VEHICLE SAFETY: IMPORTANT ROAD SAFETY PILLAR

CARIBBEAN ROAD SAFETY REGIONAL WORKSHOP

Pillar 3: Safer vehicles
Encourage universal deployment of improved vehicle safety technologies for both passive and active safety through a combination of harmonization of relevant global standards, consumer information schemes and incentives to accelerate the uptake of new technologies.
Activity 1: Encourage Member States to apply and promulgate motor vehicle safety regulations as developed by the United Nation's World Forum for the Harmonization of Vehicle Regulations (WP 29). Activity 2: Encourage implementation of new car assessment programmes in all regions of the world in order to increase the availability of consumer information about the safety performance of motor vehicles. Activity 3: Encourage agreement to ensure that all new motor vehicles are equipped with seat-belts and anchorages that meet regulatory requirements and pass applicable crash test standards (as minimum safety features). Activity 4: Encourage universal deployment of crash avoidance technologies with proven effectiveness such as Electronic Stability Control and Anti-Lock Braking Systems in motor vehicles. Activity 5: Encourage the use of fiscal and other incentives for motor vehicles that provide high levels of road user protection and discourage import and export of new or used cars that have reduced safety standards. Activity 6: Encourage application of pedestrian protection regulations and increased research into safety technologies designed to reduce risks to vulnerable road users. Activity 7: Encourage managers of governments and private sector fleets to purchase, operate and maintain vehicles that offer advanced safety technologies and high levels of occupant protection.

Characters used for Designation of the Model Year

Year	Code	Year	Code	Year	Code	Year	Code	*Year*	*Code*
1971	1	1981	B	1991	M	2001	1	*2011*	*B*
1972	2	1982	C	1992	N	2002	2	*2012*	*C*
1973	3	1983	D	1993	P	2003	3	*2013*	*D*
1974	4	1984	E	1994	R	2004	4	*2014*	*E*
1975	5	1985	F	1995	S	2005	5	*2015*	*F*
1976	6	1986	G	1996	T	2006	6	*2016*	*G*
1977	7	1987	H	1997	V	2007	7	*2017*	*H*
1978	8	1988	J	1998	W	2008	8	*2018*	*J*
1979	9	1989	K	1999	X	2009	9	*2019*	*K*
1980	A	1990	L	2000	Y	2010	A	*2020*	*L*

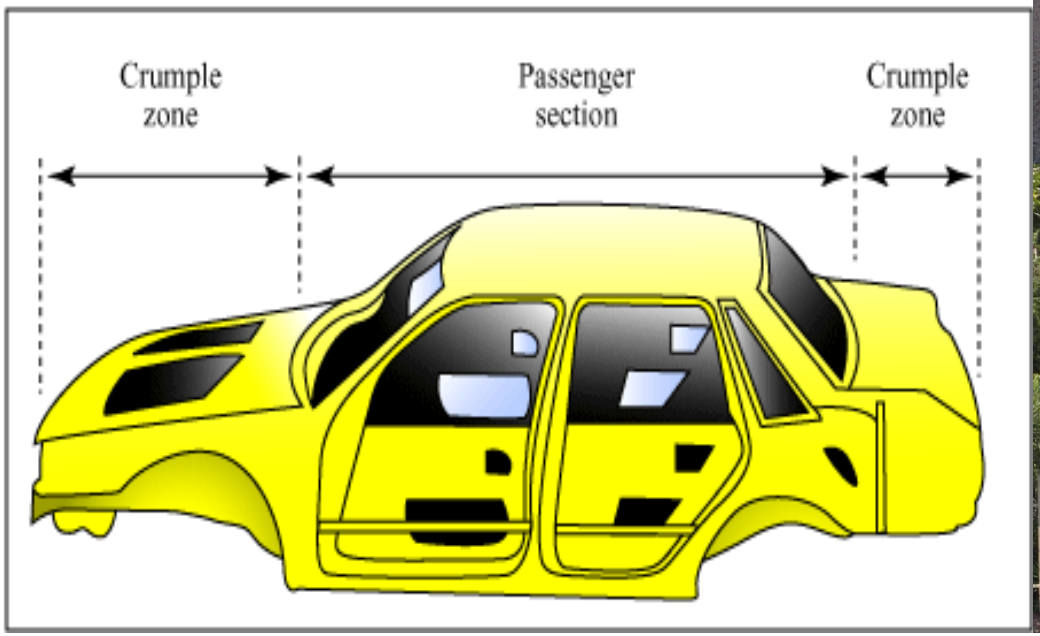
Source: ISO/Wikipedia

Road Safety Pillars

- **Pillar** 1. Road Safety management.
- **Pillar** 2. Safer roads and mobility.
- **Pillar** 3. Safe vehicles.
- **Pillar** 4. Road user behaviour.
- **Pillar** 5. Post-crash care.

Safety Systems Approach

- Safe Roads and Roadsides
- Safe Traffic Speeds
- Safe Vehicles



- 90% of the road deaths occurred in developing countries that possess 48% of the global motor vehicle fleet.
- Global harmonisation of motor vehicles standards in order to ensure that motor vehicles are equipped with the latest crash avoidance system technologies such as autonomous emergency braking, electronic stability control, anti-lock braking system, contemporary passive and active safety features.

- Passive and active safety features should be placed in all vehicles, irrespective of the market location. Too often the safety features reaches developing countries slowly.
- Ensure that motor vehicles manufactured for European and North American markets are of the same quality as those manufactured and deployed in developing countries.
- Consumer information needed as it relates to the promotion of safer vehicles. Dedicated funding needs to be in place to ensure thus is done sustainability.

- Jamaica supports the UN Regulations on Safety and steps are being taken to ensure that Jamaica's motor vehicle standard incorporate the postulates evinced by the United Nations.
- Technical Assistance needed to ensure the development of a motor vehicle standard in Jamaica.

Crashworthiness

Small overlap front: driver-side	G
Small overlap front: passenger-side	G
Moderate overlap front	G
Side	G
Roof strength	G
Head restraints & seats	G

Crash avoidance & mitigation

Headlights (varies by trim/option) — G A

Front crash prevention

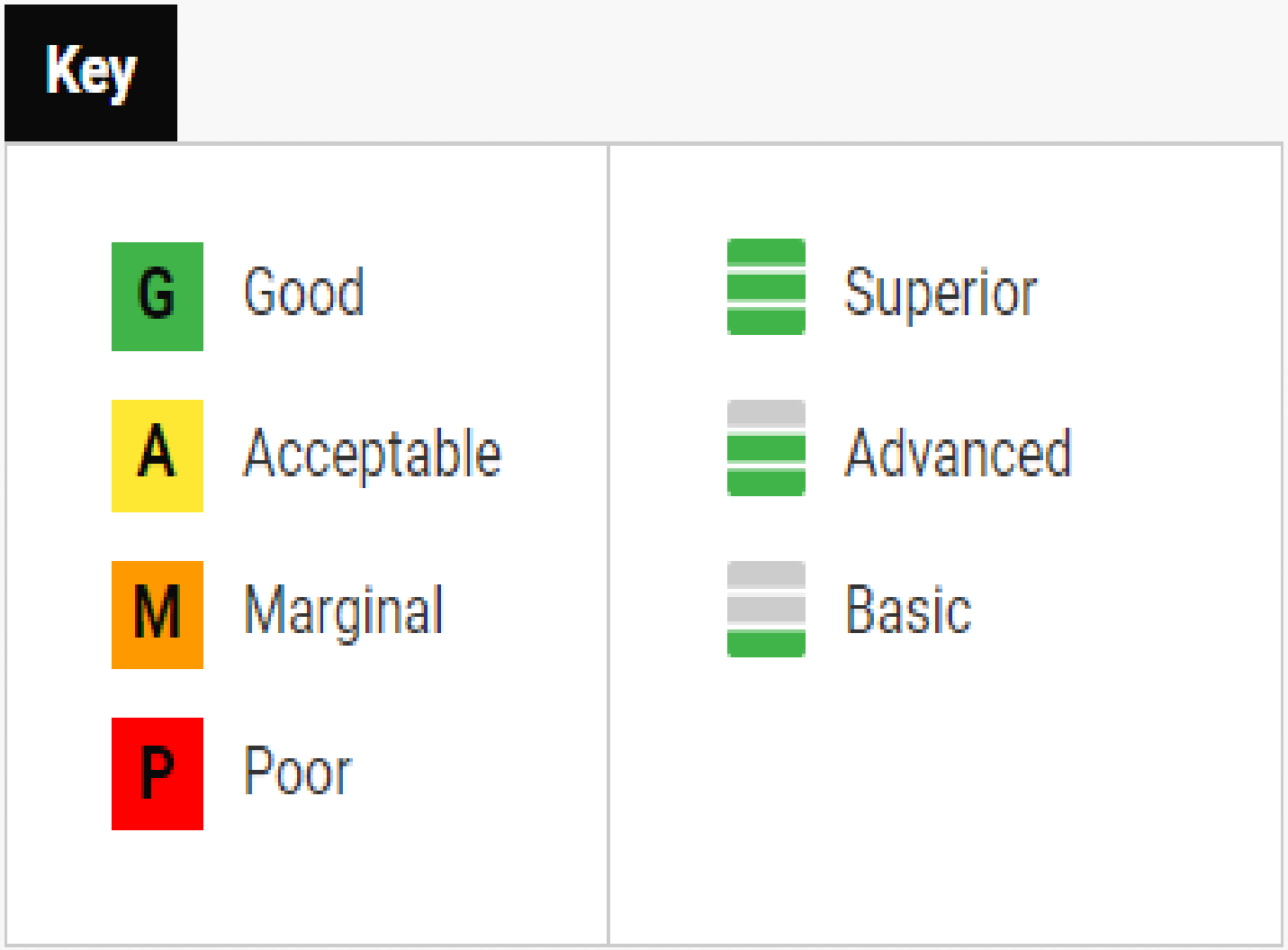
Standard system — 

Child seat anchors

LATCH ease of use — G+

Other available safety features

- Standard daytime running lights
- Optional blind spot detection
- Standard lane departure warning
- Standard lane departure prevention


Key
G
Good
A
Acceptable
M
Marginal
P
Poor
Superior
Advanced
Basic

SAFETY FEATURES IN MOTOR VEHICLES

- Passive safety features
- Active safety features

Passive safety

Passive safety features are features that help occupants of a vehicle to stay alive and unharmed in the event of an accident. These include:

- **Seatbelts**
- **Front driver and passenger airbags**
- **Head protecting side airbags**
- **Head restraints**
- **Fuel pump shut-off devices**
- **Side impact bars**

Active safety

Active safety features help drivers to avoid accidents. These features may include:

- **Anti-lock braking system (ABS)**
  This system prevents brakes from locking and allows drivers to apply the brakes hard and fast with a minimal risk of losing steering control. ABS shortens stopping distances in most cases.

