

Developing your skill at cornering

Cornering – driving a car round a corner, curve or bend – is one of the main driving activities, and it is important to get it right. When you corner, your vehicle loses stability and you place extra demands on the tyre grip available. The faster you go and the tighter the bend, the greater these demands are.

This chapter explains how to apply the system of car control to cornering, starting with some general principles and then going on to look at the forces involved in cornering, the factors affecting your vehicle's ability to corner safely, and how to use the system of car control in conjunction with limit point analysis to corner safely.

See Chapter 3 *The system of car control*, page 50.

Using the system to corner safely

Cornering is potentially dangerous so you should use the system of car control to help you carry out the manoeuvre safely. Each phase of the system is relevant but processing information is especially important. Correctly assessing the severity of the bend is essential for safety.

Four key principles for safe cornering

- Your vehicle should be in the correct position on the approach.
- You should be travelling at the correct speed for the corner or bend.
- You should have the correct gear for that speed.
- You should be able to stop safely within the distance you can see to be clear.

Over half of all fatal accidents for drivers under 30 are the result of the driver losing control on a bend or a curve.

Applying these principles to the variations in bend, visibility, traffic conditions, road surface conditions, and other factors calls for good judgement and planning. Before looking in more detail at using the system of car control for cornering, think about the factors that affect a vehicle's ability to corner safely.

The faster you go into a corner or bend the more tyre grip you need to keep your position.

If one or more of these forces causes loss of tyre grip, the vehicle will continue in a straight line rather than turning. So in a left-hand bend, as you lose tyre grip, your vehicle drifts to the right of your intended position and in a right-hand bend it drifts to the left. The design of the vehicle will reduce or increase this effect.

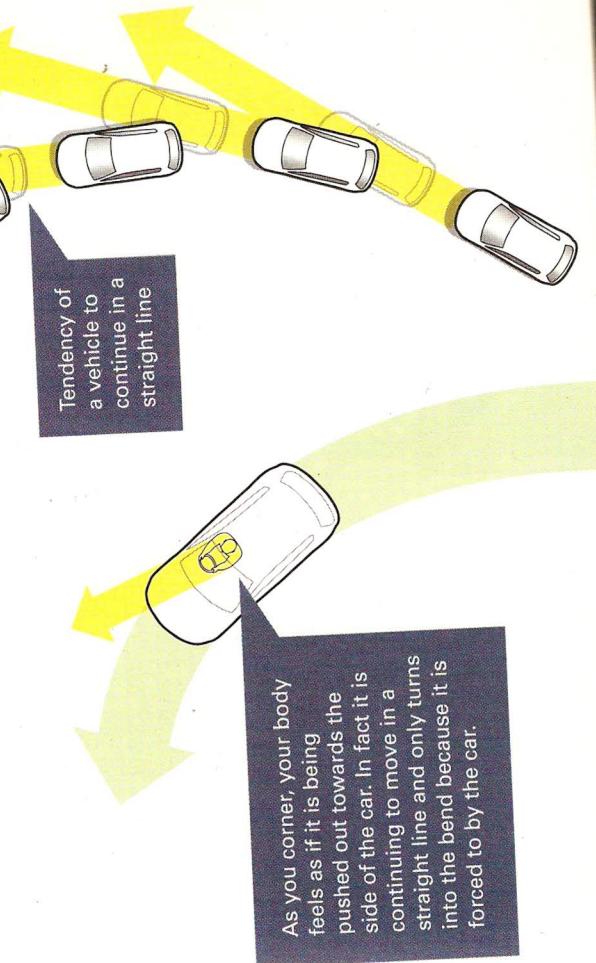
Cornering forces

A moving vehicle is most stable when its weight is evenly distributed, its engine is just pulling without increasing road speed, and it is travelling in a straight line. It will continue to travel in a straight line unless you apply some other force to alter its direction. When you steer, the turning force to alter direction comes from the action of the front tyres on the road. You saw in Chapter 4 that this force depends on tyre grip. If the front tyre grip is broken, the car will continue in a straight line. On tighter bends, at higher speeds and in heavier vehicles, the demands on tyre grip are greater.

