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FM O2 signal modifier installation

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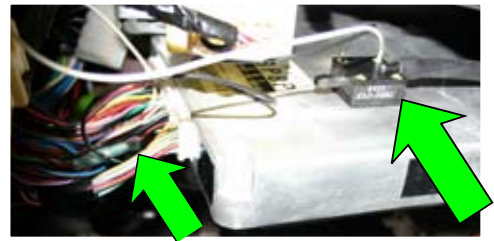
The engine computer in late model cars can sometimes be way too smart for its own good when combined with an aftermarket boosted application and its own closed loop O2 control. We need to occasionally “pull the wool over its eyes” to keep air/fuel ratios rich enough for safe, smooth operation on throttle tip in. The FM O2 signal modifier intercepts the O2 signal, and when the manifold goes to positive pressure it sends a false value to the ECU telling it that the motor is running lean so that the factory ECU adds fuel. Without this, the O2 sensor would report a rich condition under boost and the ECU would pull fuel causing lean tip in when operating in closed loop (below ~4000rpm on 90-97 Miata and below 5000rpm on 99-05 Miata). This unit can be used on any FI application; Miata-specific installation instructions follow.

1) Find your factory ECU (engine computer)- It is the (roughly) 6" square (1" tall) silver box that's under the passenger's feet in a 90-93, behind the passenger seat in a 94-97, and under the driver's side dash by the steering column on a 99-05 (including MSM). Un-plug the connectors from the ECU and strip away the electrical tape from the wires going to the clip that has the O2 signal wire in it so that the wires can be fanned out.



2) Use the included butt connectors to connect the O2 Signal Modifier to the stock ECU. You'll need to cut the original wire, twist the appropriate O2 Signal Modifier wire around one of the cut and stripped ends, crimp it into the butt connector, then crimp the other end into the butt connector. Do this as shown in the picture to the right, but bear in mind that the wire colors / locations in these pictures are not correct. If the red butt connectors aren't big enough, use the blue butt connector. You will have one butt connector left over. Cut and connect one wire at a time to ensure that you don't confuse the different wires. Once connected, give a slight tug to ensure that the wires are firmly held in the butt connector. **CONFIRM YOUR CONNECTIONS WITH A MULTIMETER!** If the wire color and location don't agree with our schematics, match the location instead of the color. Once all of the wires have been connected, **CAREFULLY** heat shrink the new butt connectors. The heat shrink helps seal the connector and acts as a strain relief, so it's a good thing to do. Be very careful using the heat gun, as you don't want to melt any other wires. Watch out for shielding on the O2 sensor wire - if it's not colored as shown in the diagrams, you'll have to strip the metal shield away before attaching the butt connector. There shouldn't be any shielding in the last couple of inches before the ECU plug. There should be no disconnected wires once you're done, if there are you've missed something.

3) You can see the modifier in the picture to the right, as well as one of the wire connections.



4) Run a vacuum line to the O2 signal modifier using the supplied tee. This line must see vacuum and boost, so the source needs to come from between the throttle body and the head. The line going to a boost gauge is a good one. Plug this vacuum line into the port labelled "HIGH" on the unit. This is the port that's opposite the side with the screw. The port itself is labeled "High," whereas the other side is labeled "Low" elsewhere on the plastic. The other port (Low) is left open to atmosphere. On Mazdaspeeds, there's a grommet in the firewall next to the throttle cable that's good for running the vacuum line, although it's certainly not the only option. You can also tee into the small vacuum line on the top rear of the intake manifold, although there are other options as well.

All diagrams are looking at the harness plug from the wire side, thumb tab up.