- **Turn signals**
  Turn signals and brake lights to make your car's movements visible to others on the road.

- **High performance tyres**
  Tyres are the only point of contact between your vehicle and the road and a good set will determine how your car responds to driving conditions.

- **Dynamic steering response**
  Dynamic steering response (DSR) corrects the rate of power steering system to adapt it to the cars driving conditions.

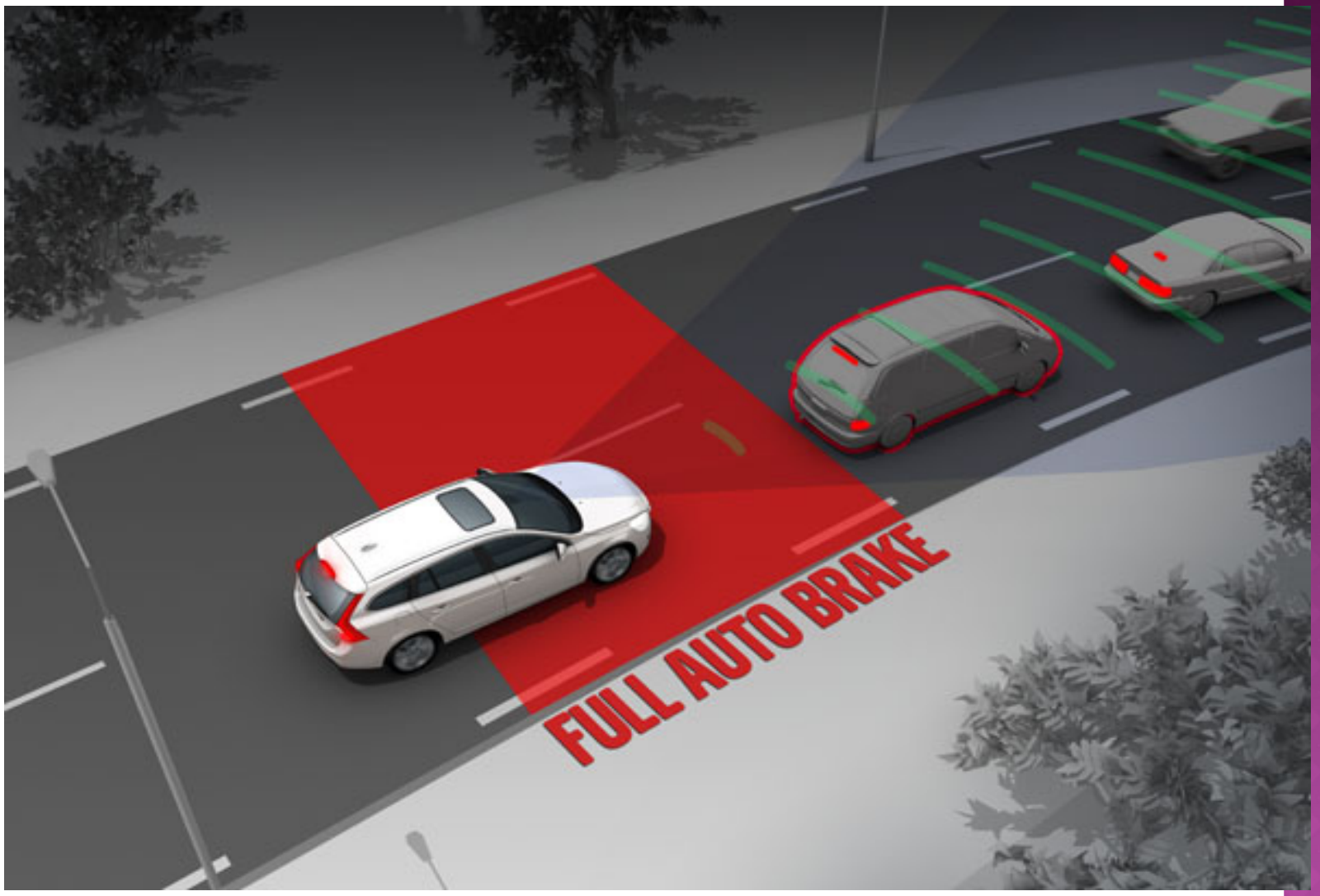
- **Traction control**
  Traction control actuates brakes or reduces throttle to restore traction if driven wheels begin to spin.

- **Powerful windscreen**
  Powerful windscreen wipers to increase your visibility.

- **Four wheel drive**
  Four wheel drive (AWD) with a center differential. This distributes power to all four wheels lessens the chances of wheel spin

- **Directional headlights**
  Headlights which allow the driver to see obstacles ahead in the roadway while turning a corner.

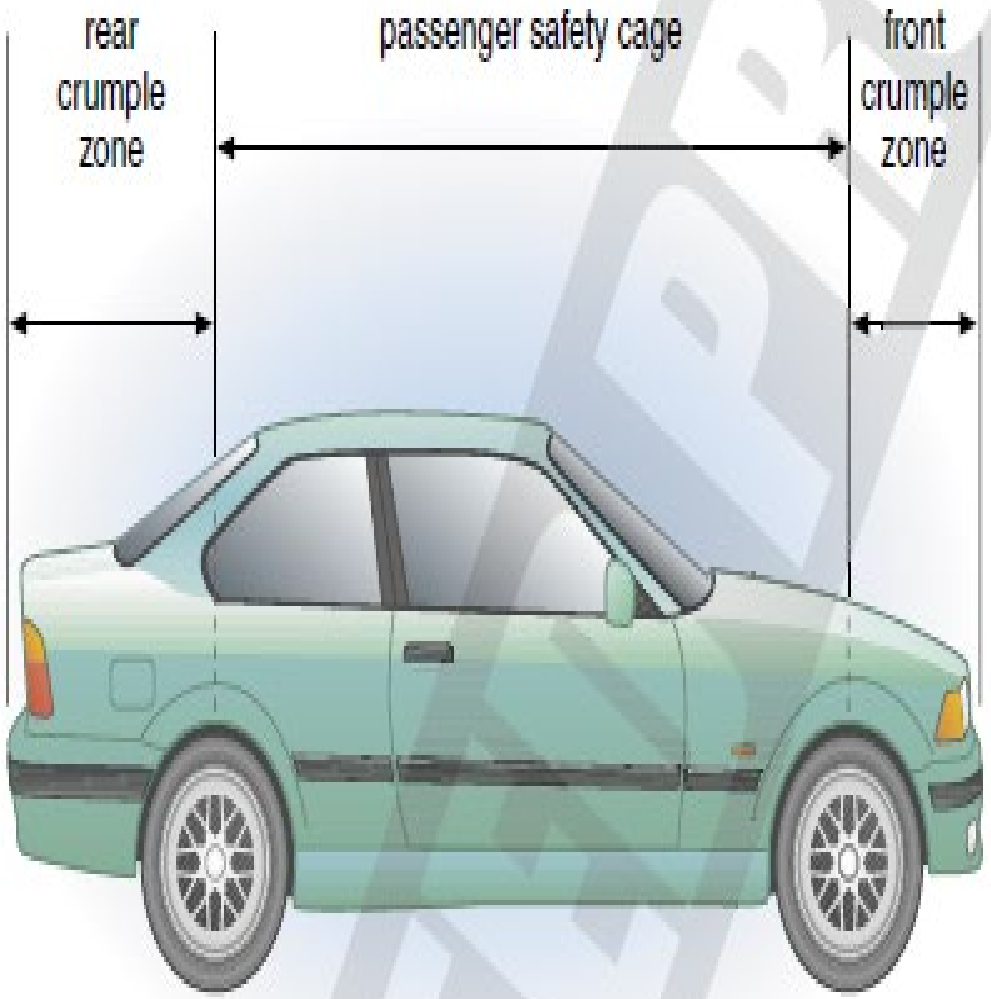
Reverse backup sensors
These alert drivers to nearby objects in their path when reversing.

