



Use of on-board ABS Speed Sensors to Determine Wheel End Brake Performance

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Fact:

During vehicle braking, wheel speed is less than vehicle speed

Opportunity:

Use wheel speed data to “learn” the characteristics of a brake

Use wheel speed data to compare wheel decelerations

Keep cost effective by using existing hardware and computers

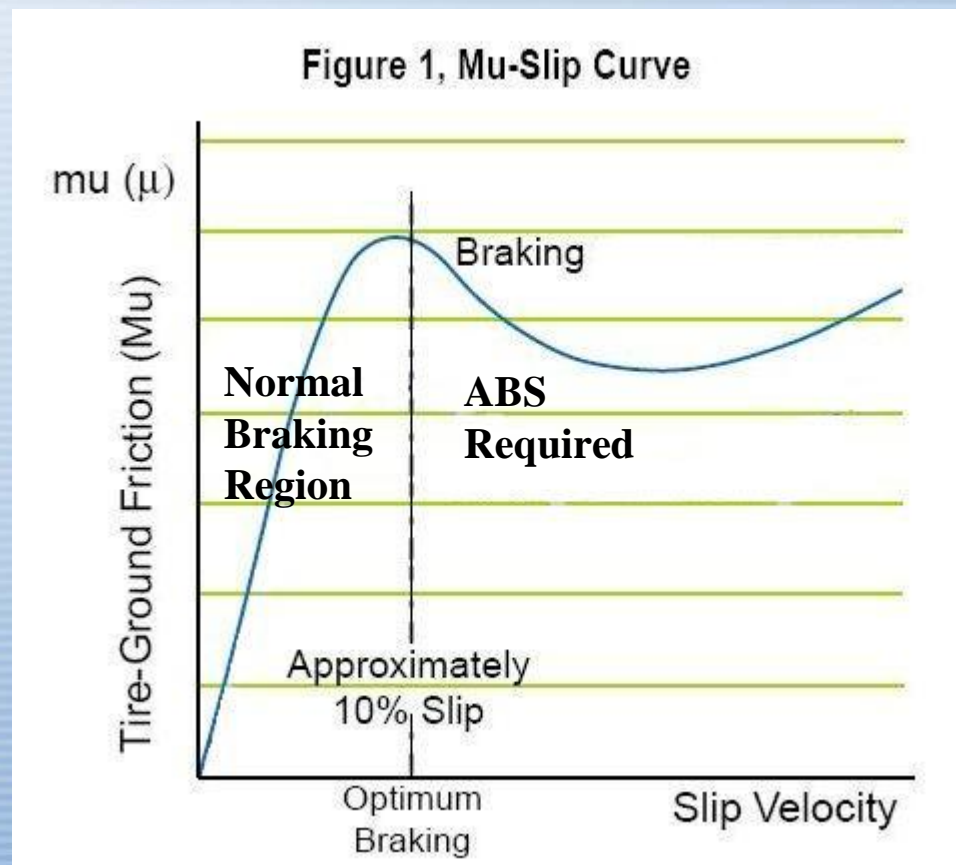
Major Components Used

Existing ABS ECU

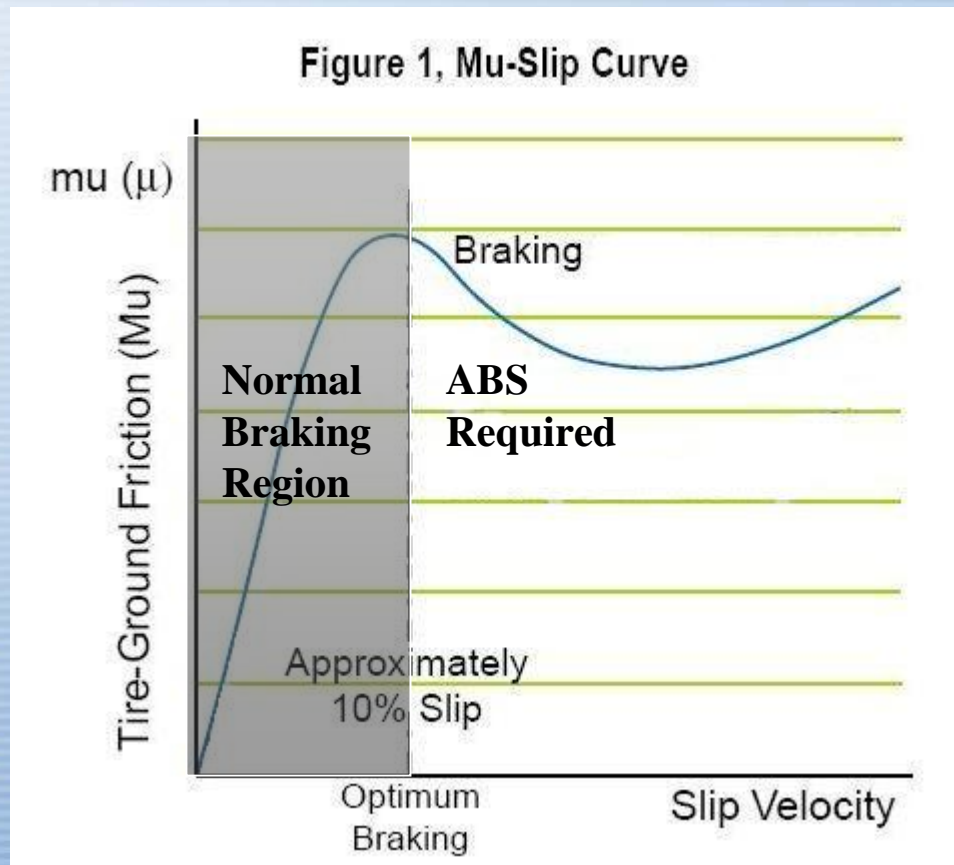
Existing ABS Wheel Speed Sensors



From the μ -slip curve for a typical truck tire, we can see regions where normal braking occurs as well as where an ABS system would activate

