

Carroll Gaseous Intercooling[™] Systems are unique, highly refined Gaseous Intercooling[™] systems. These systems may be used in conjunction with Carroll as well as other manufacturers' super and turbocharger systems to obtain superior engine performance and safety. A Carroll Gaseous Intercooling[™] System is often used in conjunction with and/or to replace bulky air-to-air intercoolers. This technology is also known as *Gaseous Intercooling*[™]. Evaporative cooling causes the compressed air temperature to be reduced by, on average, 100°F.

A properly designed and installed Gaseous Intercooling[™] system will ALWAYS produce more power than either overfueled or spark retarded engines. Additionally, an engine that uses Gaseous Intercooling[™] will burn and stay cleaner, use less fuel, and run cooler under boosted conditions. Peak cylinder pressures and temperatures are reduced. Engine stress is greatly diminished; you will find no signs of hammered rod and crank bearings on engines equipped with a Carroll Gaseous Intercooling[™] System. It is almost impossible to detonate an engine (and subsequently break a cast or hypereutectic piston) when using a properly designed and functioning Gaseous Intercooling[™] system.

A properly designed Gaseous Intercooling[™] system MUST utilize a high pressure (100 psig) pump and atomizing type nozzle. Windshield washer pumps in conjunction with a "jet" will NEVER work as well: so don't compare the two.

A properly designed Gaseous Intercooling[™] system MUST have some sort of safety control to prevent injecting water when the engine is not running.

A properly designed Gaseous Intercooling[™] system will drop the intake air temperature 50° F within 1 second after injection starts.

Why is it that other manufacturers of supercharging systems do not promote Gaseous Intercooling™? There are several reasons:

- 1. COST
- 2. DEGREE OF DIFFICULTY IN SELECTION OF COMPONENTS
- 3. DEGREE OF DIFFICULTY IN ENGINEERING THE OVERALL SYSTEM
- 4. BASIC KNOWLEDGE OR LACK OF
- 5. MAINTENANCE

The Carroll Supercharging Company has been designing, selling, and installing Gaseous Intercooling[™] systems since 1972; does that say enough?

CHOICES

At Carroll we have designed a number of Gaseous Intercooling[™] systems to meet your needs and budget. They ALL work well and do what they are suppose to do: STOP DETONATION! All of our systems use the same high pressure diaphragm pump and stainless steel atomizing nozzle. All of the systems are fully automatic being activated by manifold pressure. What changes from system to system is the degree of complexity of the control systems. All of our systems use components made from plastic, brass or stainless steel so that they are unaffected by water and/or alcohol.

STANDARD[™] WATER

Our simplest and least expensive system is called STANDARD[™] Gaseous Intercooling[™]. It consists of the pump, nozzle, reservoir, adjustable boost pressure activation switch, and power relay with wiring harness. The power relay is interlocked to the vehicle's fuel pump circuit so you cannot inject water unless the engine is running.

STANDARD PLUS[™] WATER

This STANDARD PLUS[™] System includes all of the same quality components as our STANDARD[™] Gaseous Intercooling[™] System. The STANDARD PLUS[™] System also includes a water pressure proof switch and lighted rocker switch that allows the system to be turned ON/OFF from inside the vehicle as well as give a visual indication of when water is actually being injected. This is the system we most often recommend for our truck and SUV supercharging systems.

DELUXE™ WATER

The DELUXE[™] Gaseous Intercooling[™] System includes the following major components:

- > Electronic Control Module ["Black Box"] With Trouble Alarm.
- > Wiring Harnesses.
- > Illuminated Rocker Control Switch.
- > Green Remote LED for Indicating Boost, i.e. "SUPERCHARGING".

The DELUXE[™] Gaseous Intercooling[™] has the following controls, indicators & features:

- > A two position momentary rocker switch with:
 - 1. An amber "ON" indicator to alert the driver that the system is active and ready to inject water and
 - 2. A green "ON" indicator when water is being injected and
 - 3. An "ON/TEST" switch and
 - 4. An "OFF/ALARM SILENCE switch.

