

2008 ENGINE PERFORMANCE

Intake Air Distribution & Filtering - Mustang

SPECIFICATIONS

Material

Item	Specification	Fill Capacity
Motorcraft Premium Gold Engine Coolant with Bittering Agent (bittered in US only) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1	-
Motorcraft Synthetic Supercharger Fluid XL-4	ESE-M99C115-A	-
Threadlock and Sealer TA-25	WSK-M2G351-A5	-

TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
Air cleaner (ACL) outlet pipe clamps	3	-	27
ACL bolt/nut	8	-	71
Charge air cooler (CAC) coolant tube assembly bolts	10	-	89
CAC bolts ^a	-	-	-
Lower intake manifold cover bolts ^a	-	-	-
Strut tower cross brace nuts	35	26	-
Supercharger (SC) bolts ^a	-	-	-

^a Refer to the procedure.

DESCRIPTION AND OPERATION

INTAKE AIR DISTRIBUTION AND FILTERING

The air intake system consists of the:

- air cleaner (ACL).
- ACL element.
- mass air flow (MAF) sensor.
- ACL outlet pipe.

The air intake system:

- cleans intake air with an ACL element.

- measures air flow with a MAF sensor. Refer to **ELECTRONIC ENGINE CONTROLS** article.

INTAKE AIR DISTRIBUTION AND FILTERING - SUPERCHARGER, CHARGE AIR COOLER

The air intake system consists of the:

- air cleaner (ACL).
- ACL element.
- mass air flow (MAF) sensor.
- ACL outlet pipe.
- ACL and duct assembly.

The air intake system:

- cleans intake air with an ACL element.
- measures air flow with a MAF sensor. Refer to **ELECTRONIC ENGINE CONTROLS** article.

The supercharger (SC) is a positive displacement pump. Its purpose is to supply an excess volume of intake air to the engine by increasing air pressure and density in the intake manifold. The SC is matched to the engine by its displacement and belt ratio, and can provide excess airflow at any engine speed.

NOTE: The SC is repaired only as an assembly. Disassembly of the SC unit may void the warranty.

NOTE: The SC is not a bolt-on option. It is part of a integrated engine system. Many components of the supercharged engine are not interchangeable with similar parts from a non-supercharged engine.

The SC contains two 3-lobed rotors. The helical shape and specialized porting provide a smooth discharge flow and low level of noise during operation. The rotors are supported by ball bearings in front and needle bearings at the rear. The drive gears are pressed into place, therefore the SC is installed new as a unit, and is not repairable.

The SC system is a blow-through type with the fuel injected directly into the intake ports. The SC is belt driven off the crankshaft through an idler pulley. The throttle body (TB) controls the amount of intake air to the SC through the intake plenum. Air from the SC is routed through the charge air cooler (CAC), then to the intake manifold. The resulting denser air charge in the combustion chamber provides for a higher power output of the engine over a non-supercharged engine or the same displacement.

NOTE: It is not possible to increase manifold pressure or engine power output by altering the bypass valve or the actuator.

At partial-throttle opening or when vacuum is present in the intake system, a vacuum controlled bypass valve reroutes some discharged air from the SC back through the intake plenum. This prevents the SC from

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cavitating, causing reduced performance, increased temperatures and poor economy.

The SC has a self-contained oiling system that does not require a fluid change for the life of the vehicle. However, at every 48,000 km (30,000 mi) interval, the SC fluid level should be checked. The vehicle should be parked on a level surface, the engine cool and not running. To check the oil, remove the Allen head plug located at the front of the supercharger. The oil level should be at the bottom of the fill plug threads when cold. If the fluid level is low, add Synthetic Supercharger Fluid Motorcraft XL-4 or equivalent meeting Ford specification ESE-M99C115-A. Supercharged vehicles are equipped with a CAC. The CAC cools the pressurized air from the SC, increasing the air density, which improves combustion efficiency, engine horsepower and torque.

DIAGNOSTIC TESTS

INTAKE AIR DISTRIBUTION AND FILTERING

Refer to the [Introduction - Gasoline Engines](#) article.