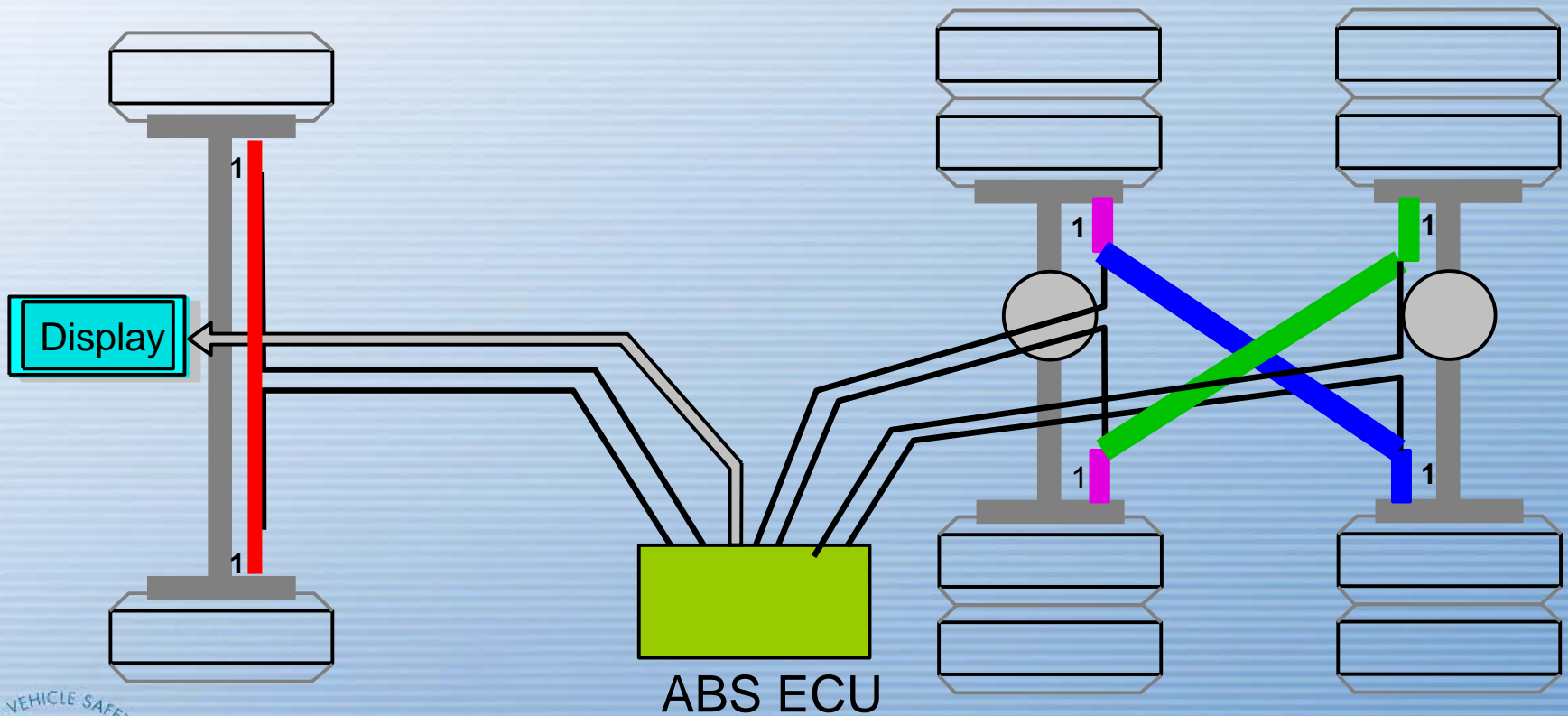


- If we measure a wheel's speed data during normal braking, in the stable section of the curve we will get a measure of brake performance.

