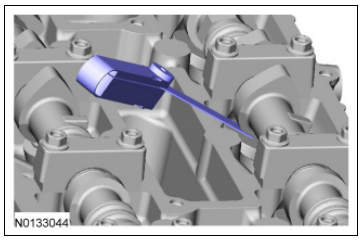
Valve Clearance Check

1. Remove the valve covers. For additional information, refer to Valve Cover - LH and Valve Cover - RH in this section.

2. **NOTE:** Engine must be at room temperature before measuring. The valve clearance must be measured with the camshaft at base circle. The engine will have to be rotated with the crankshaft pulley bolt to bring each valve to base circle.

   Use a feeler gauge to measure the clearance of each valve and record its location. A midrange clearance is the most desirable:

   - Intake: 0.15-0.25 mm (0.006-0.01 in)
   - Exhaust: 0.360-0.460 mm (0.0142-0.0181 in)



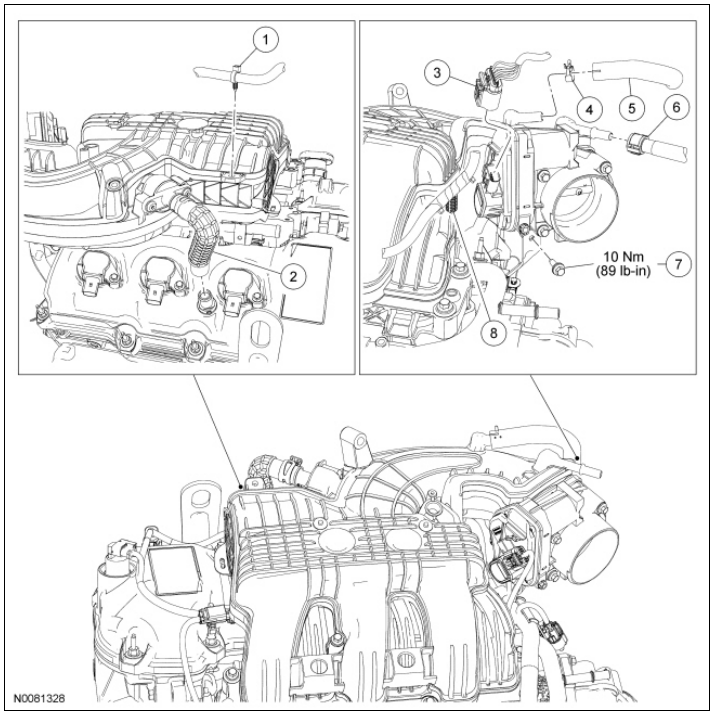
3. **NOTE:** The number on the valve tappet reflects the thickness of the valve tappet. For example, a tappet with the number 3.310 has the thickness of 3.31 mm (0.13 in).

   If any of the valve clearances are out of specification, select new tappets using this formula: tappet thickness = measured clearance + the base tappet thickness - most desirable thickness.
   Select the tappets and mark the installation location.

4. If required, install the new selected valve tappets in the marked locations. For additional information, refer to Valve Tappets in this section.

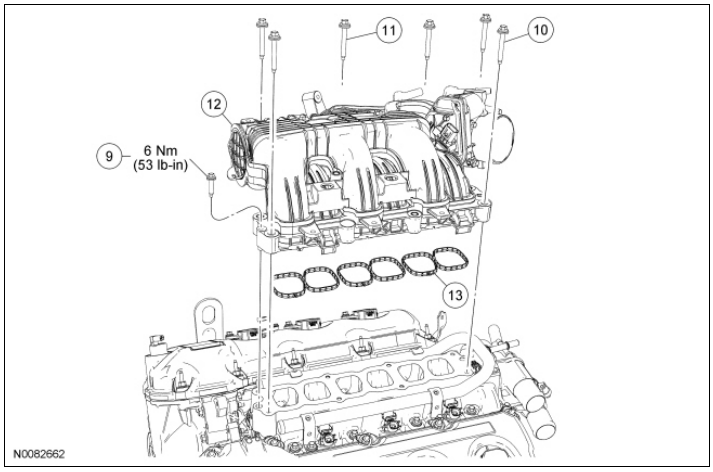
Upper Intake Manifold

Upper Intake Manifold (View 1 of 2)



Item	Part Number	Description
1	-	Evaporative Emission (EVAP) tube-to-upper intake manifold pin-type retainer
2	6K817	PCV hose
3	14A464	Throttle Body (TB) electrical connector (part of 12C508)
4	CS16140	Brake booster-to-intake manifold vacuum hose clamp
5	6K817	Brake booster-to-intake manifold vacuum hose
6	9D661	EVAP -to-intake manifold tube
7	W503274	Upper intake manifold support bracket bolt
8	-	Engine control wiring harness retainer (part of 12C508)

Upper Intake Manifold (View 2 of 2)



Item	Part Number	Description
9	-	Fuel tube bracket bolt
10	W503282	Upper intake manifold bolt (5 required)
11	W707083	Upper intake manifold bolt
12	9S455	Upper intake manifold
13	9H486	Upper intake manifold gasket (3 required)