REMOVAL AND INSTALLATION

INTAKE AIR SYSTEM COMPONENTS - EXPLODED VIEW, 4.0L SOHC

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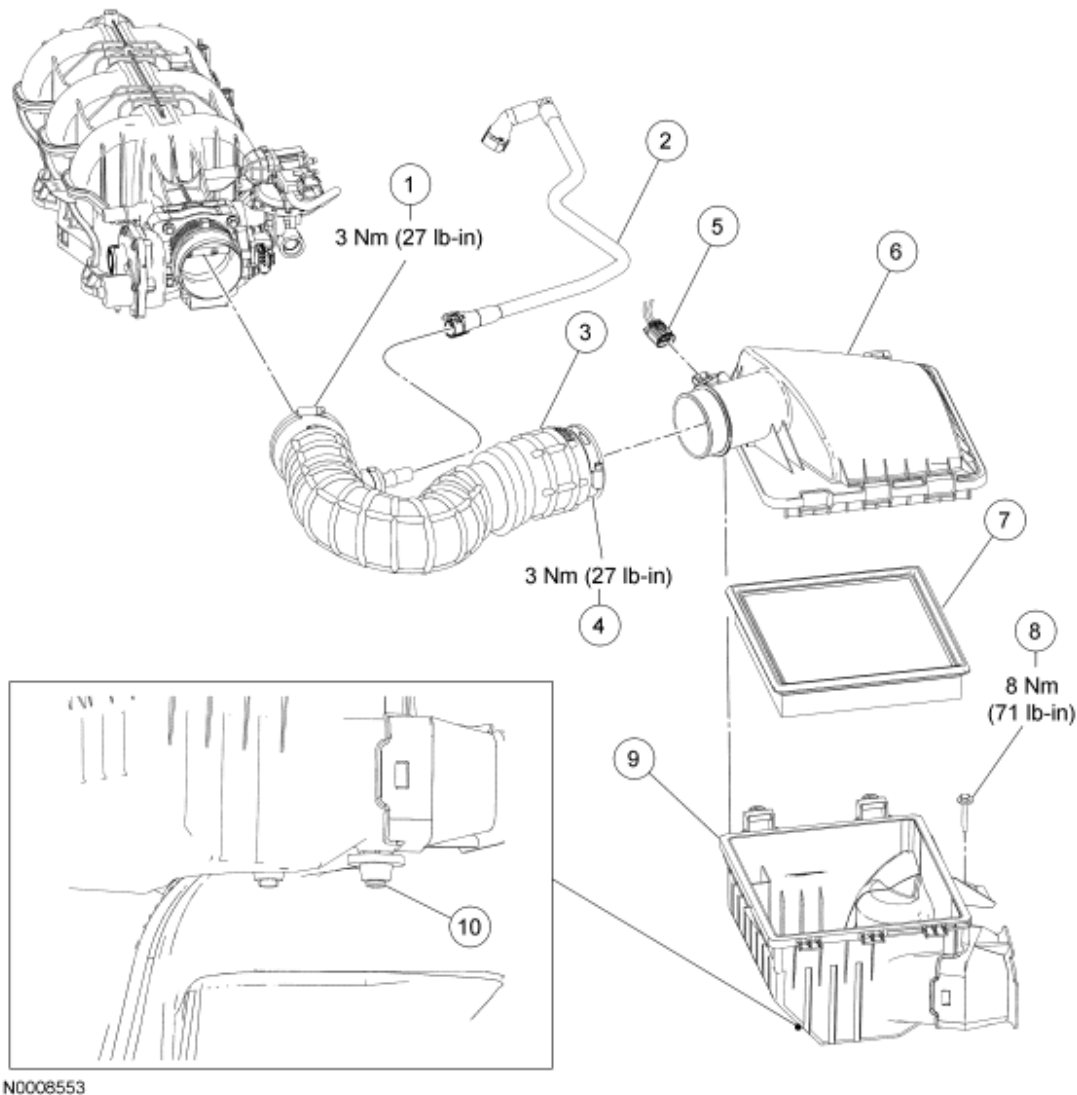
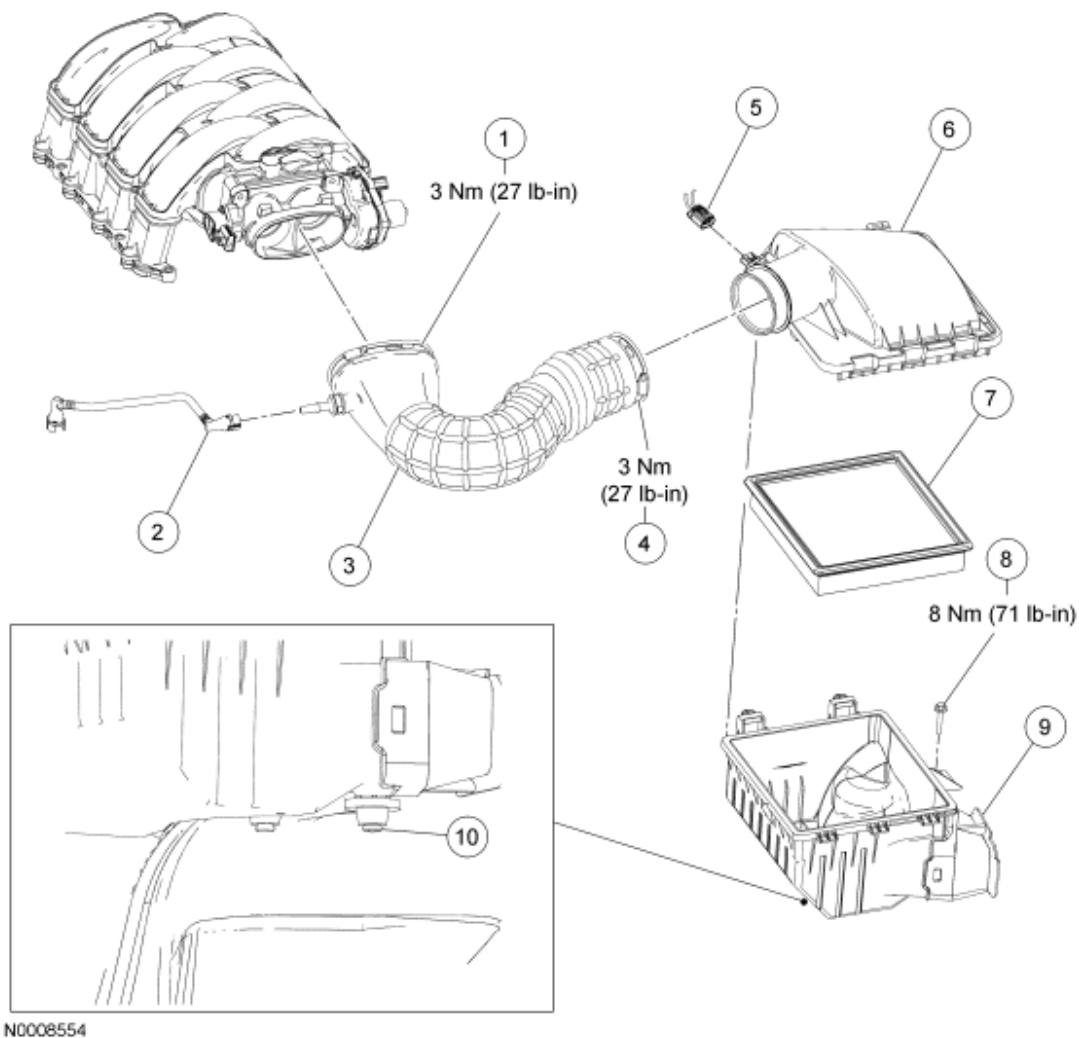