Three forces reduce tyre grip:

- steering
- accelerating
- braking.

The more you brake or accelerate the less tyre grip you have for steering.



As you corner, your body feels as if it is being pushed out towards the side of the car. In fact it is continuing to move in a straight line and only turns into the bend because it is forced to by the car.

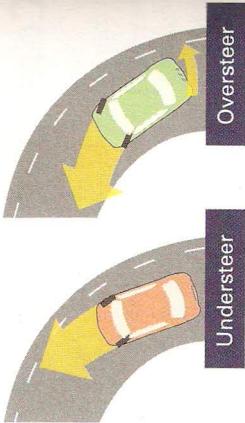
Vehicle characteristics

Roadworthiness

Vehicles vary in their ability to corner, and they only corner to the best of their ability if they are well maintained.

Steering, suspension, shock absorbers, tyres, tyre pressures and the loading of the vehicle all affect its balance and tyre grip when cornering. Position loads evenly so they don't upset the balance of the vehicle.

Make sure that your vehicle and tyres are in good condition and that you keep your tyre pressures at the recommended levels.



Four wheel drive cars provide better tyre grip all round but when driven to extremes they behave in a similar way to the front or rear wheel drive model from which they are derived.

Camber and superelevation

Overshoot

response to a given turn of the steering wheel. The tendency to understeer or oversteer is a characteristic of the vehicle itself and depends mainly on what sort of drive the vehicle has. Most front wheel drive vehicles understeer and some rear wheel drive vehicles oversteer. However, some modern vehicles are designed to compensate for these tendencies. Make sure you know the different steering characteristics of each vehicle you drive and adapt your driving on corners and bends.

In a front wheel drive car, you will increase understeer if you:

- enter the bend too fast
- apply too much power in the bend
- steer too sharply.

You can reduce this understeer by reducing power and/or steering. But if you reduce power too much and too suddenly, you may convert the understeer to oversteer (known as 'lift-off oversteer').

A rear wheel drive car initially behaves in the same way, but if you apply too much power on a slippery surface any understeer may convert quite suddenly to oversteer. Correct the steering promptly in the opposite direction to the bend.

Superelevation is where the whole width of the road is banked up towards the outside edge of the bend, making the slope favourable for cornering in both directions (similar to banking on a race track).

Observe how camber affects your steering

On your next journey, observe the camber whenever you corner. Notice how it affects the steering and balance of your vehicle. Pick out one or two sections of familiar road where cornering is tricky and work out whether unexpected camber is a factor.

Summary of factors affecting cornering

The factors that determine your vehicle's ability to corner are:

- speed
- the amount of steering you apply
- the amount of acceleration and/or braking
- the characteristics of the vehicle
 - the slope across the road surface – camber and superelevation
 - the road surface and how the weather has affected its grip.



Understeer and oversteer

Understeer is the tendency of a vehicle to turn less, and oversteer is the tendency of a vehicle to turn more in

The system of car control and the limit point

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Roadcraft

limit point is where the edge of the road meets the central white line (or the centre of the road if there is no white line). To drive safely you must be able to stop within the distance you can see to be clear – that is, the distance between you and the limit point. The more distant the limit point, the faster you can go because you have more space to stop in; the closer the limit point, the slower you must go because you have less space to stop in.

As you approach and go through a bend the limit point appears at first to be stationary, then to move away at a constant speed and finally to sprint away to the horizon as you come out of the bend. Watching the limit point enables you to match your speed to the speed at which this point appears to move. If it is moving away from you, you may accelerate. If it is coming closer to you or standing still, you must decelerate or brake. Even when the bend is not constant, you can still match your speed to the apparent movement of the limit point, because this will vary with the curvature of the bend. Acceleration sense is useful here. Using the limit point together with the system helps you:

Be aware of the foreshortening effect when you go uphill or downhill. The slope will make the limit point look nearer than it is so that it will take longer to reach.

