

INSTALLATION OF 2.4L INTAKE MANIFOLD ON 2.2L ECOTEC ENGINE

Note: Procedures were tested on an 06 Cobalt with 2.2L Ecotec engine. Other years/models may not be exactly the same, so far this manifold has worked on earlier and some later models with only one modification needed to an 07 Cobalt. The hole for the MAP sensor was a too small for the sensor used on this vehicle and it needed to be drilled out to 15/32" to reuse the factory MAP sensor.

1. 2.2L intake removal (Allow engine to cool-do not remove when engine is hot). . Disconnect battery prior to starting work and/or clear the ECU with a scan tool. The ECU learns the throttle position and has set parameters for the original 2.2L intake manifold. This will reset the ECU and allow it to relearn new parameters with the new intake manifold.

A. Remove Air cleaner assembly by disconnecting:

MAF sensor harness connector

Hose to valve cover

Loosen clamps at both ends

If stock air cleaner: remove push-pin fastener from support bracket (right side) (1)

Helpful Hint 1: Sand and dirt collects on top of the intake manifold where it attaches to the cylinder head. Clean with compressed air (can of keyboard cleaner) before removal if possible.

- B. Remove EVAP valve tube (2). This is done by moving a lever inside the end connector and sliding the end off
- C. Remove four Throttle Body (TB) mount bolts (3) and electrical connector (4). Remove TB.
- **D**. Disconnect four fuel injector (5) and the MAP sensor harness (5a) connectors and move out of the way. This is done by sliding the green clip back; pushing down on the gray lever and pulling the fuel injector connector off the fuel injector (do not pull using the wires).
- E. Remove four harness mounts from manifold (6) (6a) (6b) (6c). Use a common flat screwdriver to assist, if needed.
- F. Remove Knock Sensor Electrical connector mount from manifold (7)
- **G**. Remove bolt from oil dipstick tube bracket (10mm wrench) (8). Note: 2.2L engine uses upper bolt hole in bracket.

- **H**. Remove AC hose clamp from bracket **(9)** and spin clamp away from bracket (allows additional movement of AC hose for manifold removal)
- I. Remove 5 bolts and 2 nuts holding manifold to cylinder head (10mm socket) (10)
- J. Disconnect brake booster hose from intake manifold (11). The hose is held on by a white clip compress the two ends and push up as pictured, then slide hose off. **See hose drawing**.
- **K**. Remove intake manifold. Helpful Hint 2: there is just enough room to remove the manifold it may help to pull on the rubber portion of the AC tube (14) running in front of the manifold.
- **L**. Inspect and clean all cylinder head surfaces.

2. 2.4L Intake Manifold Install:

A. Install 4 intake gaskets and PCV orifice plate on intake. NOTE 1: Inspect inside of manifold for cleanliness. NOTE 2: Insure PCV orifice plate is installed (either direction ok) or the engine will not idle properly

B. Position manifold on cylinder head

Helpful Hint 2: Clearance is tight; it may help to pull on the rubber portion of the AC tube running in front of the manifold **(14)**.

Helpful Hint 3: Using a mirror and flashlight inspect that the manifold-to-head gaskets/PCV plate are still in position before installing bolts.

Helpful Hint 4: Cover throttle body opening with a lint free cloth/paper towel to prevent dropping anything into manifold.

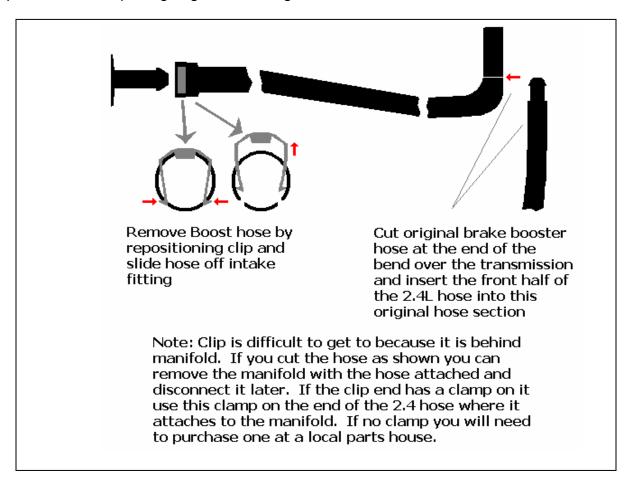
- **C.** Install 5 bolts and 2 nuts finger tight **(10)**. Then torque bolts and nuts to 10 N-m **(89 lb in)** tighten from the center outward alternating between upper and lower bolts/nuts. <u>89 lb in</u> is barely more than hand tight with a ratchet assembly. Do not over-tighten -- Torque wrench recommended!
- **D.** If not part of intake: Remove MAP sensor **(5a)** from 2.2L intake by turning and pulling up on the sensor. It is held on the 2.2L manifold by a plastic lip. Inspect seal for cleanliness or damage. Position the MAP sensor on the 2.4L intake by sliding it over the self-locking clip **(5b)** and insure it is fully seated.
- E. Install four fuel injector and MAP sensor harness connectors (5, 5a).
- **F.** Install Knock Sensor Electrical Connector mount in manifold fitting (7).
- **G.** Install harness mount in hole **(6c)** and use a tie strap to secure wiring harness in upper fitting hole **(6)**. Install lower harness manifold mount **(6b)**
- **H.** Install bolt in oil dipstick tube bracket **(8)** Note: 2.4L intake bolt uses lower hole in bracket. Reinsert AC hose clamp in bracket **(9)**.
- **I.** Brake booster hose assy. Your kit includes a 2.4L brake booster hose. For ease of installation separate the 2 halves **(13)**. **Helpful Hint 5:** Cut the original 2.2 hose where it is straight over the transmission use the new hose's middle connector and clamps and install the front half of the new booster hose **(12)**(front section has protective cover on it) to the manifold and cut portion of original