Removal

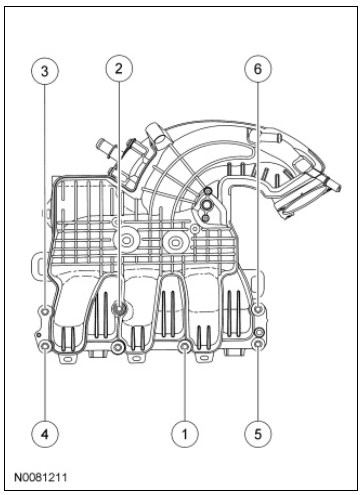
1. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to Section 303-12 .
2. Disconnect the Throttle Body (TB) electrical connector.
3. Disconnect the Evaporative Emission (EVAP) tube from the intake manifold.
4. Detach the EVAP tube pin-type retainer from the upper intake manifold.
5. Disconnect the brake booster vacuum hose from the intake manifold.
6. Disconnect the PCV tube from the PCV valve.
7. Detach the wiring harness retainers from the upper intake manifold.
8. Remove the upper intake manifold support bracket bolt.
9. Remove the fuel tube bracket bolt.
10. Remove the 6 bolts and the upper intake manifold.
    - Remove and discard the gaskets.
    - Clean and inspect all of the sealing surfaces of the upper and lower intake manifold.

Installation

1. ***NOTICE:*** **If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.**

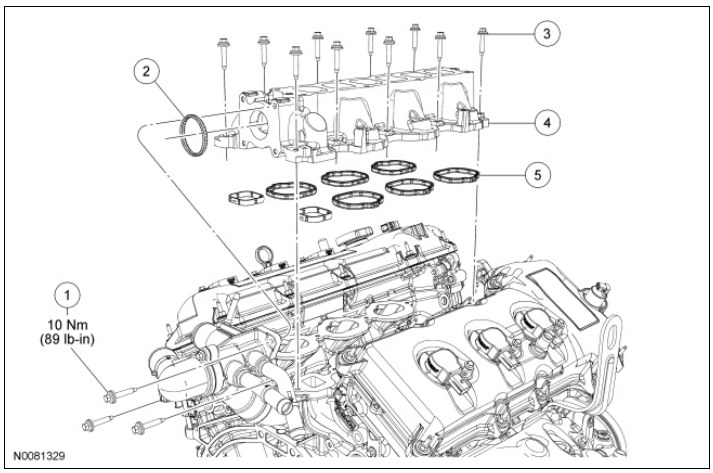
   Using new gaskets, install the upper intake manifold and the 6 bolts.

- Tighten in the sequence shown to 10 Nm (89 lb-in).



2. Install the fuel tube bracket bolt.
   - Tighten to 6 Nm (53 lb-in).
3. Install the upper intake manifold support bracket bolt.
   - Tighten to 10 Nm (89 lb-in).
4. Attach the wiring harness retainers to the upper intake manifold.
5. Connect the PCV tube to the PCV valve.
6. Connect the brake booster vacuum hose to the intake manifold.
7. Connect the EVAP tube to the intake manifold.
8. Attach the EVAP tube pin-type retainer to the upper intake manifold.
9. Connect the TB electrical connector.
10. Install the ACL outlet pipe. For additional information, refer to Section 303-12 .

Lower Intake Manifold



Item	Part Number	Description
1	W503279	Thermostat housing-to-lower intake manifold bolt (3 required)
2	8A571	Thermostat housing gasket
3	W503279	Lower intake manifold bolt (10 required)
4	9K461	Lower intake manifold
5	9439	Lower intake manifold gasket (8 required)

Removal

NOTICE: **During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, may cause engine failure.**

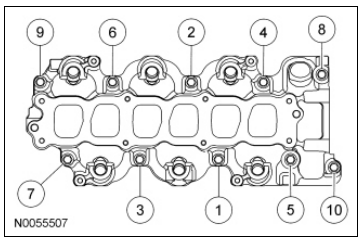
1. Remove the fuel rail. For additional information, refer to Section 303-04A .
2. Drain the cooling system. For additional information, refer to Section 303-03 .
3. Remove the 3 thermostat housing-to-lower intake manifold bolts.
4. Remove the 10 bolts and the lower intake manifold.
   - Remove and discard the intake manifold and thermostat housing gaskets.
   - Clean and inspect all sealing surfaces.

Installation

1. ***NOTICE:*** **If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.**

   Using new intake manifold and thermostat housing gaskets, install the lower intake manifold and the 10 bolts.

- Tighten in the sequence shown to 10 Nm (89 lb-in).



2. Install the 3 thermostat housing-to-lower intake manifold bolts.
   - Tighten to 10 Nm (89 lb-in).

3. Install the fuel rail. For additional information, refer to Section 303-04A .

4. Fill and bleed the cooling system. For additional information, refer to Section 303-03 .
