



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF AUTOMOBILE ENGINEERING

19AUE402 – Intelligent Vehicle Technology

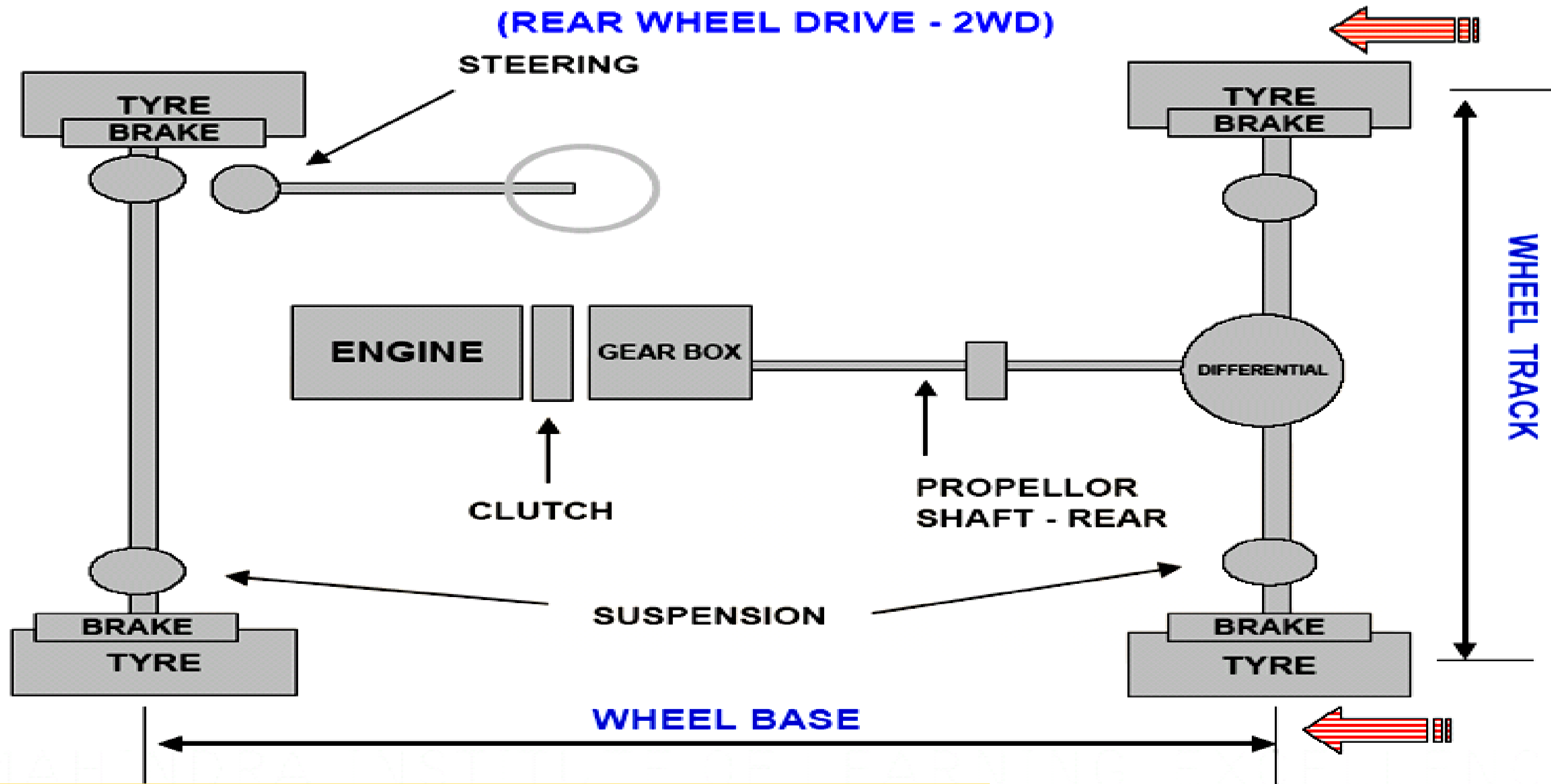
IV YEAR / VII SEM

UNIT – 5 Safety Impacting Devices

Topic: Anti Lock Braking Systems



ANATOMY OF AN AUTOMOBILE (REAR WHEEL DRIVE - 2WD)