How to use the limit point to help you corner

The limit point is the furthest point to which you have an uninterrupted view of the road surface. On a level stretch of road, or on a right-hand bend, this is where the right-hand edge of the road appears to meet the left-hand edge in the distance. On a left-hand bend, the

The system of car control helps you plan how to approach and negotiate corners and bends. Information processing and the four phases of the system – position, speed, gear and acceleration – are the key factors that you must consider when cornering.

As you approach a bend, seek as much information as possible about the severity of the bend using all the observational aids and clues available to you (weather, road surface, road signs, road markings, the line made by lamp posts and trees, the speed and position of oncoming traffic, the angle of headlights at night, etc.). The limit point gives you a systematic way of judging the correct speed to use through the bend.

Be aware of the foreshortening effect when you go uphill or downhill. The slope will make the limit point look nearer than it is so that it will take longer to reach.

- adjust your speed so you can stop safely within the distance you can see to be clear
- decide the correct speed to approach and negotiate the bend
- assess the correct speed to go round the bend, selecting the correct gear for the bend
- decide the point at which to start accelerating.

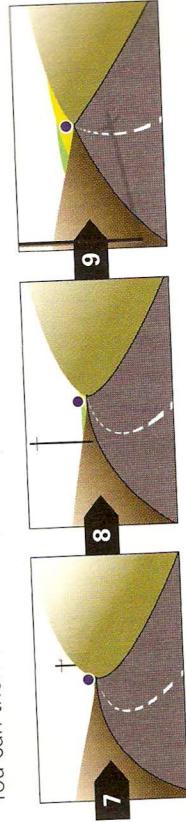
Using the limit point

Read the diagram from the bottom of the page upwards

Coming out of the bend

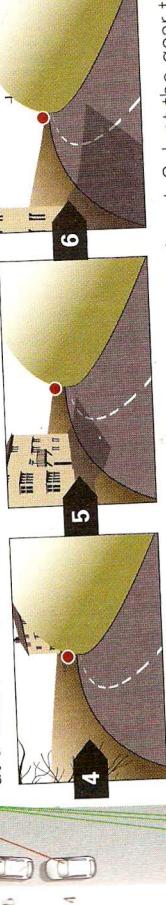
As the bend starts to straighten out your view begins to open up, and the limit point ● starts to move away more quickly.

You can then accelerate steadily as you straighten your steering.



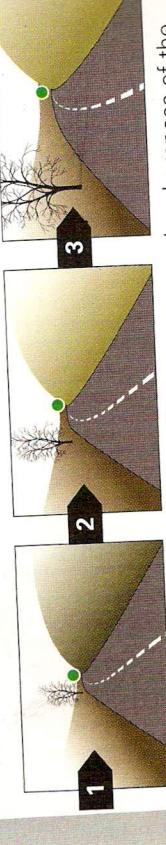
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Approaching the bend

At first the limit point ● appears to stay at the same point in the road. Adjust your speed so you can stop safely within the remaining distance.



As you approach the bend take information about the sharpness of the bend and carefully assess the appropriate speed for cornering.