Fig. 1: Exploded View Of Intake Air System Components With Torque Specifications - 4.0L SOHC
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9C632	Air cleaner (ACL) outlet pipe clamp
2	67582	Crankcase vent tube
3	9B659	ACL outlet pipe
4	9C632	ACL outlet pipe clamp
5	14A464	Mass air flow (MAF) sensor electrical connector
6	9661	ACL cover (part of 9A600)
7	9601	ACL element
8	W505427	ACL assembly bolt
9	9A600	ACL assembly

1. For additional information, refer to the procedures.

INTAKE AIR SYSTEM COMPONENTS - EXPLODED VIEW, 4.6L (3V)



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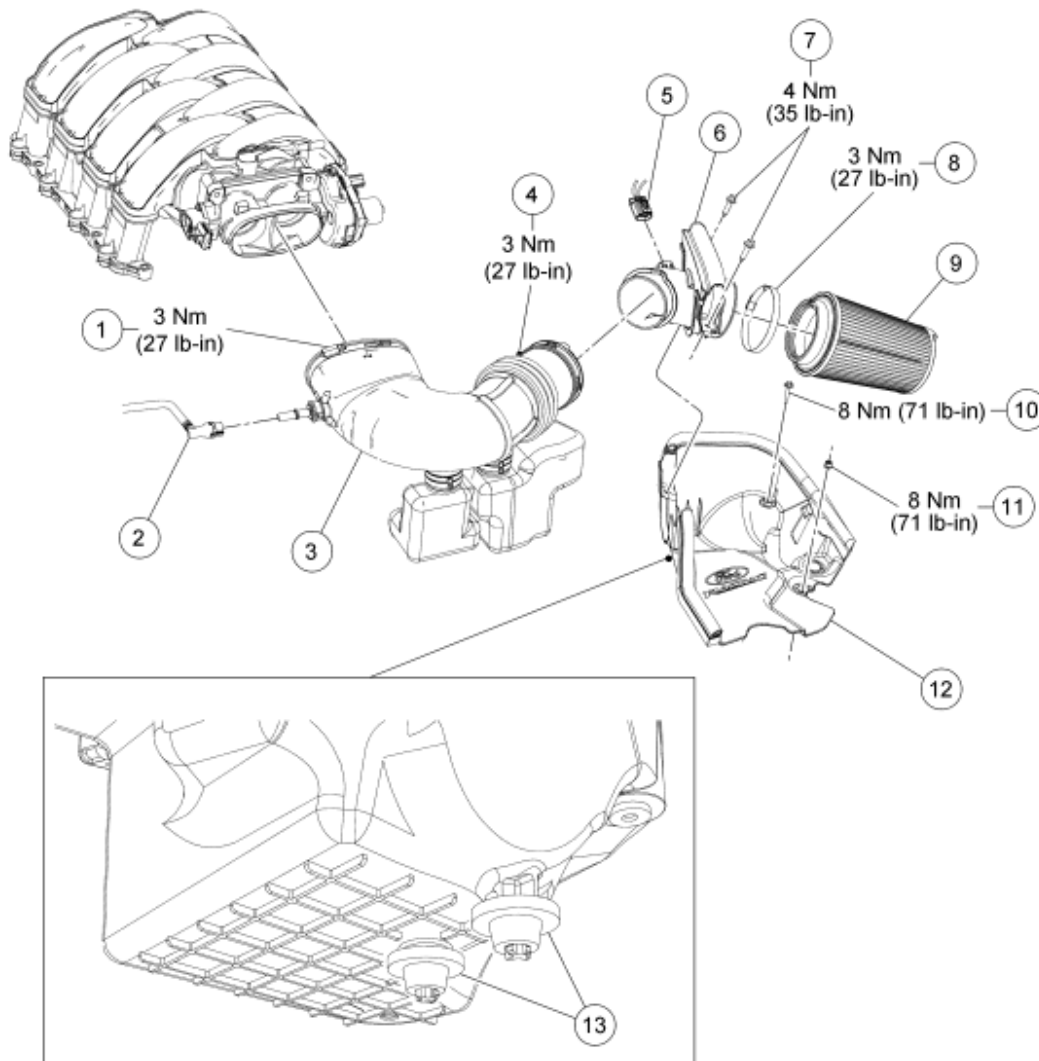
Fig. 2: Exploded View Of Intake Air System Components With Torque Specifications - GT 4.6L (3V)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9C632	Air cleaner (ACL) outlet pipe clamp
2	6758	Crankcase vent tube
3	9B659	ACL outlet pipe
4	9C632	ACL outlet pipe clamp

