

Bulletin BPI 06-11

Subject: Braking Principles

Vehicle Involved: All Vehicles

Condition: Energy Stops the Vehicle

Repair Procedure: Braking Principles that Stop The Car

ENERGY: Energy is a measure of availability to do work.

There are three types of energy, potential, kinetic, and heat.

- Potential energy is exactly what it says, the potential to do work. A gallon of gasoline contains the potential energy to do work.
- Kinetic energy is the energy that is in a body in motion. A 2000 pound vehicle moving at 70 miles an hour creates the potential for kinetic energy.
- Heat is the energy that is transferred between a body and its surroundings due to the temperature differential. Heat always flows to less heat. Another way to describe it is from hot to cold.

THE LAW OF CONSERVATION OF ENERGY

The law of conservation of energy states that energy can neither be created nor destroyed. It is merely transformed from one type of energy to another.

Starting at the beginning the gas combustion is transferred into heat energy.

Through the principles of physics the heat energy is transformed into kinetic energy and the vehicle is rolling down the road.

**FRICION + PRESSURE (HEAT) = BRAKING SAFELY SLOWING
DOWN THE VEHICLE** *Affinia Under Vehicle Group 4400 Prime Parkway
McHenry, IL 60050 (815) 363-9000*

Newton's first law of motion states that a body at rest will remain at rest, unless, it is acted upon by an outside force. In addition, a body in motion

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will remain in motion at a constant velocity unless it is acted upon by an outside source.

Friction is the force that opposes movement between two surfaces in contact with each other. That force depends on the nature of the surfaces that are in contact and the amount of pressure exerted on those surfaces perpendicular to each other. Friction is the force that actually causes a vehicle to stop.

Heat energy must take place between the friction material contact point and the rotor or drum. The heat must then be dissipated because excessive heat can damage brake components.

There are three types of heat transfer:

- Conduction is the type of heat transfer that migrates heat from hot to cold through metal contact.
- Convection is the transfer of heat through motion, with airflow over a hot component carrying the heat away.
- Radiation is the type of heat that causes the air surrounding a hot component to get hotter.

A very specific heat range is needed to stop the vehicle effectively. Any interruption of that operating temperature can create a safety hazard.

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