ROAD SAFETY PROGRAM MANUAL

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Welcome to the world of World's Best Practice for Driving!

What is 'World's Best Practice' for Driving? This is when a driver is capable and will drive confidently and correctly in all situations to levels not usually seen in Australia. For fleets, this means achieving less than four avoidable crashes (incidents) for every one million kilometres of exposure. The influences are mostly German and Swedish, and philosophies derived from passenger jet pilots.

To make the maximum use of this manual, it must be used as a reference on ADI training programs, delivered by ADI instructors. It is also a useful tool to research and recall the fundamentals of driving. Throughout this manual, you will see the icons below. The purpose of these icons is to associate the image with a question, a statement, or a safety tip. Please refer to your instructor if the message is not clear.

 Statement

 Key to Safety

 Question

You don't need to be an enthusiast to be a good driver. It might take more motivation, but enthusiasts don't always make good drivers. In this manual, you will learn how to consistently apply sound driving principles.

ADI has been exposed to many different training situations, in extraordinary environments and needs that far exceed the needs for the normal road user. ADI has conducted safety training in Papua New Guinea and that resulted in being delivered as a 'personal protection' course. ADI educated 350 people to be test drivers for a car manufacturer (with no crashing!) but the most difficult task in recent years was training celebrities how to drive to stay safe in a Celebrity Race.

In this reference manual, we have attempted to limit the words with the intention of offering clear, concise information. It is intended that you read and then discuss each appropriate element with your trainer. They are trained to understand each element to a greater level. You will also notice we refer to 130 kph as a speed. This is for the benefit of drivers in the Northern Territory, where some roads are limited to 130 kph.

Today our task is simply to improve your driving and we will be aiming for World's Best Practice. Regardless of your current standard, we hope to have at least one positive impact. Use a pen to highlight a point of discussion and question our position on subjects. Challenge old myths & ask more questions! Finally, this document is intended to be used with a qualified, ADI instructor.

AUSTRALIAN DRIVING INSTITUTE

"Enjoy your day, ask questions and aim to be proficient, efficient and competent….to a world standard".

Cameron Wearing
Director Research & Development

Introduction

Why are you here? As part of your work, you are expected to drive on unsealed roads and often many kilometres from the nearest centre or town. Many drivers, through a lack of practical experience in such conditions, can underestimate the risk that the terrain presents. The differences between a sedan and a 4WD vehicle and the logistical difficulties in remote areas can present problems in receiving quality early first aid.

This program is not a 4WD course, but many conventional vehicles traverse areas more suited to 4 wheel drives. However, due to our work place commitments we may find ourselves driving in conditions not generally conducive to the conventional sedan; it is more about the continual and safe operation of a vehicle in all conditions. Most crashes occur due to carelessness.

The motivation for this training is not just compliance. Avoidable crashes and fatalities are a daily risk. Our intention is to raise the standard of your driving, regardless of your current skill and ability.

Comparing our safety performance with a 3rd world or developing country is not a reasonable comparison. Australia and Australian industry make comparisons to 'world's best practice'.

Attitude is the single biggest factor to influence your driving.

Why the human is the weak link

It is a fact that parked cars don't crash.

Human weaknesses include:

1. Optimism Bias: where do you rate yourself from 1 to 10?
2. Complacency starts early, *"I don't recall driving through those lights ..... !"*
3. Emotion can impact on decisions, for example, angry drivers are harsh.
4. Not accurate when judging speeds and weights over 20 kph.

Human strengths include:

1. The ability to learn and adapt
2. Very good eyes, when used correctly (*knowing what to look at and why*)
3. Judgment; *learning about braking comfortably for example*.
4. Decision making which is refined over time

The examples above define good and bad driving traits. It also helps to know our limitations, so we actively prevent ourselves from going beyond these limits. For example:

1. The physical limitations of the human are quite low. We know that if our bodies hit a solid object at over 19 kph, the likelihood of death is around 90%. This is why doctors are concerned with contact sports that potentially have two people running flat out towards each other. Falling from a height of two metres will do it too. This is also the speed at which you will receive serious brain injury; at best a broken back and why airbags detonate at around 20 kph (Ref MMAL Product Development 2004).

2. We also know that humans have not evolved to naturally appreciate speeds over 20 kph. Driving at 60 kph is 3 times faster than our ability to assess speed and that is why driving takes huge amounts of concentration. Surviving a crash over 80 kph is unlikely. Air bags help to improve this statistic but over 80 kph into a solid object can still tear the organs (particularly the heart and aorta) from the chest.

The age-old question: who is the better driver? Is it men, women, racing drivers or emergency services?

According to the insurance industry, women present a lower risk. This still doesn't really answer the question of who is better. Racing drivers don't always make good road drivers and ambulance drivers are better trained.

VS

ADI says... "The person who puts in the mental effort is the better driver."

Until cars are automated, the responsibility falls directly into the hands of the driver. The problem (as first asked in this element) is often tied into each of the following:

1. **Distractions and Fatigue** are the biggest causes of crashes. Distractions also vary in severity. A conversation with a passenger is a low-level distraction, while a mobile call is high level. Text messaging is the worst. The mind and eyes are taken off the job.
2. **Vision:** not only are your hands and eyes linked, but eyes also help with planning and observing. Most drivers look at the boot of the car they follow and will react to conditions. A driver who looks past that same vehicle (about 15 seconds-300 metres down the road) can observe what manoeuvres the vehicle is doing and plan for it. For example, your lane is slowing while the adjacent lane is moving more efficiently, planning to move over can be seamless and efficient.
3. **Concentration:** this is difficult to maintain and only mastered by a few. In city conditions, a driver will make more observations, decisions and actions per second than a pilot does when preparing to land a Jumbo aircraft (Capt. Woodward, pilots association). Fatigue will affect this too.

The above are the reasons why driving can be such a problem.

Australia Verses the World

It's true, Australia has long distances between towns and we have unique conditions…, BUT…!

Australia is often compared to America when looking at our way of life and doing business. On this occasion, we look to Europe (including the United Kingdom). The parallels between Australia and Europe are surprising. First world countries in Europe are the leaders for infrastructure, technology, engineering, crash statistics and they also build the best cars.

Looking at the averages:

1. **From Perth to Sydney** is near the same distance from London to Istanbul. Our land masses are also similar.
2. **Europe has 450 million** people; we have about 25 million (ABS September 2017).
3. **The average Australian** will travel around 15,000km per annum, so do Europeans.
4. **The average company** driver will accumulate 30,000 km pa. So does the average European corporate driver.
5. **The average company driver in agri-business** will travel around 50,000 km pa, so too in Europe.
6. **We have kangaroos, they have moose**, **elk, boar and deer**, most of which are long legged creatures creating more of a risk on impact with your vehicle (by entering the windscreen).
7. **Australia has occasional heavy rain**, in Europe they get snow.

Generally, Europeans drive faster but their crash, injury and fatality rates are lower. While their road system is superior, Australia has less congested roads. There is no clear-cut answer why Australia lags behind, but there is one constant denominator - a driver makes decisions. It would appear 'our' decisions are not as good as theirs. Fatigue is now a bigger rural problem too.

- The average Australian driver is expected to crash once every five years
- An average fleet driver, once every 2.5 years (Lynn & Lockwood 1998)
- Country drivers crash in the country and city drivers crash in the city. Why?

The table below is derived from the World Health Organisation (WHO) 2015 and compares the number of fatalities for every 100,000 people.

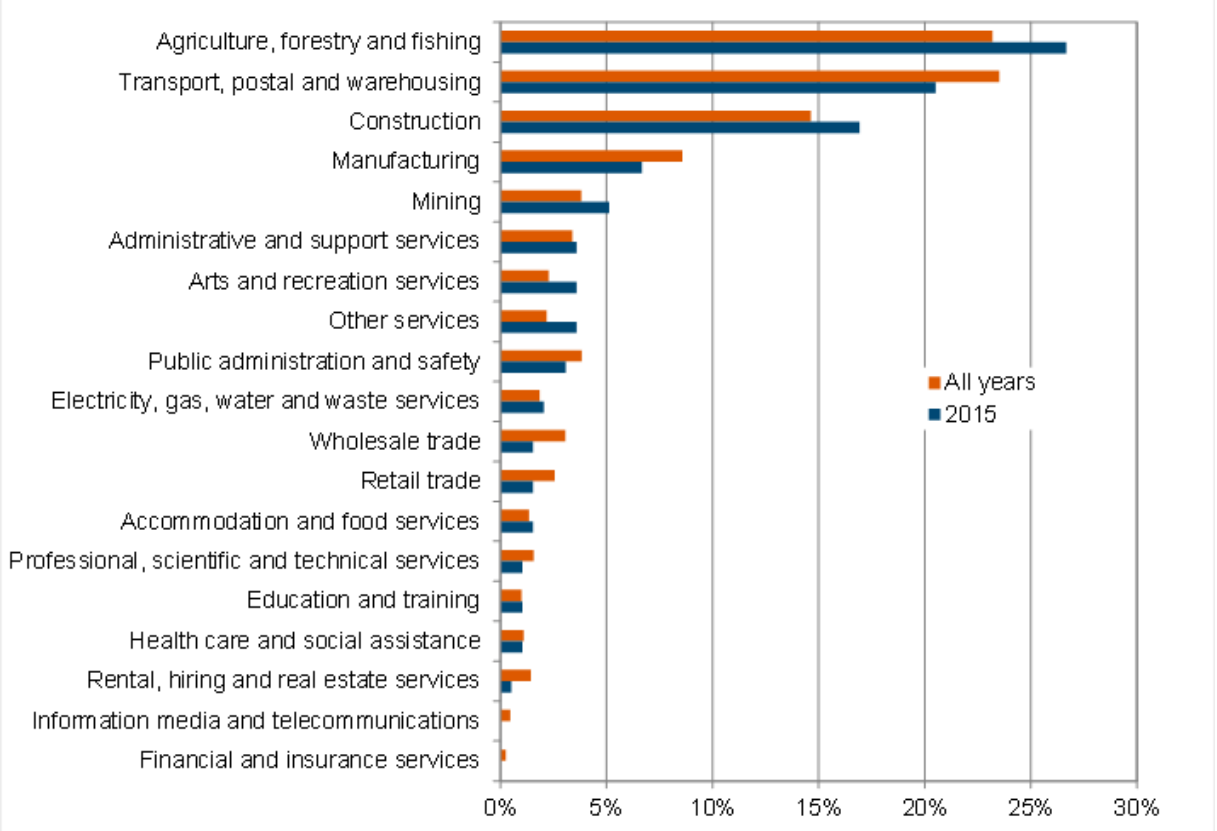
Europe		Americas		West Pacific		SE Asia		Middle East	
UK	2.9	USA	10.6	Australia	5.4	Indonesia	15.3	Egypt	12.8
Sweden	2.8	Canada	6	Malaysia	24	Thailand	36	Libya	73
Netherlands	3.4	Mexico	12.3	China	18.8	India	16.6	Israel	5.6
Germany	4.3	Brazil	23	Vietnam	24			Iran	32.1
Italy	6.1	Argentina	13.6	NZ	6				
France	5.1								
Czech Rep	6.1							Kenya	29
Spain	3.7							S Africa	25

Kilometres travelled: Australia compared to other countries (2015 and 2017)

Country	Distance per annum ave.	International ave by job	
Australia	15,700 km	Agronomist	30-50,000 km
America	21,000 km	Sales Rep	30,000 km
UK	12,700 km	Stock Agent (Aust.)	50-75,000 km
Germany	14,000 km	Delivery driver	50,000 km
France	13,000 km	Truck driver	150,000 km
New Zealand	14,000 km		
India	12,000 km		

Industry overview of workplaces at greatest risk

(Source; Safework Australia -Key Work Health and Safety Statistics, Australia 2015)



Worker fatalities: number of traumatic injury fatalities and fatality rate (fatalities per 100,000 workers), 2011–12

(Source; Safework Australia -Key Work Health and Safety Statistics, Australia 2014)

Agriculture, forestry & fishing	16.7 *this is up from 6.*
Transport, postal & warehousing	6.6
Construction	3.2
Manufacturing	1.5
Arts & recreation services	2.9
Public administration & safety	0.8
Mining	4.4
Wholesale trade	0.8
Retail Trade	0.2
Education	0.2
Other industries	1.6

Preparation for the vehicle

Fundamentals of checking a vehicle: There are simple, quick checks and more thorough checks depending on the task and location. Here are some things to consider:

- Does your car still need a registrations label? If not, how do you check?
- How well does the car present?
- Some checks are done via the dashboard (oil, tyres, water).

A check to do every time you walk to your vehicle; walk in such a way you can scan the underneath of the car. This will ensure you don't have fluid leaks, an obstruction or even a person lying in the way.

It is a little known fact: *find where the fuel gauge is located in the instrument cluster of the dash board. There will be an arrow by the symbol of a fuel pump, this will identify on which side of your vehicle the fuel flap is.*

In the future, vehicle checks will be redundant.

Daily checks are no longer needed unless your conditions are extraordinary. These conditions will include driving in dusty, remote, high speed and mining/oil/gas industries.

Weekly checks are still an important part of operating a company car. More importantly, when you drive a 'pool' vehicle, you must ensure other checks are carried out to maintain your legal obligations on the road and ensure the vehicle is safe to drive.