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5	14A464	Mass air flow (MAF) sensor electrical connector
6	9661	ACL cover (part of 9A600)
7	9601	ACL element
8	W505427	ACL assembly bolt
9	9A600	ACL assembly
10	9P686	ACL assembly grommet



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Fig. 3: Exploded View Of Intake Air System Components With Torque Specifications - Bullitt 4.6L (3V)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9C632	Air cleaner (ACL) outlet pipe clamp
2	6758	Crankcase vent tube

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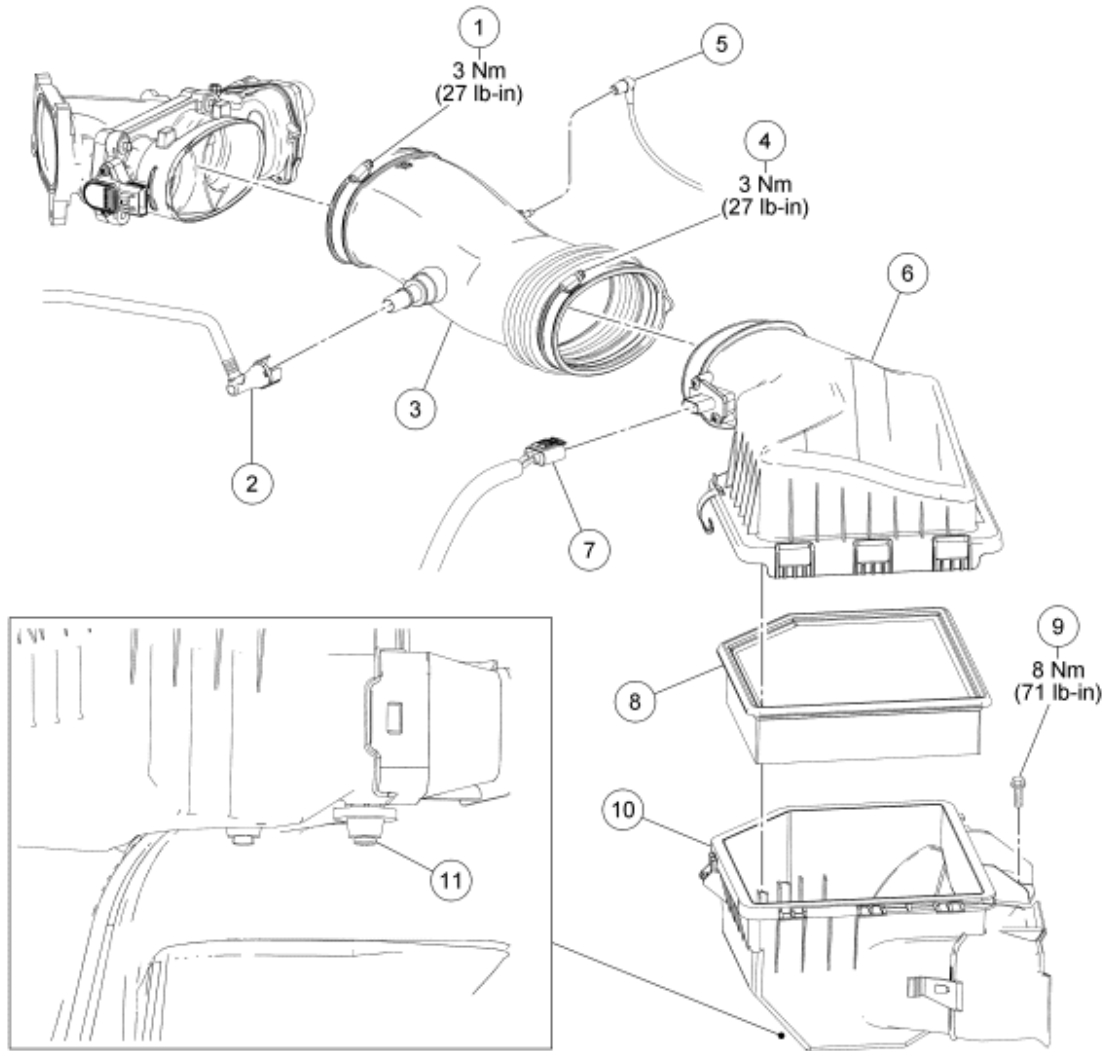
3	9F805	ACL outlet pipe
4	9C632	ACL outlet pipe clamp
5	14A464	Mass air flow (MAF) sensor electrical connector
6	-	ACL pipe seal (part of 9600)
7	W500224	ACL pipe seal bolts (2 required)
8	9C632	ACL element clamp
9	9601	ACL element
10	W505427	ACL bolt
11	N620480	ACL nut
12	9600	ACL housing
13	9P686	ACL assembly grommet