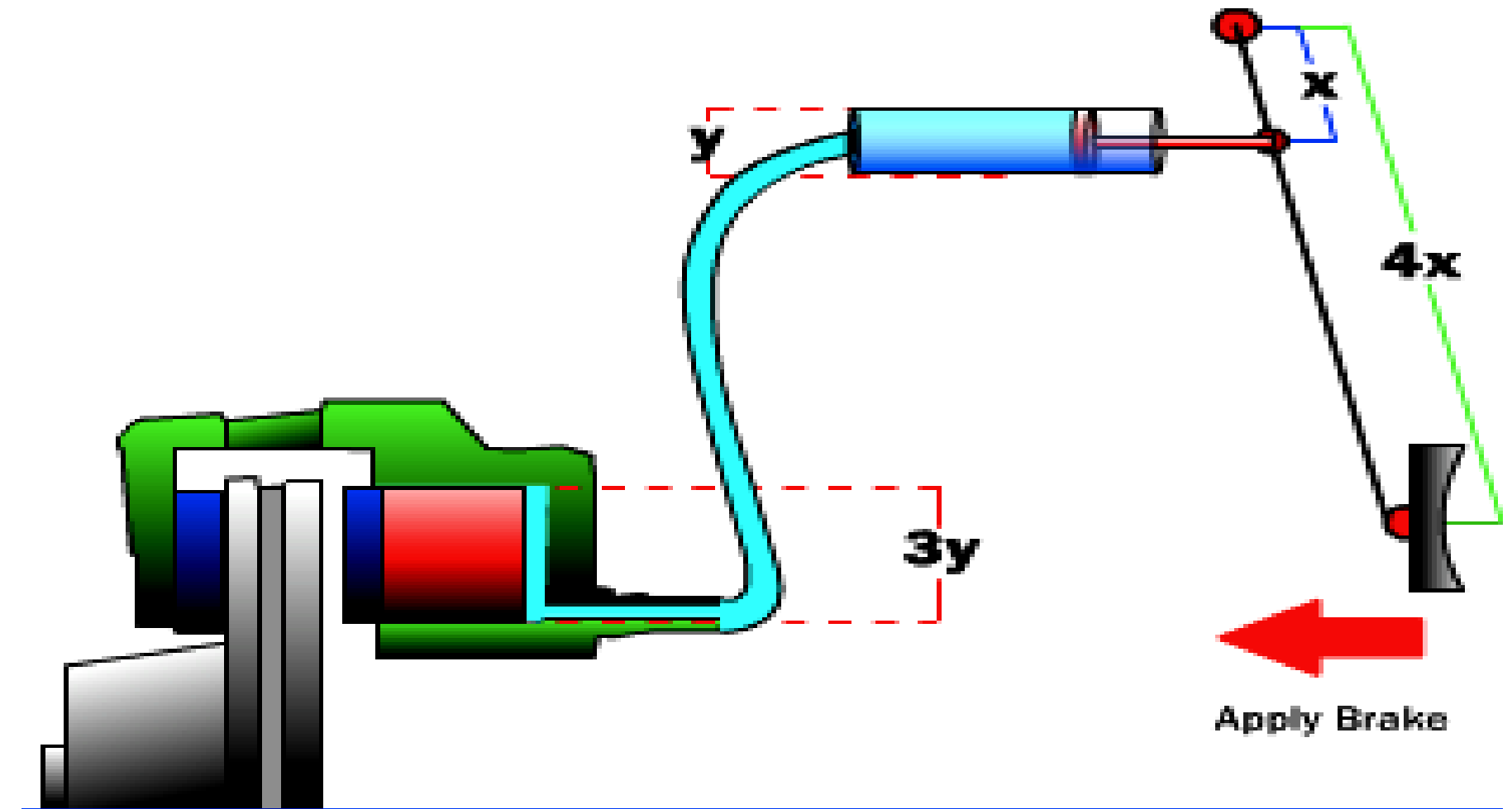




SYSTEM BASICS



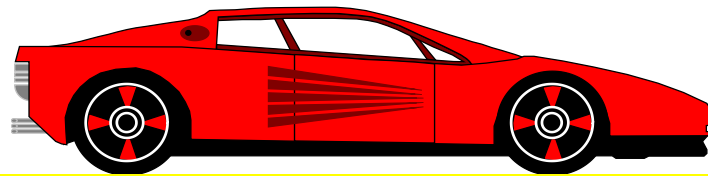
- The brake pedal is applied mechanically by the foot of the driver.
- This allows a pushrod to be pushed linearly in and out of its master cylinder.
- This pushes brake fluid into the brake lines which provide the necessary force to the brake shoes or pads.
- Hydraulic actuation allows multiplication of pedal force.



