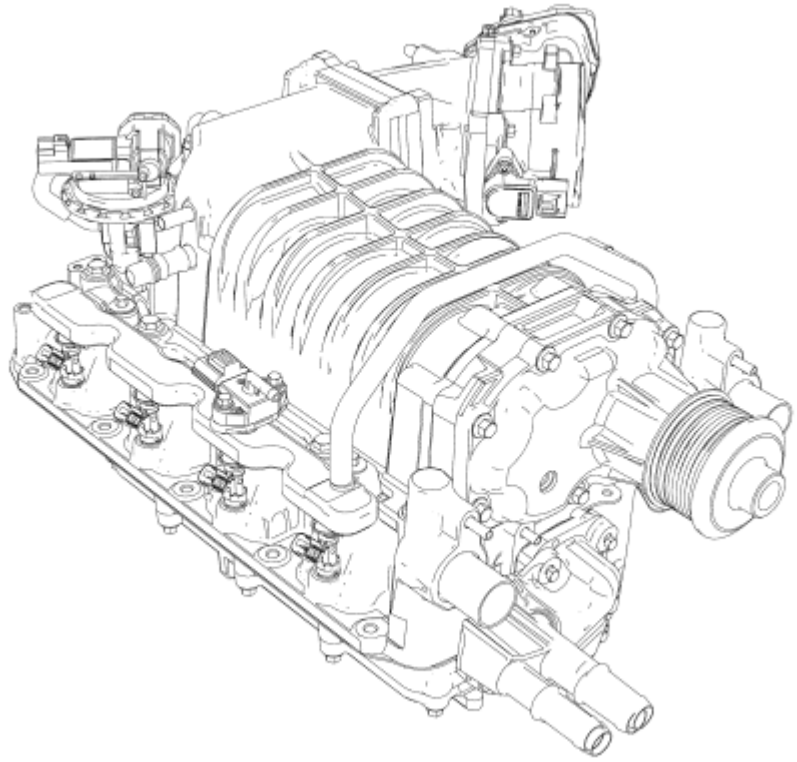
# Supercharger and Charge Air Cooler (CAC) Systems

## Supercharger Assembly

The supercharger assembly is a positive displacement pump. The supercharger supplies an excess volume of intake air to the engine by increasing air pressure and density in the intake manifold. The supercharger assembly incorporates the bypass system to reduce air handling losses when boost is not required, resulting in better fuel economy. When integrated on the engine the supercharger increases torque across the entire engine operating range from 25 to 50 percent without compromising driveability or emissions. The supercharger is matched to the engine by its displacement, and belt ratio and can provide excess airflow at any engine speed. It contains two screw-type 3-lobed rotors. The helical shape of the rotors and specialized porting provide a smooth discharge flow and a low level of noise during operation. The rotors are supported by ball bearings in front and needle bearings at the rear.



