GENERAL INFORMATION

The introduction of emission controls is a result of excessive high pollutants from tailpipe emissions. Smog is the main by-product of these emissions. This is primarily produced from Hydrocarbons, Oxides of Nitrogen and sunlight creating photochemical smog. Since automobiles are the main producers of these pollutants tighter and more stringent laws have been legislated to control these pollutants. Auto manufacturers have developed and produced components to control these emissions. Along with these components, fuel systems and internal engine design have been changed to aid in the effort. With the advent of electronic fuel injection and computers monitoring such systems, not only are these vehicles producing less emissions, they are also running more efficient wasting little of the produced power.

The three kinds of emission gases being controlled in gasoline engines are:

HYDROCARBONS OR HC.
These are particles, usually vapors, of gasoline that have not been fully burned. They are present in the exhaust and crankcase vapors. Raw gas that evaporates out of the tank or carburetor (throttle body) is considered a HC.

CARBON MONOXIDE OR CO.
This is a poisonous chemical compound of carbon (part of gasoline and oxygen from the air). It forms in the engine when the fuel burning (combustion) is less than complete. CO is found in the exhaust and is a by-product of combustion, but may also be in the crankcase.

OXIDES OF NITROGEN OR NOx
Various compounds of nitrogen and oxygen, both present in the air used for combustion, are formed in the cylinders during excessive high engine temperatures and are part of the exhaust gas. They become part of the tailpipe emissions if not reduced in the exhaust system.

These are some of the systems and components used to decrease emissions:

POSITIVE CRANKCASE VENTILATION
First used in the early 1960's, the PCV system removes gases that "blow by" the pistons into the crankcase. These gases (HC, CO and NOx) were originally vented to the air by a road draft tube. They are now recirculated into the induction system.

SECONDARY AIR INJECTION/CATALYST
Air Injection systems originated in the mid 1960's. Their function is to put fresh air into the exhaust to reduce HC and CO to harmless water vapor and carbon dioxide by chemical reaction with oxygen in the air. In the 1970's catalytic converters were introduced to help this process. Three-way catalyst will reduce NOx as well as HC and CO.

EVAPORATIVE CONTROL SYSTEM
In the 1960's. evaporative control systems were used to trap raw gas vapors in the fuel tank (and later carburetor bowl) and route them to the air cleaner when the engine ran. In the 1970's the system was refined to a "sealed housing" system to control emissions better and purge them to the intake manifold during specific engine modes.

EXHAUST GAS RECIRCULATION

EGR is strictly a control for NOx in the exhaust gases. It reduces NOx by diluting the air/fuel mixture with some exhaust gas, which doesn't burn. This reduces peak combustion chamber temperature, so less NOx is formed.

ENGINE DESIGN/IMPROVED COMBUSTION SYSTEM (IMCO)

Starting in the 1960's. a group of engine modifications were designed to improve combustion and reduce HC and CO in the exhaust. It included a heated primary air system, carburetor design changes, fuel injection, engine "breathing" refinements and spark timing controls.