April 26, 2012

Models:	1996-99 E36 328i/M3; 1997-98 E39 528i, 1997-98 Z3 2.8, 1998-2000 MZ3 S52
Product(s):	Turner M50 Manifold Adapter Kit
Subject:	Installation Guidelines and Tips

This guide will aid you in the installation of the M50 manifold adapter from Turner Motorsport. We strongly recommend having a repair manual on hand for more in depth explanation and diagrams. We prefer the Bentley Service Manual for this and any other Do-It-Yourself work on your car. Please review the process before starting your installation. If you feel this job is beyond your mechanical abilities, consult a shop or professional to have them do the work.

This manifold adapter allows you to locate and use the crankcase ventilation valve, idle control valve, and other related components at or near their original mounting location. The stock M52 manifold had these mounted with a central baseplate on the manifold and the M50 manifold lacks the proper ports and fittings for a direct swap. This adapter solves all of that for a clean, reliable, professional, and Original Equipment appearance and function.

Turner M50 Manifold Adapter Kit Includes:
MAN-1 adapter
M50 manifold profile gaskets
M50 manifold to throttle body profile gasket
Fuel rail adapter plates with screws and captive nuts
Crankcase Vent hose heat-shrink extension
M50 manifold temp sensor plug with o-ring
M50 manifold fuel pressure regulator vacuum tip cover
Vacuum baseplate screws – Allen/Hex head, M6x16
Plastic fuel rail cover screws – Allen/Hex head, M6x20 (for modifying your stock fuel rail cover)

Tools to have on hand –
Metric socket set and ratchet
Metric wrench set
Phillips screwdrivers in various sizes
Torx male bit set
Allen/Hex male bit set
Flathead screwdrivers in various sizes
11/32 drill bit and drill
Heat gun
Pliers (channel-lock, needle-nose and snips)

Before You Begin:

+ Thoroughly clean and inspect the M50 manifold. Look for cracks or damage.

+ Check that the new manifold profile gaskets match up and install on the M50 manifold. There are versions of the M50 manifold with smaller intake runner ports and you want to confirm you have the right one before starting work.

+ Terminology –

Vacuum Baseplate = the mounting baseplate that is transferred from the M52 to the M50 manifold. It includes brackets and ports for the ICV, CVV, evap purge valve, air pump solenoid, fuel pressure regulator, intake air temperature sensor, and dipstick tube

ICV = Idle Control Valve

CVV = Crankcaske Vent Valve

FPR = Fuel Pressure Regulator

Purge Valve = Fuel Tank Vent Valve

These are the main components from your car that you will be working with:

Manifold Vacuum Baseplate

Purge Valve

Idle Control Valve (ICV)

Crankcase Vent Valve (CVV)

Air Pump Solenoid

Removing the original M52 Manifold

1. Remove the heater box access panel on the firewall. Pull away the wiring harness and weather stripping to allow you better access when removing and installing the manifolds.

2. Remove the airbox, HFM, rubber boot, and throttle body.

3. Unbolt the dipstick tube from the bracket under the manifold.

4. Unbolt the crankcase vent valve from the bracket. Separate the vent valve from the housing on the manifold (it pops out).

5. Pull off the 3 rubber lines for the evap purge valve, FPR, and air pump solenoid from the manifold.

6. Unbolt the manifold support brackets from the engine block.

7. Remove the alternator cooling air duct.

8. Disconnect the crankcase vent tube at the top on the head and at the CVV, under the manifold.

9. Remove the vacuum booster line from the brake booster (either from the booster or manifold).

10. Remove the plastic BMW fuel rail cover.

11. Mark and unplug the oxygen sensor harnesses located under the fuel rail cover. Mark one or both carefully! Plugging in the wrong connectors later will give you problems.

12. Unplug the camshaft sensor on the front of the fuel rail.

13. Unbolt the air pump solenoid and bracket.

14. Unplug the harnesses from each fuel injector.

15. Unbolt the fuel rail from the manifold.

16. Disconnect the rubber fuel lines from the back of the fuel rail (down behind the manifold). Mark the feed and return lines to prevent re-connecting the wrong lines.

17. Pull fuel rail with injectors from the intake manifold. Use care and pull with small amounts to avoid putting bends or creases in the rail.

18. Remove the seven 11mm nuts holding the manifold on the cylinder head.
    The manifold should now be ready to come entirely off the engine.