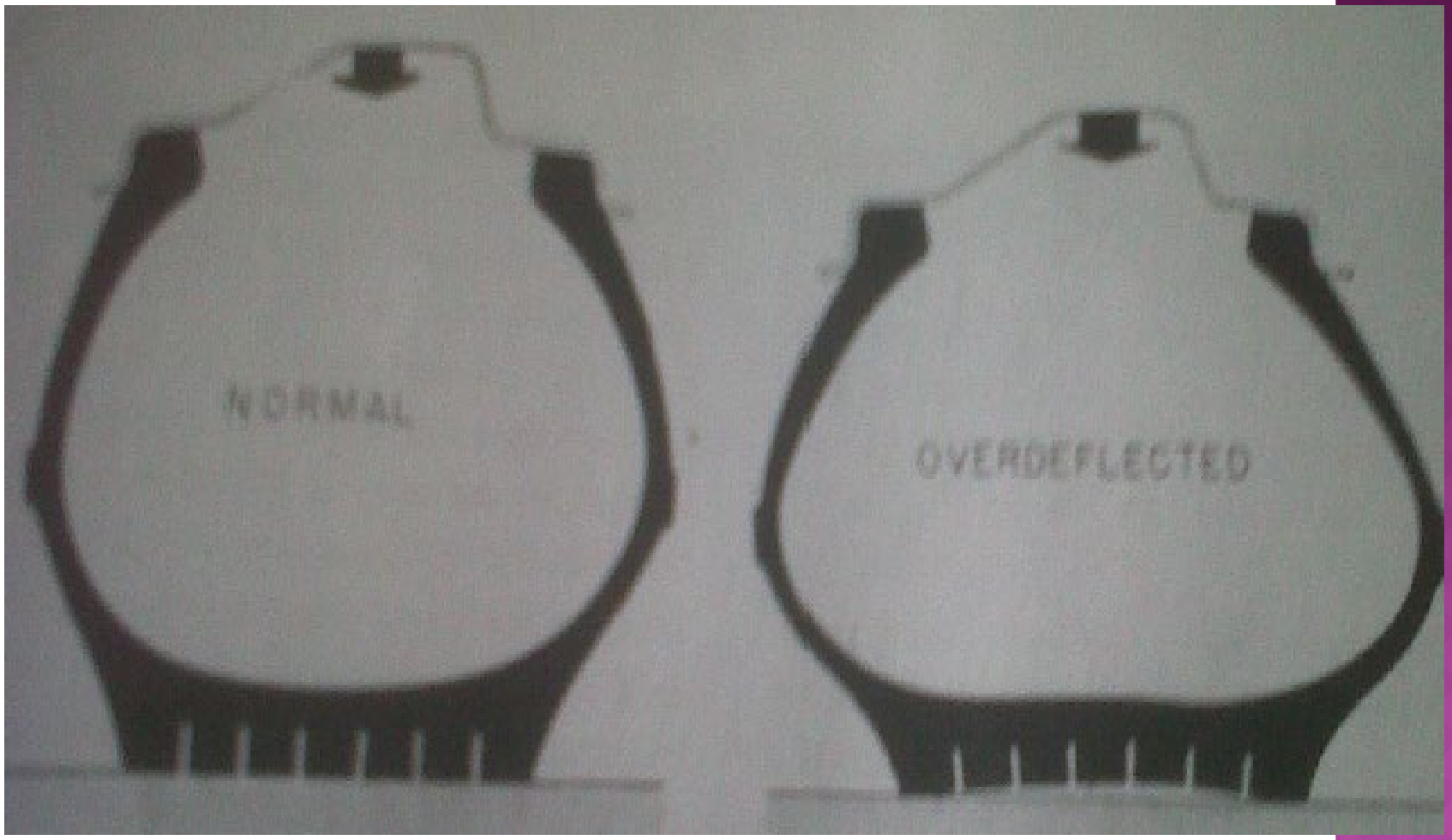

FULL AUTO BRAKE

- **Lane departure warning system:**
  The Lane departure warning system is a mechanism used to alert the driver if the car is moving out of the lane. There are two types of lane departure warning system, one which warns the driver when the vehicle starts to move away from the lane and the other which acts by itself ensuring the vehicle is in a safe position in case no step is been taken by the driven in spite of the alert.

- **Autonomous Cruise Control:**
  Another passive safety feature is the autonomous cruise control that will automatically slow the car when another car comes near and speed up the car later. It is an optional cruise control feature that is mostly available in high-end cars. Both laser and radar are used in the cruise control system.

- *Crumple zones in a car*




NORMAL
OVERDEFLECTED

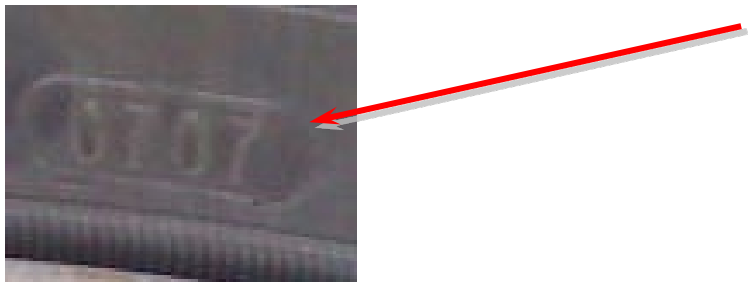
TYRE SAFETY

Most of us operate motor vehicles on a daily basis and hardly ever pay any attention to one of the most vital parts of the vehicle which are our tires.

TYRE SAFETY

Unfortunately very few of us change this bad habit until it is too late.

Did you know that tires expire 4 years after the date of manufacture and this date is stamped on the side of the tire?



TYRE SAFETY

It is very easy to find out what the expiration date is on a tire, if you check on the side of it, you will have a 4 digit number stamped on it, this number indicates the week and the year it was manufactured, the expiration date will be 4 years later.

TYRE SAFETY

This number indicates that the tire was manufactured on the 7th week of 2007 or which is the same February 2007, that would place the expiration date on February 2011

7th week of the year "February"

Year of manufacture 2007

TYRE SAFETY

If we use expired tires these are likely to burst and result in a very serious or even a fatal accident, it would be a good practice for us to check our tires and make sure they have not passed their expiration date

TYRE SAFETY

Another important point that we miss many times is proper tire inflation most of the gas stations in Mexico will calibrate your tires at 28 PSI and if you are going to travel they will even in many cases bring your pressure down to 24-26 PSI because they will "heat up on the highway and the pressure will come back up".

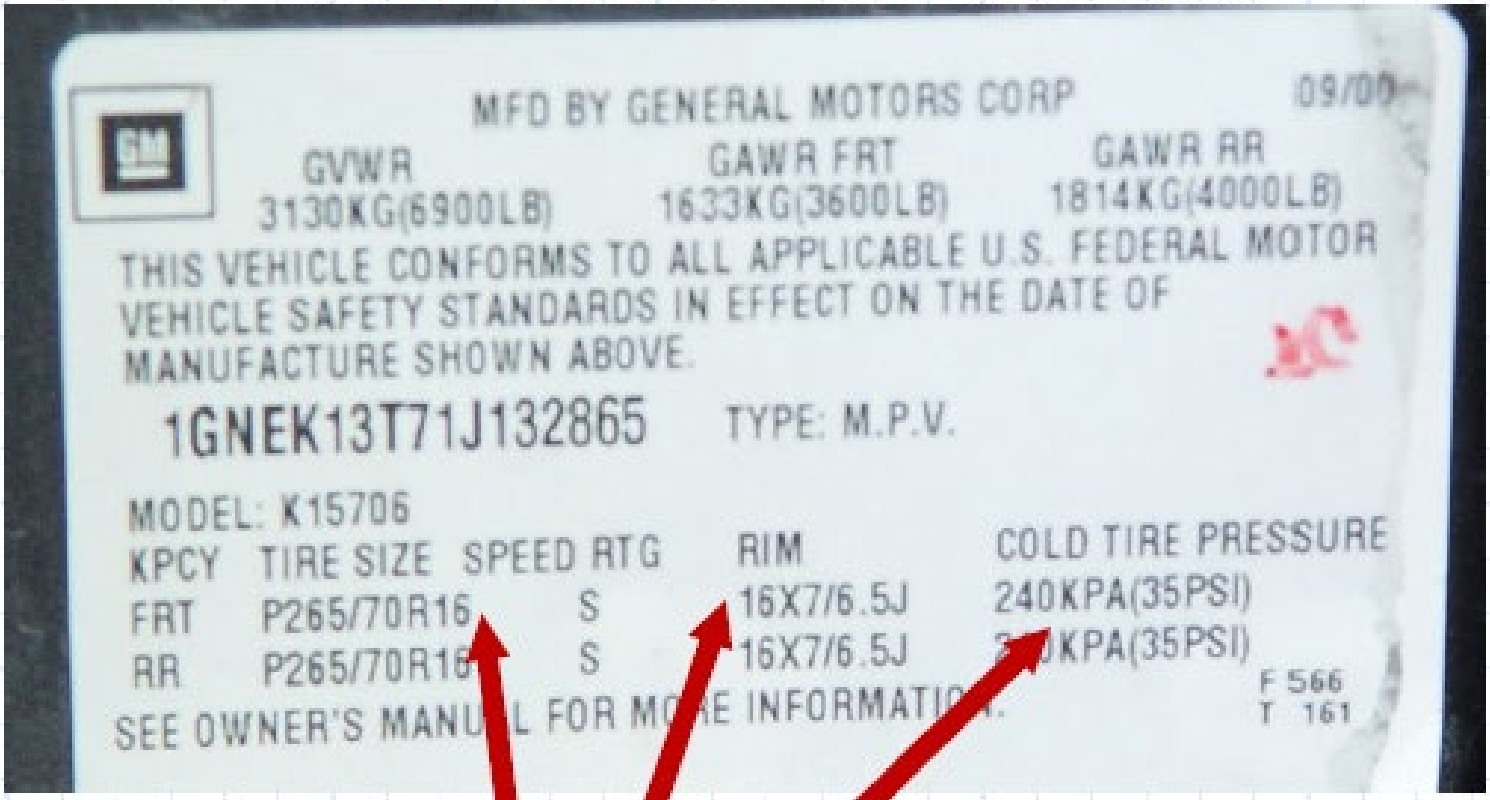
DO NOT ALLOW THIS

TYRE SAFETY

On the side of the tire, you will also find the maximum allowable inflating pressure for that specific tire, some tires have a maximum pressure of 32 PSI some are rated at 44PSI and some even at 50 PSI. Check your specific tire to see what the maximum pressure is for your tires, it is an acceptable practice to have your tires a few pounds below maximum allowable pressure but not too much.

TYRE SAFETY

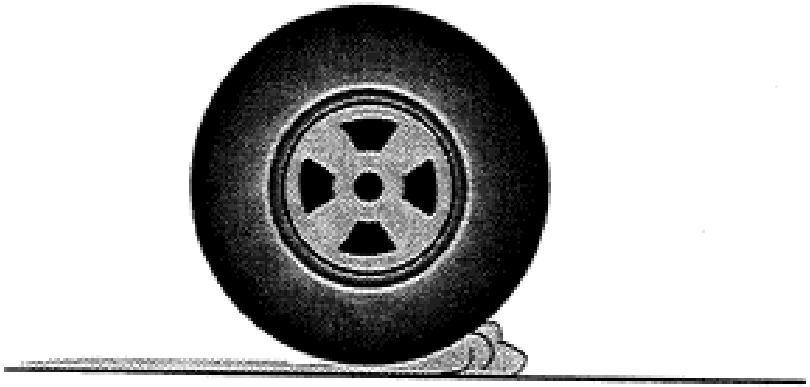
Information on Vehicle



Tire size – Rim size
Cold Tire Air Pressure

TYRE SAFETY

Hydroplaning tire has lost contact with the road surface



If you have ever been water skiing, you have been hydroplaning!