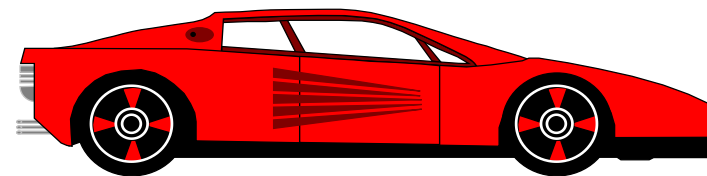
A simple brake system



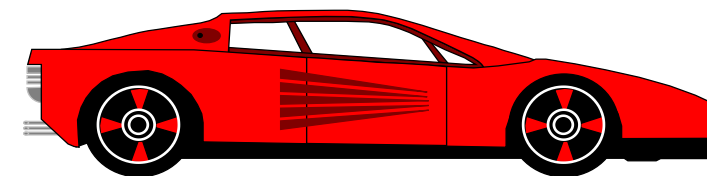
STOPPING DISTANCE



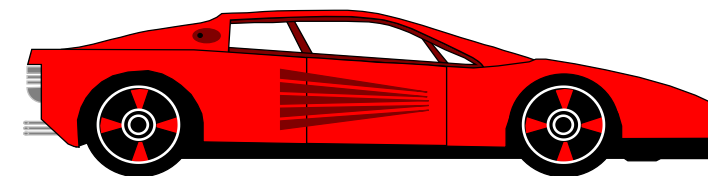
NORMAL STOPPING



STOPPING IN RAIN – 50%



STOPPING IN SNOW – TWICE NORMAL

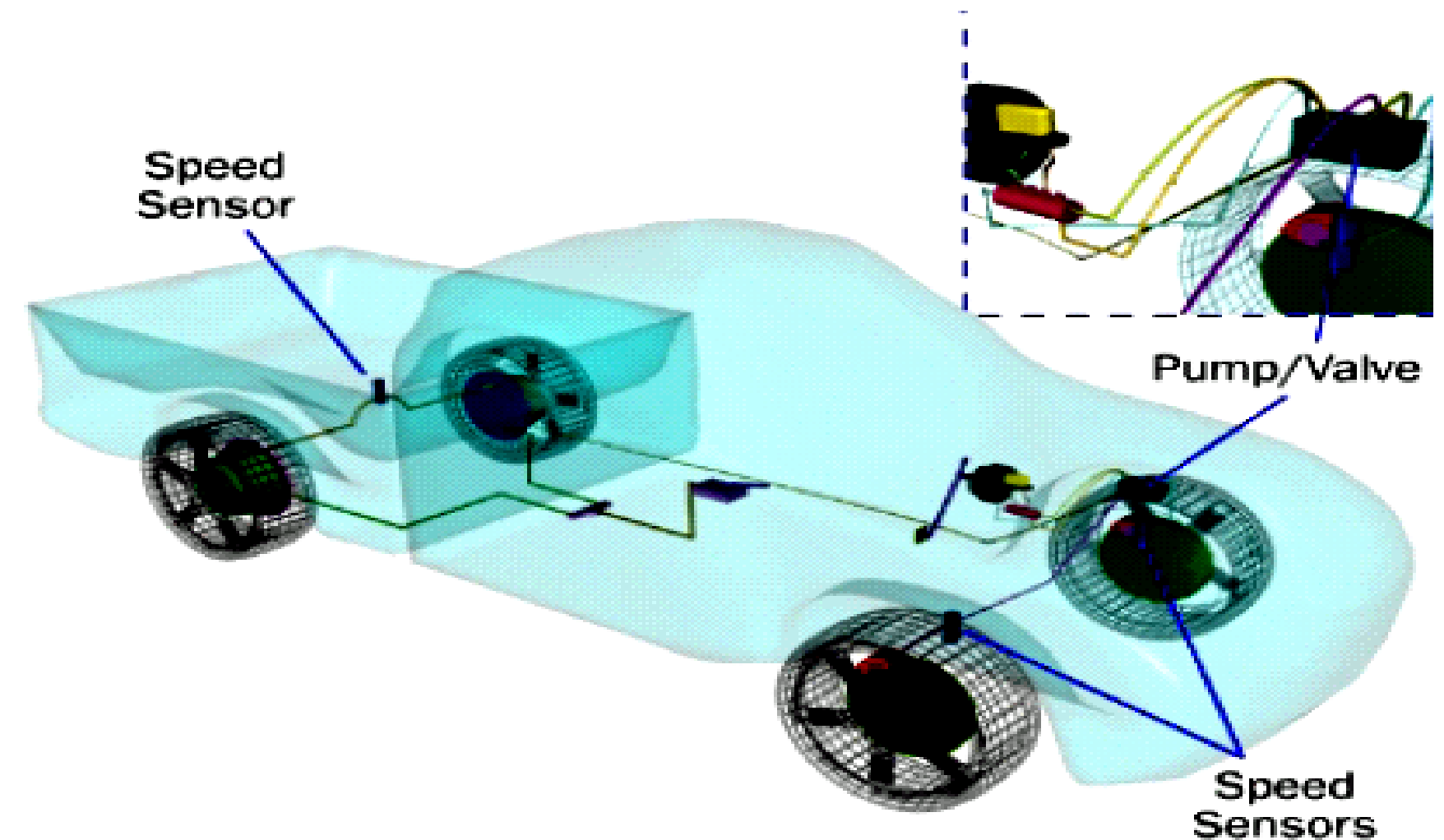


STOPPING ON ICE – THREE TIMES NORMAL DISTANCE



WHAT IS ABS? (ANTI-LOCK BRAKING SYSTEM)

- Also known as **Anti-Skid Braking System**.
- ABS means a portion of a service brake system that automatically controls the degree of rotational wheel slip during braking.
- ABS detects if one or more of the tires are slipping and then accordingly reduces the braking force on those tires.





ORIGIN OF ABS



ABS was first developed for the Jet Aircrafts where the landing speeds/weights are high and Runway lengths often wet and limited.

It's been since perfected to the extent that the Pilot can today touch down with the Brake Pedal 'fully home', w/o fearing any skidding of the Aircraft, and bring it to a safe halt.





PURPOSE OF ABS



- Anti-lock braking systems works by making sure the wheels roll without slipping.
- A locked (sliding) wheel offers less braking force than a decelerating rolling wheel.
- The locked wheel also produces little lateral force, preventing steering control.
- ABS monitor wheel lock-up and modulate brake pressure to provide controlled braking under most circumstances.