P.O.W.E.R.S. This acronym represents the basic vehicle checks below:

P 'Petrol' Do not put the wrong fuel in the tank. If you do, do not start the engine. This reduces the cost of repair to ¼ of the alternative.

O **'**Oil' Engine, transmission, steering and brakes all have oil or fluid. If any of these levels are low, you must fill the container to the indicator line showing maximum for filling.

W **'**Water' The levels: radiator, battery and the forgotten windscreen washer.

E **'**Electrics' Check; indicators, head and taillights, reverse, dashboard and brakes. Battery is secure and for corrosion on the terminals. Many batteries today are under a seat.

R 'Rubber' As a guideline, good drivers will achieve at least 50,000 km from their tyres. All the information you need is on the tyre placard, usually located on the 'B' pillar. Instructors look at tyres to gauge driving styles and speeds.

S **'**Safety' Remove loose items in the cabin and make sure all loads are secure.

Reporting on vehicles that are damaged or have poor performance

If the vehicle does not operate normally or you identify an issue with the vehicle that may compromise your safety, ensure you put a system in place where there is no likelihood anyone else can drive it until the repairs have been fixed.

Reporting faults will help to prevent vehicles breaking down and save drivers from having to wait by the roadside and lost time.

Vehicles that are defective require immediate action. Examples of these include:

- Cracked windscreens
- Bald tyres
- Blown globes
- Smoking exhaust
- Excessive noise
- System warning lights that don't extinguish

If your vehicle or the vehicle that you are checking has any damage or a performance issue, your company will require you to fill in a report.

It is a WHS requirement that vehicle safety checks are made regularly and records are maintained and kept up to date. If you have filed a report, ensure that you follow up the hazard and it is repaired or replaced.

Preparation - You and your PPE!

Choosing the correct protective wear, Personal Protective Equipment (PPE)

In your own worksite you would have undergone a workplace induction.

Many on-site rules, procedures and practices would have been discussed. The wearing of PPE (personal protective equipment) is a requirement on all worksites in one form or another. PPE requirements will vary according to job role, location and type of activity undertaken.

All PPE must comply with WHS legislation.

Before any task is started in some organisations work permits or authorisations are required. It is important that the PPE you wear complies with Australian standards.

In remote areas, PPE usually consists of hard-capped footwear, long sleeve, reflective and sun resistant shirts, long trousers and a hat. Other equipment depending on the task undertaken will include a hard hat, protective eye equipment, ear protection and gloves. The list of PPE can be exhaustive depending on what tasks you are performing.

In Vehicle Monitoring System (IVMS)

In Vehicle Monitoring Systems have been fitted in vehicles for over a decade. Companies who conduct remote operations generally fit these systems, or companies whose fleets travel vast distances. Poor road conditions, coupled with the poor driving behaviour of speeding, have led to significant vehicle incidents including rollovers and fatalities in remote regions of Australia. Some remote mining sites/resource projects have seen the need for in-vehicle monitoring systems. It is not uncommon to hire vehicles fitted with this system in country areas.

The in-vehicle monitoring system is fed via satellite and monitors the following types of information:

- Speed
- Distance travelled
- Seat belt usage
- Braking habits
- Four-wheel drive engaged on unsealed roads
- Identification of the driver and vehicle
- Time of journey
- Other information includes the ability to provide vehicle data following a crash or incident
- The IVMS shall be operational when the vehicle is running

Preparation – You, the Driver!

Switch on.... when you get in to drive.

This is about the driver. The first thing a driver needs is to have their 'head in gear'. It is no secret that a driver who is angry will drive differently. Even your reactions to other drivers might venture into 'irrational'.

Concentration and Distractions:

The most underrated skill of all. There is more mental effort needed to drive than to fly, we already know the average driver will crash once every five years. To be involved in a plane crash will take 1400 years. Driving vigilantly is less than exciting so motivation can be low.

Eyes:

Your eyes will determine everything; where you look is where you go and they are essential for planning. The problem can be the amount of energy they need and can contribute to fatigue.

Complacency:

We tend to crash in our 'back yard'. City drivers tend to crash in the city, country drivers in the country. The consequences are different because of the speeds travelled.

Human limits:

To fall from a height of 2 metres, your speed on impact to the ground is 20 kph and potentially fatal. 20 kph is our limit; this is why air bags usually detonate from 19 kph onwards.

Not natural or intuitive:

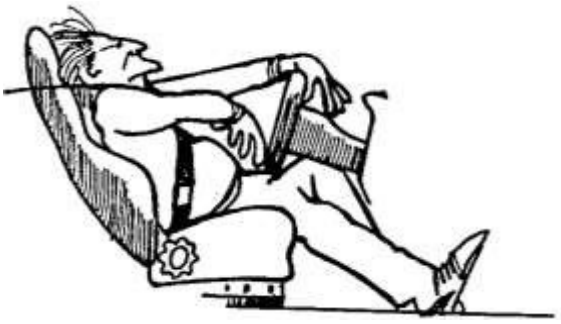
No other living being on earth can travel faster than us. We have developed the means to do this and what is concerning, we control it. Autonomous cars (and eventually driverless) are being developed. They will do a better job for longer.

Seating

It's OK to be comfortable, you must also be alert.

Find balance between them

and the way you sit will affect the way you drive.



Oh well..... at least he is comfortable!

It is not ok to sit close, and worse, too far back. Too far back gets more dangerous the faster you drive. In the worst-case scenario, the body will not be held back and can slide under the belts during a collision. Below is a basic check list for a position to best suit your body.

1. **Push the seat back and down**

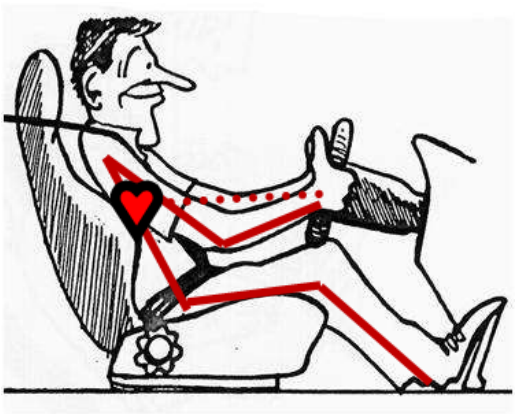
2. **Set steering wheel up and in**

3. **Seat forward (and possibly up)**
   a. Left foot on footrest and the leg falls to the console
   b. Legs to be positioned with an approximate bend of 22 degrees

4. **Set backrest**
   a. One hand to be positioned at 12 o'clock on wheel to establish 'reach' (no stretching..!).
   b. Shoulders are to remain supported in the seat to always sit square

5. **Steering wheel down** as low as practical;
   a. The wheel will encompass the dials.

6. **Bring the wheel towards you**: ideally, the elbows will have 100 degree bend and your hands at heart level.



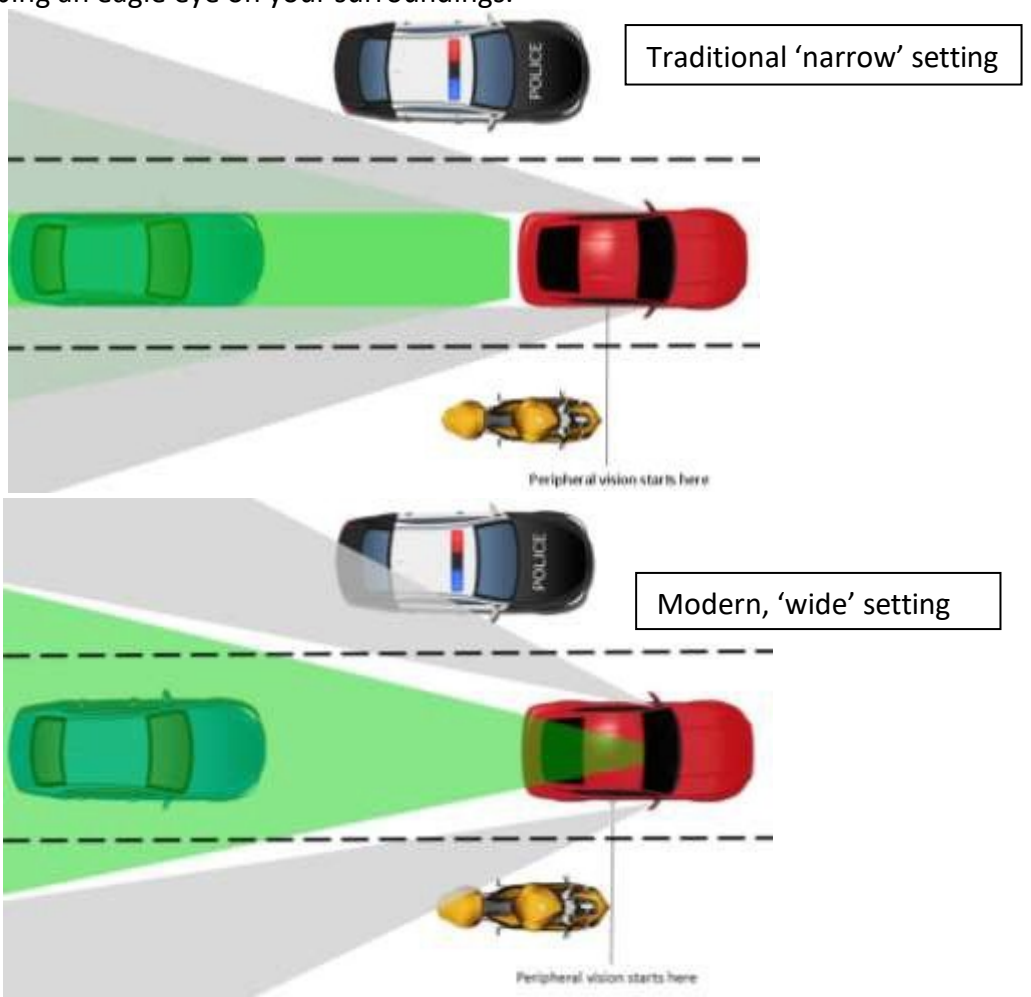
Mirrors

This more efficient method of mirror use was introduced to Australia by ADI circa 1995. Car manufacturers never intended for us to take our eyes off the road.

Mirrors are only small. To set them for maximum view is important, particularly in city traffic and on the highway. The method shown below is based on the intended (engineered) method and is much wider than normal. This may take up to a week to adjust to.

The purpose of this is to minimise (in most cars, eliminate) the blind spot and observe all vehicle types (including motor bikes) merging from centre mirror, to side mirror and eventually into peripheral vision. Seamless view of traffic from side to behind.

Be aware in three lane situations where two cars from the most outside lanes merge into the centre lane. No mirror setting can deal with this totally. Otherwise, this method is very effective for keeping an eagle eye on your surroundings.



Mirror setting when towing: Because your centre mirror may be obstructed when towing, re-adjust your mirrors to view down the side of the trailer (using the traditional method).

Steering

Steering has two roles with two functions:

1. **The first is direction.** As you turn the wheel, you are giving direction to the vehicle. Basically, you move the wheel fast when driving slowly, and slow when driving fast.
2. **The second is stability.** The way in which you use the wheel impacts directly on stability. This is a serious subject and is why drivers lose control from 60 kph.

The faster you drive, the more significant the problem and outcomes become.

Where do you place your hands and why? For cars, the vast majority of 4WDs and SUV's, the hands are positioned at 9 and 3 (analogue clock) to be at the widest part of the wheel. This aids stability and keeps the hands at heart level.

4 and 8 is being used for relaxing in ideal conditions (sunny, good road, dual carriageway) in California and Germany.

The thumbs wrap around the wheel in a natural manner, biomechanically this offers better control with less effort than other methods like 10 and 2 and/or exposing the thumb to run up the wheel (reduced strength). Both of these are now considered inefficient and unnecessary in the modern car. Maybe a consideration for off road (4wd) conditions.

How do you turn the wheel? This is 'speed dependent' as shown below.

Hand over Hand	Pull/Push		Fixed Hand
		Merge these two for 'Lead Steer'	
Slow speed Up to 15 kph Car parks, U-turn Under Air bag speed	Medium speeds 15 kph to 80 kph Suburbs and twisting roads Use all of the wheel, be fluid		High Speeds 60 to 130 kph Suburbs to Highway Don't go past '12'

You cannot correctly control a car at high speed (80 kph+) with only one hand on the wheel like this:

- Too top heavy for stability.
- Inputs are too fast at high speed.
- If an animal surprises the driver, the first reaction to jolt can spin a car.

This method is limiting, inaccurate and is not considering air bag deployment.

- If an air bag detonated (releasing at 200+ kph), what would happen to the driver's elbow?
- How do you return the steering after this input?

