123557

Ex Parte Meeting

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Attorney, Office of Chief Counsel, NHTSA

Docket NHTSA-2000-8572 - 14

On February 27, 2001, NHTSA representatives met with representatives of Toyota concerning the impending rulemaking on tire pressure monitoring systems required by the recently-enacted Transportation Recall Enhancement Accountability and Documentation (TREAD) Act.

NHTSA was represented by Dion Casey, George Soodoo, Joe Scott, Art Carter, John Finneran, Bruce Spinney, John Hinch, and Joseph Kanianthra. Toyota was represented by Christopher J. Tinto, Takashi Yoshie, and Kozo Fujita.

Toyota representatives gave a presentation on their tire pressure warning system. That presentation is attached.

Toyota's Proposal on TPWS (Tire Pressure Warning System)

27/02/01

TOYOTA MOTOR CORPORATION

Introduction

- ABS/Frequency Based TPWS
- Tire Performance and Grading
- Conclusion

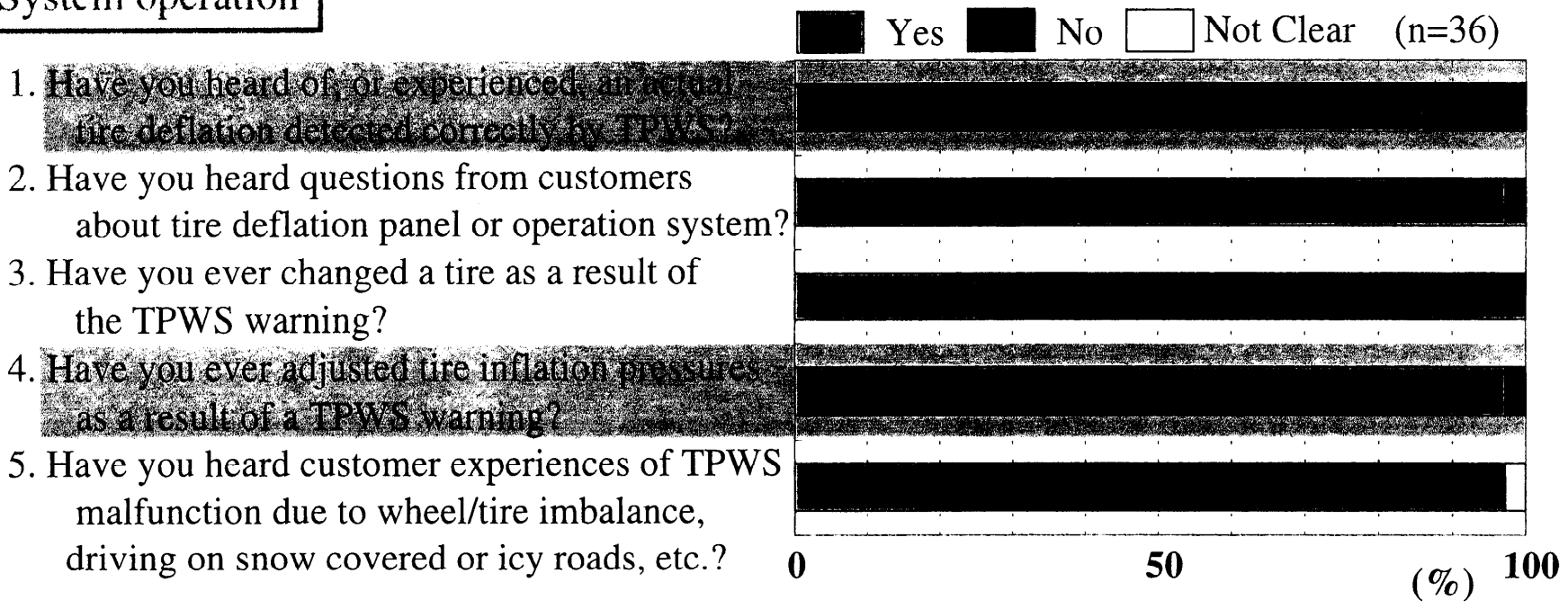
1. Current ABS-based TPWS

<Questionnaire Results of Toyota Sienna's TPWS>

Toyota has installed ABS based Detection System with Relative Wheel Speed Comparison Method on about 350 thousand Sienna in US and Canada.