> A super brite LED for indicating "SUPERCHARGING".

> An audible "ALARM" to alert the driver in case of trouble with the Gaseous Intercooling[™] system such as no water.

> A 2-Bar MAP Sensor that senses the intake manifold pressure.

> A water pressure proof switch.

The DELUXE[™] Gaseous Intercooling[™] System has the following features:

- > The System is fully automatic, requiring no driver intervention.
- > Automatically turns itself "ON" each time the engine is started.
- > Allows you to "TEST" the injection system by manually injecting water.
- > Allows you to turn "OFF" the Gaseous Intercooling™ system when not needed.
- > Allows you to silence the trouble alarm with the "ALM. SIL." button.
- > Automatically saves water by varying the speed of the Gaseous Intercooling™ pump.
- > Includes standard and optional engine protection provisions.
- > Prevents water from being injected unless the engine is running & under boost.
- > Constantly monitors the water pressure and sounds an alarm if low Gaseous Intercooling[™] pressure occurs.
- > Constantly monitors the manifold pressure and lights the L.E.D. in boost.
- > Prevents going into boost if the Gaseous Intercooling™ is inoperative.
- > Optional feature prevents going into boost if engine oil is cold.

GEN-IV DELUXE™ WATER

The GEN-II, GEN-III and now GEN-IV DELUXE[™] System was developed in 1992 to match the performance requirements of the then new LT1 Corvette engine. The GEN-IV DELUXE[™] System incorporates all of the parts and features of the DELUXE[™] System as well as an electrical solenoid and unique steel accumulator tank with bladder. This system stores the energy of the Gaseous Intercooling[™] pump and delivers INSTANTANEOUSLY atomized water on demand. Because the system is so fast the water does not have to be injected in advance in anticipation of detonation. Subsequently the tuning is finer and the end result is more usable POWER!

GEN-V WATER

In 1997 General Motors introduced an all new small block engine designated the LS1. This engine represents some incredible engineering, developing 345 horsepower from 350 cubic inches without overhead cams!



About the same time we at Carroll Supercharging had been investigating several more sophisticated methods of injecting water – always trying to improve our products.

Well we've done it again! We have taken our GEN-IV controller and made several changes (GEN-IV will continue to be sold as is – GEN-V is for the serious engine builder who must have the best).

SETPOINTS

We added one more manifold pressure setpoint for a total of 3: LOW - MEDIUM - HIGH.

NOZZLES

We added a second nozzle with an additional solenoid.

PUMP

When the system is activated the high-pressure pump runs on its' own internal pressure switch, maintaining 100 psig at all times.

CONTROLLER & CONCEPT

The GEN-V controller has 3 setpoints: For the sake of argument let's use 3–6 and 9 psi with one 5 GPH nozzle and one 10 GPH nozzle. At 3 pounds of manifold pressure the controller activates SOLENOID A. Connected to Solenoid A is the 5 GPH (gallons per hour) high-pressure atomizing nozzle. At 6 psi the controller deactivates Solenoid A and activates Solenoid B which is connected to the 10 GPH atomizing nozzle. At 9 pounds of manifold pressure the controller reactivates Solenoid A thus delivering a total of 15 GPH (Nozzle A plus Nozzle B).

So what is so special about this? Simple – because the pump speed and pressure are fixed at 100 psi the delivery system is able to turn the water into a true fog. The smaller the "droplets" of water the better the cooling and anti-detonation effect. The smaller the droplets the more even is the distribution because the "fog" will follow the air stream making even tight turns. This system has tremendous potential to solve detonation problems with the *least* amount of water. This system makes water injection truly a Gaseous Intercooler[™]. The delivery of the water is totally transparent to the user. No effect of the water can be felt – only the total release of power through the most advance spark curve.