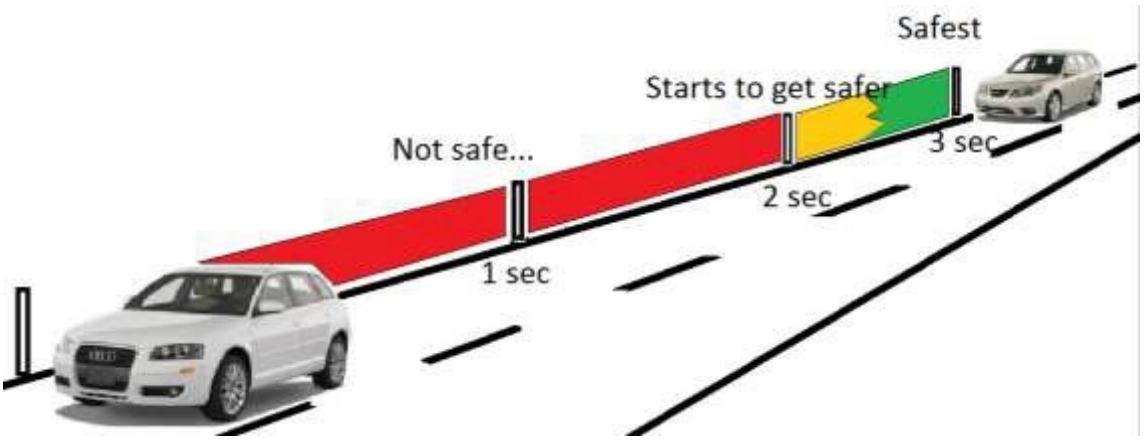
City Driving

THE ART OF DRIVING IN TRAFFIC

There are many misconceptions about this and one is to confuse defensive driving with being overly safe. Done correctly, you will have a gap in front of you, plenty of vision and the ability to avoid problems while maximising opportunities to improve your position.

Avoidable situations are when you hit someone or something.

1. **Running into the rear** of another vehicle is the most avoidable of all.
2. **This includes intersections**. It is possible to avoid someone who doesn't give way at a stop sign. With good observation techniques you can predict this.



Prevention is as easy as keeping a constant 3 second gap when travelling. In the past, a 2 second gap was applied but the biggest flaw in this principle is that you require perfect conditions and a well-practiced driver to react and brake in time to avoid an incident.

Yes, drivers may pull into the gap but that's OK.

A three second gap provides the space you need to stop, look and plan better. Some drivers will choose to take this space and yes, it can be frustrating, but it makes very little difference to your journey time. You gain more, more often, so the averages are in your favour.

Roadcraft

Using eyes correctly for planning and noticing hazards.

It's not just about identifying hazards in the country. The city offers a high number of potential incidents and your planning (helped with long vision) will also improve your average speed from point to point. The biggest gain is the improved safety.

1. **City needs as much vision and planning as the country**
2. **At least 15 seconds** (minimum)
3. **300 metres in town** (minimum)
4. **500 metres regionally** (minimum), best not to limit vision in this environment

Long vision looks to a fine point. This also controls the accuracy of your steering.

Short vision looks onto the road immediately in front of you. This makes your steering inaccurate, you are less able to plan and the driving feels sharp (not planned and fluid).

Peripheral vision is less focused and detailed. This vision is off to the sides and when you are concentrating and paying attention to the messages in your peripheral vision it provides a very good early warning system.

Scanning vision is when you swing your eyes from side to side: this is best used in the country, especially for sighting dust on side roads and livestock or wildlife.

Our eyes are less effective at night and are at their weakest in the twilight. Driving at this time is best avoided until there is a distinction between night and day.

Body Language from other drivers can help to isolate a better lane for travelling or someone who presents a risk based on their behaviour. A driver moving to change lanes just before signaling is a common fault. Other indicators are erratic movements or a phone to their ear - or worse, texting!

Parking & Slow Moving

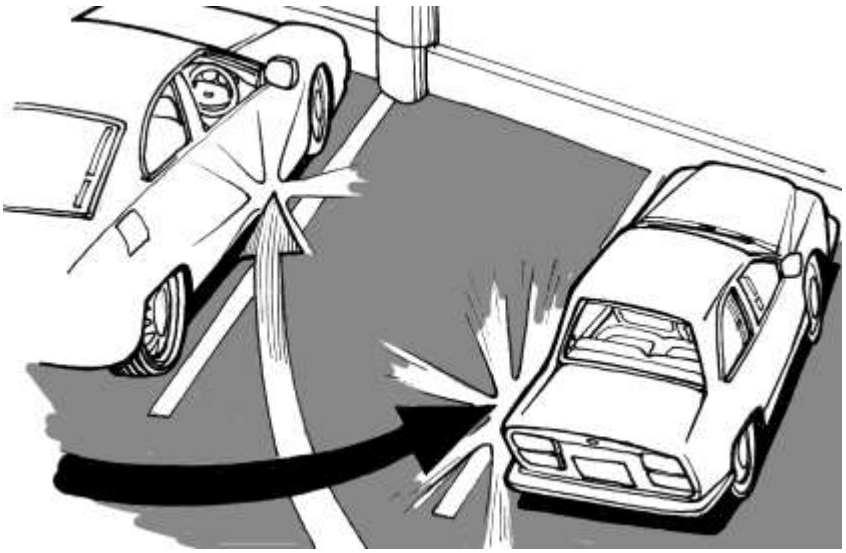
Parking accounts for 30% of all fleet vehicle incidents**.** This is an appalling figure. Driving slowly is when it is easiest to be perfect, so why is it a problem?

Most drivers will keep going when the going gets tight. This is precisely when a driver must back off and reset their position.

Simple tips include:

1. **Remember the rear of all vehicles will cut the corner**, exposing the rear to hitting an object.
2. **Scan the parking spot** by slowly driving past. If it is clear and the right size, turn away from it and prepare for a reverse park. This process is safer and quicker than driving in 'nose first'.
3. **Plan and prefer reverse parking:**
    a. This process is generally safer.
    b. It is also faster (from entry to departure).

Watch for the outside edges (corners) of your vehicle against other vehicles



30% of most fleet crashes are in the car park or doing tight manoeuvring. The key is to take more care, go slower and ***no guessing***. Sounds easy but for some reason, we humans misjudge it too often.
Reversing is risky. You can easily miss visual clues and people.

1. *Its best to drive adjacent to a park, assess that it is clear and then*
2. *Turn away from the gap and present the rear of the car to the gap*
3. *It's OK to turn in your seat while reversing and use the mirrors to double check*

This mitigates reversing out of a park where vision is more limited and the chances of crashing are very high.

Vans tend to lack side view and reversing is even more risky.

1. *Vans also tend to be longer than cars when turning in tight spaces, the rear wheels will always cut a tighter turn drawing the back of the van closer to stationary objects becoming a collision risk with pylons and other vehicles.*

Small busses have the advantage of side windows but can be longer than a van making tight turns very difficult.

You must drive past the point where you would normally turn and then turn harder to bring the front around in a wider arc allowing the rear to miss any objects. Your speed must be very slow.
Vans, busses and cars all have corners, these become 'swing zones.'
This is when that point of the car swings around in a long arc and is exposed to impacts. It's the opposite problem to the rear wheels cutting in too tight. In this case, the outside corner goes too wide.

When in doubt get out for a visual check or even better, ask a 3rd party to assist. Use the vehicle's reverse camera and sensors when reversing out of a car park or to guide you into the park.

Braking: Ideal Situations & Preferred Methods

How to conduct a controlled, everyday stop…,

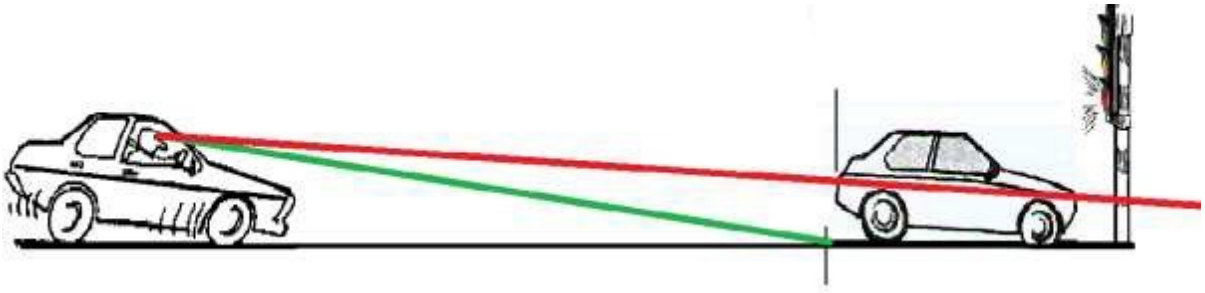
Linear Braking

Braking in time and with accuracy is a weak link in the human make up. At speeds over 20 kph, we need better planning to stop. The two most common situations are stopping for intersections or traffic lights and pulling in behind stationary traffic. Even at 60 kph, your momentum is many tonnes more than you think. By following some simple rules and using your eyes correctly, every stop will work perfectly.

When planning to stop, look down. By looking at the vehicle in front, you are planning to stop in that vehicle! Look down to the ground so you see their tyres touching the road. This WILL affect your foot pressure on the pedal. The stop will be more comfortable, eliminating the 'thump' at the end.

1. **The heel** of your foot remains on the floor (it is a pivot point).
2. **Early** & gently, 'unnaturally' earlier than you think.
3. **Firm**, using the ball of your foot and in a straight line is ideal.
4. **Avoid long duration** braking when descending; use gears to sustain (hold) speed.
5. **Vary the braking effort** to varying road surfaces. Consider a normal, sealed road when it is dry, now imagine it wet, now imagine a gravel road.

This illustration is where to look (green) and not to look (red). The latter will have heavier braking towards the end. Normally, the driver is looking at the back of the car and not on the road behind the tyres (about one metre). When the rate of deceleration is on the red line, at some point it must be increased to match the green line.



Braking Principles

How to conduct a controlled emergency stop…,

Threshold Braking

Today's modern fleet vehicle will have technology to assist with emergency braking, however the application of brakes in an emergency is still worth knowing because the average driver will not push the pedal enough. Supplementary to Anti-Lock Brakes (ABS), additional technology called Brake Assist (BA) will measure the level of panic and do the braking for you. Not all fleet vehicles may have this technology, so you might not have this assistance.

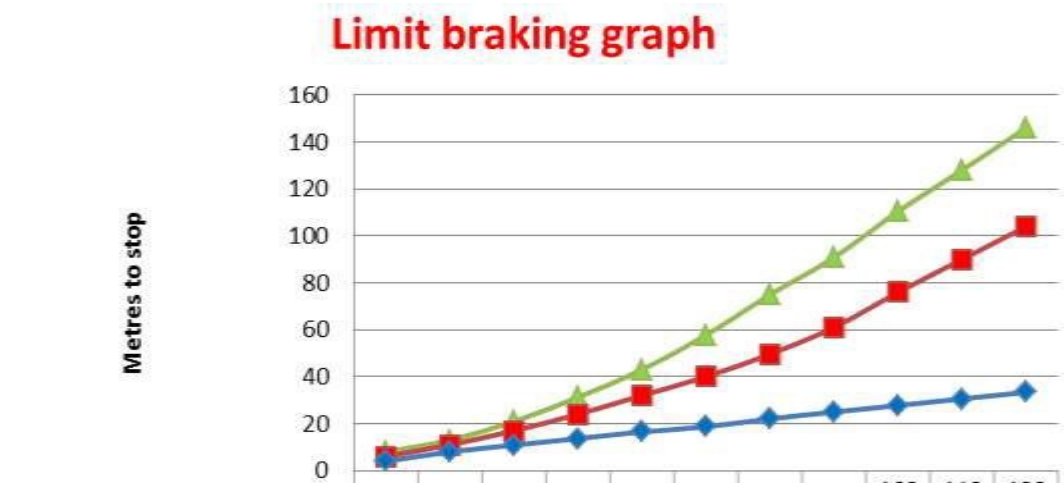
First, braking can be broken down into four different zones

1st	**Weight transfer starts** and helps grip on the front tyres
2nd	**Huge deceleration** can now be achieved
3rd	**50% of original speed at 2/3rd!** Start of maximum deceleration
4th	**Stop …** finally!

It will take 2/3 of your stopping distance to wipe off half your original speed.

Therefore, at 100 kph you are still doing 50 kph at the 3rd zone.