- A tire is said to hydroplane the water can no longer be pumped out from under the contact patch of the tire.

TYRE SAFETY

MAX PRESS	ACCEPTABLE
32 PSI	28 PSI
44 PSI	35 PSI
50 PSI	44 PSI

Different tires are designed for different pressures you will find your maximum tire inflation pressure on a small number next to the rim on the side of the tire, never exceed this pressure

TYRE SAFETY

Attached table shows the load index and maximum load carrying capacity per tire in pounds and kilograms.

Maximum Load-Carrying Capacity Per Tire

Load Index	Pounds	Kilograms	Load Index	Pounds	Kilograms
71	761	345	99	1709	775
72	783	355	100	1764	800
73	805	365	101	1819	825
74	827	375	102	1874	850
75	853	387	103	1929	875
76	882	400	104	1984	900
77	908	412	105	2039	925
78	937	425	106	2094	950
79	963	437	107	2149	975
80	992	450	108	2205	1000
81	1019	462	109	2271	1030
82	1047	475	110	2337	1060
83	1074	487	111	2409	1095
84	1102	500	112	2484	1129
85	1135	515	113	2561	1164
86	1168	530	114	2640	1200
87	1201	545	115	2721	1237
88	1235	560	116	2806	1275
89	1279	580	117	2892	1315
90	1323	600	118	2982	1355
91	1356	615	119	3074	1397
92	1389	630	120	3169	1440
93	1433	650	121	3267	1485
94	1477	670	122	3368	1531
95	1521	690	123	3472	1578
96	1565	710	124	3580	1627
97	1609	730	125	3690	1677
98	1653	750			

TYRE SAFETY

Load index 109 maximum load capacity 2271 lbs 1030 kg.

TYRE SAFETY

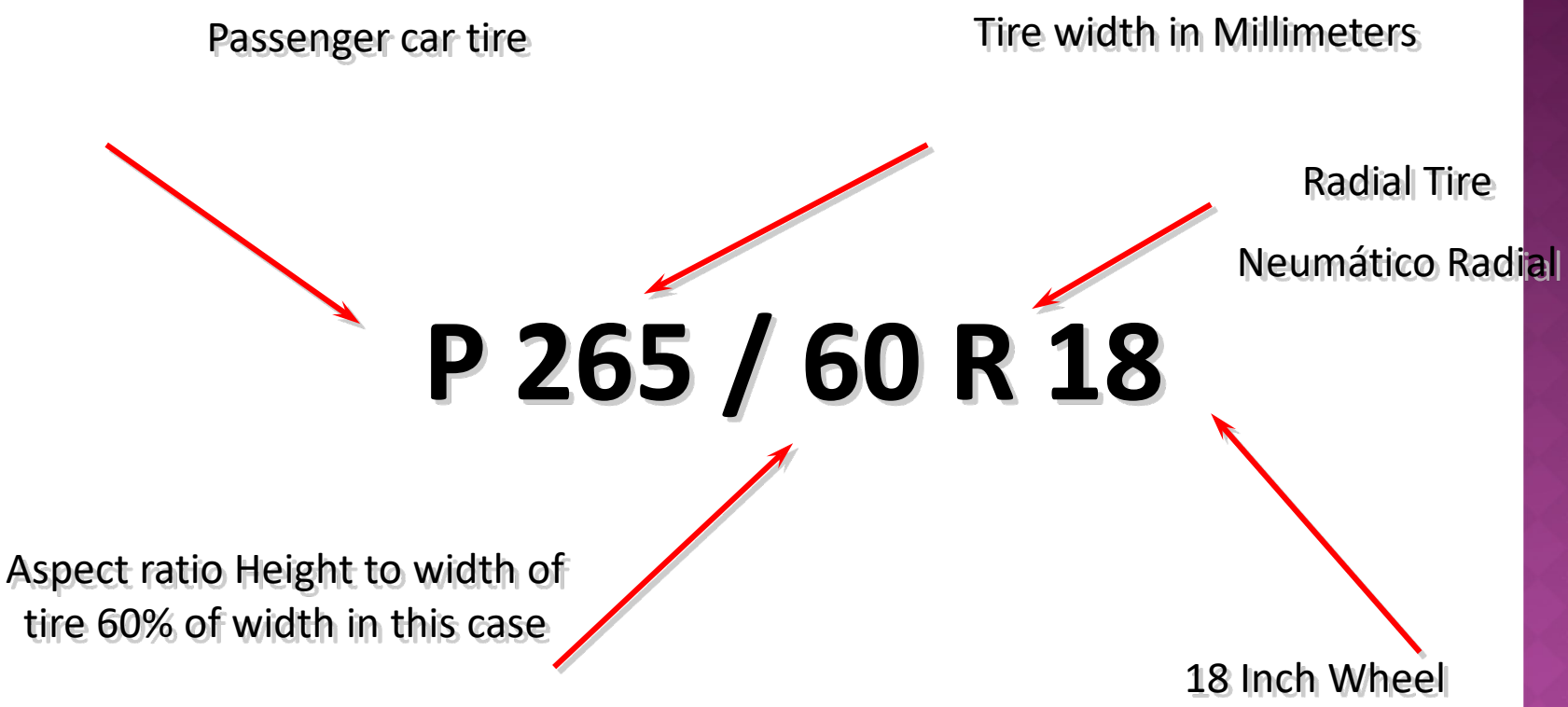
Speed Symbol	Maximum Speed (km/h)	Maximum Speed (mph)
Q	160	100
R	170	106
S	180	112
T	190	118
U	200	124
H	210	130
V*	Above 210	Above 130
V	240	149
W	270	168
Y	300	186
Z	Above 300	Above 186

The speed rating for which a tire is designed is indicated by a letter next to the load index, adjacent table shows the speed ratings in Km/h & Mph.

TYRE SAFETY

Many of us have bought tires in the past and when they ask us the size of the tires we just read it from the old tire and give them to the person at the tire shop but, what do those numbers mean?

TYRE SAFETY


Passenger car tire
Tire width in Millimeters
Radial Tire
Neumático Radial
P 265 / 60 R 18
Aspect ratio Height to width of tire 60% of width in this case
18 Inch Wheel

TYRE SAFETY

TEMPERATURE RESISTANCE

Simbolo Symbol	Area
A	Hot area Area Caliente
B	Normal Area Area Normal
C	Cold Area Area Fria

The letters will indicate a tyre's resistance to heat. Tires are rated from highest to lowest resistance as A, B or C

TYRE SAFETY

TRACTION

Traction is a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your vehicle on a wet road in a shorter distance than a tire with lower grade. Traction is graded from highest to lowest as "AA", "A", "B" and "C"

TREADWEAR

This number will give you the rate at which the tire wears out, the higher the treadwear the longer it should take for the tire to wear out. Hence, a tire graded at 400 should last twice as long as a tire graded at 200

WHAT WE NEED TO KNOW ABOUT TIRES

- Date of manufacturing
- Maximum inflating pressure
- Traction
- Treadwear
- Maximum load capacity per tire
- Speed Rating
- Temperature resistance
- Tire size

Takata Airbag Inflator Recall

American Honda Motor Co., Inc.

WHAT IS THE RECALL ABOUT?

What is the purpose of an Airbag Inflator?

- In a crash, the airbag inflator ignites a solid propellant (chemical) that inflates the airbag fabric

What is the Defect?

- Takata's inflator design was defective
- The propellant that works to inflate the airbag becomes unstable after years of exposure to High Temperatures and Humidity
- This causes the metal housing to become over-pressurized and **EXPLODE**, sending sharp metal fragments towards vehicle occupants

What Happens in a Rupture?

- In the event of an accident when the airbags deploy, the inflator could **EXPLODE**, sending metal fragments to vehicle occupants causing **INJURY** or **DEATH**

Areas With High Heat And Humidity Are at Highest RISK!

AIRBAG INFLATOR RUPTURE

Exterior View of Windshield After Passenger Side Airbag Inflator Ruptured (RHD Vehicle)

Interior View of Backseat/Headrest Area After Driver Side Airbag Inflator Ruptured

Passenger Side Airbag Inflator After it Ruptured

Driver Side Airbag Inflator After it Ruptured

AIRBAG INFLATOR RUPTURE

Stephanie Erdman Seriously Injured by a Ruptured Airbag Inflator (Sept. 2013, Florida)
She has been a huge Advocate to Raise Awareness

10:42 PM

Tweet

The Road Safety Unit Retweeted

ArchaicDinosaurIdiot
@BobbyPick2

An informer lives in your car. Beware of your stupid driving habits, it may cost you in court...

The Road Safety Unit @RoadSafetyJA

We very careful on the road network.Remember your motor vehicle i...