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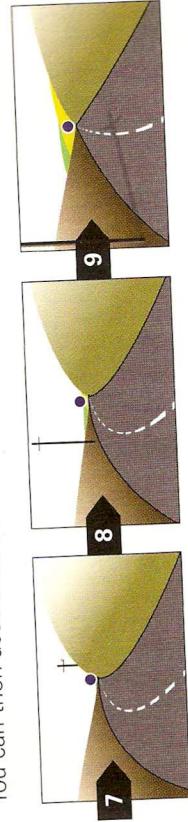
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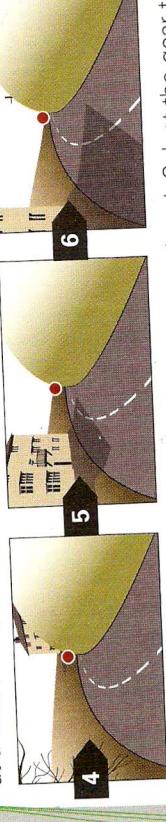
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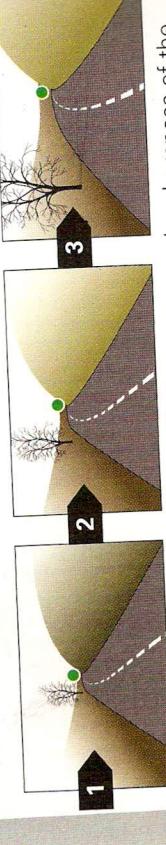
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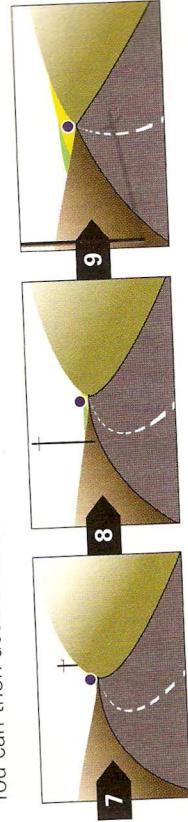
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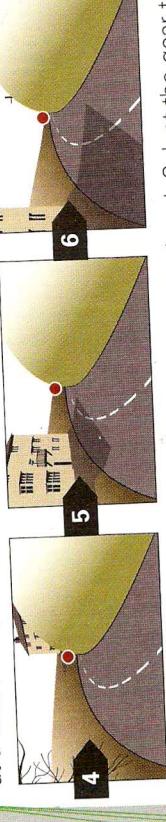
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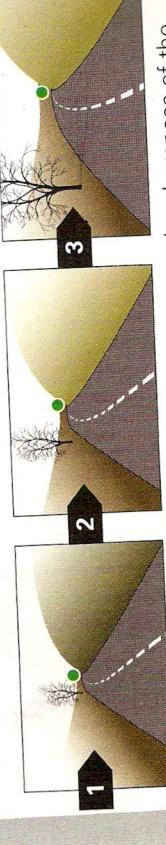
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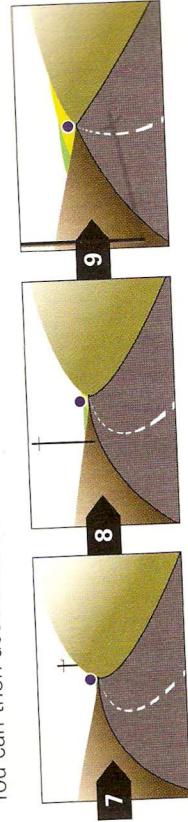
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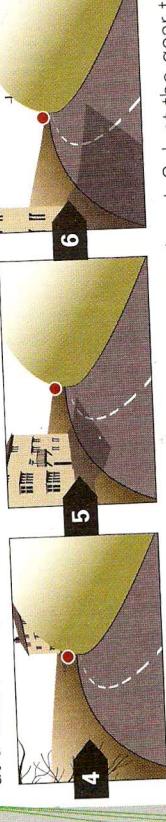
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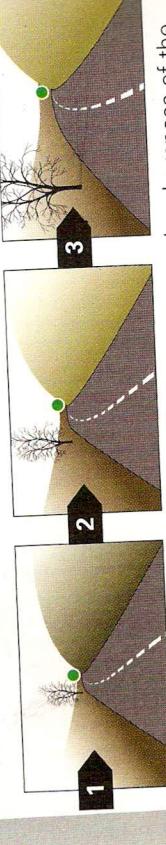
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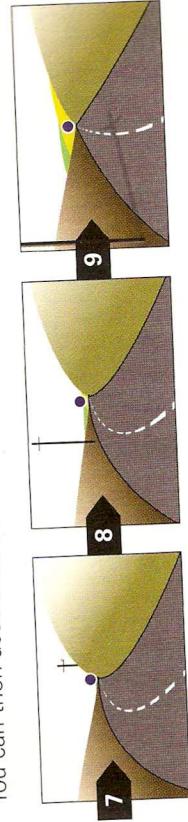