[Extracted]

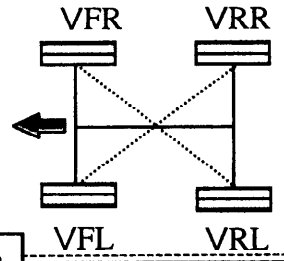
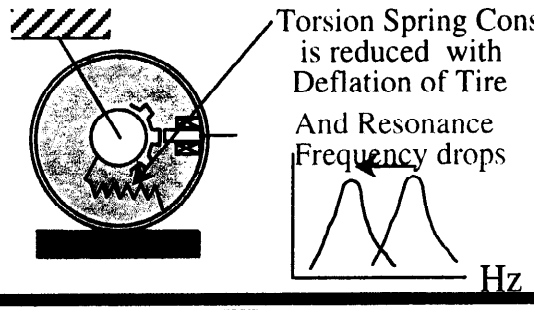
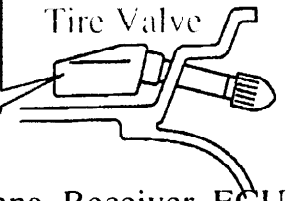
System operation



Toyota Sienna's System is pasitively accepted in Market

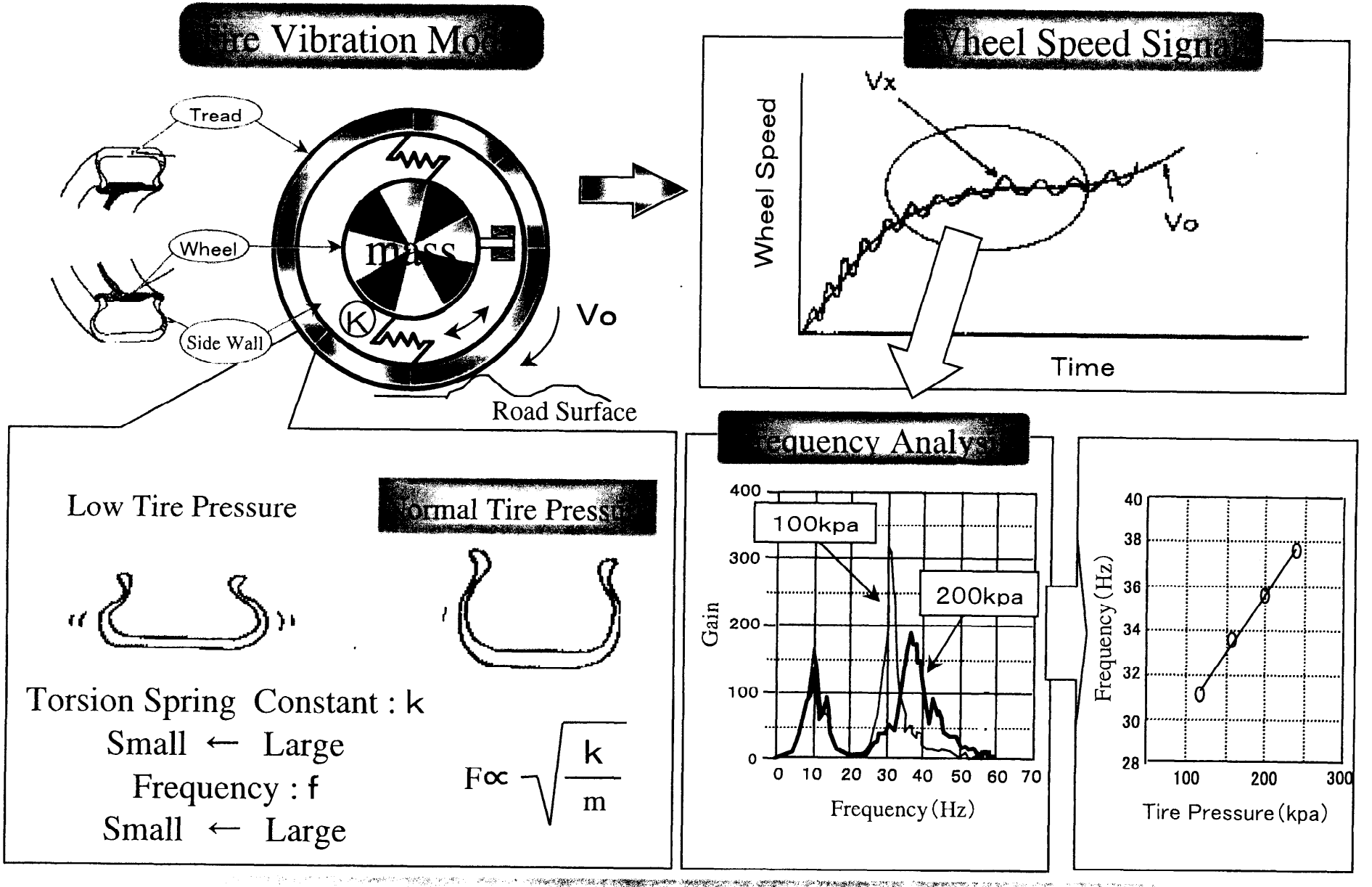
2-1. Comparison of Detection Method for Low tire