1. For additional information, refer to the procedures.

INTAKE AIR SYSTEM COMPONENTS - EXPLODED VIEW, 5.4L (4V)

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Fig. 4: Exploded View Of Intake Air System Components With Torque Specifications - 5.4L (4V)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9C632	Air cleaner (ACL) outlet pipe-to-throttle body clamp
2	6758	Crankcase vent tube-to-air cleaner outlet pipe
3	9R504	ACL outlet pipe
4	9C632	ACL outlet pipe-to-air cleaner clamp
5	9E498	Vacuum tube-to-air cleaner outlet pipe
6	9643	ACL cover (part of 9A600)
7	14A464	Mass air flow (MAF) sensor electrical connector

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8	9601	ACL element
9	W505427	ACL assembly bolt
10	9A600	ACL assembly
11	9P686	ACL assembly grommet

1. For additional information, refer to the procedures.

AIR CLEANER OUTLET PIPE

All vehicles

1. Disconnect the crankcase vent tube from the air cleaner (ACL) outlet pipe.

Vehicles with 5.4L (4V)

2. Disconnect the vacuum tube from the ACL outlet pipe.

All vehicles

3. Loosen the 2 clamps and remove the ACL outlet pipe.
 - To install, tighten to 3 Nm (27 lb-in).
4. To install, reverse the removal procedure.

AIR CLEANER

REMOVAL AND INSTALLATION

All vehicles

1. Loosen the clamp and disconnect the air cleaner (ACL) outlet pipe from the ACL assembly.
 - To install, tighten to 3 Nm (27 lb-in).
2. Disconnect the mass air flow (MAF) sensor electrical connector.

All vehicles except Bullitt

3. Remove the ACL assembly bolt.
 - To install, tighten to 8 Nm (71 lb-in).

Bullitt vehicles

4. Remove the ACL housing nut and bolt.
 - To install, tighten to 8 Nm (71 lb-in).

All vehicles

NOTE: Make sure that the 2 rubber grommets are retained to the ACL assembly feet.

5. Remove the ACL assembly.

NOTE: Make sure that the 2 ACL assembly feet rubber grommets are seated into the locating holes in the fender.

NOTE: The ACL outlet pipe should be securely sealed to prevent unmetered air from entering the engine.