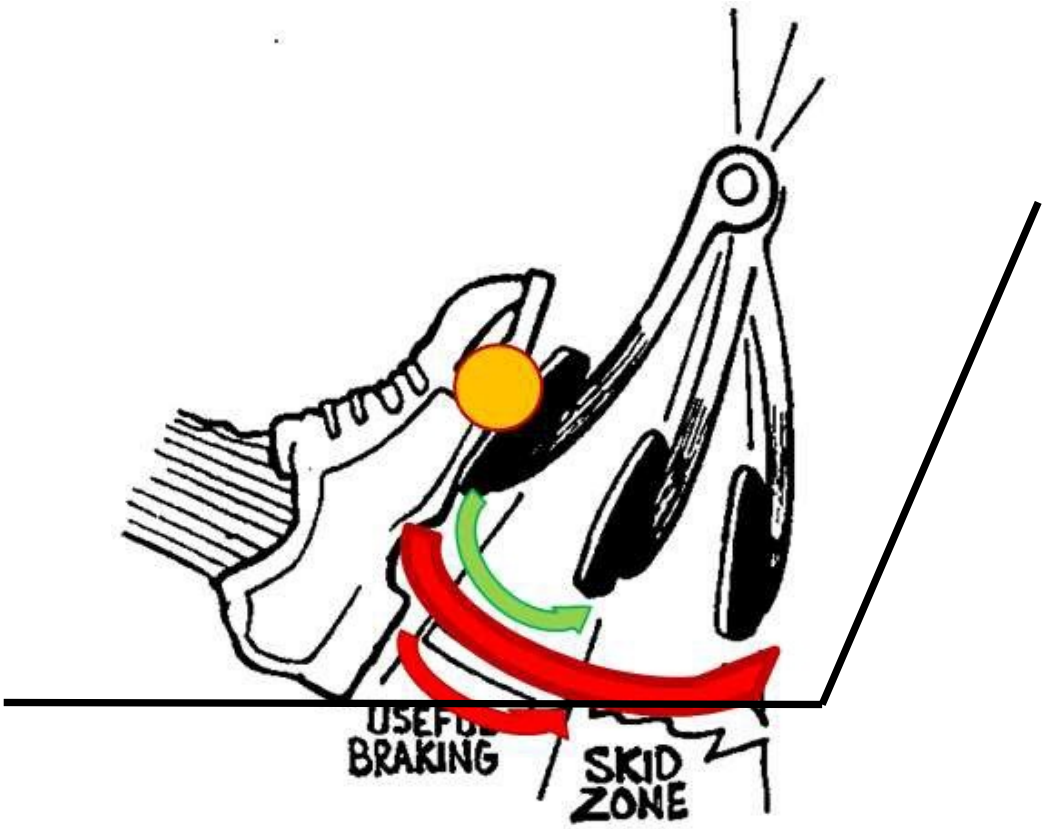
The graph below is a comparison between tarmac and gravel.



	20k	30k	40k	50k	60k	70k	80k	90k	100 k	110 k	120 k
Metres to stop on gravel	8	13	20.9	31.2	43	57.7	74.9	90.8	110.4	128	146
Metres to stop on tarmac	6	11	17	24	32	40	49.6	61	76	90	104
Reaction time in Metres	4	8	10.9	13.7	16.5	18.7	22.1	25	27.8	30.6	33.4

How do you perform an emergency stop (shortest possible distance)? Your left foot braces your body and your foot must remain here for all driving. It is used more vigorously depending on the speed or situation.

- **Brake to the limit** with no skidding
- **Use the ball of your foot** and leave your heel on the ground
- **If no ABS** a skid is possible
- **ABS:** the pedal will pump to keep tyres rotating for steering control
- **Look to where you want to go** if you are going around a corner. Don't aim for the problem!



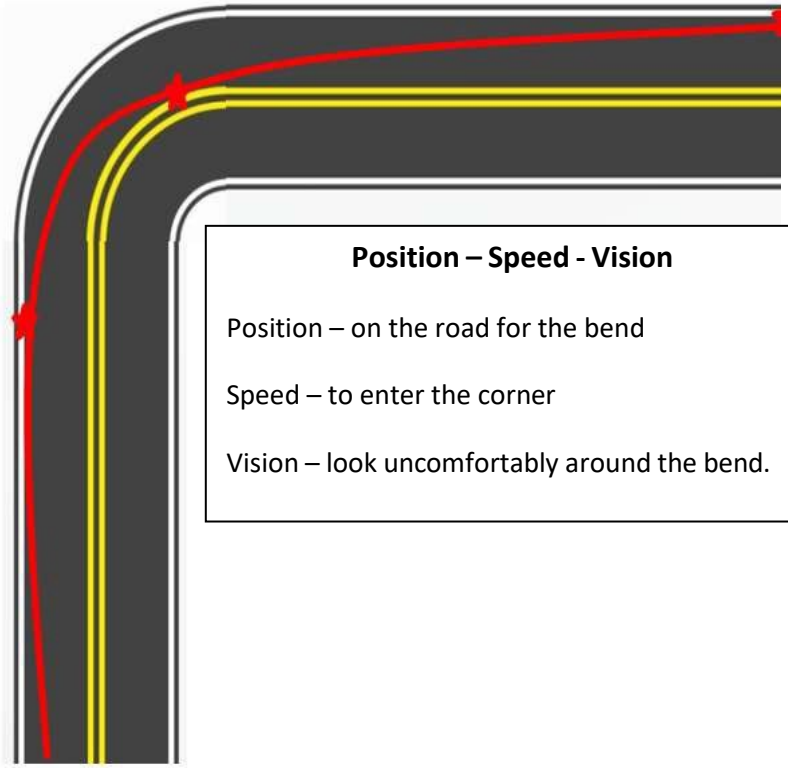
Cornering Principles

Corners are the natural enemy of any vehicle; they all prefer to go straight on.

The process of taking a bend is complex in theory, but relatively easy in practice, but often taken incorrectly. Racing lines are not the goal. Racing lines are taken to maximise the speed around the bend. On a public road, we rarely have the luxury of runoff areas and our goal is not speed.

The first tip is drive like you have a half-filled fishbowl**.** The actions of braking, taking the bend and accelerating amalgamate from one action to the other, with no perceptible change (not rough) inside the vehicle, thus keeping the water in the bowl. This is a general approach to a bend:

1. **Get into a wider position** (to extend the radius)
    a. Bring the speed down and if downhill, keep the brakes on until you start exiting. This is called Trail Braking.
2. **Turn with the bend** (push against the wheel)
3. **As the car approaches the apex** (not at the apex, this is too late), look to the next bend, or as far as you can (don't look at the sides of the road or oncoming traffic)
4. **Trust your eyes**. Where you look is where you steer.
5. **Look 'uncomfortably ahead' of yourself**.



Position – Speed - Vision

Position – on the road for the bend

Speed – to enter the corner

Vision – look uncomfortably around the bend.

Position – Speed - Vision

Position – on the road for the bend

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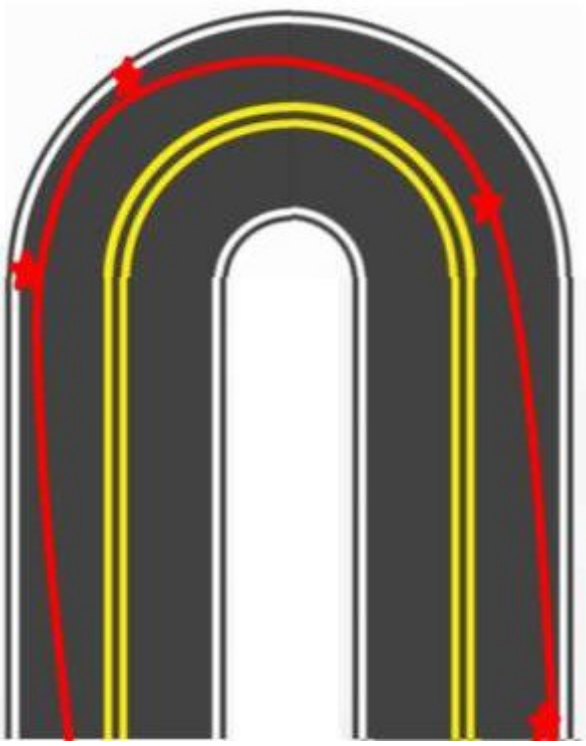


If the car ever feels like it is going away from the bend, you have done something wrong, possibly coming off the brake too soon or powering on too soon. Occasionally, this can be steering out too early. Remember: where you look is where you steer!

Different Vehicles

In this element, we are referring to the differences between a sedan and a dual cab 4x4. A 'dual cab' is not a car and needs to be driven more like a commercial vehicle.

The Centre of Gravity is only one problem. Weight and dynamic capabilities are significant subjects too. We will discuss each one now.

1. Centre of Gravity definition: centre of gravity is the place in a system or body where the weight is evenly dispersed and all sides are in balance.
2. Tipping past this point will result in the 'body' falling over.
3. The higher a vehicle is (4WD), the more prone it is to fall over.
4. Load that same vehicle and you raise the centre of gravity.

Here is a standard dual cab.

The diagram below illustrates a 4 x 4 performing a standard European 'Elk Test' and the 'height of the weight' is causing the vehicle to tip over.

This example is extreme.

It is a rally car and the lower centre of gravity keeps it flat. In this case, the car needs to be tripped up to lift off the ground whereas above, the vehicle needs no assistance. It is easy to 'over drive' the dual cab.

Identifying Hazards and Risks

In your day-to-day travels you will come across many hazards whilst driving from one location to the next. Road Hazards can be moving or fixed.

Moving hazards can be pedestrians, other vehicles, animals or weather conditions**.**

Fixed hazards could be power or utility poles, roundabouts, kerbs or any type of road engineering, such as a flooded section of road, oil on the road.

Hazards can be found around your workplace. This also can include your vehicle with such hazards as faulty brakes, leaking fuel, faulty mechanisms or tyres. Road authorities will address the road infrastructure but what do you do in the workplace?

As part of your work, you are expected to drive on unsealed roads and often many kilometres from the nearest centre or town. Many drivers, through a lack of practical experience in such conditions, can underestimate the risk that the terrain presents. The differences between a sedan and a 4WD vehicle require different driving styles and the logistical difficulties in remote areas can present problems in receiving quality early first aid.

Due to our workplace commitments, we may find ourselves driving in conditions not generally conducive to the conventional sedan; it is more about the continual and safe operation of a vehicle – driving to the conditions. Most crashes occur due to carelessness.

The motivation for this training is not just compliance. Avoidable crashes and fatalities are a daily risk. Our intention is to raise the standard of your driving, regardless of your current skill and ability.

By employing consistent systems and methods, it is reasonable to suggest all crashes are avoidable. By choosing to use the systems in this program on a consistent basis, you will maintain control. Go outside of the systems and you are choosing to increase risk.

Rural Driving

Anomalies with some rural roads are like this (below), where there is only one lane width of sealed road. This requires two approaching vehicles to straddle the gravel verge. This is a remarkably dangerous exercise and the risk of losing control is considerably increased.

Points to be aware of:

1. Driving with one hand at 12 o'clock on the wheel will make the car unstable.
2. Drive with hands at 9 & 3 on the wheel, this is critical.
3. Dawn/Dusk driving must be limited to 80 kph, if at all.
4. Release the power to change surface, look high up the road (disappearing point on the image above).
5. Remain off power during the pass (this keeps rocks/stones down).
6. Hold power (not accelerating), preferably no power, when returning to single lane.

If the vehicle is unstable or starts to slide:

1. Release power entirely.
2. If braking, stay on brakes to gently slow down, your grip increases with less speed.
    a. Snapping the brakes will create instability and worse.
    b. Conversely, releasing the brakes rapidly can cause a spin across the road.
3. Maintain vision as high as you can. Looking only a short distance ahead will increase unstable driving.

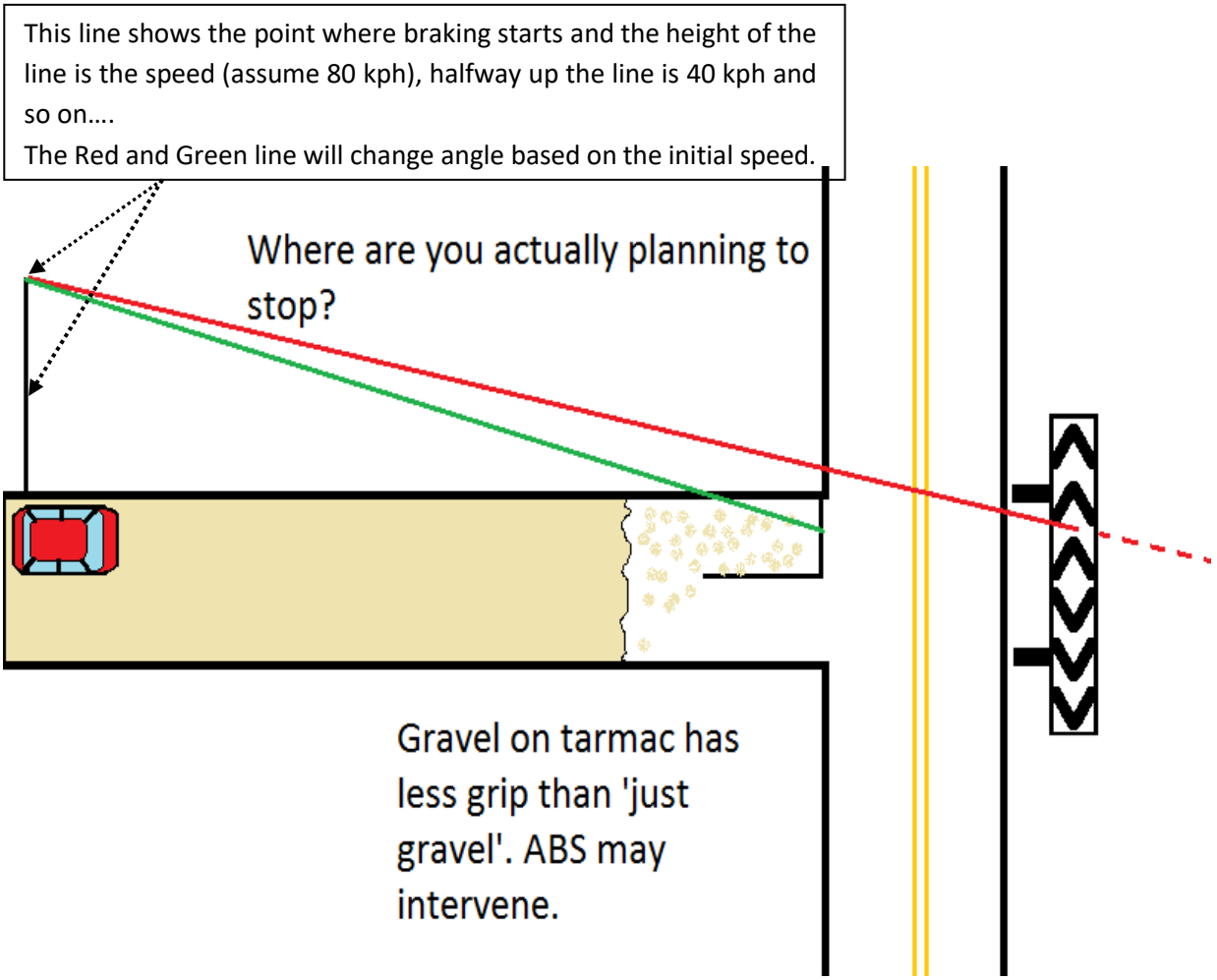
Where possible it is preferable to slow down and stop your vehicle on the side of the road. This allows the approaching vehicle to pass whilst travelling entirely on the bitumen. This will avoid rocks being sprayed over your vehicle.