++: Excellent ±: Good
+: Very good −:Fair

pressure / System	Performance	Performance & Accuracy			Reliability		Cost
		Flat Tire (One Tire)	Natural Leak (Any Tires)	Accuracy	Durability	Safety Design	
Improved Indirect Detection Method with ABS wheel Speed Sensor	**Relative Wheel Speed Comparison Method**  $\alpha = \frac{VFL}{VRL} - \frac{VFR}{VRR}$	+ Relative Detection		+	++ Utilize only ABS Wheel Speed Sensor	++ No Additional Parts in Tires	+ Soft wear Sensing
	& **Resonance Frequency Method** 		+ Independent & Absolute Detection		Improvement		
Direct Detection Method	Pressure Sensor Temperature Sensor Transmitter Lithium Buttery  Vehicle Body : Antenna, Receiver, ECU	++	++	++	± Influence of vibration & heat	± Additional Parts in Tires	− Many Parts

Indirect method that applies the ABS signal is a good system in terms of the total balance

<Principle of Detection by Resonance Frequency>



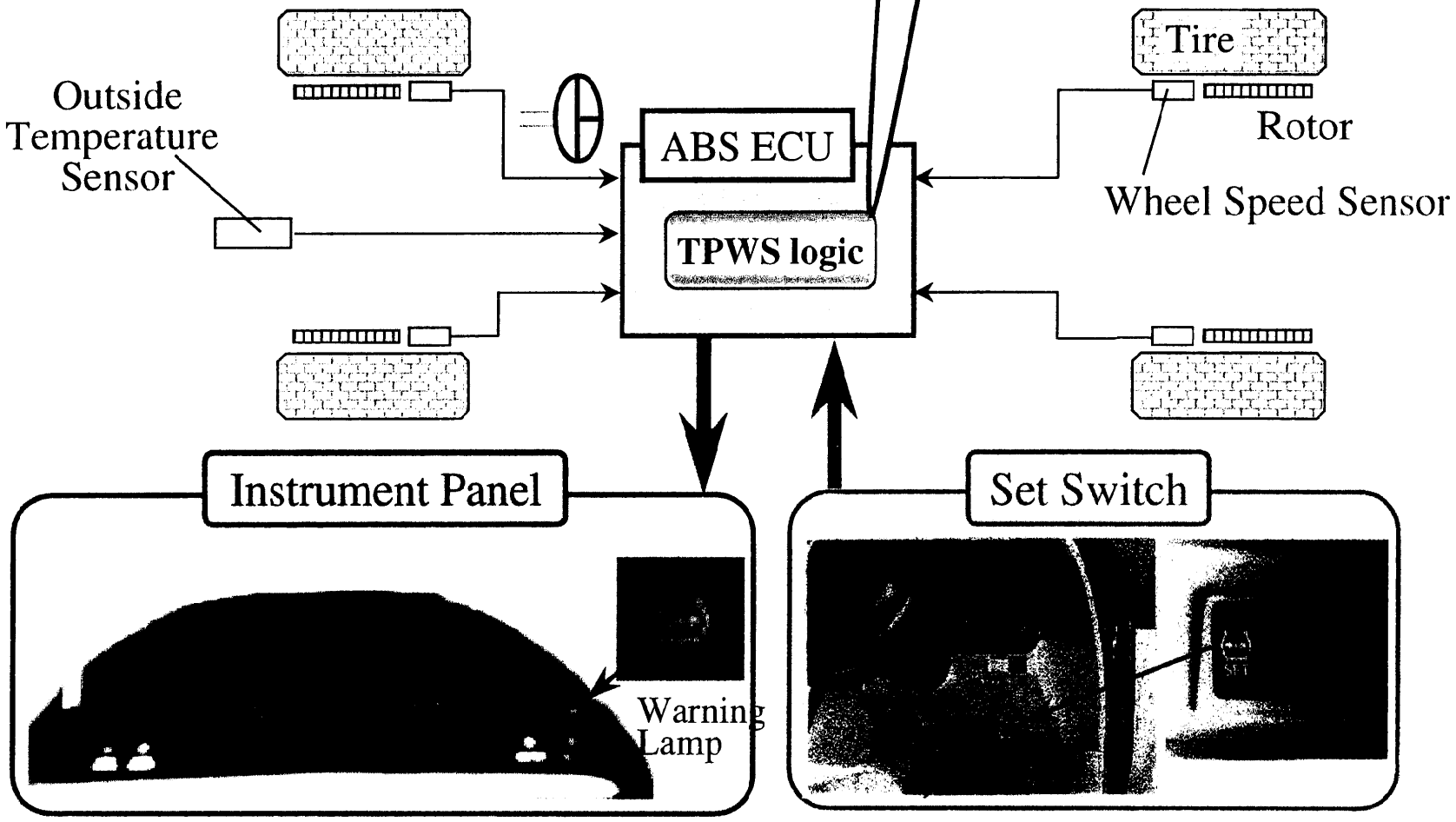
It is possible to estimate Tire Pressure
by using Resonance Frequency of Tire Vibration