6. To install, reverse the removal procedure.

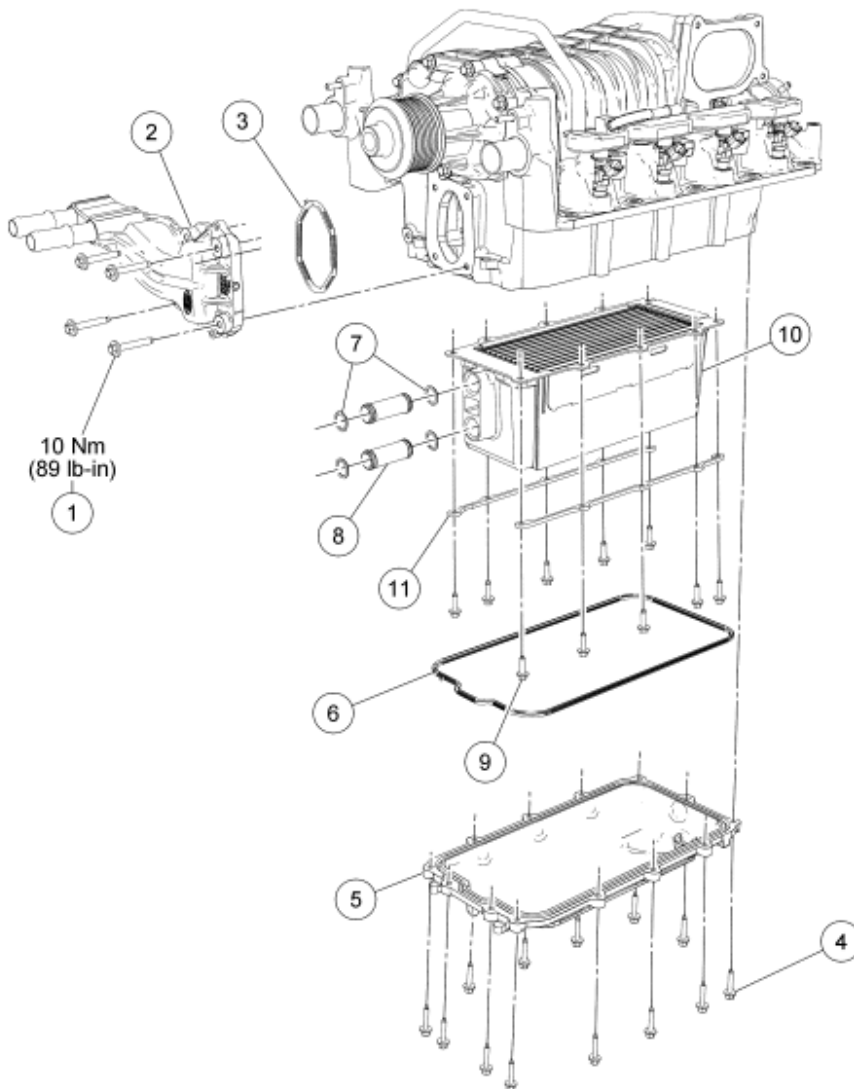
CHARGE AIR COOLER

Material

Item	Specification
Motorcraft Premium Gold Engine Coolant with Bittering Agent (US only) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1
Threadlock and Sealer TA-25	WSK-M2G351-A5

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Fig. 5: Exploded View Of Charge Air Cooler With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N807071	Charge air cooler (CAC) coolant tube assembly bolt (4 required)
2	6F077	CAC coolant tube assembly
3	9L438	CAC coolant tube assembly gasket
4	W704682	Lower intake manifold cover bolt (13 required)
5	9K461	Lower intake manifold cover
6	9E436	Lower intake manifold cover gasket
7	N802927	CAC tube O-ring seals (4 required)
8	9L442	CAC coolant connector tube (2 required)
9	N605892	CAC bolt (10 required)

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10	6K775	CAC
11	6K808	CAC rail supports (2 required)

REMOVAL

1. Remove the intake manifold. For additional information, refer to **ENGINE - 5.4L (4V)** article.
2. Remove the 4 bolts and the charge air cooler (CAC) coolant tube assembly.
3. Remove the 2 CAC coolant connector tubes and the 4 O-ring seals.
 - Discard the O-ring seals.
4. Remove the 13 bolts and the lower intake manifold cover and gasket.
5. Remove the 10 bolts, the 2 CAC rail supports and the CAC.

INSTALLATION

NOTE: Apply threadlock and sealer to the CAC bolts prior to installation.

1. Position the CAC and install the support rails and bolts.
 - Tighten the bolts in the sequence shown in 2 stages:
 - Stage 1: Tighten to 2 Nm (18 lb-in).
 - Stage 2: Tighten to 10 Nm (89 lb-in).

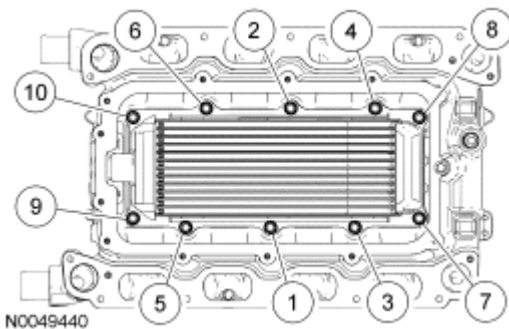


Fig. 6: Positioning CAC & Tightening Bolts In Sequence
Courtesy of FORD MOTOR CO.