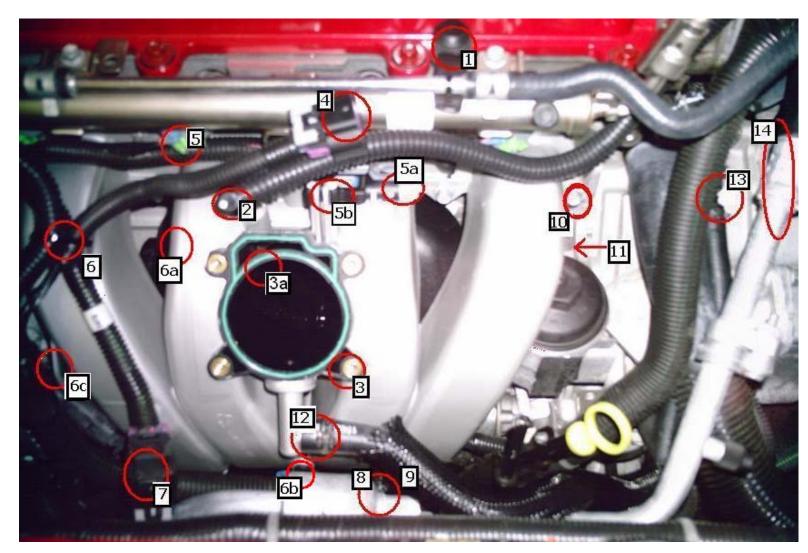
brake booster hose. It is easier to cut the original brake boost hose than to remove it from the booster at the back of the engine compartment.

- **J.** Align and secure paper gasket and plate to throttle body using the 30mm long bolt supplied with kit. Note: paper gasket goes between throttle body and plate. Tighten bolt to 10 N-m (**89 lb in**)
- **K.** Inspect Throttle body opening of 2.4L intake. The intake has a removable plate at the rear of the opening **(3a)** -- insure it is securely installed and position throttle body gasket. Install throttle body and tighten 4 bolts to 10 N-m **(89 lb in)**. Note: remove any protective covers you used to keep out foreign materials and inspect the inside of the manifold to insure it is clean before installing throttle body. Reattach throttle body electrical connector.
- **L.** Reinstall EVAP valve tube. Slide ends on male fittings and insure each end is secure.
- **M.** Reinstall air cleaner assembly, position and tighten clamps, MAF sensor connector, and PCV hose to valve cover.

N. Reconnect battery.

O. Recheck all connections. Start engine and check for leaks. Allow engine to reach operating temperature before putting in gear or driving car.





Pictured is 2.4L manifold on 2.2L engine. 2.2L manifold connections are similar – Items 6, 6a, 6b, 6c on 2.2L engine are threaded fittings, while 2.4L manifold has some holes in plastic for securing the wire harness.

- [1] Push-pin fastener
- [2] EVAP valve tube
- [3] Throttle Body bolts (4ea)
- [3a] 2.4L removable plate
- [4] Throttle Body electrical connector
- [5] Fuel Injector harness
- [5a] MAP sensor harness
- [5b] MAP sensor mount clip
- [6] Harness mounts at manifold
- [6a] 2.2L harness mount
- [6b] Harness mount at lower manifold

- [7] Knock sensor electrical connector
- [8] Oil dipstick tube bracket
- [9] AC hose clamp
- [10] Manifold mounting nuts (2ea) and bolts (5ea)
- [11] 2.2L Brake booster hose located behind manifold
- [12] 2.4L Brake booster hose connector at manifold
- [13] Brake booster hose middle connector
- [14] AC tube; pull lightly forward on this hose to remove and install the manifold in the engine compartment

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