2-2. System Configuration based on ABS

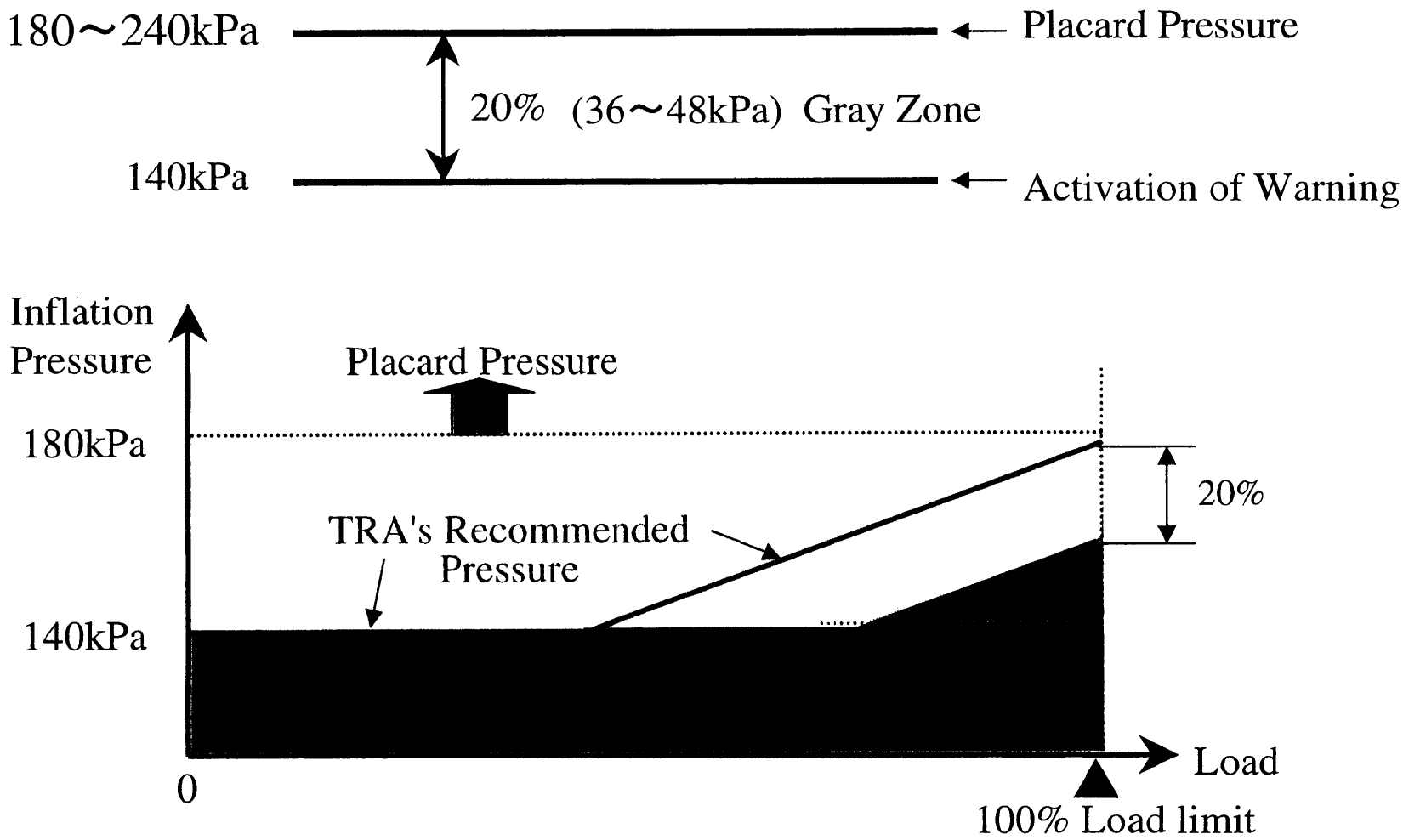
The Logic of Toyota Hybrid Detection System based on ABS

		Performance
Puncture (Air Loss of one tire)	**Detection of change in Relative Wheel Speed**	Warning criteria : 20% Vehicle speed : 20-100 mph
Natural Leak (Air Loss of All tires)	**Detection of change in Resonance Frequency**	Warning criteria : 20% Vehicle speed : 20-65mph