NOTE: Inspect the lower intake manifold cover gasket. Install a new gasket if necessary.

2. Position the gasket and the lower intake manifold cover, and install the bolts.
 - Tighten the bolts in the sequence shown to 10 Nm (89 lb-in).

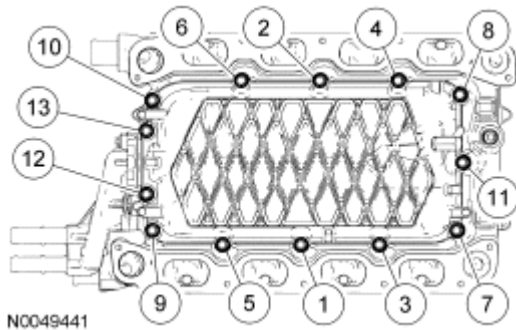


Fig. 7: Positioning Gasket Lower Intake Manifold Cover & Tightening Bolts In Sequence
Courtesy of FORD MOTOR CO.

3. Apply clean engine coolant to the new CAC coolant connector tube O-ring seals, and install them on the CAC coolant connector tubes.
4. Install the CAC coolant connector tubes.

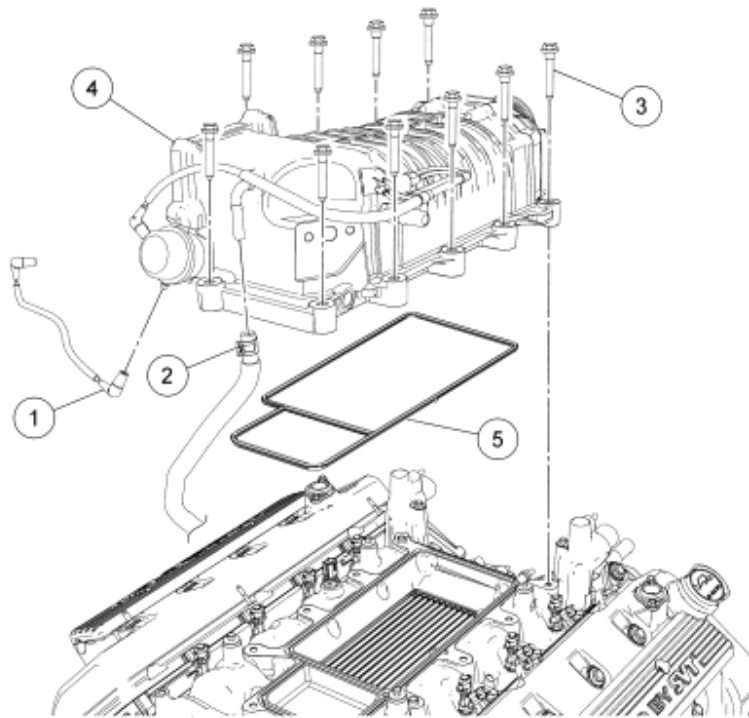
NOTE: **Inspect the CAC coolant tube assembly and gasket. Install a new gasket if necessary.**

5. Position the gasket and the CAC coolant tube assembly, and install the bolts.
 - Tighten to 10 Nm (89 lb-in).
6. Install the intake manifold. For additional information, refer to **ENGINE - 5.4L (4V)** article.

SUPERCHARGER

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Fig. 8: Exploded View Of Supercharger
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9E498	Supercharger (SC) bypass vacuum actuator vacuum connector
2	6C324	SC bubbler hose
3	N806177	SC bolt (10 required)
4	6F066	SC
5	9H486	SC gasket

REMOVAL

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the 4 nuts and the strut tower cross brace.