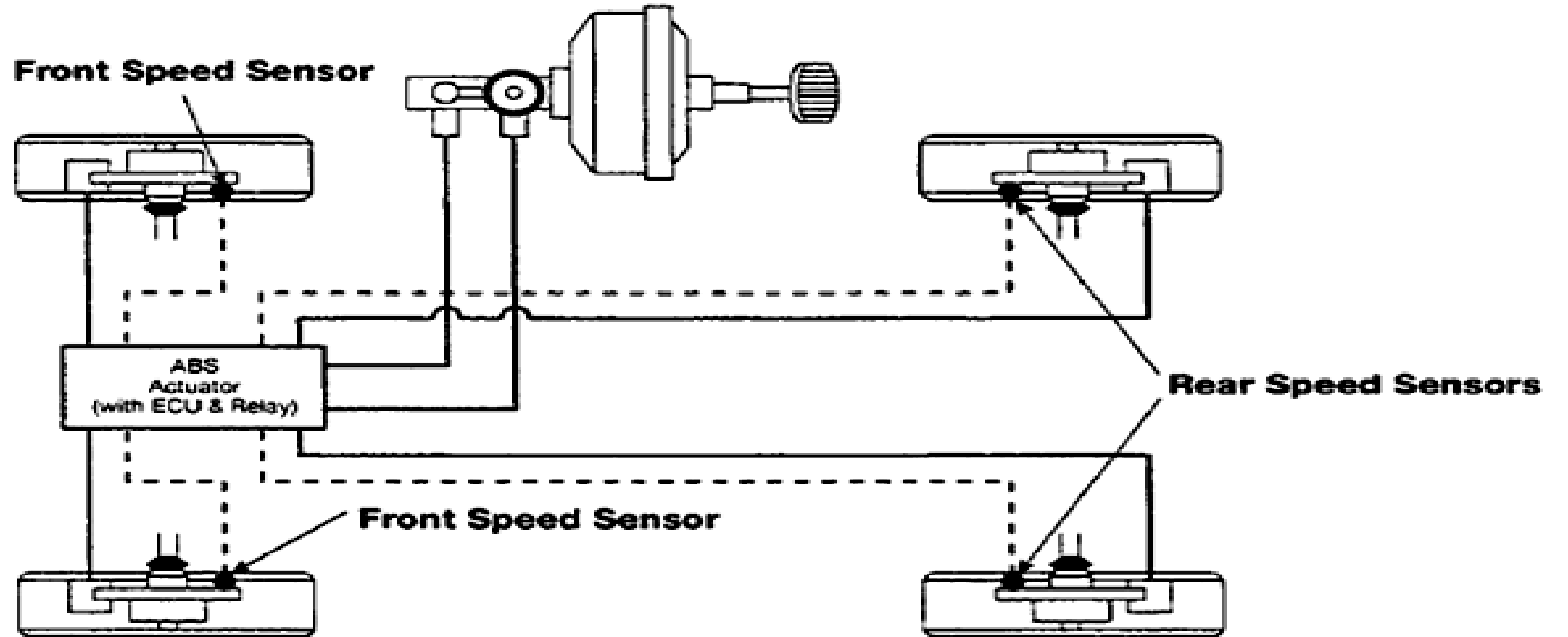
HOW DOES ABS PREVENT WHEEL LOCK UP?



- The ABS pump valve system blocks the hydraulic pressure in the lines and releases it as required.
- ABS can pump the brakes 18 times per second, compared to a maximum of 5 times per second for professional drivers.
- The rapid pumping keeps the pressure on the rotor close to the threshold of lock up.



ABS SYSTEM DIAGRAM



Legend:

- Electrical
- Hydraulic



TYPES OF ABS

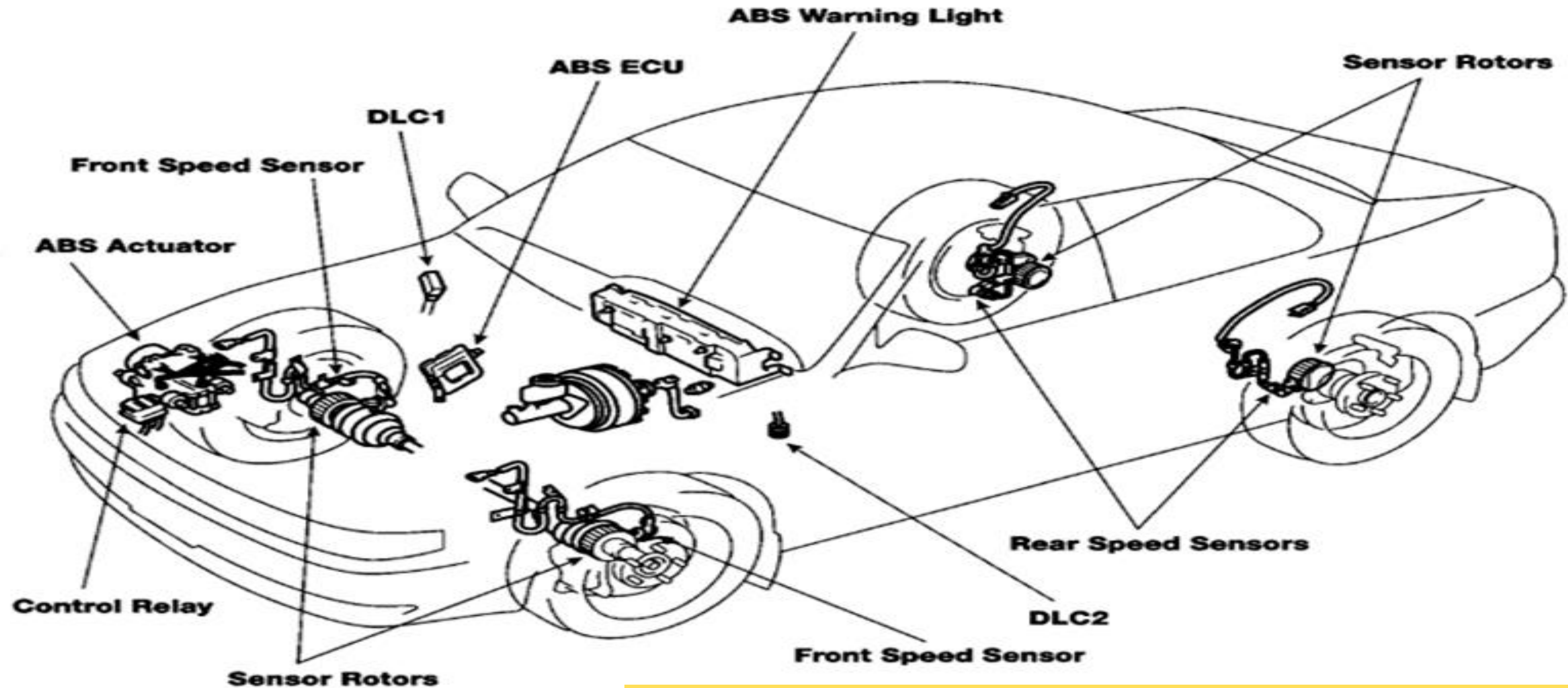


Anti-lock braking systems use different schemes depending on the type of brakes in use. We will refer to them by the number of channels:

- that is, how many valves that are individually controlled and the number of speed sensors.
1. Four-channel, four-sensor ABS
 2. Three-channel, three-sensor ABS
 3. One-channel, one-sensor ABS

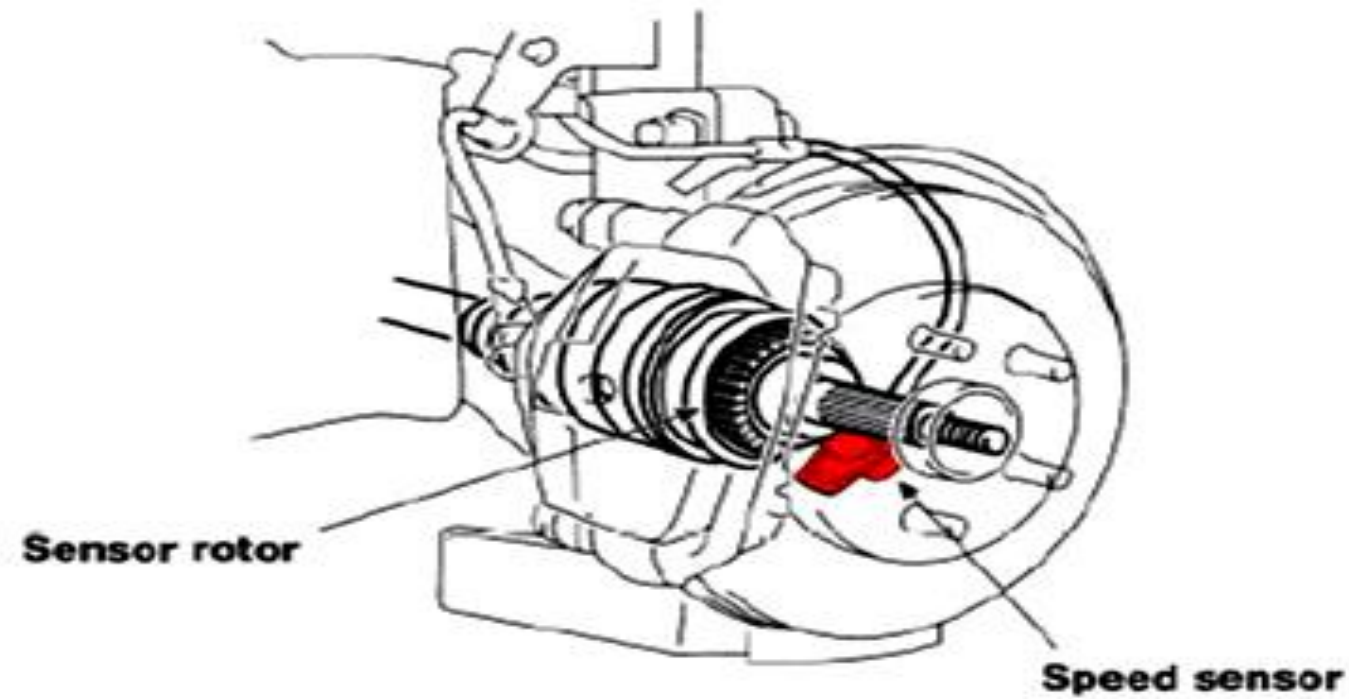
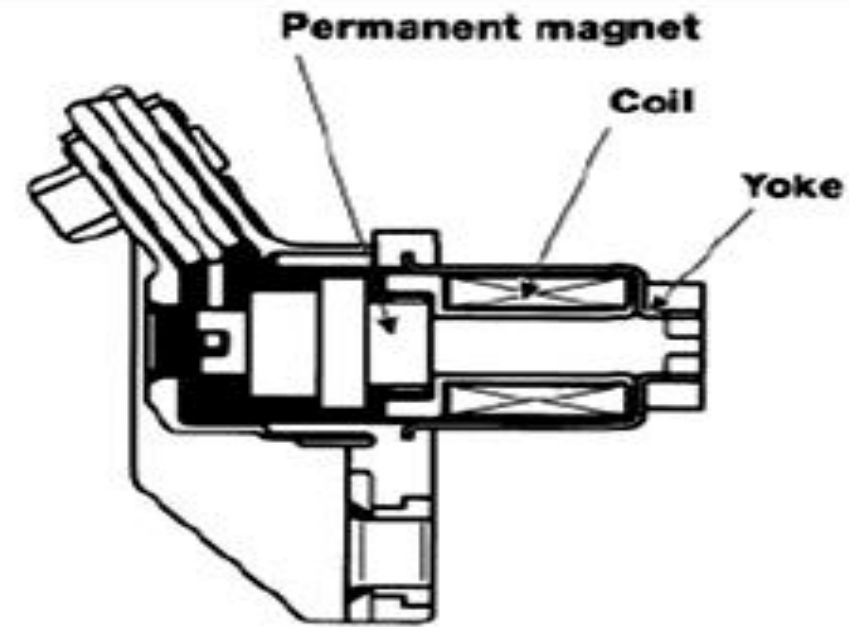
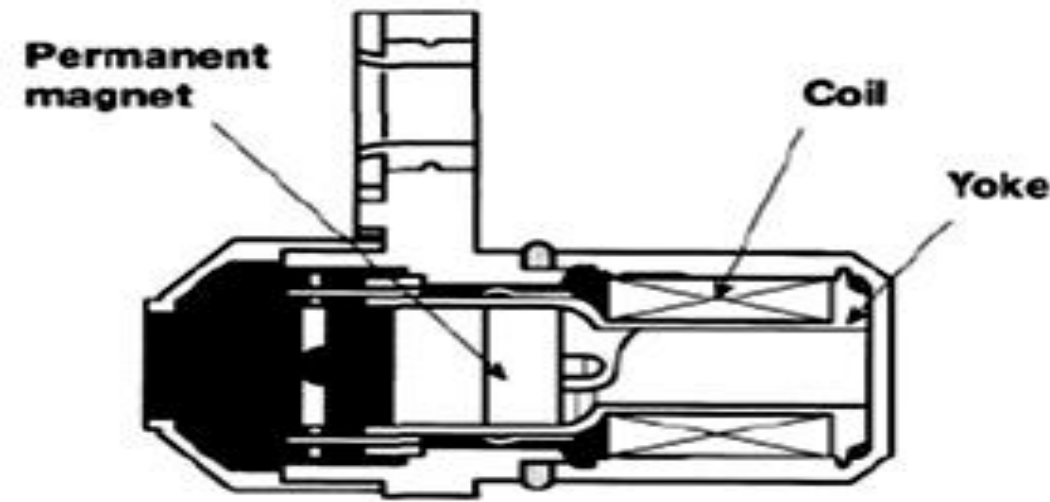