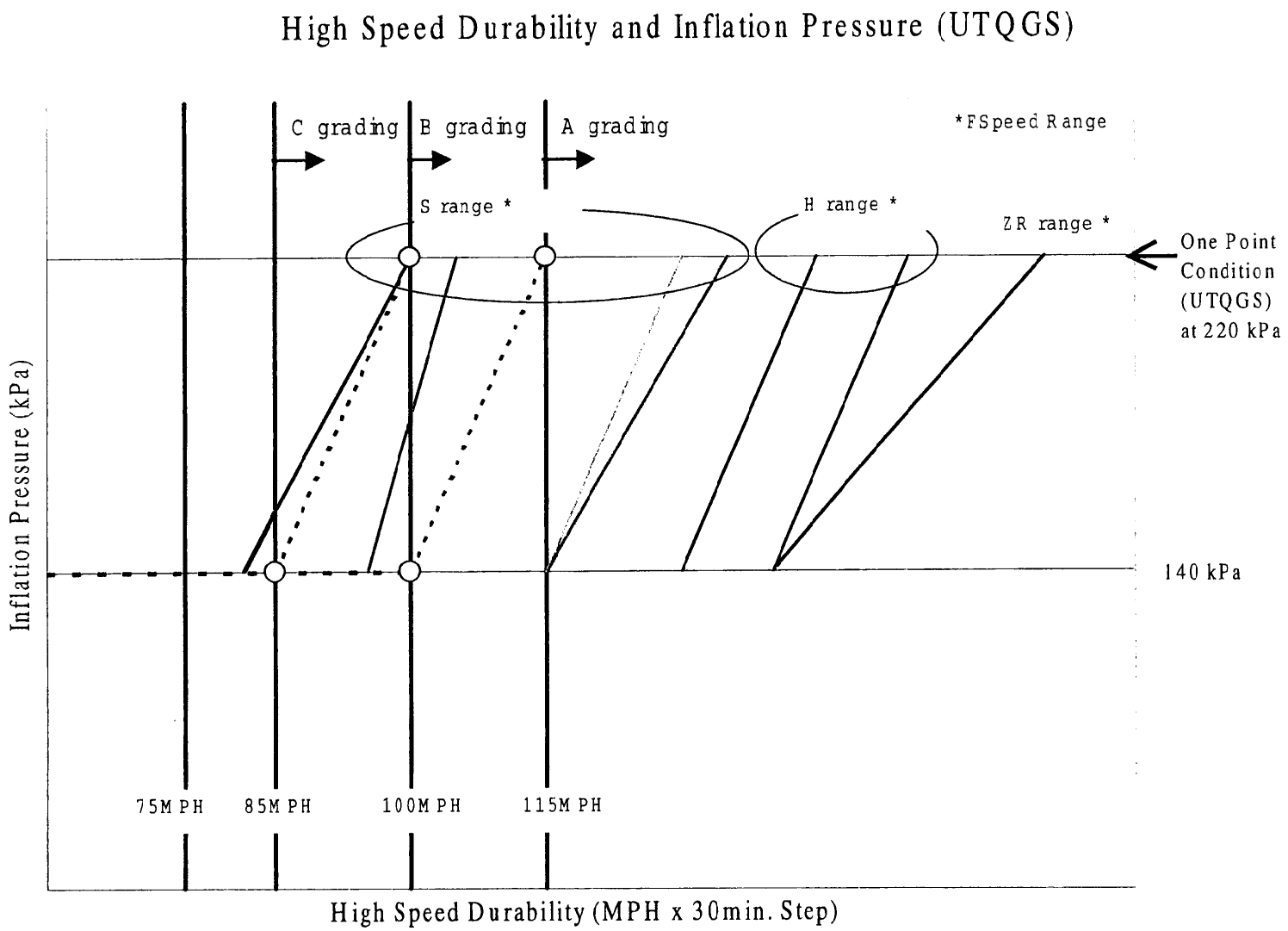
In straight smooth driving conditions



2-3. Accuracy level of ABS-based System

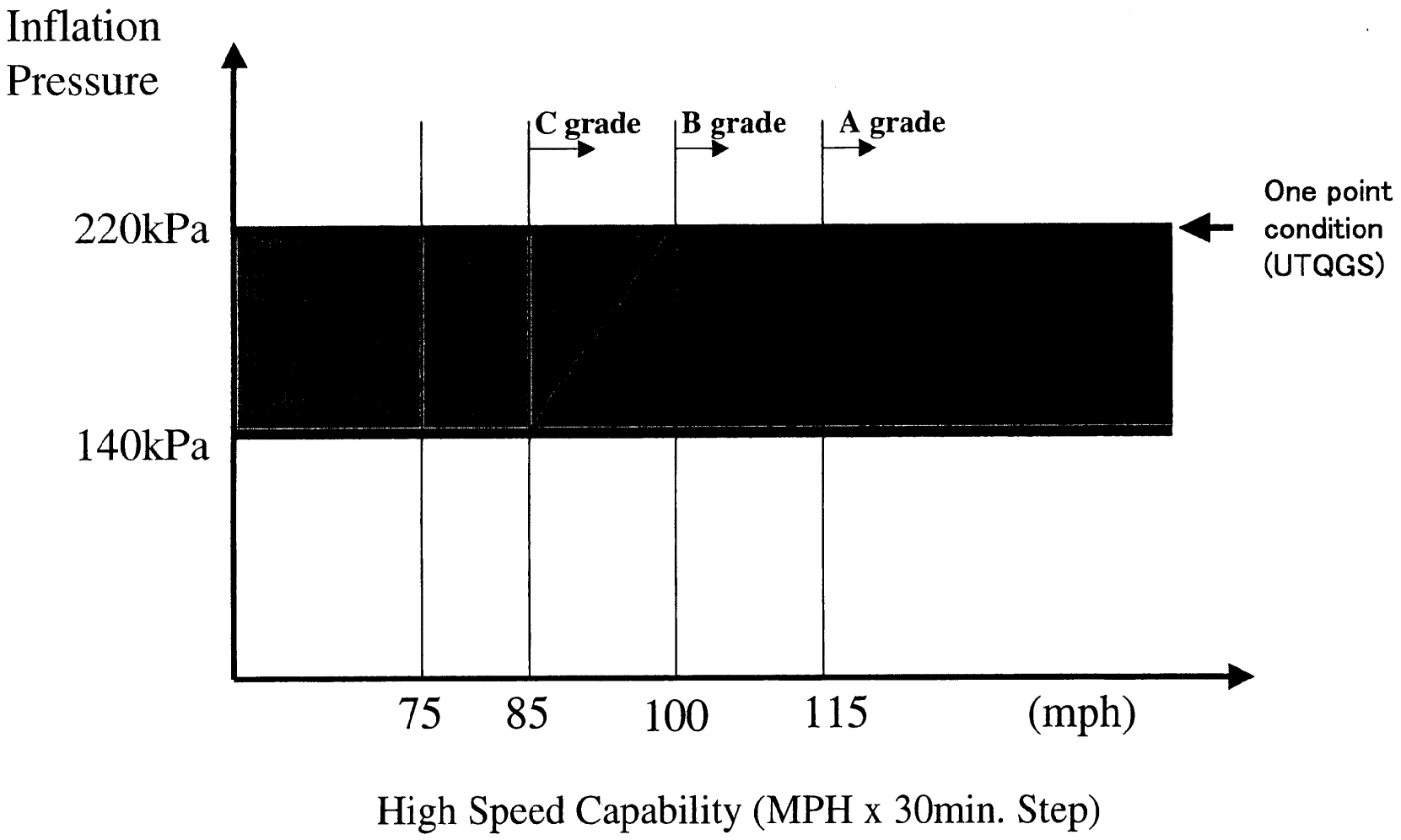


3-1. Tire performance and grading



3-2. Tire Performance and Grading

<High Speed Durability and Inflation Pressure (UTQGS)>



Conclusion

- Frequency-based TPWS can improve ABS-based system performance, through the ability to measure single, multiple, and 4 Wheel simultaneous tire deflations

- Toyota believes the required 20% detection range is appropriate and sufficient for real world safety performance.