24. Feed the BLUE oxygen sensor wire from the TDR wiring harness along with your air/water/temp sensor cable and vacuum hose from the dash over to the factory ECU. Keep the wiring loose and tie-wrap were necessary to keep out of the drivers feet area.

25. In Photo 6-C are the different year model wiring terminal blocks to help you locate the BLUE oxygen sensor wire labeled "L" and highlighted in Yellow. The '99-00 model is terminal 2-C while the 2001+ models is terminal 4-W.

26. It might be easier for you to disconnect the terminal connectors from the ECU. You can see in Photo 6-B the pushdown connection. Use the supplied vampire clip or solder the connection to the BLUE factory ECU wire.

99-00 ECU WIRING

Oxygen Sensor Terminal 2C
Dual Fan Jumper Terminals 1I Blue with White Tracer and 1R Red with Green Tracer

1U V/Y	1S L/B	1Q BR/R	1O GY/R	1M *	1K V/G	1I L/W	1G BR	1E W/L	1C *	1A L/R
1V V	1T GY	1R R/G	1P LG/B	1N P/B	1L BR/Y	1J *	1H G/R	1F G	1D G/W	1B W/R

2O P/B	2M V	2K G/O	2I LG/R	2G *	2E R/L	2C L	2A R/G
2P P	2N W/G	2L LG/B	2J GY/R	2H GY/L	2F W	2D W/B	2B P/L

3Y Y/R	3W Y/B	3U L/O	3S GY	3Q W/L	3O V/R	3M O	3K BR/B	3I BR/W	3G BR/Y	3E G/B	3C B/L	3A B/Y
3Z Y/G	3X V/G	3V R/Y	3T GY/B	3R *	3P *	3N LG	3L BR/R	3J R	3H BR	3F B/R	3D *	3B B/Y

01-05 ECU WIRING

Oxygen Sensor Terminal 4W
Dual Fan Jumper Terminals 2B Red with Yellow Tracer and 2C Blue with White Tracer

2P O	2M R/W	2J Y/G	2G Y/R	2D V/G	2A Y/B
2Q V/R	2N B/W	2K L/B	2H P/B	2E LG	2B R/Y
2R W/L	2O *		2I P	3F W/G	2C L/W

3X *	3U BR/R	3P W/B	3M GY/R	3J B/O			3D GY/B	3A B
3Y V/W	3V GY/L	3S R/B	3Q G/W	3N *	3K *	3H *	3E L/O	3B B/R
3Z *	3W *	3T G/R		3O G/O	3L *	3I B/Y	3F BR/W	3C G/Y

4AF W/R		4AC V/G	4Z P/B	4U *	4R V/Y	4O B/R	4L LG/R			4D Y	4A B/L
4AG L/R	4AD BR/B	4AA R	4X P	4V G/B	4S *	4P R/L	4M W	4J O	4H V	4E BR/Y	4B G
4AH *	4AE L/Y	4AB R/G		4W L	4T G/Y		4N P/L	4K *	4I W/G	4F LG/B	4C BR

WIRING COLOR CHART

COLOR	CODE	COLOR	CODE
Blue	L	Orange	O
Black	B	Pink	P
Brown	BR	Red	R
Dark Blue	DL	Purple	PU
Dark Green	DG	Sky Blue	SB
Green	G	Tan	T
Gray	GY	White	W
Light Blue	LB	Yellow	Y
Light Green	LG	Violet	V
Natural	N		

Photo 6-C: ECU terminal connections for '99-00 and '01-05 Miata

DUAL FAN COOLING OPTION

27. You might want to consider wiring your fans together as well for added cooling efficiency. Apply a jumper wire between the two wires designated on the terminal connectors in blue in Photo 6-C. With the jumper connected, both fans operate together when cooling is required. Normally the passenger fan operates the A/C and or is activated when the temperature reaches a second set point level in the ECU. This connection parallels the two fan relay coil wires so the relays will continue to carry the full fan load.

INSTALLING THE SENSORS

28. For air, water and oil sensors use the extension wire supplied with the TDR Gauge kit. Feed the sensor wire to the appropriate sensor area through the firewall using the supplied tie-wraps to help attach the cable. Attach the sensor connector plug using either the butt connector supplied or the preferred solder method with shrink tubing. The sensors do not have polarity.

29. The vacuum hose can be Teed into another vacuum hose, but the best reading would be behind the throttle body for a more accurate reading of what is entering the intake manifold as shown in Photo 7-A.

30. If you ordered the water sensor kit the temperature sensor attaches to the supplied tee fitting as shown in Photo 7-B. The tee fitting uses 5/16" barb fittings for the water lines and pipe clamps to secure the hoses. The preferred water line runs from the bottom of the radiator thermostat housing over to the throttle body as shown in Photo 7-B.