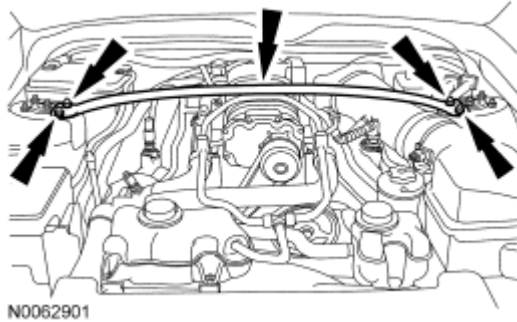


Fig. 9: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

4. Rotate the drive belt tensioner clockwise and detach the drive belt from the supercharger (SC) pulley.

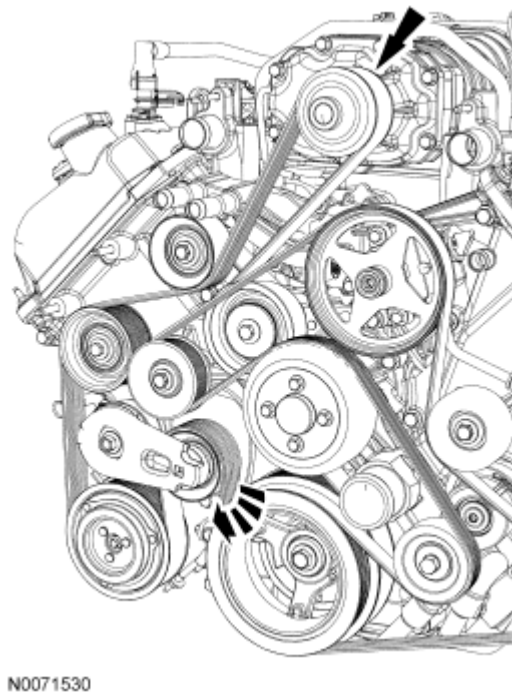


Fig. 10: Identifying Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

5. Remove the EGR system module. For additional information, refer to **ENGINE EMISSION CONTROL** article.
6. Remove the fuel rail. For additional information, refer to **FUEL CHARGING AND CONTROLS - 5.4L (4V)** article.
7. Disconnect the SC bubbler hose and the SC bypass vacuum actuator vacuum connector.
8. Remove the 10 bolts and the SC.
9. Remove and discard the SC gasket.

- Cover the lower intake manifold with a shop towel to prevent foreign material from falling into the engine.

INSTALLATION

NOTE: **Install a new gasket.**

1. Position the SC gasket on the lower intake manifold dowels.
2. Position the SC and install the bolts.
 - Tighten the bolts in the sequence shown in 2 stages:
 - Stage 1: Tighten to 5 Nm (44 lb-in).
 - Stage 2: Tighten to 25 Nm (18 lb-ft).

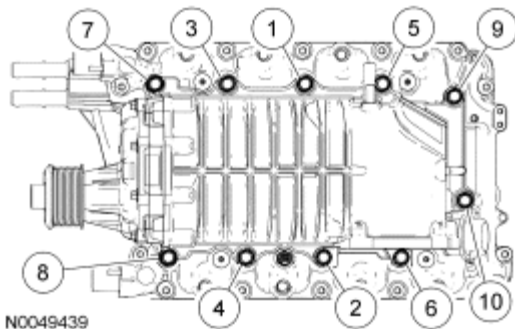
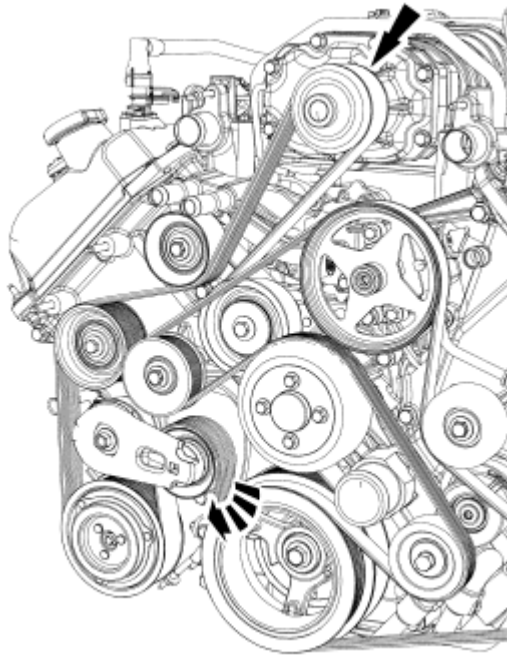


Fig. 11: Positioning Supercharger & Tightening Bolts In Sequence
Courtesy of FORD MOTOR CO.

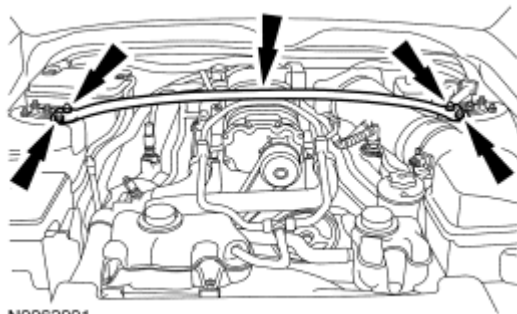
3. Connect the SC bubbler hose and the supercharger bypass vacuum actuator vacuum connector.
4. Install the fuel rail. For additional information, refer to **FUEL CHARGING AND CONTROLS - 5.4L (4V)** article.
5. Install the EGR system module. For additional information, refer to **ENGINE EMISSION CONTROL** article.
6. Rotate the drive belt tensioner clockwise and attach the drive belt to the SC pulley.



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Fig. 12: Identifying Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

7. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).



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Fig. 13: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

8. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.