The image below has a typical rural situation; Approaching a T junction from a gravel road and you are aproaching a 'chevron' sign (the sign with opposing arrows to signify the road stops and goes left or right).

Have you ever noticed how many of these are damaged or knocked down? The driver has not planned correctly and has looked at the wrong thing. Same as stopping in traffic, look down the GREEN line of vision.

If you are braking on the RED line (looking at the chevron), you will at some point have to increase your braking effort to pull up in time and avoid a wheat truck (for example).

If you combine later and heavier braking on the tarmac/gravel surface, ABS will likely intervene meaning you would have otherwise been skidding (ABS will only ever be activated once it senses a skid). In more blunt terms, the driver misjudged the road conditions and didn't adapt.



Gravel Roads

Gravel, dirt or unsealed roads are commonplace in regional Australia.

There are many different types of material used to build these roads and this will impact on the behaviour of the vehicle.

Only one cleared path

- Animals
- High ridges can steer the car into a slide
- Sedans may 'bottom out' on the ridges
- What if the road was wet?

Winding road

- Low dip (consider kangaroos) may have water, hard for planning
- Hazards might be concealed
- Very slippery when wet
- Some roads become impassable

Mud is slippery

- Position on the high sections (the crowns)
- Reduce speed dramatically
- Slides will develop very easily
- ABS will intervene much earlier

One lane

- Road disappears
- What's the plan or expectations for approaching vehicles?

Wildlife

Would you drive differently without a Roo Bar?

How would you change your approach to driving?

How to ensure you crash with wildlife: Do you ever do the following at the same time? All you need to do is combine any 3 of these for an incident with wildlife:

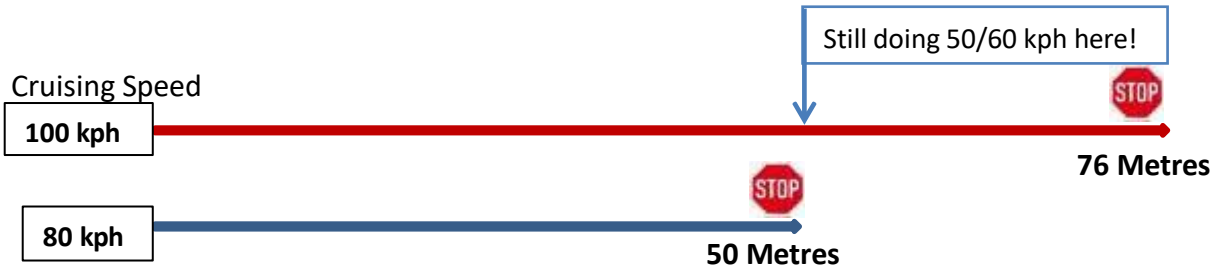
1. Drive at dusk or dawn?
2. Using cruise control and/or maintain highway speeds?
3. With one hand on the wheel (worse at 12 o'clock)?
4. Are your feet pulled away from the pedals?
5. Are you engaged with the radio or a conversation?
6. Or even a phone call (which is different to talking with a passenger)?

You are doing everything you need to crash into wildlife.

How to reduce the chances of you crashing with wildlife:

1. Establish where wildlife (in this case kangaroos), might be more likely:
    a. Low lying areas where moisture collects (winter creeks).
    b. Dusk and dawn.
    c. Scrub (of all types; blue gum, phalaris, stunted gum, etc.).
    d. Green pick after rain or dew (Hay Plain is renowned for this).
    e. No particular reason needed, it's Australia and they live everywhere.

Consider reducing your speed to 80 kph (in the last 1/3 of braking, your speed is still 50% of the speed where you commenced braking – *see below*)



At 80 kph, you STOP in 50 metres; at 100 kph you are still doing 50/60 kph at that same point!

Problems with other wildlife:

1. **Cows, cattle, horses and camels** have a high centre of gravity and can fall onto the cabin.
2. **The hair of animals** will soak up your headlights, and sheep can look like salt-bush.
3. **Cattle especially** can rest on a warm road! This makes them harder to see.

Note! It's OK to steer once around an object, steering back is the problem. Solution: Keep reducing speed and gently steer back using a wider arc. Two sudden steering inputs will make the car unstable and often be the cause of the big black skid marks that cross over.

ADI fitted poly bars (SmartBar):

- Poly bars absorb energy better and don't send energy into the chassis/body.
- They are designed to reform (in the sun is best).
- Can repair itself after most 80 kph hits. Steel must be replaced.
- Limit damage to body work. Under half of that with steel.
- Less likelihood of damage to the radiator.
- Suitable for air bags, lights and winches.
- Weighs less than aluminium.
- Less likely to impact on suspension (lever effect over the front axles).
- 100% safer than steel around pedestrians.

Overtaking

Overtaking is the single most dangerous act you will perform intentionally: just think, two vehicles, travelling at a closing speed of 200 kph; the same speed as passing an Olympic swimming pool every second!

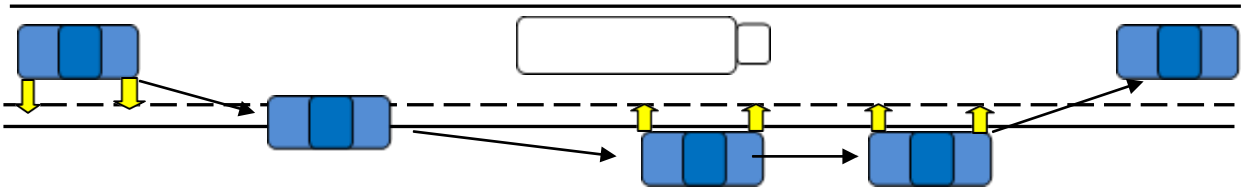
The photo below shows a road train, the most extreme of Australian overtaking events and an example of the vision available to a driver.

What possible hazards can you identify in the photo? And…

How long will it take in seconds (____) and metres (____) to pass a road train?

Understanding the danger of distance is important to appreciate before undertaking the act of overtaking!

1st Prepare/Signal **2nd Commit** **3rd Indicate** **Return with a gap**



This illustration above doesn't represent the actual distance. If the semi-trailer is travelling at 100kph and the car at 110kph, this event will take 930 metres and 30 seconds when done legally. Below: This table is showing the metres/seconds to overtake most vehicle types. This takes into account the time to leave and return to your lane. Also helps explain why overtaking lanes appear so short. How long will it take to overtake a B-Double?

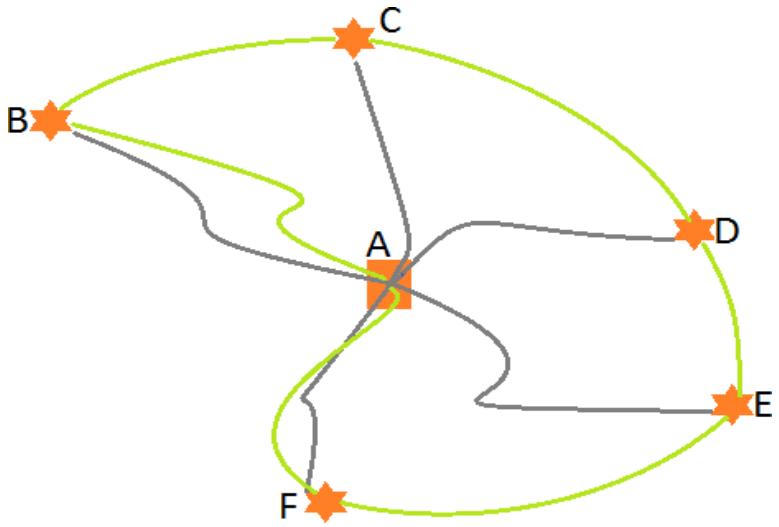
Vehicle being overtaken and their speed		The speed you choose to overtake at			
		100	110	120 (NT)	130 (NT)
Car 5 metres	90	989m/36s	444m/15s	330m/10s	260m/7s
	100		800m/26s	549m/17s	351m/10s
	110			1084m/33s	622m/17s
Assumed NT	120				1211m/34s
Semi-Trailer 19 metres	90	1162m/43s	555m/18s	388m/12s	306m/8s
	100		930m/30s	636m/19s	218m/6s
B-Double 25 metres	90	1236m/45s	1026m/37s	413m/13s	325m/9s
	100		1365m/45s	673m/20s	432m/12s
B-Triple 35 metres	90	1360m/50s	649m/22s	454m/14s	358m/10s
	100		1481m/49s	735m/22s	508m/14s
Road Train 2 trailers 35 metres	90	1360m/50s	649m/22s	454m/14s	358m/10s
	100		1481m/49s	735m/22s	508m/14s
Road Train 3 Trailers 53 metres	90	1589m/58s	758m/25s	528m/16s	418m/12s
	100		1713m/57s	847m/26s	587m/16s

Journey Planning

This relates directly to fatigue and productivity. A plan for any journey needs to include:

1. Start at the end; establish a finishing time first, this will reveal the start time.
2. Use an average of 80 kph to estimate time.
3. Programmed 15 minute breaks every 2 hours.
4. Consider an afternoon break for the circadian low around 2 pm.
5. Factor in dawn/dusk and the risks of:
    a. Wildlife, kangaroos in particular.
    b. Deer are becoming increasingly frequent.
    c. Fatigue and eyesight are a factor at dusk/dawn.
6. Avoid 'pin wheeling'. This is 'Doubling Back' to "A" every time.
7. Instead, try 'A' to 'B', to 'C' and back to A.

Common Journey behaviour (GREEN is the most efficient route, BLACK is not

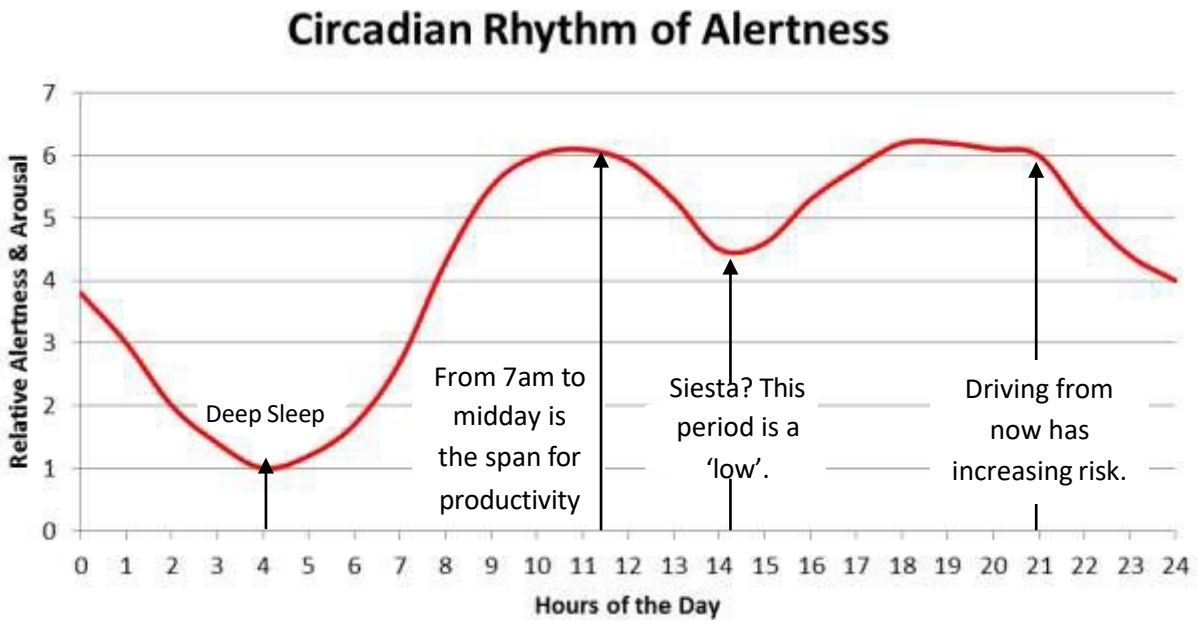


ly Journey Plan				
Overview		**Details and finalising**		
Start location	Melbourne	Actual Start time	0800	
Finish location	Adelaide	Going Via	Ballarat	Horsham
Est of KM	730		Bordertown	Tailem Bend
Est of hours	8	Actual Finish Time	1800	
No. of visits	4	Planned breaks including lunch	Ballarat	Horsham
Visit time est	15 min		Bordertown	Tailem Bend
Total Time Est	9 hours	Notes ;		
Divide by	2	Joe in Horsham talked for too long and held me up		
Fatigue break =	4			
If total time exceeds 12 hours, get authority from a supervisor to continue.				