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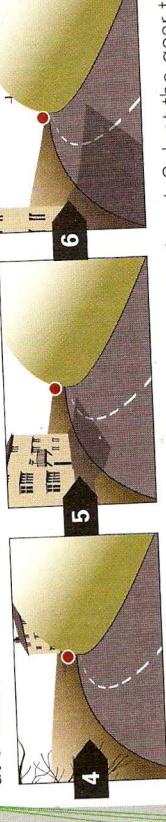
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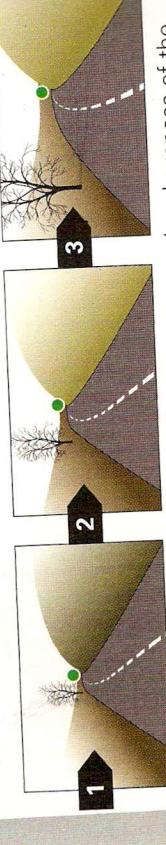
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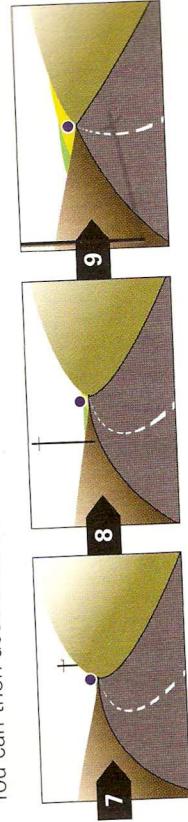
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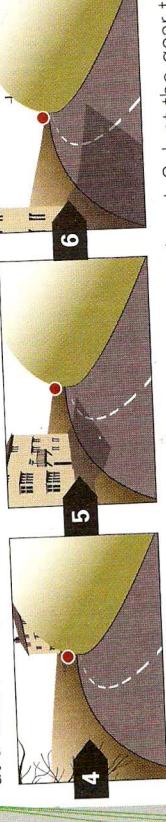
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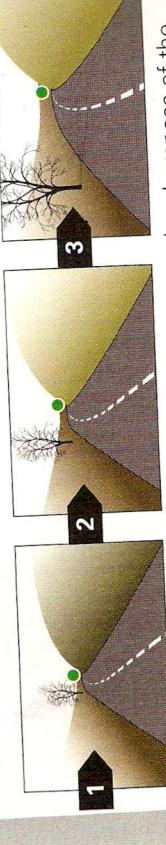
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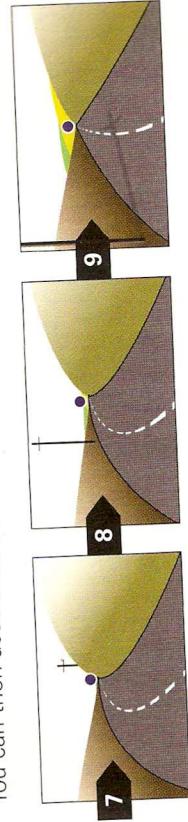
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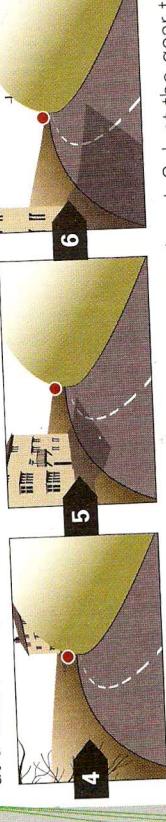
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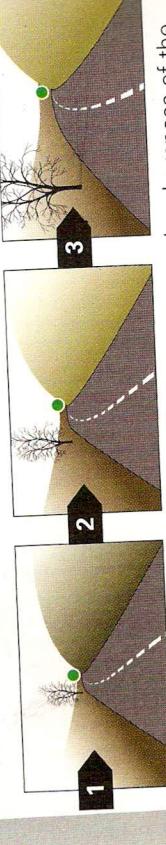
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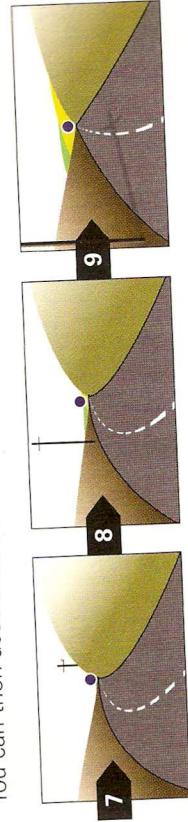
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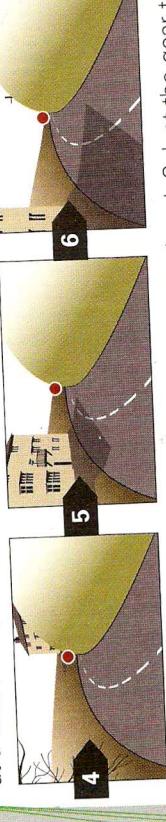
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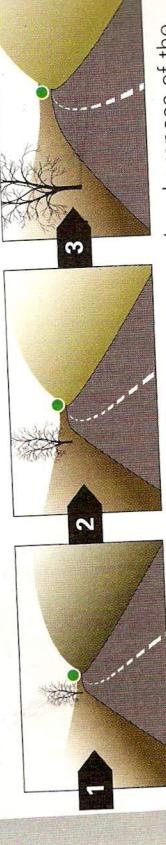