9:55 PM · 14 Apr 17

1 RETWEET

Tweet your reply

Event Data Recorders (Black Boxes) of compliant motor cars and sports utility vehicles exists in Jamaica and the technology is being leveraged. The data that can be acquired are as follows; once the imaging process is executed:

- Acceleration
- Seatbelt usage of both drivers and passengers
- Brake
- Obtain pre-crash and crash data
- Obtain crash severity data (deltaV)
- Obtain vehicle speed
- Steering input
  - Critical to understand runoff road crashes
- Manoeuvre

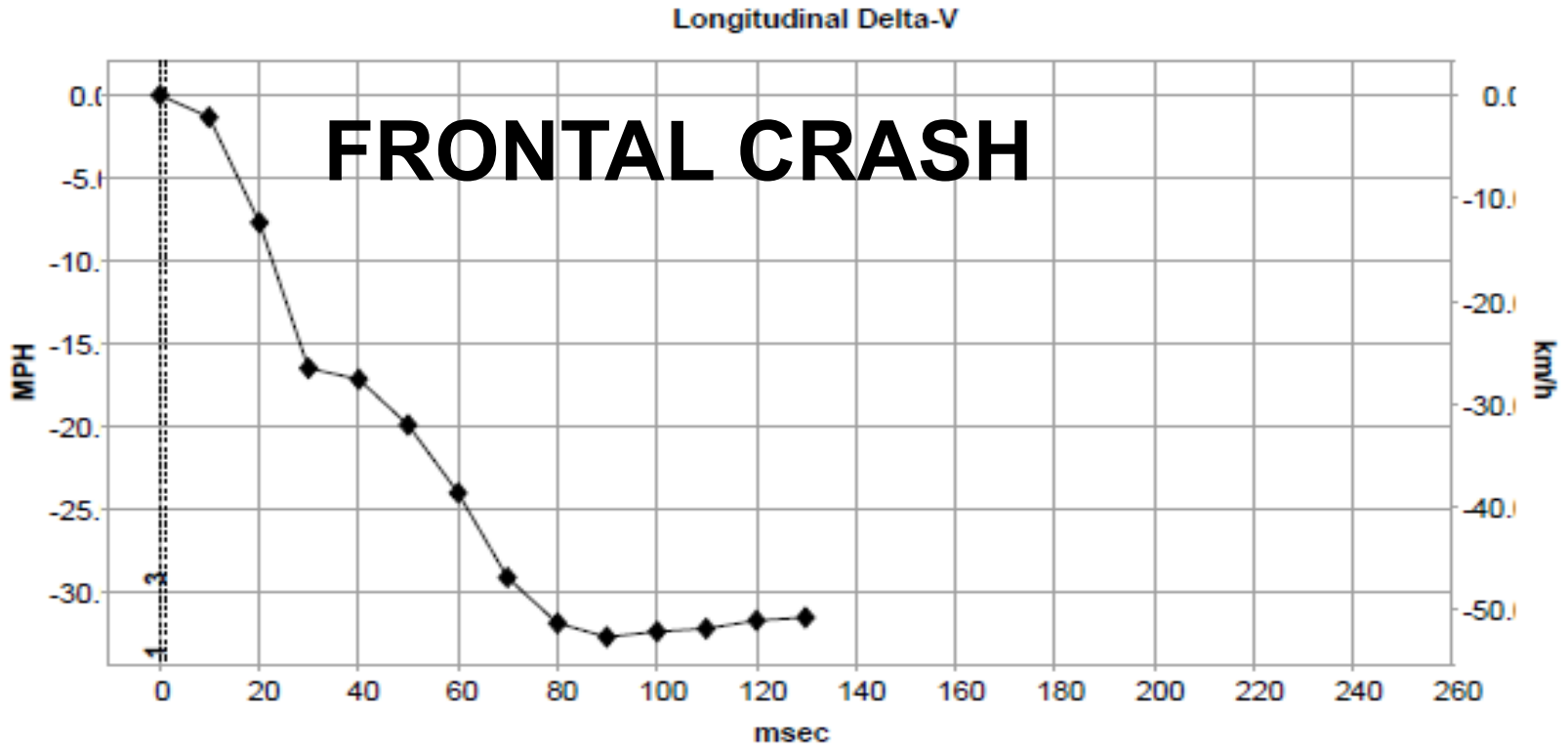
- Provide accurate data in your collision reconstruction.
- Determine if certain crash scenarios are possible.
- Being prepared to explain the crash data if the "other side" also has the crash data.
- Evaluate fraudulent claims.
- Make accurate, defensible determinations where liability is questioned.
- Jamaica has Bosch Crash Data Retrieval Kits that are strategically placed across the country.

N.B. This Speed can be acquired up to five (5) seconds prior to the collision, thus we are able to acquire information on driver behaviour.

- Event Data Recorders (Black Boxes) have the ability to display the steering input of vehicles involved in traffic crashes.
- Feature is noticeably present in the vehicles that are compliant with the NHTSA 49CFR Part 563 Rule.
- Toyota manufactured since 2012 are found in Jamaica with this feature.
    - Allows us to know the angle at which drivers were holding the steering wheel prior to the collision.
    - Allows us to know the angle at which drivers were holding the steering wheel at the time of the collision.

Longitudinal Crash Pulse (2nd Prior Event, TRG 1 - table 1 of 2)

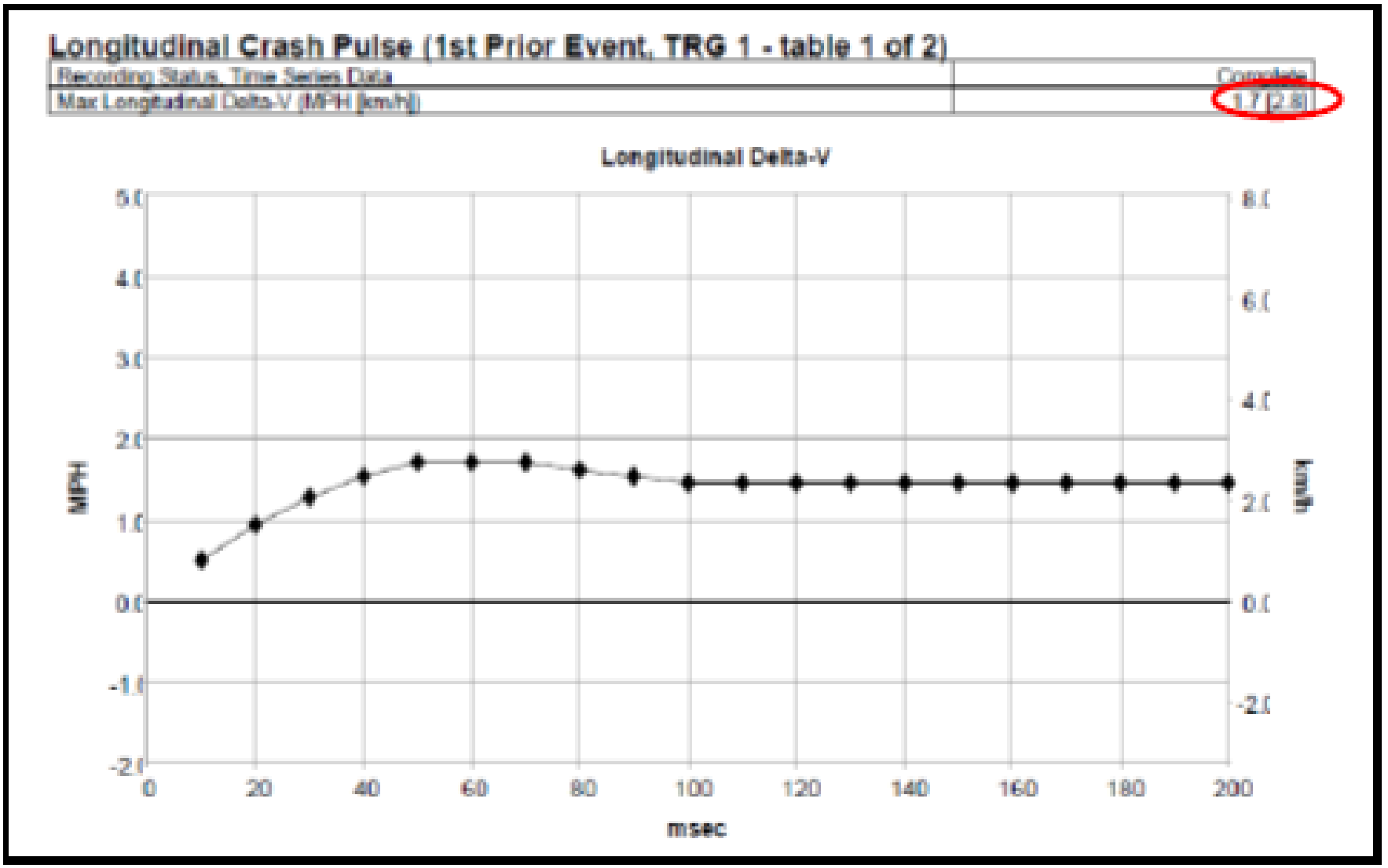
Recording Status, Time Series Data	Complete
Time from Time Zero to TRG (msec)	1.5
Length of Delta-V (msec)	130
Max. Longitudinal Delta-V (MPH [km/h])	-32.7 [-52.7]
Time, Maximum Delta-V, Longitudinal (msec)	89.5
Power Supply Status at Max. Delta-V	OFF



Deployment Time Marker Key

1	Driver Airbag Deployment Time
2	Passenger Airbag Deployment Time
3	Driver/Passenger Pretensioner
4	Driver 2nd Stage Airbag Deployment Time
5	Passenger 2nd Stage Airbag Deployment
6	Driver/Passenger AIR
7	Driver/Passenger CSA
8	Rear Window Airbag Deployment Time