ABS COMPONENT LAYOUT

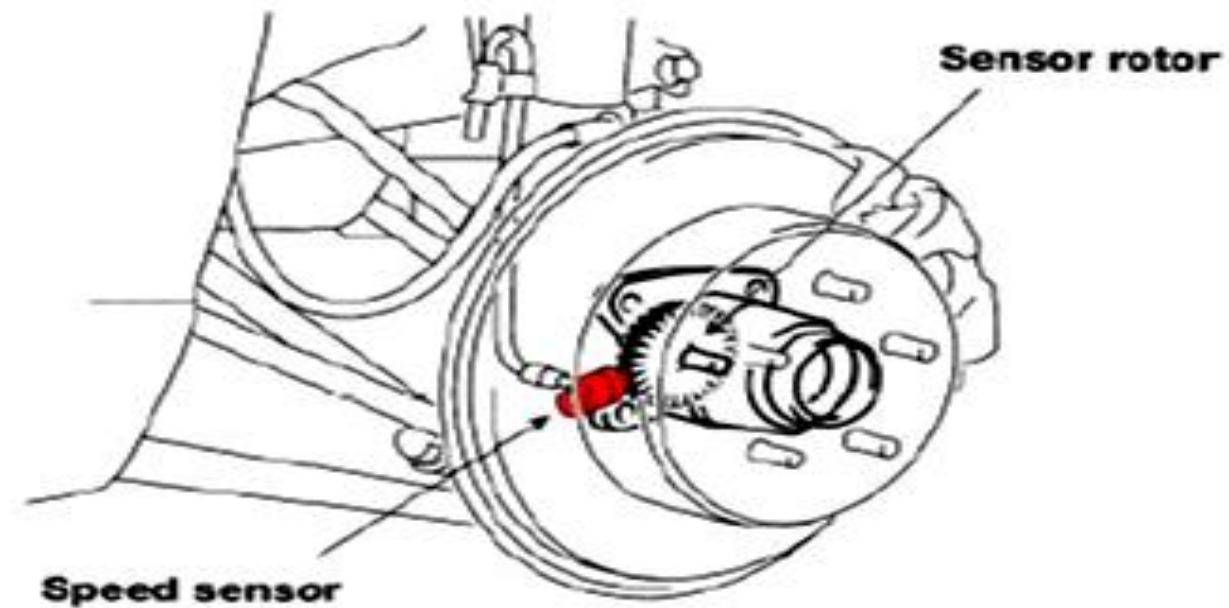




WHEEL SPEED SENSORS



Front Wheel Speed Sensor



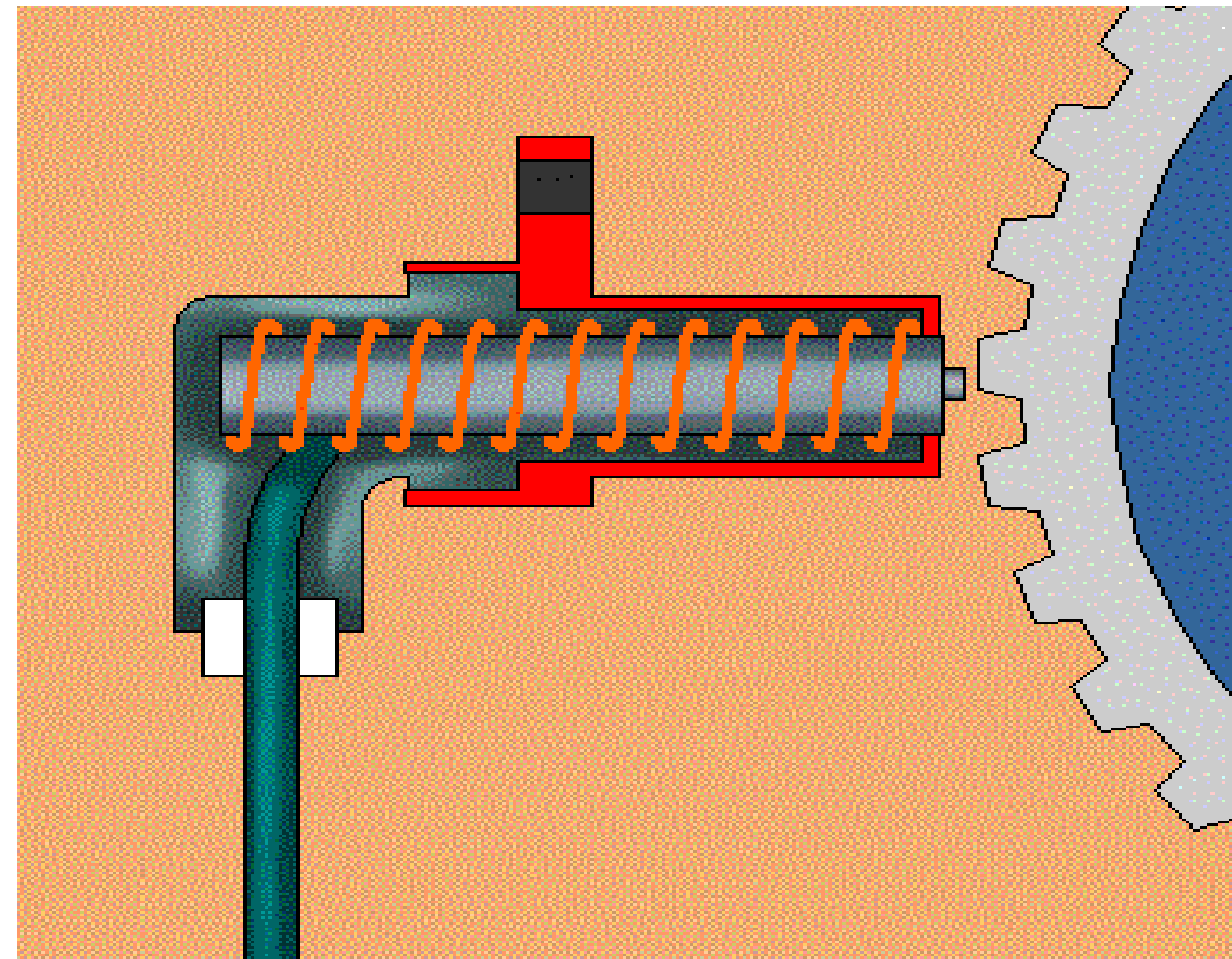
Rear Wheel Speed Sensor



WHEEL SPEED SENSORS



- A wheel speed sensor is mounted at each wheel and sends a wheel rotation signal to the ABS ECU.
- The front wheel sensors are mounted to the steering knuckle.
- The rear wheel sensors are mounted to the rear axle carrier.