Fatigue

Issues with Fatigue

1. **48 hour delay** - especially for shift workers or multiple late nights.
2. **Young men under 25** – one of the most susceptible age groups affected by fatigue.
3. **Over 70** – the next most susceptible age group.
4. **Processed foods** - can excite the metabolism and then drop you into a low.
5. **Preservatives** - can do the same.
6. **Turkey and tryptophan** - it's a sedative found in all proteins but high in turkey.
7. **Myths include** - coffee, sugar, loud music, open window: these delay the inevitable.
8. **Limit a 'snooze' to 20 minutes** - this will limit slipping into deep sleep.
9. **If you do sleep for too long** you will wake up feeling very groggy: this can happen if you sleep for one hour or more.



Ref: Dr. William Dement of Stanford University Sleep Disorders and Research.

Tips include:

- *Stop and rest every 2 hours for 15 minutes*
- *Keep hydrated, drink water*
- *Cross-reference this information with your 'Journey Planning'*

Night Driving

Australia is not alone for driving at night but our risks are different. We have an oversupply of roads where the approaching drivers are not separated by a physical barrier, only a metre or two. *The road below is an example of gravel and animals, but the advantage of daytime.*

Some facts concerning Night Driving;

- The human eye is least effective at dusk and dawn; avoid this time
- Wildlife is particularly active at dusk and dawn
- Low beam is ineffective for a suitable reaction time at 100 kph (27 metres per sec)
- Flat areas (Hay Plain) may require low beam for a few kilometres
- High beam is effective for only 50 to 60 metres
- The increased attraction to bugs reduces vision when looking for wildlife
- After 9 pm, the risk of fatigue steadily increases to dangerous levels (Refer to 'Fatigue')
- The human eye takes a while to recover from glare, this gets worse with age
- Avoid looking at lights and as a result, not swinging your eyes into bushes/scrub
- With approaching lights, look as far up the left side of your lane as possible

Below: Day view with the white line defining high beam at approximately 50 metres, this ground will be covered in just 2 seconds. It takes the average driver 50 to 75 metres to stop.

Imagine this scene at night!

Technology in Cars

Cars are now equipped with technology to compensate for human errors.

The 'Autonomous Car' started development in earnest when ABS (Anti-Lock Brakes) became main-stream, followed by traction control. They are the first examples of a car intervening when a driver misjudges conditions and grip. 'Tomorrow' will be very different with driverless cars coming after autonomous. This element covers the common and new technology currently available in vehicles.

When Technology Intervenes (the car) and sometimes the driver got it wrong!

Known as	Full name(s)	Intended operation
ABS	**Anti-lock Braking System Anti-skid Braking System**	*An **anti-lock braking system** or **anti-skid braking system** (**ABS**) is a vehicle system that allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding. While ABS can assist with an effective braking distance, its primary goal is to help you (the driver) to remain in steering control.*
TC	**Traction Control System**	*A traction control system (TCS) is typically (but not necessarily) a secondary function of the electronic stability control (ESC) on production motor vehicles, designed to prevent loss of traction of driven road wheels.* *TC is activated when throttle input and engine torque are mismatched to road surface conditions. Both ABS and TC will intervene while steering is occurring, helping you to maintain direction.*

Known as	Full name(s)	Intended operation
SRS Air Bags	**Supplementary Restraint System (SRS)**	*An airbag is a type of vehicle safety device and is an occupant restraint system. The airbag module is designed to inflate extremely rapidly then quickly deflate during a collision or impact with a surface or a rapid sudden deceleration.* *It consists of the airbag cushion, a flexible fabric bag, inflation module and impact sensor.* *The purpose of the airbag is to provide the occupants a soft cushioning and restraint during a crash event to reduce any impact or impact-caused injuries between the flailing occupant and the interior of the vehicle.* *The airbag provides an energy absorbing surface between the vehicle's occupant and a steering wheel, instrumental panel, A, B or C structural body frame pillars, headliner and windshield/windscreen. Air bags will generally detonate from 19kph if the car hits a solid enough object. Their deployment speed is over 200 kph hence the importance of respecting its ferocity.*
Side and Curtain air bags		*Side-impact airbags or side torso airbags (side thorax/abdomen airbags) are a category of airbag usually located in the seat or door panel and inflate between the seat occupant and the door.* *These airbags are designed to reduce the risk of injury to the pelvic and lower abdomen regions.* *Curtain shield airbags are designed to protect the front and rear occupants' heads in the event of an impact or rollover. This is why it's important to not lean against a window, as the force they deploy with is potentially catastrophic.*

EBD	**Electronic Brakeforce Distribution**	*Electronic brakeforce distribution (EBD or EBFD) or electronic brakeforce limitation (EBL) is brake technology that automatically varies the amount of force applied to each of a vehicle's wheels, based on road conditions, speed, loading, etc.* *Always coupled with anti-lock braking systems (ABS), EBD can apply varying braking pressure to each wheel in order to maximise stopping power whilst maintaining vehicular control.* *Typically, the front end carries the most weight and EBD distributes less braking pressure to the rear brakes so the rear brakes do not lock up and cause a skid.*

Known as	Full name(s)	Intended operation
ESC **DSC**	**Electronic Stability Control** **Electronic Stability Program** **Dynamic Stability Control**	*Electronic stability control (ESC), also referred to as electronic stability program (ESP) or dynamic stability control (DSC), is a computerised technology that improves a vehicle's stability by detecting and reducing loss of traction (skidding).* *When ESC detects loss of steering control, it automatically applies the brakes to help "steer" the vehicle where the driver intends to go.* *Braking is automatically applied to wheels individually, such as the outer front wheel to counter oversteer or the inner rear wheel to counter understeer.* *Some ESC systems also reduce engine power until control is regained.* *ESC does not improve a vehicle's cornering performance rather, it helps to minimise the loss of control.*
BA	**Brake Assist**	*Brake assist (BA or BAS) is a generic term for a vehicle braking technology that increases braking pressure in an emergency.* *By interpreting the speed and force with which the brake pedal is pushed, the system detects if the driver is trying to execute an emergency stop, and if the brake pedal is not fully applied, the system overrides and fully applies the brakes until the anti-lock braking system (ABS) takes over to prevent the wheels from locking up.*

AEB	**Autonomous Emergency Brake**	*Autonomous Emergency Brake (AEB) is a safety system designed to avoid or reduce the severity of a collision.* *Once the detection occurs, the systems activate autonomously without any driver input (by braking or steering or both).*
FCWS CM	**Collision Mitigation Forward Collison Warning System**	*Forward Collision Warning System (FCWS) can be used independently or in conjunction with Autonomous Emergency Brake (AEB) and is a safety system designed to reduce the severity of a collision.* *It is also known as a pre-crash system, forward collision warning system, or collision mitigating system.* *It uses radar (all-weather) and sometimes laser (LIDAR) and camera (employing image recognition) to detect an imminent crash. GPS sensors can detect fixed dangers such as approaching stop signs through a location database.* *Once the detection occurs, these systems either provide a warning to the driver when there is an imminent collision or activate autonomously without any driver input (by braking or steering or both).* *Vehicles with collision avoidance may also be equipped with adaptive cruise control and use the same forward-looking sensors.*

Known as	Full name(s)	Intended operation
Cruise	**Cruise Control**	*Cruise control (sometimes known as speed control or autocruise) is a system that may control the speed of a motor vehicle. The system is a servomechanism that takes over the throttle of the vehicle to maintain a steady speed as set by the driver. Most standard cruise controls set the minimum speed, not the maximum, so the vehicle will overrun on downhill. It can be disconnected by either braking or switching it off on the controls.*
ACC	**Adaptive Cruise Control**	*Adaptive cruise control (ACC; also called autonomous cruise control, radar cruise control, traffic-aware cruise control or dynamic radar cruise control) is an optional cruise control system for road vehicles that automatically adjusts the vehicle speed to maintain a safe distance from vehicles ahead. Control is based on information from on-board sensors. Such systems may use a radar or laser sensor or a stereo camera setup allowing the vehicle to brake when it detects the vehicle is approaching another vehicle ahead, then accelerate when traffic allows. If the vehicle's speed is set to 110 kph and it approaches a truck doing 100 kph, the vehicle will maintain a predetermined distance from the vehicle it is following. AEB works with this technology.*

	Speed Limiter	*The cruise control systems of some vehicles incorporate a "speed limiter" function, which will not allow the vehicle to accelerate beyond a pre-set maximum, this can usually be overridden by either braking or switching it off on the controls.*
APA	**Automatic Parking Assist**	*Automatic parking is an autonomous vehicle manoeuvring system that moves a vehicle from a traffic lane into a parking spot to perform parallel or angle parking.* *The automatic parking system aims to enhance the comfort and safety of driving in constrained environments where much attention and experience is required to steer the vehicle.* *The parking manoeuvre is achieved by means of coordinated control of the steering angle and speed which takes into account the actual situation in the environment to ensure collision-free motion within the available space. With the vehicle's help a suitable parking spot is located, follow the prompts and control the speed, the vehicle will do the steering.*
Hill Hold	**Hill Hold** **Auto Hold**	*This function will hold the brakes until the accelerator is applied, then releasing the brakes so the vehicle does not roll back or forward.*
Hill Start Assist	**Hill Start Assist**	*The hill-start assist is a system that prevents the vehicle from rolling away when trying to pull away on an up or down hill gradient, simulating a "handbrake hill start". The system engages automatically when a gradient is detected, it then acts to hold the vehicle stationary after the brake is released giving the driver time to apply the throttle.*

Known as	Full name(s)	Intended operation
DHA **DCS**	**Down Hill Assist** **Descent Control System**	*Descent Control System (DCS) utilises the active braking capability of the ESC to maintain a controlled speed when travelling downhill.* *When on, the vehicle will descend using the ABS brake system to control each wheel's speed.* *If the vehicle speed increases without driver input, the system will automatically apply the brakes to slow down to the desired vehicle speed.* *Cruise control buttons can adjust the speed to a comfortable level. Applying pressure to the accelerator or brake pedal will override the HDC system when the driver requires.* *The other name for this is Hill Mode Descent Control.* *Four Wheel Drive and All Wheel Drive vehicles use the automated brakes to apply effort to each wheel independently (a brake pedal can only manipulate 4 at the same rate) for a controlled descent down a hill.*

LA **LKA** **LSS** **LDW**	**Lane Assist** **Lane Support System** **Lane Departure Warning**	*In road-transport terminology, a lane departure warning system is a mechanism designed to warn the driver when the vehicle begins to move out of its lane (unless a turn signal is on in that direction) on freeways and arterial roads that have clearly marked lane lines.* *It won't steer the vehicle, but it will assist/warn the driver.*
LK	**Lane Keeping Assist** **Self-Steering**	*Lane keeping assist is a feature that, in addition to the lane departure warning system automatically take steps to ensure the vehicle stays in its lane.* *Some vehicles combine adaptive cruise control with lane keeping systems to provide additional safety.*
Blind Spot **BSD** **RCTA**	**Blind Spot Checker** **Blind Spot Warning** **Blind Spot Alert** **Blind Spot Detection** **Cross Traffic Alert** **Rear Cross Traffic Alert**	*The blind spot monitor is a vehicle-based sensor device that detects other vehicles located to the driver's side and rear.* *Warnings can be visual, audible, vibrating, or tactile.* *However, blind spot monitors are an option that may do more than monitor the sides and rear of the vehicle.* *They may also include "Cross Traffic Alert", which alerts drivers manoeuvring (vehicle does not have to be backing) out of a parking space when traffic is approaching from the sides.*

Known as	Full name(s)	Intended operation
DAD	**Driver Attention Detection** **Driver Monitoring System**	*The Driver Monitoring System, also known as Driver Attention Monitor, Driver drowsiness detection is a vehicle safety system that co-operates with the Pre-Collision System (PCS).* *The system uses sensors to monitor driver attentiveness.* *If the driver is not paying attention to the road ahead and a dangerous situation is detected, the system will warn the driver by flashing lights, warning sounds, vibrating the steering wheel.* *If no action is taken, the vehicle will apply the brakes (a warning alarm will sound followed by a brief automatic application of the braking system).* *A very clever method of observing the drivers' eyes and head movements. Even the retina is being observed.* *Once the system detects drooping eyes, slow and regular blinking and wobbling head, the seat and steering wheel will shake to alert the driver with a warning regarding their alertness levels.*