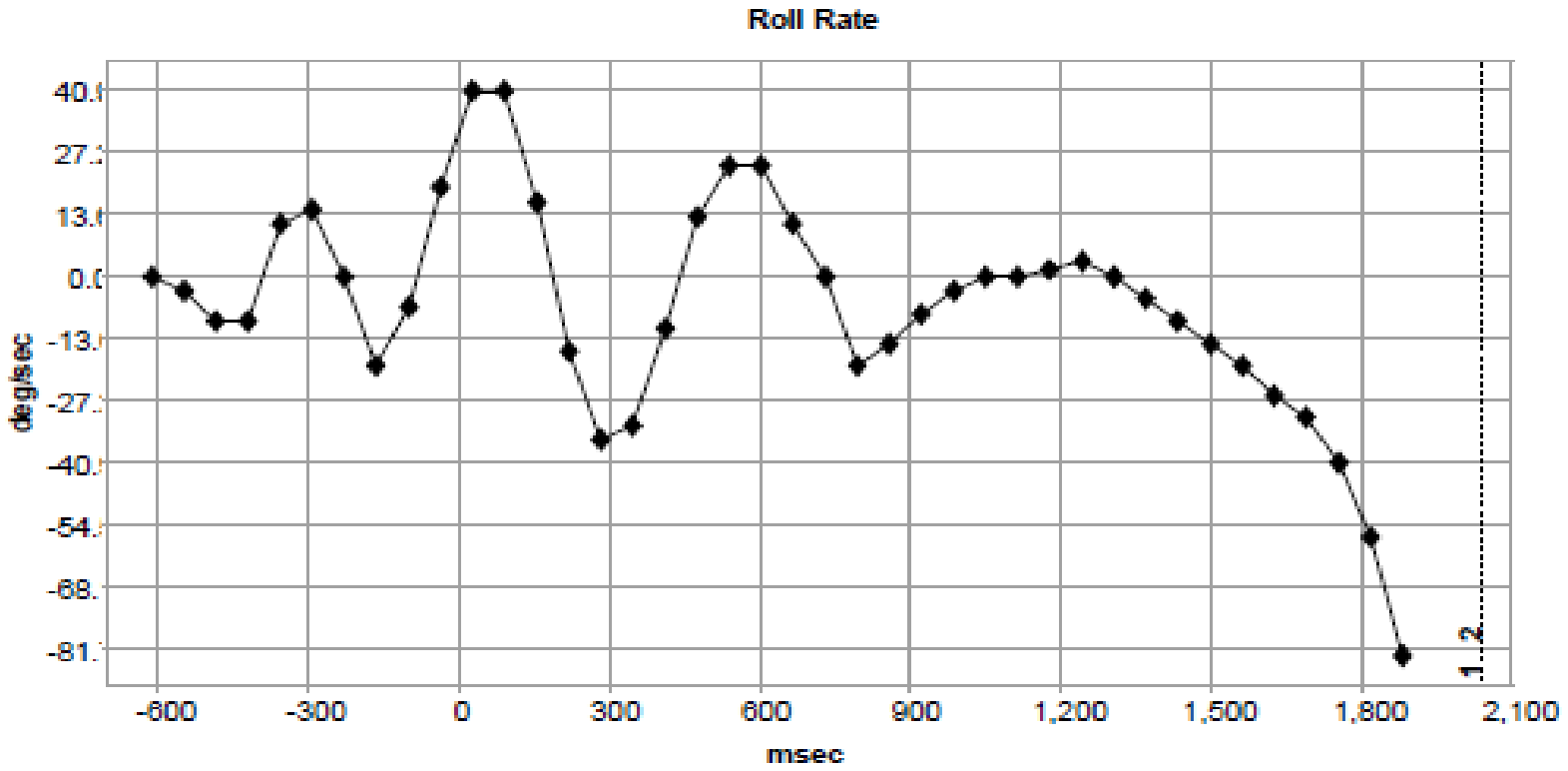
Table 9. Rear end collision and longitudinal/lateral crash pulse data of Toyota Prado.



REAR END CRASH

Rollover Crash Pulse (Most Recent Event, TRG 3 - table 1 of 2)

Recording Status, Time Series Data	Complete
Time from TRG to Next Sample (msec)	27
Roll Angle Peak (degrees)	-169.7
Roll Angle at the Time of TRG (degrees)	-4.0



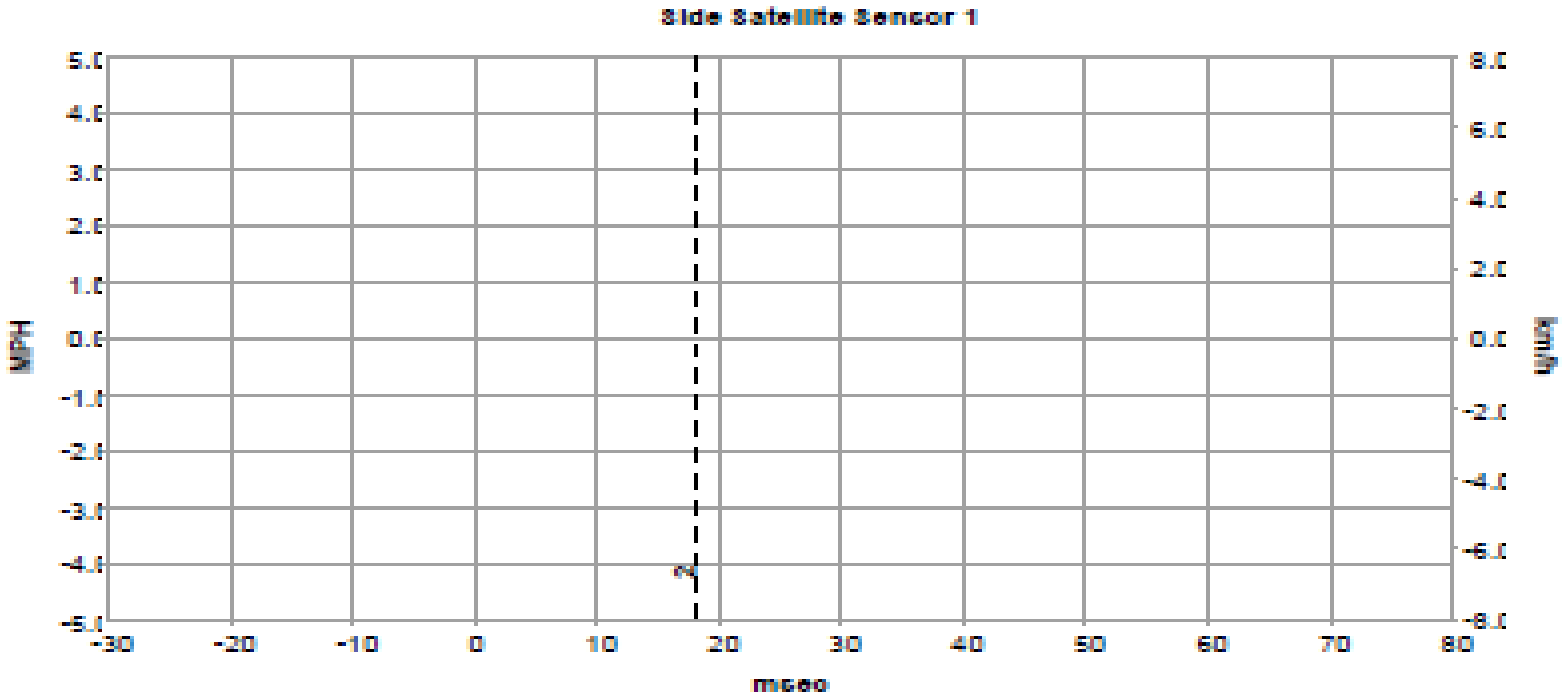
Deployment Time Marker Key

1	Driver/Passenger CSA
2	Driver/Passenger Pretensioner

ROLLOVER CRASH

Lateral Crash Pulse (1st Prior Event, TRG 2 - table 1 of 2)

Recording Status, Time Series Data	Complete
Recorded Side	Right Side
Time from TRG to Next Sample (msec)	3
Location of Side Satellite Sensor 1	Not Equipped
Location of Side Satellite Sensor 2	B-Pillar
Location of Side Satellite Sensor 3	Not Equipped
Location of Side Satellite Sensor 4	C-Pillar
Maximum Delta-V Lateral, Side Satellite Sensor 1 (MPH [km/h])	N/A
Maximum Delta-V Lateral, Side Satellite Sensor 2 (MPH [km/h])	-22.4 [-36.0]
Maximum Delta-V Lateral, Side Satellite Sensor 3 (MPH [km/h])	N/A
Maximum Delta-V Lateral, Side Satellite Sensor 4 (MPH [km/h])	-12.0 [-19.2]



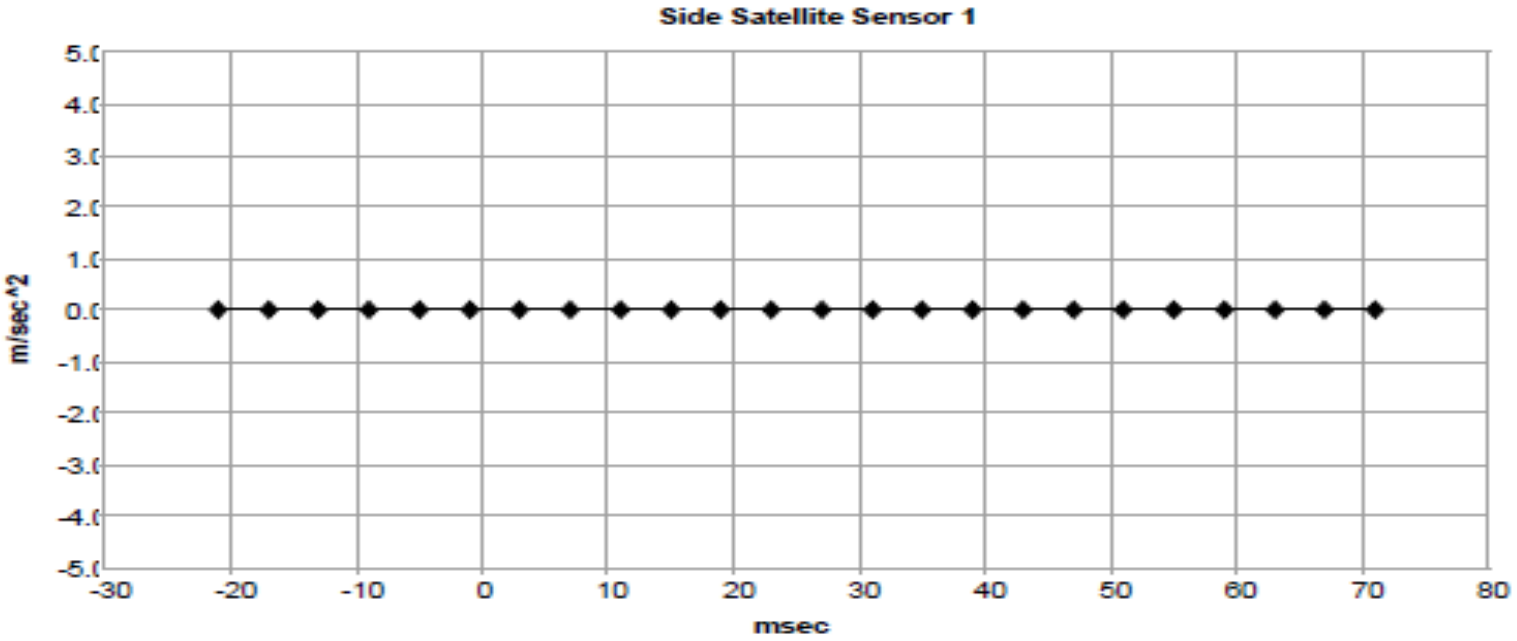
Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time

SIDE CRASH: RIGHT

Lateral Crash Pulse (2nd Prior Event, TRG 4 - table 1 of 2)

Recording Status, Time Series Data	Complete
Recorded Side	Left Side
Time from TRG to Next Sample (msec)	3
Location of Side Satellite Sensor 1	Front Door
Location of Side Satellite Sensor 2	Not Equipped
Location of Side Satellite Sensor 3	Not Equipped
Location of Side Satellite Sensor 4	C-Pillar
Location of Floor Sensor	Airbag ECU
Clipping Time of Lateral Acceleration, Side Satellite Sensor 1 (msec)	No
Clipping Time of Lateral Acceleration, Side Satellite Sensor 2 (msec)	SNA
Clipping Time of Lateral Acceleration, Side Satellite Sensor 3 (msec)	SNA
Clipping Time of Lateral Acceleration, Side Satellite Sensor 4 (msec)	No
Clipping Time of Lateral Acceleration, Floor Sensor (msec)	No



Deployment Time Marker Key

1	Driver/Passenger Pretensioner
2	Side Airbag
3	Rear Window Airbag Deployment Time

SIDE CRASH: LEFT

Table 1. Event Summary highlighting the number of times a traffic crash is recorded.