This is what you see with the M52 manifold removed:

A ICV

B CVV

C AIR PUMP SOLENOID

D MANIFOLD BRACKETS

E FPR VACUUM LINE

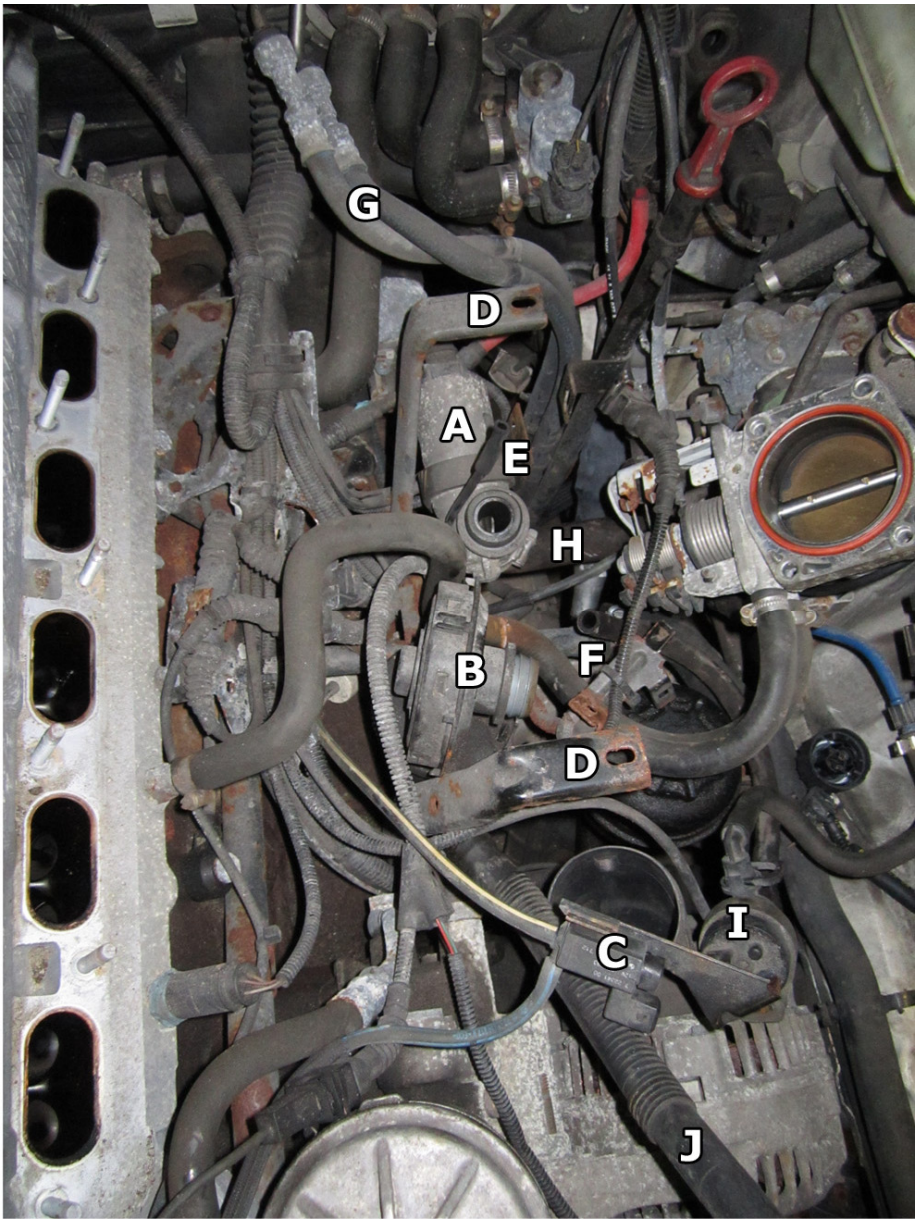
F HOSE TO PURGE VALVE

G FUEL RAIL HOSES

H COOLANT RETURN

I PURGE VALVE

J CVV HOSE



Prepping The M50 Manifold

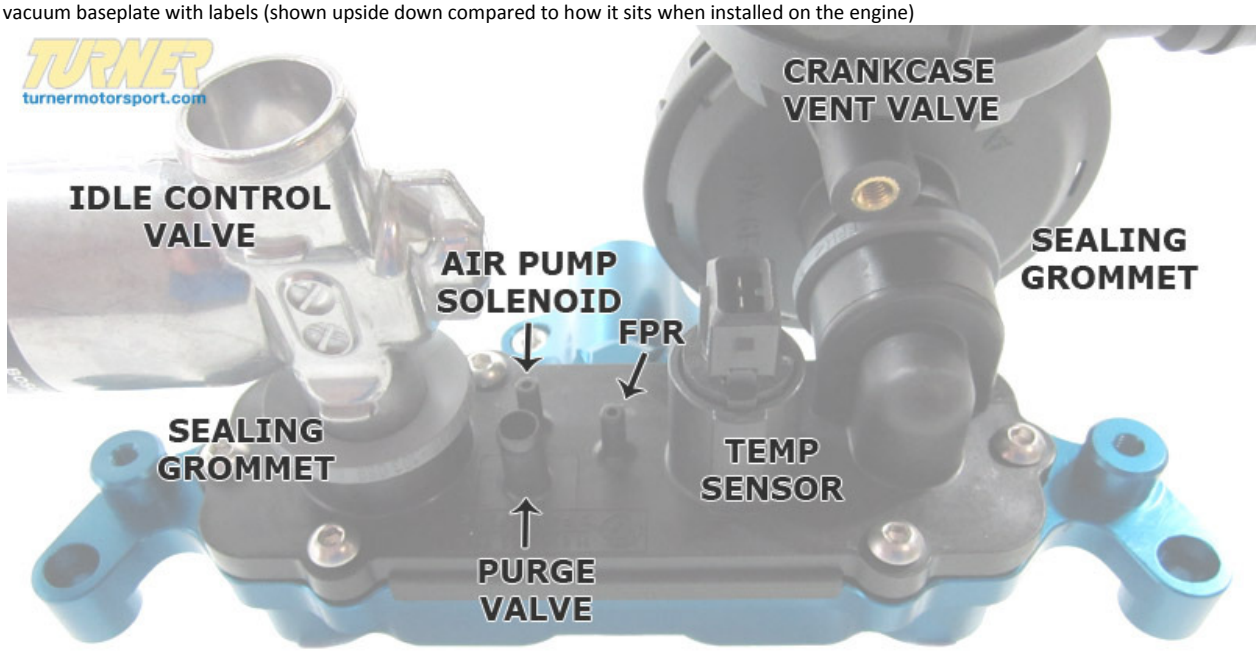
With our adapter, the new manifold is mostly a direct swap. But the M50 manifold needs a small amount of prep work to be ready to bolt on.

19. Pop the M50 adapter on to the M50 manifold. You can leave the hardware loose but make sure you have a snug fit to the manifold.

20. Unscrew the ICV/CVV vacuum baseplate from the old manifold and transfer it to the M50 adapter with the new supplied hardware.