AVs	**Autonomous Vehicles** **Driverless Vehicles**	*Most modern vehicles have some form of partial automation, while a growing number now offer advanced systems such as adaptive cruise control, and self-parking capabilities that are becoming increasingly common.* *The term 'driverless' refers to all vehicles which have higher levels of automation, beginning at the point where a driver may not need their hands on the steering wheel, but is ready to take over control, right through to where a vehicle doesn't need a driver and may not even have a steering wheel.* *As technology evolves, autonomous vehicles will continue to use a variety of technologies to monitor their surroundings, such as radar, laser light, GPS, odometry and computer vision.* *Advanced control systems will be able to interpret sensory information to identify the most appropriate navigation path, as well as detect obstacles and relevant signage.* *There are six distinct levels of car control on the journey towards fully autonomous vehicles, ranging from no automated technology right through to vehicles that can operate without anyone, and may not even have a steering wheel.* *0 - No Automation* *1 – Driver Assistance* *2 – Partial Automation* *3 – Conditional Automation* *4 – High Automation* *5 – Full Automation* *Vehicles cannot legally operate in highly or fully automated driving mode on public roads due to existing legal barriers.*

Known as	Full name(s)	Intended operation
CAV	**Connected Autonomous Vehicles**	*Connected autonomous vehicles communicate to one another and with roadside infrastructure, as well as in 'Vehicle to Everything' communications (V2X).*
EV	**Electric vehicles**	*Electric vehicles (EVs) have a battery instead of a gasoline tank, and an electric motor instead of an internal combustion engine, and the battery needs to be recharged.* *Charging depends on how far you drive each day; you may be able to meet all of your driving needs by plugging in only at night.* *Most EVs can be charged with a standard 240 V outlet or a dedicated faster charging system.*

Hybrid	**Hybrid Petrol/Electric**	*A petrol-electric hybrid most commonly uses an internal combustion engine (using a variety of fuels, generally petrol or diesel engines) and an electric motor to power the vehicle.* *The energy is stored in the fuel of the internal combustion engine and an electric battery set. There are many types of petrol-electric hybrid drivetrains, from parallel hybrid, series hybrid to mild hybrid, which offer varying advantages and disadvantages.*
PHEV	**Plug in Hybrid Electric Vehicle**	*Plug-in hybrid electric vehicles (PHEVs) are powered with electricity and fossil fuel.* *Like electric vehicles, plug-in hybrid electric vehicles (PHEVs) have a battery and an electric motor, but PHEVs also have a fuel tank and an internal combustion engine.* *Some PHEVs operate exclusively, or almost exclusively, on electricity until the battery is nearly empty, then fuel is burned in the engine to provide additional power.* *Other PHEVs sometimes called "blended mode" use both fuel and electricity to power the vehicle while the battery is charged.*

Road Rage

When anger boils over into irrational behaviour, there is no predicting the outcome. It takes your mind away from what you should bedoing. Stay away from Road Rage!

Defusing a situation:

- From the safety of your cabin, mouth the words 'Sorry' and move on.
- Do not engage in their behaviour.
- Leave the road you are on to separate yourself from the protagonist.
- If you must stop, do so in a busy place like a fuel station.
- Drive to a police station.
- Dial the police.

If you are approached:

- Close windows and lock doors.
- Dial in the police '**000**' and prepare to call.
- It is very hard to break a window even with a tyre lever or bat.
- Leave a space between you and other traffic (if stationary) so you can drive away.

Four Wheel Drive

Four-wheel driving (4WD) is not common for business as the vehicles are used mostly in a recreational environment. Some professions do require a basic skill level in four-wheel drive applications, consisting mainly of driving on flat ground, driving on paddocks, oil/gas, mining and power companies. The element in this manual is introductory only, however, ADI does deliver one of Australia's most comprehensive accredited (and non-accredited) programs.

General advice:

- 4WD's are not cars (high centre of gravity and reduced performance)
- Slow first. Low range and first gear at idle provides maximum torque at minimum revs
- Reducing tyre pressures will:
  - Spread the load over a greater area
  - Allow the tyre to form around sharp objects
  - Act like the tracks on a tank for sand
- Wheel spin is the natural enemy of grip, all you are doing is digging holes
- On rare occasions, very mild wheel spin can clear the road and then provide marginal grip
- Using speed (momentum) has very limited advantages and can take you beyond natural grip

This gravel, public road is typical in Australia:

- Small amount of rain has soaked in
- Hard crust has broken through
- 1st driver leaves a sign for others
- Getting bogged in this is either:
  - Ignorance
  - Being fool hardy
- To get bogged on a damp paddock is easier and yet, avoidable

Creek crossings

Safety first! Do not proceed if there is another alternative.

Things to consider:

- How deep is the water? If you must proceed, check the depth first. This may mean wading through the water.
- How fast is the water flowing?
- What is the condition of the road leading up to and under the water?
- What is the exit like?
- Can I get out after I cross the creek?

Alcohol and Drugs

Since the dawn of time, drugs of various types (including socially acceptable alcohol) have been an unfortunate part of driving. The facts surrounding drugs and alcohol have not been kept a secret and now we reinforce what we already know and present some new facts.

Alcohol

Most corporations have banned any (Blood Alcohol Concentration) BAC to be present in the system while driving for the company.

Alcohol reduces your ability to drive safely. It affects your coordination, judgement, vision and your reflexes.

Be aware that alcohol can:

- Affect decision making
- Affect your concentration whilst driving
- Increase your reaction time
- Affect your vision
- Make you feel more confident, increasing the chance of you taking unnecessary risks
- Relax you, increasing your chances of falling asleep whilst driving
- Make simple tasks more difficult

Beware; you can also be affected the following day!

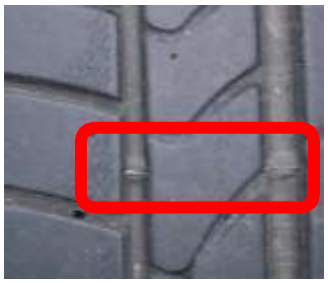
Drugs, Medicinal and Illegal,

Driving under the influence of drugs is extremely dangerous and will affect your driving ability. Drugs can affect your driving by;

- Reducing the ability to judge distances and speed, coordination and concentration
- Distorting of your perception of time, place and space
- Aggressive behaviour, paranoid psychosis, hallucinations & unconsciousness
- Blurred vision, convulsions, fatigue and memory loss

Tyres

Tyres are the only point of contact your vehicle has with the road and their condition is critical. You can determine their condition three ways.



a. *Pressures are often the first consideration. You check this by placing a gauge over the valve stem. This will have a dust cap that must be removed first. The actual pressure will vary from vehicle to vehicle and task to task. This is expanded on shortly.*
b. *Wear levels, this is checked by the wear bars. These are found by locating the small arrows on the sidewall and these in turn locate the wear indicator. If these are exposed, the tyre is now 'unroadworthy' and needs replacing.*
c. *Wear characteristics. How the car is driven is shown in its wear. Aggressive and excessive driving will wear as it is used. Careful driving will show limited damage and no flaring on the edges of the front tyres.*
d. *Free tyre checks are available from any Bridgestone Select, or Bridgestone Service Centre & Tyre Centre.*

It's a myth that car makers have a reduced pressure for comfort. They are trying to meet a balance of stability, control and then comfort. Tyre design plays a huge part in tyre suitability and fitting something less than design intended is not recommended.
Only ever put the recommended amounts of pressure in for the task.

Manufacturers have recommended pressures for various conditions including speeds and loads. Only approved tyres can be fitted to a Fleet SA vehicle.

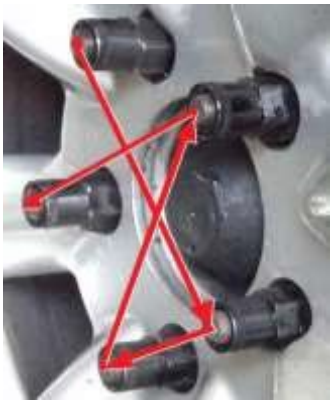
Pressures must be changed for loads and if you are doing high speeds. This is on the tyre placard often inside the driver's door, door frame or even the fuel filler flap. Failing that, look at the driver's manual.

Changing a Tyre

Changing a flat tyre can be difficult and hazardous. For this reason, some organisations don't allow the custodians of vehicles to change a wheel. For the organisations that allow it, the following information is a step by step guide.

Ensure you are on a flat surface

1. **Secure the car** on a safe, level ground. Apply park brake and Park (or in gear).
2. **Fit a wheel chock** to the diagonally opposite wheel to the one being changed.
3. **Get out the tools:**
    a. Jack
    b. Wheel brace
    c. Spare tyre (place under the car to prevent a crushing hazard)
4. **Loosen nuts** (go with gravity). Consider using your foot on the wheel brace (hold onto the car!).
5. **Fit jack** where the instructions suggest to and raise the car.
6. **Take off all nuts** and keep them out of the dust/dirt and together.
7. **Wiggle the wheel off the hub** and place it under the car to prevent a crushing hazard.
8. **Drag out the good wheel** and place it on the hub.
9. **Fit the nuts** (if possible, by finger) while ensuring the wheel is flush against the hub.
10. **Using the wheel brace**, tighten the nuts in a star pattern (Opposing nuts) to help align the wheel equally.
11. **Remove the flat tyre** from under the car.
12. **Lower the car with the jack** and retighten the nuts with the brace.
13. **Refit hub cap**.
14. **Put tools away** including the wheel chocks
15. **Put tyre to be repaired** in the boot and get it fixed.
16. **After 20 km**, re-check the nuts as the heat and movement can loosen them.



Safe use of jack

Changing a flat tyre is as easy as it is risky. Jacks can collapse with little notice; ground can give away and the nuts can be stuck. The first thing to do is check the manual if your vehicle has any specifics regarding a tyre change.

1. Stop on the hardest, flattest ground available
2. Place the vehicle in first gear (if in 4wd, select Lo)
3. Switch the vehicle off and remove the keys from the ignition
4. Apply the hand brake
5. All passengers must be out of the vehicle during entire process
6. Do not jack a vehicle with a trailer attached
7. Place jack under 'jacking point' (use a base plate)
8. Do not start engine while jack is supporting vehicle
9. Remember that any unnecessary driving of the car whilst the tyre is flat can result in further damage to both the flat tyre and rim.

There are several types of jacks available. Not all are suitable for changing spare wheels. There are also jacks that are used as equipment aiding the recovery of immobilised vehicles.

Scissor Jack

The scissor jack is only suitable for light vehicles. It requires a handle which winds the jack up. The jack must be placed on pre-determined positions on the vehicle. Their lifting height is limited which is why it is not suitable for 4wd

Adverse Conditions

Adverse conditions are when the environment changes from ideal to poor. Snow usually requires chains (or a 4wd/awd) but the common risks need more thought more often.

Fresh snow

Black Ice

Snow is better than ice! Ice is more prevalent in Australia and we call it 'black ice':

- It is difficult to see.
- Often in the shade in mornings.
- Ice can form in low points like creeks and rivers.
- It will also form on hill tops with exposure to wind.
- Slow is the key, very slow (5kph).

Rain and wet roads are two separate subjects

- Puddles need to be either avoided or taken slowly.

What are the obvious hazards?

What is the driver doing wrong here?

Wet Roads normally present a greater risk than raining on a road.

- This is when the rain has stopped, leaving the water to settle.
- Surface tension of water will incite aquaplaning at low speeds.

When rain stops, the road is tens of thousands of these!

Rain falling will break the surface tension

- A tyre will penetrate more easily to make road contact
- Less than 50% tread wear will be a problem

Flooded roads need careful consideration **"If it's Flooded, Forget it!"**

What would you need to consider before entering the road above and what could go wrong?

Did you know:

There is a $1000 fine per tyre for any vehicle that passes this sign. It will void your insurance too.

Fire

Do not proceed. Take advice from emergency workers. Tune into local radio or access CFS/CFA websites, social media etc.

Dust storms present unusual hazards

- Vision can be reduced to less than 5 metres
- Dust entering the engine bay
- Park at an angle to the road to be more easily seen
- Trucks tend to continue driving, this is unsafe

<u>Consider your surrounds at all times, don't get consumed by one hazard</u>

- Never overtake in dust
- If you can't see, pull over until it is safe to continue

Bicycles

Bike riders are legitimate road users and need to adhere to the laws of the road as all road users must.

A Comment from ADI about bikes: with the combination of bikes and cars in Europe where congestion and speeds are far greater, there is more unity. We see, hear and observe behaviour between the two where it's often a case of one being a protagonist and the other engaging. It is the people who are the problem.

It makes good sense for riders to reduce their exposure and limit congestion.

It makes good sense for drivers to respect that their fellow human has no protection and requires drivers to act in a more considerate fashion.

When law fails, let physics take over and those few seconds won't impact negatively on your day. If you are in a hurry because you left late, that is your problem and therefore it is wrong to make it everyone else's as well.

- 60 kph = 1 metre
- Over 60 kph = 1.5 metres
- Overtaking on double solid lines is allowed when safe.
- Be mindful of double standards regarding law

A humorous road painting in the USA.