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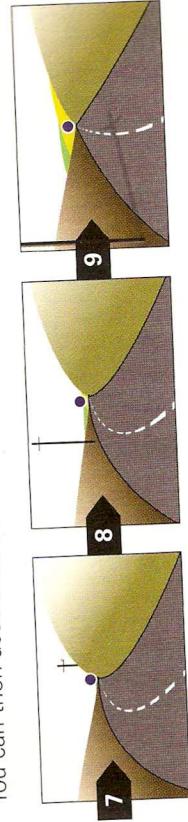
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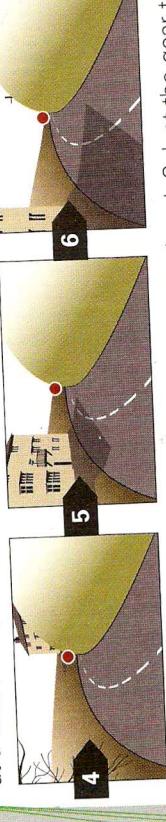
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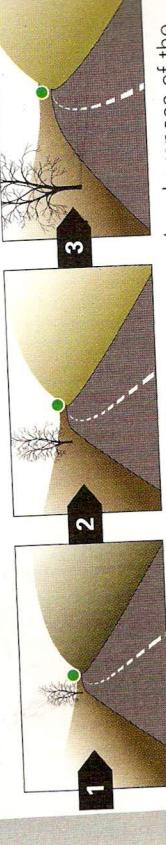
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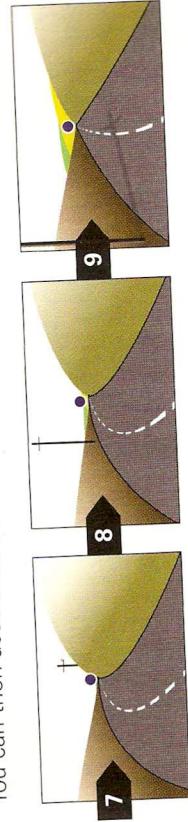
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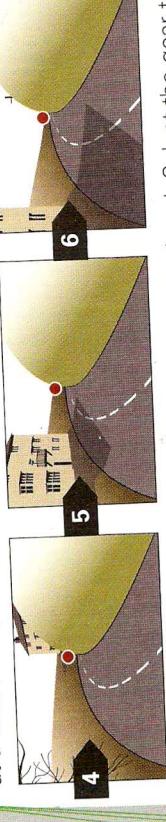
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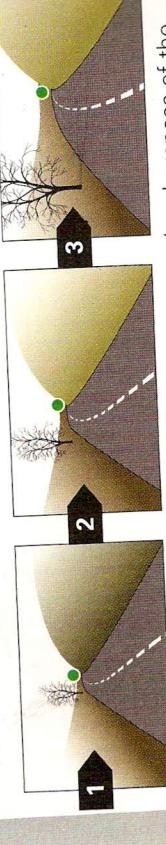
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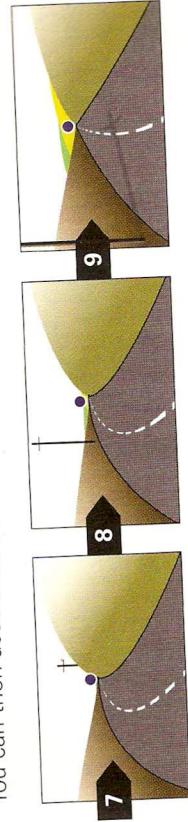
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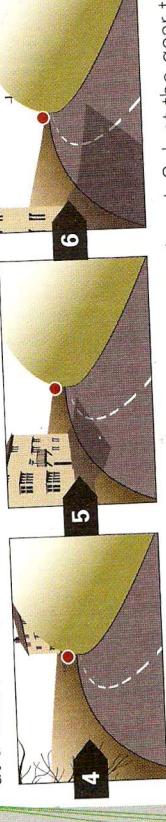
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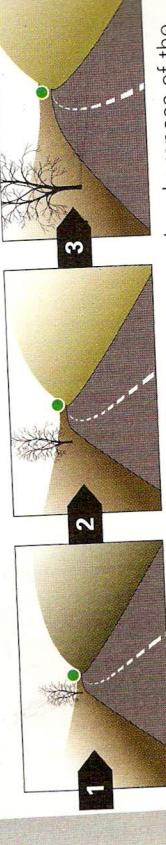
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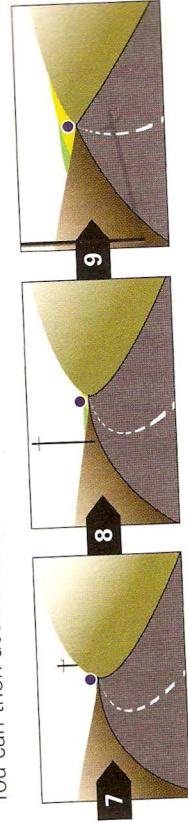