21. Reinstall the ICV, CVV, air pump solenoid hose, evap purge valve hose, fuel pressure regulator line, and dipstick bracket to the vacuum baseplate.

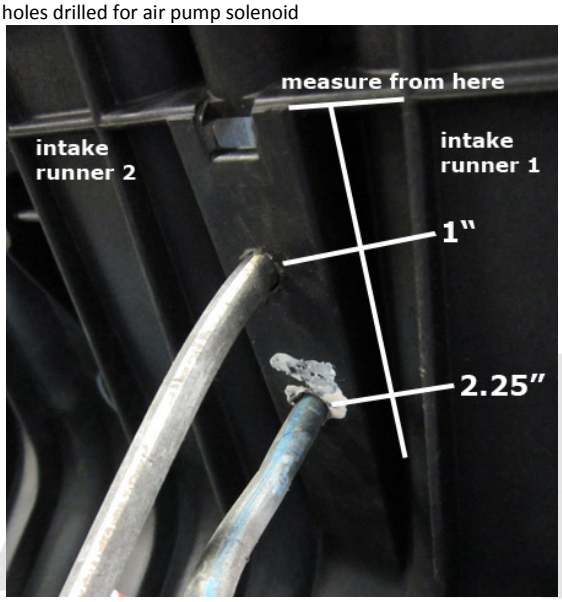
vacuum baseplate with labels (shown upside down compared to how it sits when installed on the engine)



22. Pre-install the manifold support brackets between the M50 adapter and the manifold. Don't mix up the fore and aft brackets. The front bracket needs to be bent or modified to clear the new position of the CVV. Test fit and modify as necessary to clear. Leave the brackets loosely installed on the M50 adapter.