Miata, 1990-1993

Voltage clamp wire color	Factory wire color	Terminal number	Usage
Black	Black/Light Green (B/LG)	2C	Ground
White	Red/Blue (R/L)	2N	O2 signal from sensor

1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A		
R/B	L/O	LG/B	G	*	LG/Y	*	BR/Y	Y/B	V	L/R		
BR/W (B/L)	*	B/G	(L/Y)	R	*	L/B	BR	W/Y	W/G	W/R		
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B		
2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A
*	L/O	Y	*	L/W	R	(R/B)	LG/R	B/W	Y/L	W	B/LG	B
(LG)	Y/R	Y/B	*	*	R/G	R/L	LG/W	*	R/W	*	B/LG	B
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B

Miata, 1994-1995

Voltage clamp wire color	Factory wire color	Terminal number	Usage
Black	Black/Light Green (B/LG)	2C	Ground
White	Red/Blue (R/L)	2N	O2 signal from sensor

1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A		
R/B	L/O	LG/B	G/B	G/R	B/LG	L/W	BR/Y	Y/B	V	L/R		
BR/W	Y/R	Y	L/Y	R	B/G	L/B	BR	*	W/G	W/R		
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B		
2Y	2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A
G/W	L/O	Y	L/W	L/W	R/W	R/B	LG/W	B/W	Y/L	W	B/LG	B
G	Y/R	Y/B	LG	Y/G	R/B	R/L	L/R	LG/R	LG/Y	B/R	B/L	B
2Z	2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B

Miata, 1996-1997

Voltage clamp wire color	Factory wire color	Terminal number	Usage
Black	Black/Light Green (B/LG)	4A	Ground
White	Red/Green (R/G)	3C	O2 signal from sensor

1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A	30	3M	3K	3I	3G	3E	3C	3A
LG	*	G/B	B/LG	G/R	LG/B	LG/Y	L/B	Y/B	V	B/G	B/L	R/W	R/B	LG/W	L/W	*	R/G	*
*	G/L	G	L/O	*	BR/W	R/W	R/B	*	W/B	L/W	L/Y	B/Y	R	LG/R	BR/B	R/B	R/L	R/W
1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B	3P	3N	3L	3J	3H	3F	3D	3B

4Y	4W	4U	4S	4Q	4O	4M	4K	4I	4G	4E	4C	4A
L/W	G/W	Y	*	L/O	Y	*	*	L/R	Y/L	Y/B	B	B/LG
*	G	Y/B	Y/R	BR	Y/W	BR/Y	B/W	Y/G	Y/W	W	B	W/R
4Z	4X	4V	4T	4R	4P	4N	4L	4J	4H	4F	4D	4B

Miata, 1999-2000

Voltage clamp wire color	Factory wire color	Terminal number	Usage
Black	Black/Red (B/R)	3F	Ground
White	Blue (L)	2C	O2 signal from sensor

1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A	20	2M	2K	2I	2G	2E	2C	2A	
V/Y	L/B	BR/R	GY/R	*	<V/G>	L/W	BR	W/L	*	L/R	P/B	V	G/O	LG/R	*	R/L	L	R/G	
V	GY	R/G	LG/B	*P/B	BR/Y	*	G/R	G	G/W	W/R	P	W/G	LG/B	GY/R	GY/L	W	W/B	P/L	
<*>	1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B	2P	2N	2L	2J	2H	2F	2D	2B

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

Miata, 2001-2005 & MSM

Voltage clamp wire color	Factory wire color	Terminal number	Usage
Black	Black/Red (B/R)	3B	Ground
White	Blue (L)	4W	O2 signal from sensor

2P	2M	2J	2G	2D	2A	3X	3U	3P	3M	3J	3D	3A		
O	R/W	Y/G	Y/R	V/G	Y/B	*	BR/R	W/B	GY/R	B/O	GY/B	B		
2Q	2N	2K	2H	2E	2B	3Y	3V	3S	3Q	3H	3K	3H	3E	3B
V/R	B/W	L/B	P/B	LG	R/Y	V/W	GY/L	R/B	G/W	*	*	*	L/O	B/R
2R	2O		2I	2F	2C	3Z	3W	3T		3O	3L	3I	3F	3C
W/L	*		P	W/G	L/W	*	*	G/R		G/O	*	B/Y	BR/W	G/Y

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