31. The air temperature sensor uses a different type of open cell sensor that is 1" long from the 1/8" NPT fitting for faster temperature response. Do not use this type in a liquid application, as it will damage the sensor. Most pipes supplied with turbos and superchargers have a thick enough wall to thread in a 1/8" NPT thread for the sensor. You will require a 1/8" NPT tap for the application. Thread Locker works well as a sealer on the treads as shown in Photo 7-C.

    CAUTION: An NPT thread is a taper thread; do not thread all the way to the end of the tap. Tap about 2/3 of the tap length and then test the sensor in the hole. You want the sensor fitting to begin to get tighter after about 2-3 turns. On all of the sensors do not twist the wiring as you tighten down the fitting or wire breakage can occur.

32. Oil temperature sensing is limited to either a remote oil filter kit that has a spare fitting as shown in Photo 8-A or using the oil pump plug as shown in Photo 7-D. The alternator has to be removed for this installation. You will need an Allen wrench to remove the plug and then thread in the new oil temperature sensor.

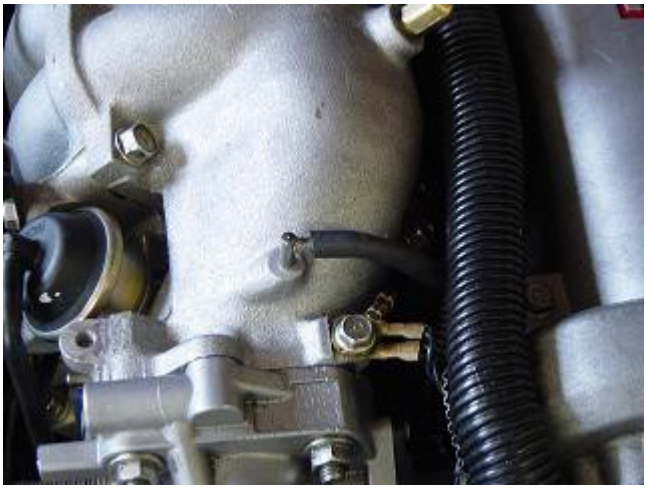

Photo 7-A: Vacuum fitting can be anywhere on the engine, but best nearest the throttle body opening

Photo 7-B: Water temperature comes from the Tee provided into the 5/16" hose

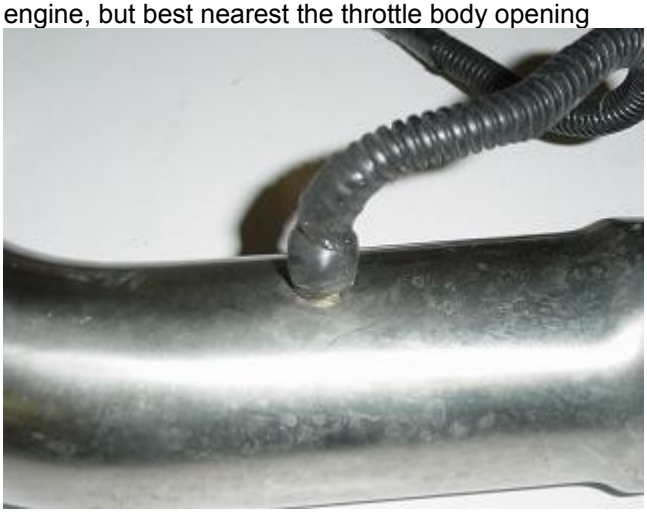

Photo 7-C: Air temperature sensor can be installed using a 1/8" NPT taped hole in the intercooler pipe

Photo 7-D: Oil temperature can be from a remote oil filter kit or by replacing the plug in the oil pump

INSTALLING THE RADIO AND GAUGE PANEL

33. After you complete the sensor installation install the radio into the middle section of the dash. Attach the radio power connector and antenna plug into the radio first before pushing the radio in. Make sure the gauge panel wiring is out of the way before pushing the radio in.

34. Connect the wiring harness plug into the gauge panel connector. Then press the gauge panel into the dash; it has spring tensioners on both ends for holding the gauge panel in a shown in Photo 8-B. Some adjustment may be required for a tight fit.

35. Test the gauges before reassembling the bezel and console. The oxygen sensor will show full lean until the engine warms up a little, usually about 2 minutes or so. See the chart below for common readings on your new gauge panel.

Photo 8-A: Oil sensor on an oil filter mount

Photo 8-B: How it should look completed

Below are some common readings you should see on your gauges that may be useful to you for a guideline.

Air/Fuel Ratio	Around 14.7 at idle and cruising, around 12 or greater at full throttle
Vacuum/Boost	Normally 15-18 vacuum at idle with increasing boost thereafter
Oil Temperature	Slightly higher than water temperature in normal driving. Temperatures around 250-275F in hard driving
Water Temperature	Normal around 180-200F. Temperatures around 225-230F during hard driving
Air Temperatures	Non-intercooled 180-210F considered high and you should resist hard acceleration; could cause detonation. Air to air intercooled ambient and up.

We hope you will be pleased with our products. If at any time you need assistance please feel free to contact us by phone or email us at ***support@trackdogracing.com***.

The Track Dog Racing Team