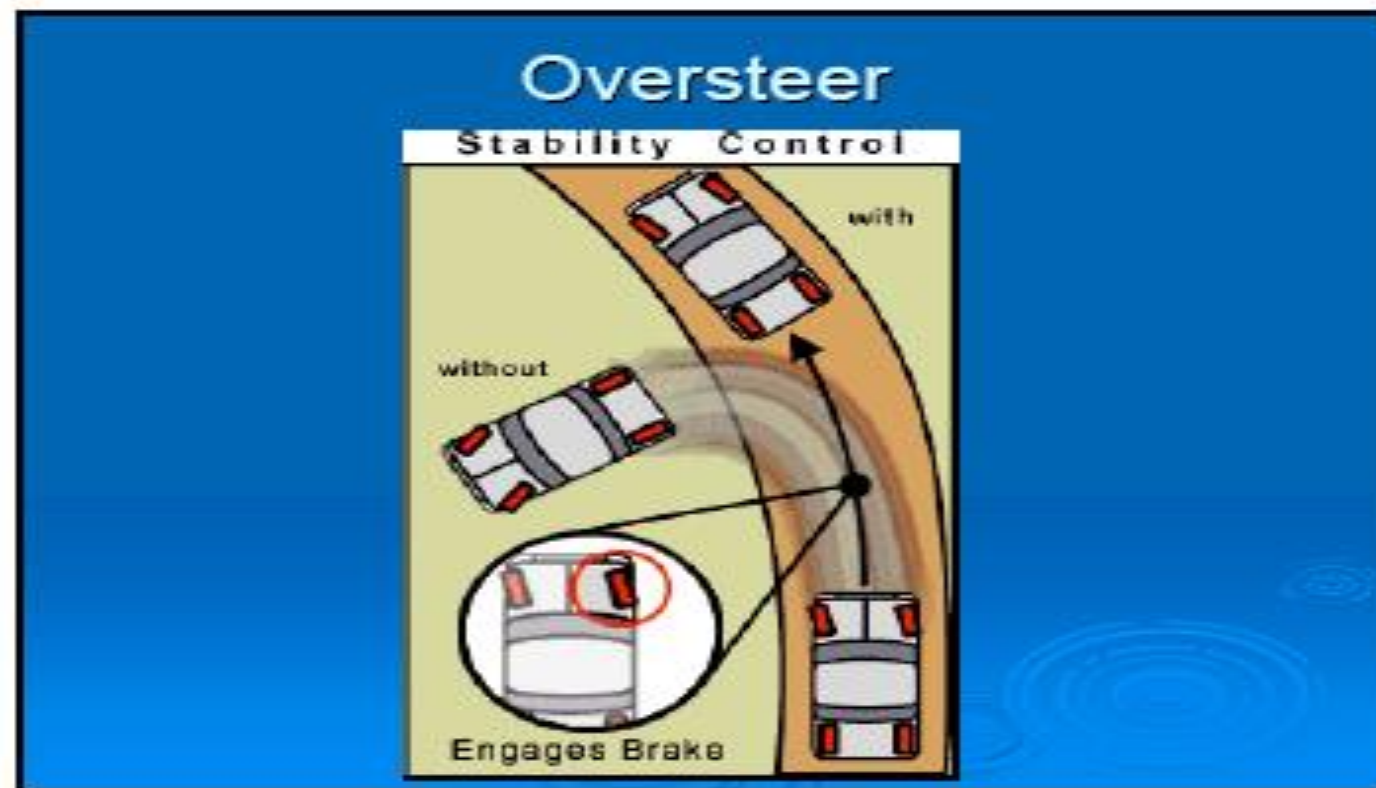




ABS ACTUATION



- The actuator controls the hydraulic brake pressure to each disc brake caliper or wheel cylinder based on input from the system sensors, thereby controlling wheel speed.
- These solenoids provide three operating modes during ABS operation:
 - Pressure holding
 - Pressure reduction
 - Pressure increase

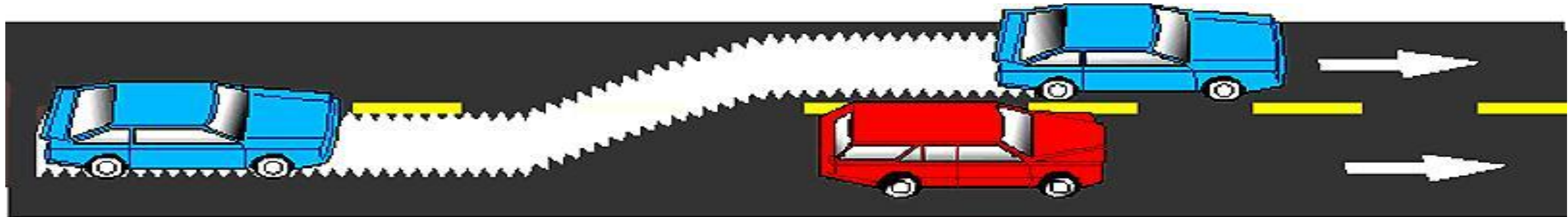




ABS ADVANTAGES



- Enhanced Braking Action.
- Vehicle Steer-ability.