Event Record Summary at Retrieval

Events Recorded	TRIG Count	Crash Type	Time (msec)	Pre Crash & DTC Data Recording Status	Event & Crash Pulse Data Recording Status
Most Recent Event	6	Front/Rear Crash	0	Complete (Page 1)	Complete (Front/Rear Page 0)
1st Prior Event	5	Side Crash	-16381 or greater	Complete (Page 0)	Complete (Side Page 0)
2nd Prior Event	4	Side Crash	N/A	N/A	Complete (Side Page 1)

System Status at Event (Event Record 1)

Safety Belt Status, Driver	Buckled
Safety Belt Status, Right Front Passenger	Buckled
Seat Track Position Switch, Foremost, Status, Driver	No
Occupant Size Classification, Right Front Passenger Airbag Suppressed (Yes/No)	No
Frontal Air Bag Warning Lamp (On, Off)	Off
Ignition Cycle, Crash	115
Multi-Event, Number of Events (1, 2)	1
Complete File Recorded (Yes/No)	Yes
Ignition Cycle, Download	135
Maximum Delta-V, Longitudinal (MPH [km/h])	-35 [-56]
Time, Maximum Delta-V, Longitudinal (msec)	130.0
Maximum Delta-V, Lateral (MPH [km/h])	-1 [-1]
Time, Maximum Delta-V, Lateral (msec)	50.0
Time, Maximum Delta-V, Resultant (msec)	130.0

Pre-Crash Data, 1 Sample (Most Recent Event, TRG 1)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	300
Buckle Switch, Driver	Buckled
Seat Position, Driver	Rearward
Shift Position	Drive

Pre-Crash Data, -5 to 0 seconds (Most Recent Event, TRG 1)

Time (sec)	-4.3	-3.3	-2.3	-1.3	-0.3	0 (TRG)
Vehicle Speed (MPH [km/h])	18.6 [30]	16.2 [26]	13.7 [22]	12.4 [20]	14.9 [24]	14.9 [24]
Brake Switch	ON	ON	ON	OFF	OFF	OFF
Accelerator Rate (V)	0.78	0.78	0.78	0.78	1.17	1.21
Engine RPM (RPM)	800	800	800	800	1,600	1,600

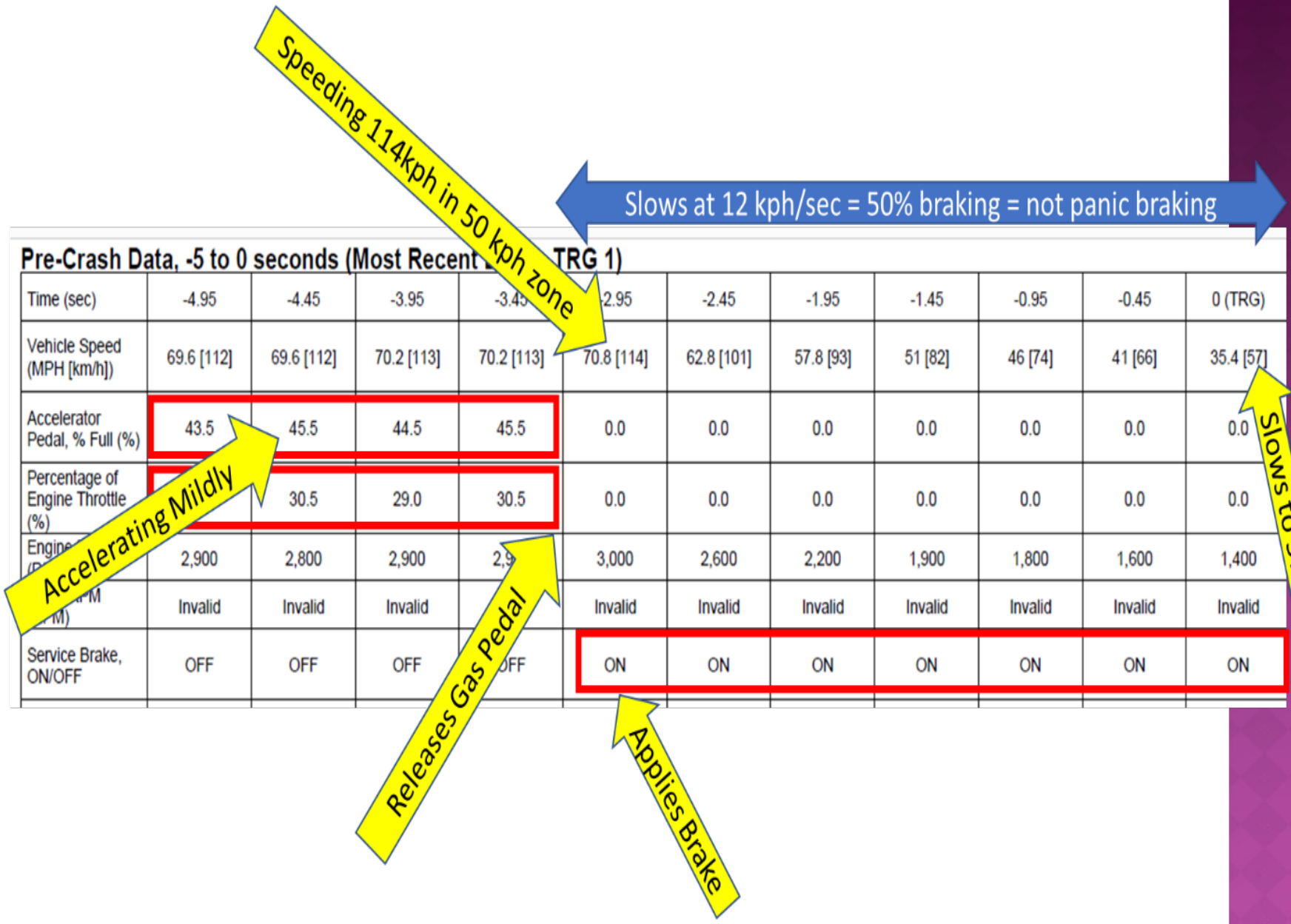
Time (sec)	-4.8	-4.3	-3.3	-2.8	-2.3	-1.8	-1.3	-0.8	-0.3	0 (TRG)
Longitudinal Acceleration , VSC Sensor (m/sec^2)	0.14	0.36	0.14	0.29	0.57	-0.65	-0.36	-0.43	0.36	-4.953
Yaw Rate (deg/sec)	0.49	0.49	0.49	0.49	0.49	1.95	1.95	8.78	15.6	6.34
Steering Input (degrees)	0	0	0	0	0	6	9	36	60	9
Shift Position	D	D	D	D	D	D	D	D	D	D