N0047963

*Supercharger Assembly*

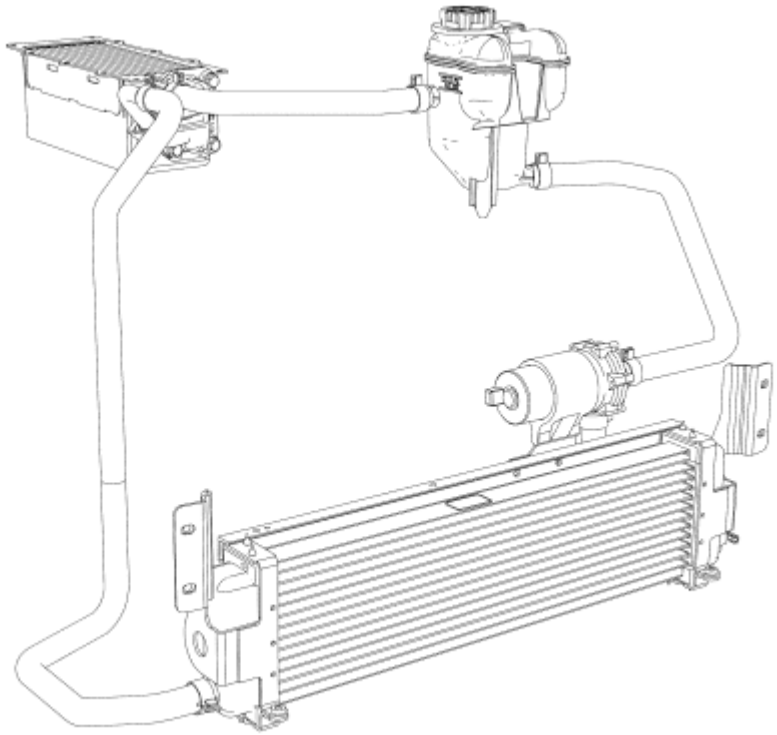
## Supercharger Bypass (SCB) System

The SCB system allows the high pressure air at the outlet of the supercharger to vent back into the inlet of the supercharger, equalizing the pressure. This eliminates the boost (increased pressure that the supercharger produces) for times when supercharger function is undesirable. The system uses a vacuum bypass actuator, which controls the bypass valve inside the supercharger. The system normally operates with engine vacuum applied to the upper port of the vacuum bypass actuator, while the lower port references the air pressure in the clean air tube to cancel out any pressure difference in the intake air system. The actuator is set to open (bypassing the supercharger) during high vacuum engine conditions. As the throttle is opened and engine vacuum decreases, the actuator closes to allow the supercharger to pressurize the air in the manifold.

## Charge Air Cooler (CAC) System

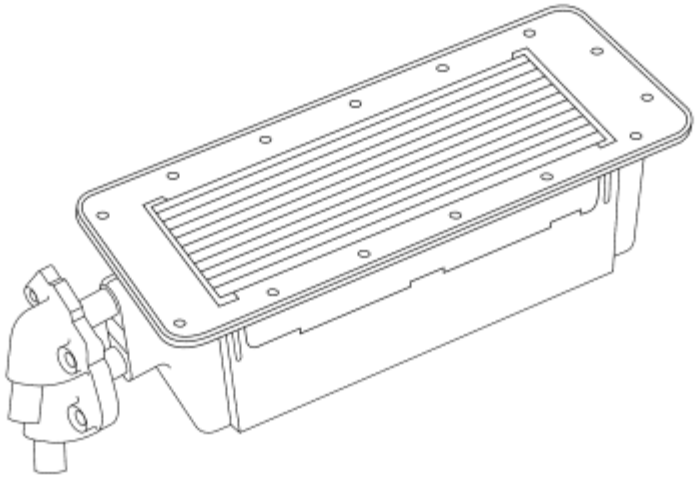
The CAC system is designed to cool the intake air which has been heated by the supercharger. The removal of heat from the pressurized air going into the CAC increases the air density which improves combustion efficiency, engine horsepower, and torque. The system consists of an additional CAC radiator in the grille, a reservoir (independent from the engine cooling system), an electric water pump, the CAC located in the lower intake

manifold, and tubing to interconnect these components. The CAC is positioned after the supercharger directly in the flow of the intake air. As the heated air flows through the CAC, heat is transferred to the coolant which is circulated back to the CAC radiator to be cooled by the airflow through the grille. The CAC pump is controlled by the powertrain control module (PCM). The PCM maintains a desirable intake air temperature by monitoring a second intake air temperature (IAT2) sensor in the lower intake manifold.



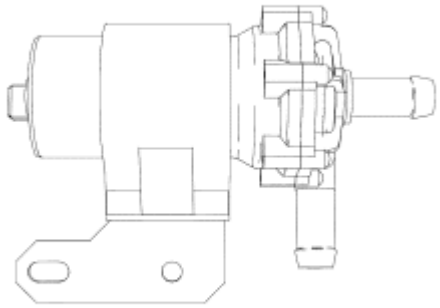
N0047961

*Charge Air Cooler (CAC) System*



A0093947

*Charge Air Cooler (CAC)*



N0047962

*Charge Air Cooler (CAC) Pump*