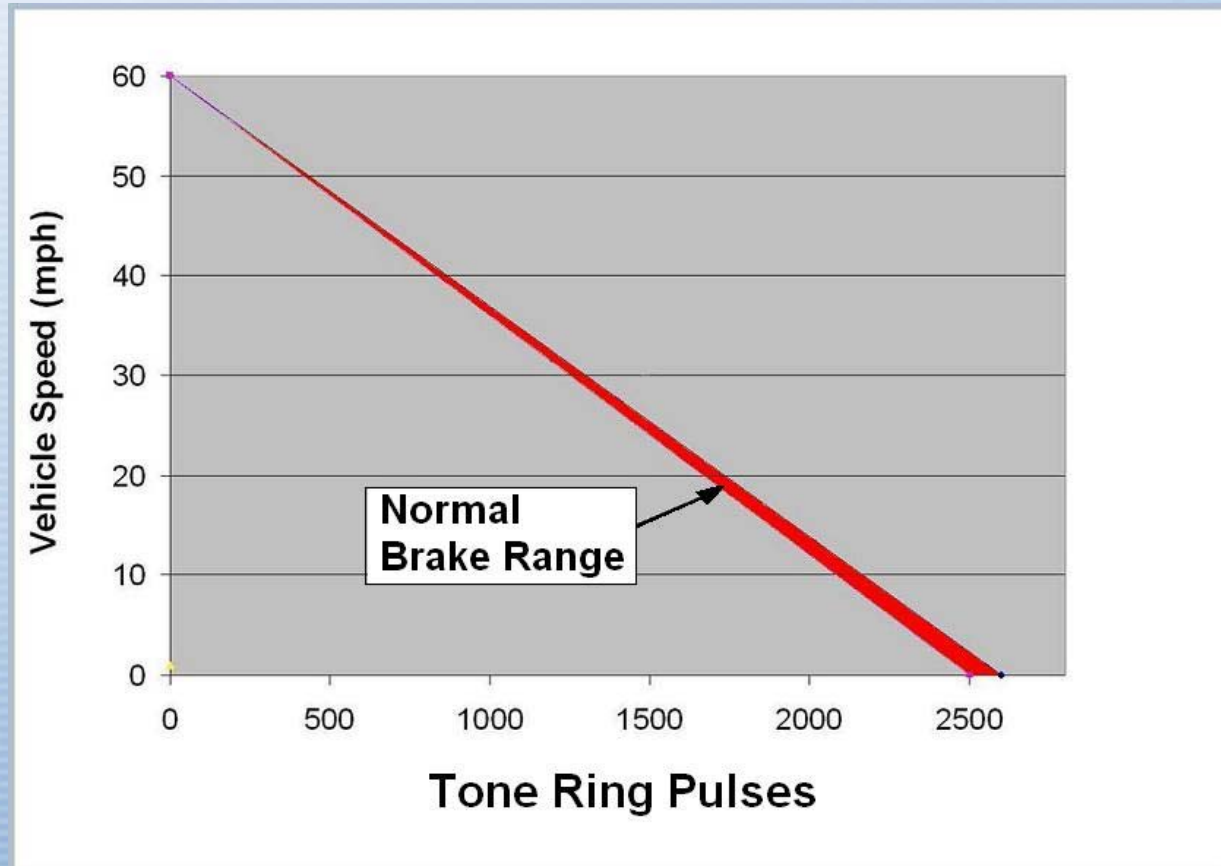


- First we use the ABS system to monitor all wheel speeds and determine the vehicle's deceleration rate
- Then compare each individual wheel speed against the vehicle's deceleration and make a preliminary determination of the brake's effectiveness
- Once enough data is gathered over multiple brake applications, the system can make the determination that a brake is under performing.

Various methods are used to compare wheel speeds during brake event



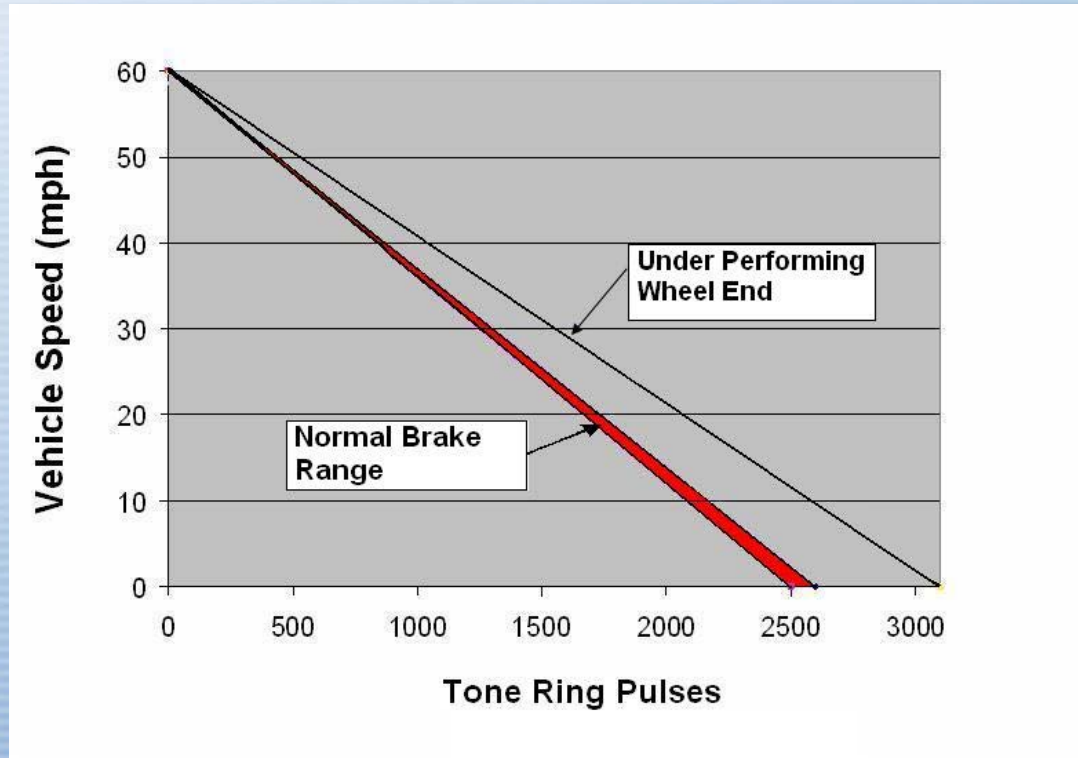
Shown below is a typical range of ABS sensor pulses accumulated during a 60-0 mph stop. Because not all axles are braked at the same level, there will be some variation between wheel ends.



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During that same stop if one brake is not operating, it shows up as a higher pulse count. That wheel will make more revolutions over the same stop because it is not slipping.

More revolutions = higher total pulse count



Key points with this technology:

Output is a measure of the braking force transmitted to the road by each wheel

A change in performance may be influenced by factors other than the brake

Output information is an indication of a problem and not a specific cause

Data on potential problems can be presented a number of ways.

Dashboard display indicator

On-board diagnostic code

Satellite transmission to fleet

Other.....