Driver moving the steering to the left of the road

Driver holding the steering steady

Driver moving the steering further to the left and off the road in a ditch

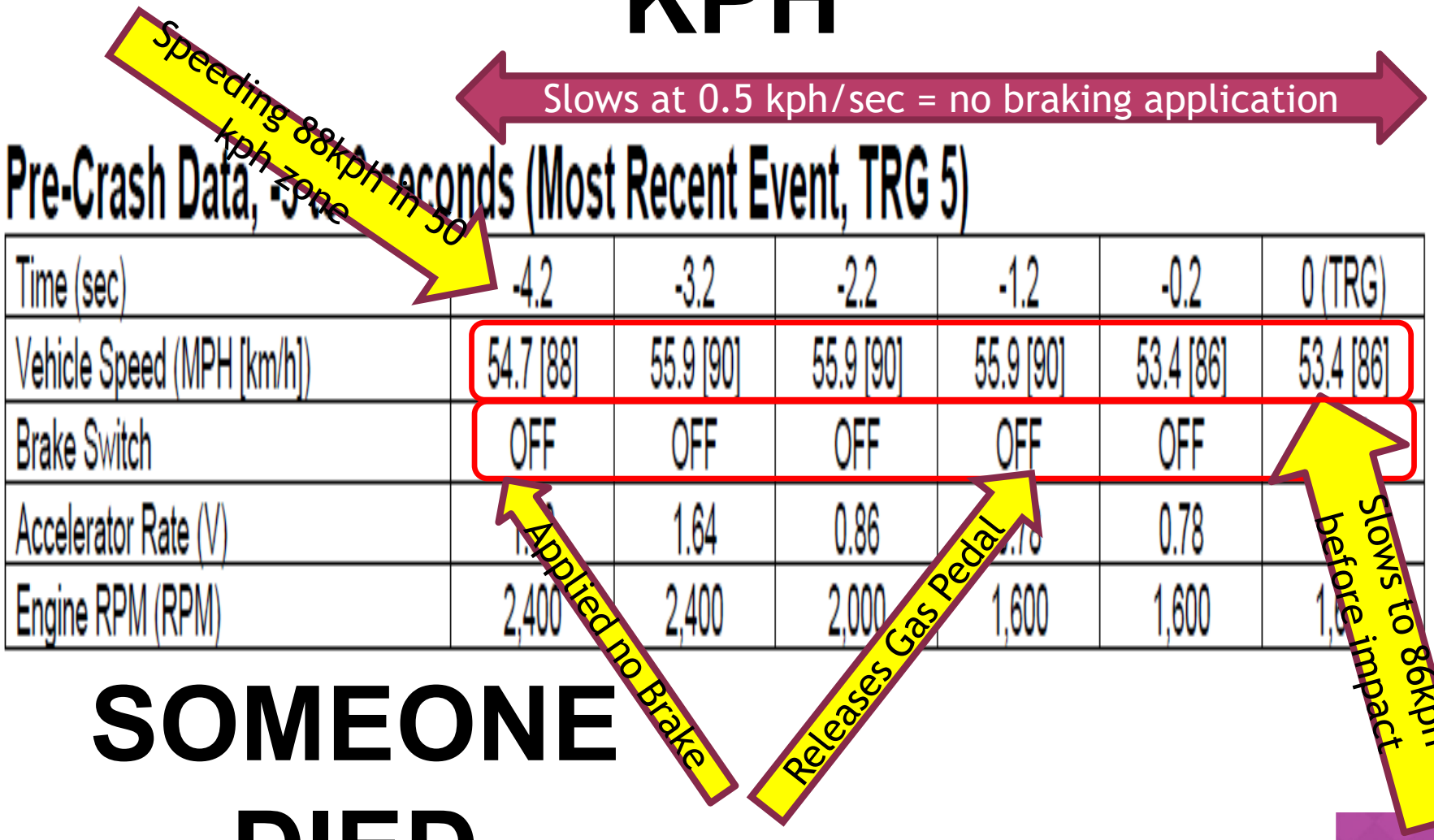
EDR REPORT HIGHLIGHTING A MOTOR VEHICLE THAT RUNOFF THE ROAD



Pre-Crash Data, -5 to 0 seconds (Most Recent [illegible] TRG 1)

Time (sec)	-4.95	-4.45	-3.95	-3.45	-2.95	-2.45	-1.95	-1.45	-0.95	-0.45	0 (TRG)
Vehicle Speed (MPH [km/h])	69.6 [112]	69.6 [112]	70.2 [113]	70.2 [113]	70.8 [114]	62.8 [101]	57.8 [93]	51 [82]	46 [74]	41 [66]	35.4 [57]
Accelerator Pedal, % Full (%)	43.5	45.5	44.5	45.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percentage of Engine Throttle (%)	[illegible]	30.5	29.0	30.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engine [illegible]	2,900	2,800	2,900	2,9[illegible]	3,000	2,600	2,200	1,900	1,800	1,600	1,400
[illegible] M)	Invalid	Invalid	Invalid	[illegible]	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid
Service Brake, ON/OFF	OFF	OFF	OFF	[illegible]FF	ON	ON	ON	ON	ON	ON	ON

IMPACTING OBJECT AT 86 KPH



Pre-Crash Data, -5.0 seconds (Most Recent Event, TRG 5)

Time (sec)	-4.2	-3.2	-2.2	-1.2	-0.2	0 (TRG)
Vehicle Speed (MPH [km/h])	54.7 [88]	55.9 [90]	55.9 [90]	55.9 [90]	53.4 [86]	53.4 [86]
Brake Switch	OFF	OFF	OFF	OFF	OFF	
Accelerator Rate (V)	[illegible]	1.64	0.86	[illegible]	0.78	
Engine RPM (RPM)	2,400	2,400	2,000	1,600	1,600	1,[illegible]

SOMEONE DIED

IMPACT OBJECT AT 100 KPH

Speeding 112kph in 50 kph zone

Brake applied 0.1 seconds before impact

Brake applied at 100kph in 50kph zone

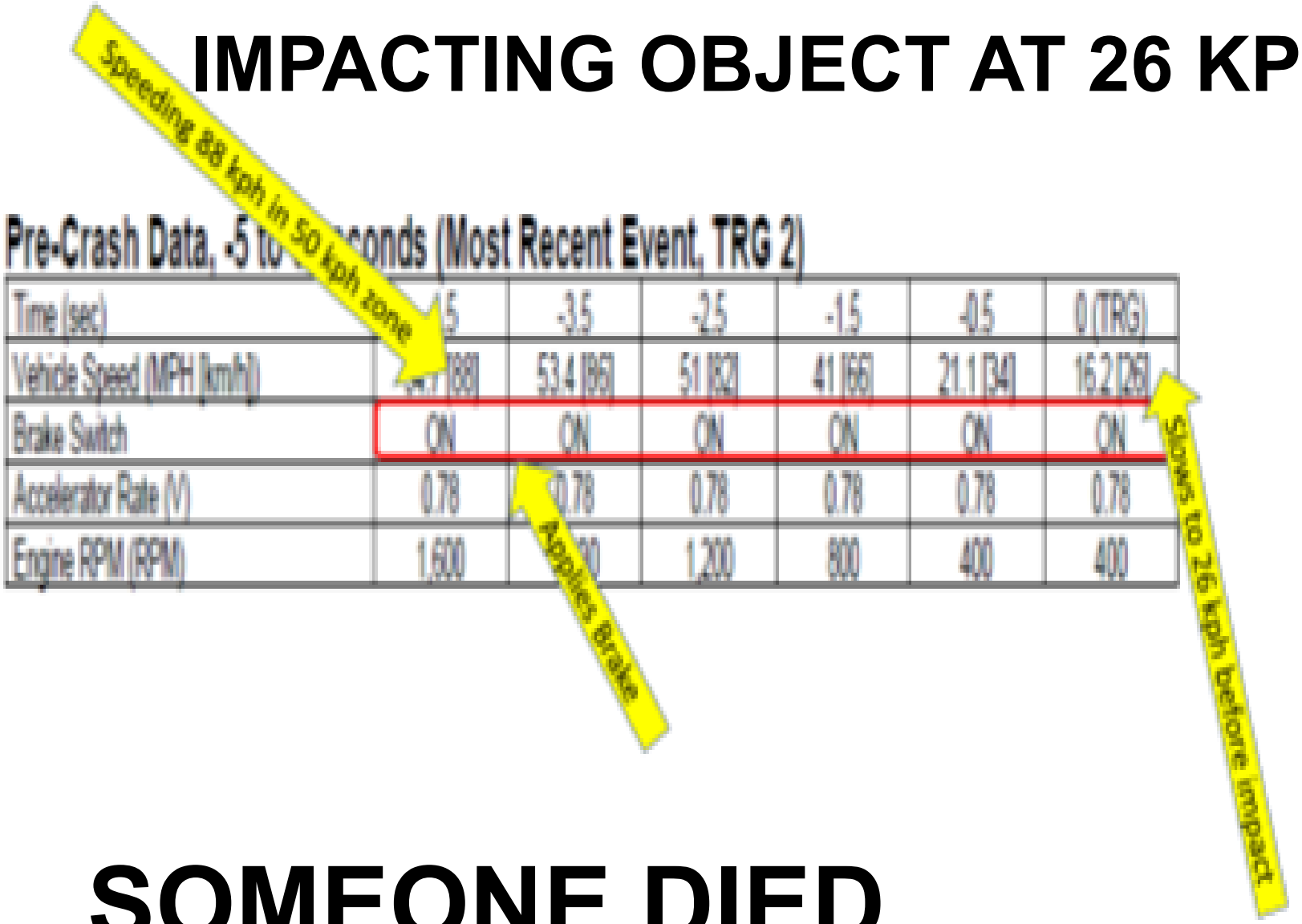
Pre-Crash Data, -5 to 0 seconds (Most Recent Event, TRG 87)

Time (sec)	-4.1	-3.1	-2.1	-1.1	-0.1	0 (TRG)
Vehicle Speed (MPH [km/h])	69.6 [112]	68.4 [110]	67.1 [108]	65.9 [106]	62.1 [100]	62.1 [100]
Brake Switch	OFF	OFF	OFF	OFF	ON	ON
Accelerator Rate (V)	0.78	0.78	0.78	0.78	0.78	
Engine RPM (RPM)	2,000	2,000	2,000	2,000	2,000	

Slows to 100kph before impact in 50kph zone

SOMEONE DIED

IMPACTING OBJECT AT 26 KPH



SOMEONE DIED

Injury Expectation

- Based on the *Rule of the Thumb* with respect to the utilisation of Delta–V to correspond to injury severity, the following should be taken into consideration.
- *Delta-V ≥* ***32kph*** *means that serious injuries are likely to occur. It should be noted that does not apply to the vulnerable road users such as pedestrian, pedal cyclists and motorcyclist where the Delta-V of the impact vehicle can be low and is due to the energy levels that these vulnerable road users absorbs, however they are impacted in a collision, thus the reason why they are much quicker to be injured when compared with a driver or passenger in a motor vehicles. Motor vehicles are designed with crumple zones to absorb energy but the human body does not possess crumple zones.*
- *Delta-V ≥* ***64 kph*** *≤* ***97 kph*** *means serious injuries occur and there is a strong possibility that the injuries could end up being fatal.*
- *Delta-V ≥* ***97kph*** *means that fatality is more likely to occur.*
- *Delta-V ≤* ***32kph*** *means that there is a possibility the injuries could be of a minor to serious nature.*

Energy Levels

The energy dissipated by the Toyota Corolla in this collision was between **99,796.2 Joules** and **178,160.2 Joules.**

$$KE = \frac{mS^2}{26}$$

$$KE_{toyotaCorolla1} = \frac{1200 \times 46.5^2}{26}$$

$$= \mathbf{99,796.2\ Joules}$$

$$KE_{toyotaCorolla2} = \frac{mS^2}{26}$$

$$= \frac{1200 \times 62.13^2}{26}$$

$$= \mathbf{178,160.2\ Joules}$$

CRUSH DEFORMATION JIG


PLAY out LOUD!