

Intake Air Distribution and Filtering — Supercharger, Charge Air Cooler

Supercharger (SC), Charge Air Cooler (CAC)

The Supercharger (SC) and Charge Air Cooler (CAC) system consists of the:

- [SC](#) assembly.
- [CAC](#) assembly.

The [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 an 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 [CAC](#), then to the intake manifold. The [CAC](#) cools and increases the density of the air charge. 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 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 [SC](#). The oil level should be at the bottom of the fill plug threads when cold. If the fluid level is low, add Motorcraft Synthetic Supercharger Fluid or equivalent. 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.