Trailers and Towing

1. The fitting of any ancillary items (like roof racks and trailers) comes with heightened risk.
2. You must be conscious of a few things as you are taking responsibility as the driver to ensure the combination is safe and durable for driving, even in an emergency.
3. A trailer must be secured to the towing vehicle;
    a. *The trailermust be secured to the tow bar, often done by lowering the trailer via the jockey wheel and its handle.*
    b. *The tow ball weight must not exceed the vehicle manufacturer's recommendation / specification.*
    c. *Do not overload the trailer.*
    d. *Ensure the loaded trailer and vehicle do not exceed the Gross Combination Mass (GCM). This is the maximum weight allowed for your vehicle and trailer combined, as specified by the tow vehicle's manufacturer.*
    e. *The ball and coupling on the trailer are the same size (normally 50 mm ball)*
    f. *A chain must be fitted and when there are 2 chains, they must be crossed over.*
    g. *A bow shackle that is rated for the load must be used*
    h. *The electrical system is connected and working.*
    i. *The wheels are in good order with suitable tyres and pressures.*
    j. *Wheel bearings are in good order with no slack.*
    k. *Is there a spare tyre, and do you have the tools for it?*
4. Braking systems vary from mechanical to hydraulic to electric. Electric brakes must be adjusted manually and will be different with and without a load.
5. A load within the trailer must be secured so that if you must brake heavily from 100 kph, the load will not move at all.
6. A load on a trailer cannot be metal on metal, if this is the case a rubber mat is best to increase the grip.
7. In the event of a roll over, the load on the trailer must remain secured to the trailer.
8. Nothing is permitted to come free or be pulled free (this is the same for loads in utility vehicles).
9. Lose items in utility vehicles or trailers can attract a fine of $360 per item.
10. To uncouple, reverse the process secure the trailer with a chock or brick, disconnecting the electrical connection, unlock the coupling (where the handle is) and wind up the jockey wheel. Undoing the chains last will prevent the trailer from rolling away if you haven't secured it correctly. The trailer must be secured to stop it moving or rolling when uncoupled from the vehicle.

Trailers and reversing.

1. If you are nervous about this, you're not alone and it's a myth that it's easier to do with only mirrors, this takes practice.
2. Turn in your seat and do what would otherwise be considered inappropriate steering (one hand near 12 o'clock) so you can look at the actual picture of reversing a trailer. More of a steering angle can be gained with less hand movement and you will know where 'centre' is intuitively.
3. You will get it wrong but go slow and you can improve.
4. Firstly, imagine you are facing the draw bar (where the coupling is or the tip of the triangle).
5. Now imagine you are going to move it like a wheelbarrow, the draw bar needs to be moved to the right for the unit to go left.
6. When you move into the car, you will need to do the same; steer away to get the angle you want.
7. Reduce the steering to match the radius you want. If you go back too far in steering, the unit will straighten up.
8. To rely only on mirrors for reversing is a skill that takes many hours of practice and the driver may have a truck driving background. There are also physiological differences between people who can judge distances more easily using this 2 dimensional method, often turning your head gives you a better and 3 dimensional view.
    i. *With your mirrors set to the narrow setting, start reversing in a straight line.*
    ii. *If you want to go left, steer gently, but early to the right and the trailer will gradually appear more and more in the left mirror. If you want less trailer in that mirror (to either straighten or go right, turn towards left mirror until it disappears from the left and moves into the right mirror.*
9. Judging distance is much harder and you may need help or a 3rd party.

Roundabouts

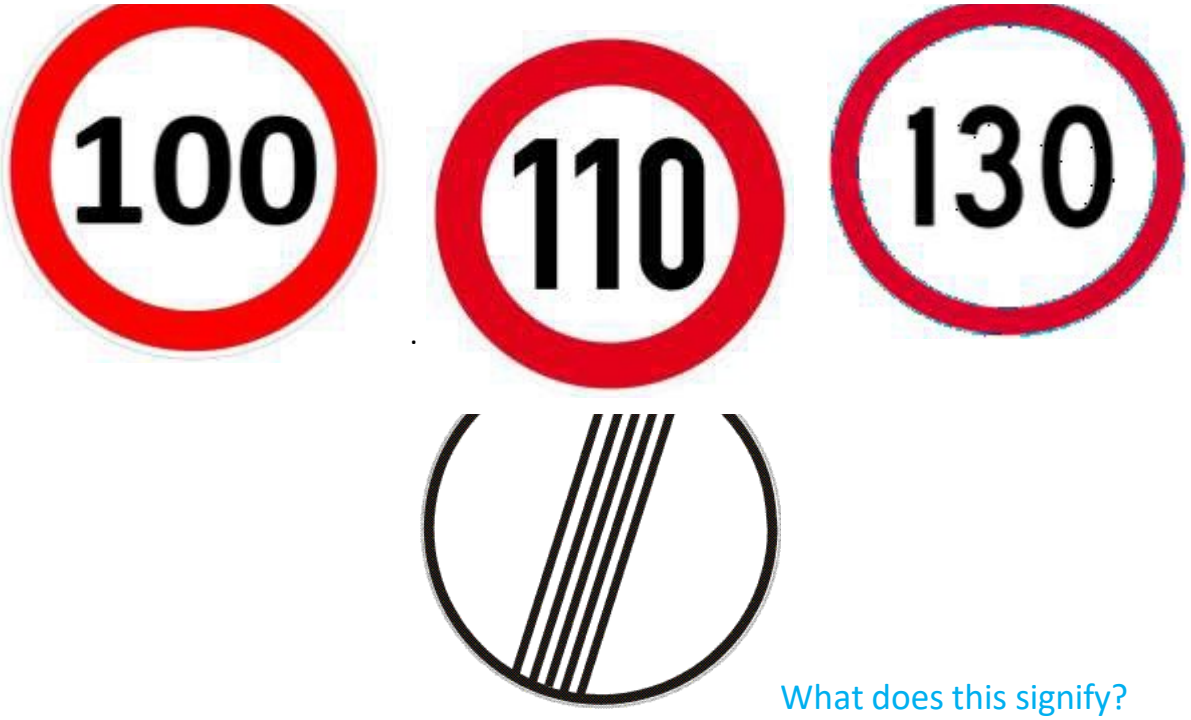
1. Always indicate to exit.
2. Driving straight on, indicate left to exit.
3. Turning left, indicate left.
4. Turning right, indicate right, then left to exit.
5. Give way to any vehicle on the roundabout and approaching from the right.

Road Law FAQ's

Australia is an island nation of just eight jurisdictions when it comes to road rules and we drive in accordance with the Australian Road Rules (ARR's). Each jurisdiction, however, has insisted on setting some little differences to their own rules separate to other jurisdictions.

Speed Limits

The state speed limits are 100 kph unless otherwise specified with the exception of WA and NT. In WA the default state speed limit is 110 kph



What does this signify?

In the NT, the default speed limit is 110 kph unless otherwise specified, and in parts of four highways; The Barkly, The Victoria, The Arnhem and The Stuart, drivers are allowed to travel up to 130 kph. Open limit speeds for the NT are varying depending on the Government in power and is currently not permitted (2018)

In all states, there is a common default limit in a built-up area of 50 kph unless otherwise specified.
In SA, there is a speed limit of just 25 kph in school zones (40 kph in most states) and past an emergency vehicle which has its red and blue lights flashing (again, 40 kph in most states). Emergency vehicles are MFS, Ambulance, Police, CFS and SES.

Painted Median Strips

Generally in SA and NT, a painted median is bordered by a single continuous line. In other states, that line is more commonly a double continuous line. Apply the same rules as for dividing lines on a road, a single you can cross to drive onto the median to then enter or leave the road, but a double you cannot cross.

U-turns

U turns are probably the one area where you will find the greatest variation between our states. In all states – **except Victoria** – it is not permissible to do a U-turn at traffic lights unless there is a sign which permits U-turns. In Victoria, you can do a U-turn at traffic lights unless a sign prohibits you from doing so. In all states – **except WA** – it is not permissible to do a U-turn across a solid or continuous dividing line, but WA will allow this – even across double continuous lines.

Vehicle positioning on multi lane roads

Vehicle positioning on multi-lane roads is the same throughout the jurisdictions, even though the wording of the law is different. Some say speed limits of 80kph or less - others say 90 kph or more – it all turns out to be the same in practice.

In essence, drive in any lane you choose if the speed limit is 80 kph or below. When the speed limit is greater than 80 kph ***or*** if there is a sign that says "keep left unless overtaking", it is an offence to simply drive in the right lane except for the following four reasons:

- To overtake
- To turn right
- To avoid any form of obstruction
- The road is so busy that it is impractical not to use all lanes

Bus Lanes/Bicycle Lanes

A driver is permitted to drive in a Bicycle Lane for up to 50 metres to enter or leave the road or to avoid an obstruction. Remember that the bicycles should be given priority.

A driver is permitted to drive in a Bus Lane for up to 100 metres to enter or leave the road or to avoid an obstruction. Remember the bus has priority.

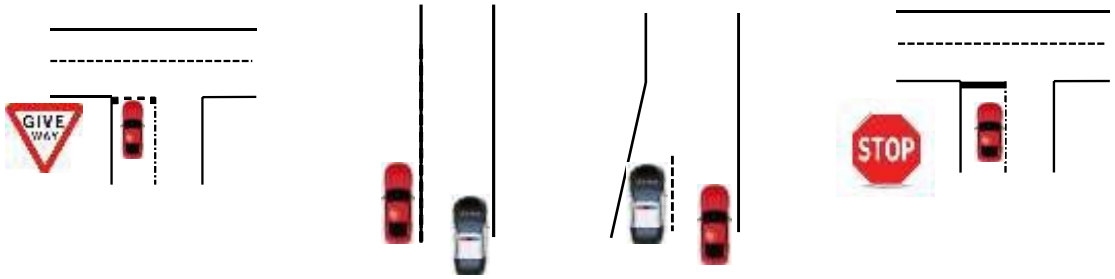
The HIERARCHY OF GIVE WAY

When a driver of a vehicle is approaching any intersection or junction, the rule for giving way should be considered in this order.

Traffic Lights

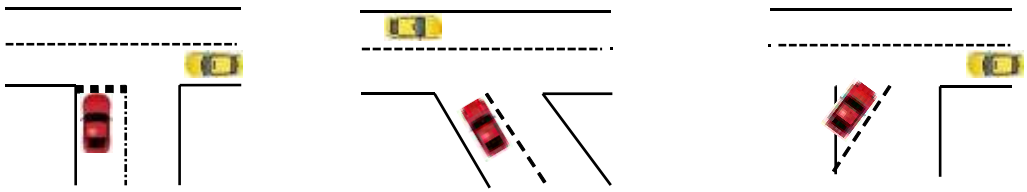
Obey traffic light rules and vehicle turning to the right rule below

Signs or Lines

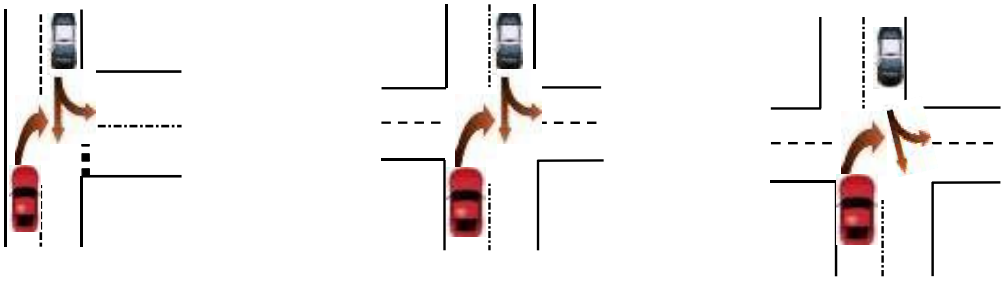


T Junction rule

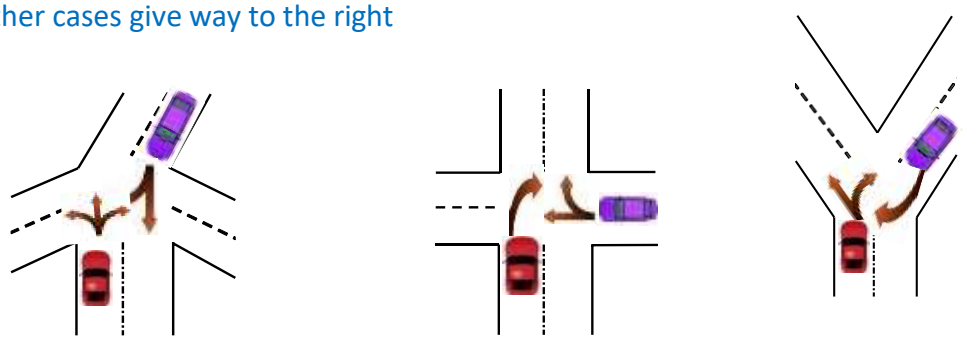
There must only be one terminating road



Vehicle turning to the right must give way to vehicle coming from the opposite direction



In all other cases give way to the right



The Decision is Yours

Today, we have done our best to improve your knowledge, fill in the gaps compared to World's Best Practice and help you to better understand subjects you wanted to learn more about.

There is only so much we can do. Now it's up to you when deciding how you drive.

By applying yourself for the next few weeks, the skills and attitudes will become habit. You will notice your travelling time will improve, your heart rate will be lower, and your driving will become measurably safer. Now you will be world class.

The chances of a crash are relatively low, however the consequences significant. We have given you the knowledge required to have a crash-free life and by applying very simple, repeatable techniques, you will at least reduce the risks.

- Be mentally ready
- Set your cabin correctly
- Keep your distances
- Look up and plan
- Avoid distractions
- Remain vigilant

The question is, to crash or not to crash?

To drive correctly is a choice……so you decide.