- Vehicle Stability.
- Stopping Distance.

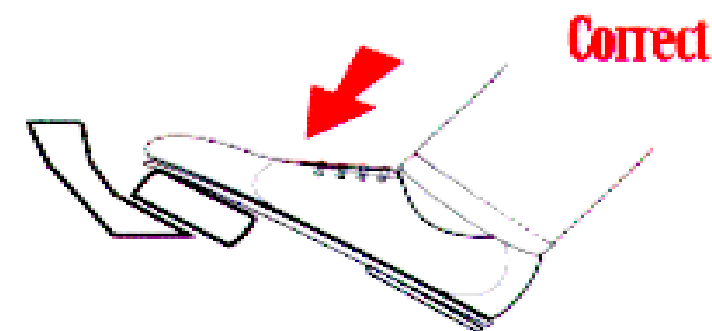
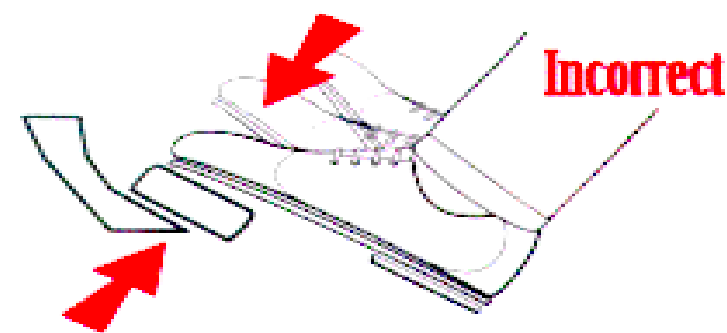




With ABS...Do



- Add to your following distance in bad weather.
- Practice use of ABS.
- Keep your foot firmly on the brake.
- Check owner's manual for special concerns.

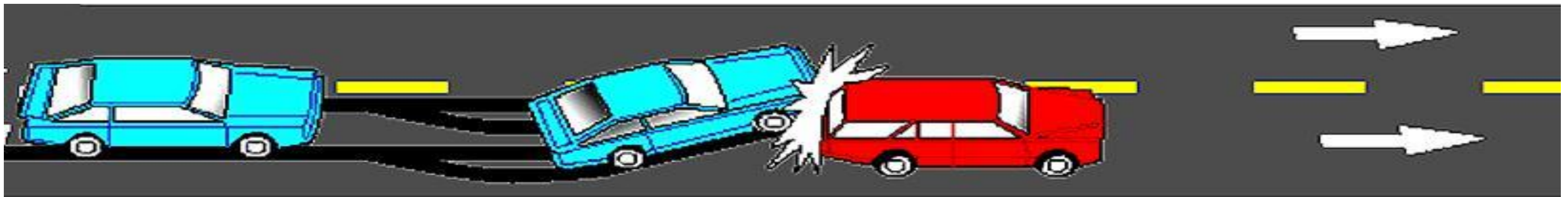




With ABS... Do Not



- Drive more aggressively.
- Pump the brakes.
- Steer too much.
- Be alarmed by ABS noise or vibration.





Thank you