23. The vacuum lines for the air pump solenoid need to be routed through the M50 manifold. You will need to drill two 11/32" holes in the plastic bridge between intake runners 1 and 2. The first hole is drilled 1" and the second hole is 2.25" down from the plastic ridge shown below.

holes drilled for air pump solenoid



24. Test fit the fuel injector rail to the M50 manifold, using the supplied adapter brackets.
    + Some slight and gentle bending of the lines may be required to bend around the intake runner.
    + Note that the rail will rub on the support boss on the manifold. Shave or grind some plastic from the boss as shown in this picture:

25. Remove the fuel rail from the M50 manifold – it is much easier for final install when the manifold is first installed on the engine.

26. There are two hard-rubber coolant pipes that run from the block towards the frame rail. Push these down slightly to allow clearance.

27. Remove the battery cable from the starter and put a small downward bend in it for clearance. Reattach the cable.

28. Plug the port in the M50 manifold that was previously used for the M50 temp sensor.
    Cap off the vacuum tip in the M50 manifold for the M50 fuel pressure regulator system.

29. If you haven't already, install the new intake runner profile gaskets and throttle body gasket.

30. Install the manifold onto the engine. As you're placing the manifold onto the head, attach the wiring connector to the ICV. Doing this now is much easier than trying to connect it with the manifold all the way on the engine.

    Torque the manifold>head mounting nuts to 11 ft-lbs (15Nm). Check the clearance between the ICV/CVV brackets to the starter cable and coolant pipe. Adjust as necessary and then tighten the manifold support brackets to the block and the adapter.

31. Run the air pump lines through the holes you drilled in the manifold. Remove the air pump solenoid from its bracket. Place the air pump solenoid on top of the manifold and connect the lines. The solenoid is not fastened to the manifold. Plug in wiring connector to solenoid.

32. Reconnect the evap purge valve hose, fuel pressure regulator hose, and air pump solenoid hose. Plug in the temp sensor. For the moment, leave off the CVV tube as it will need to be modified.

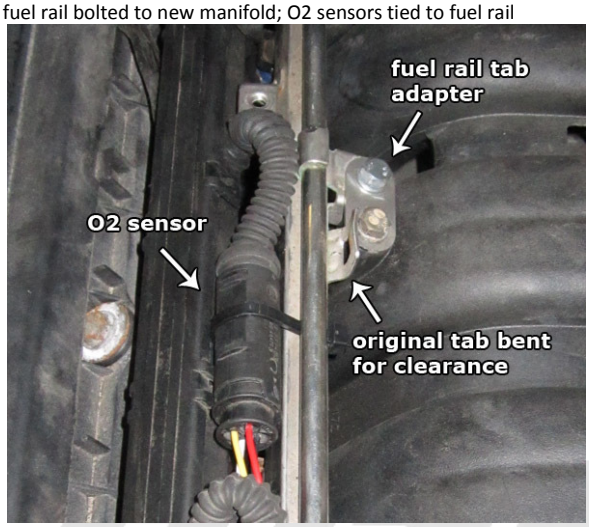
33. The crankcase vent hose needs to be lengthened slightly to fit to the new location. We supply a rubber extension tube for this purpose. Cut the stock CVV tube at the center of the solid section. Install the extension and heat shrink the two ends to the CVV tube. Reconnect the vent tube to the cylinder head and to the vent valve under the manifold.

steps to modify the CVV hose

34. Install the fuel injector rail. Make sure you connect the correct rubber lines to the metal lines on the rail – don't mix up the feed and return lines. Hint – the feed line runs out of the fuel filter.

    Use the supplied adapter tabs to position the fuel rail to the manifold. Bend or cut the original O2 sensor tabs away for clearance.

fuel rail bolted to new manifold; O2 sensors tied to fuel rail



35. Plug in each injector to the injector harness and fasten the harness to the rail.

36. Reconnect the oxygen sensors, taking care to plug in the correct sensor with the harness. Zip tie the connectors to the harness rail.

37. Reconnect the camshaft sensor at the front of the fuel rail.

38. Install the stainless steel adapter plate between the manifold and the throttle body.

39. Reinstall the alternator cooling duct.

40. Reinstall the vacuum line to the brake booster.

41. Reinstall throttle body, HFM, and air intake.

42. Install the modified plastic BMW fuel rail cover (if ordered separately). You can modify your stock fuel rail cover yourself and use the supplied M6 Allen hardware to secure it.

43. Start the engine and check for leaks around the fuel injectors, vacuum lines, and intake boots.

44. Enjoy!