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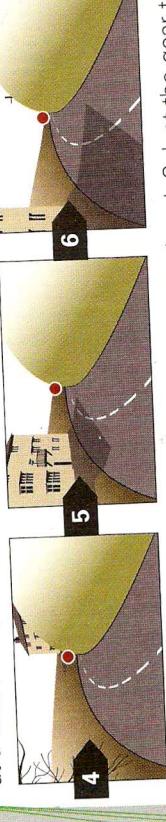
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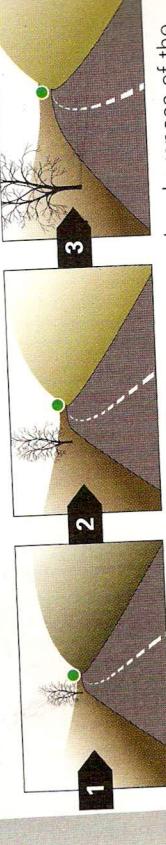
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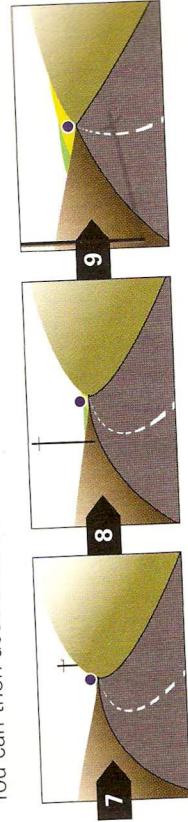
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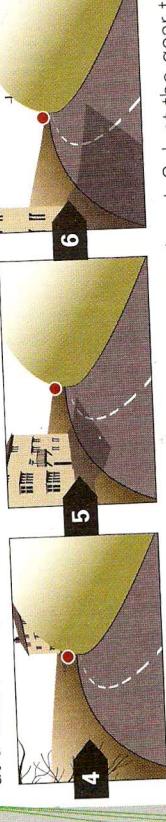
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How to use the system for cornering

The limit point technique is self-adjusting – as road visibility and conditions deteriorate you need more distance in which to stop, and so you must reduce your speed to compensate.

Use the limit point *as well as* other observation links – get into the habit of looking across or beyond the bend as you approach it. You may spot a hazard just *after* the bend – for example a warning sign or a chevron marker indicating a further bend. In this case it would be inappropriate to use the limit point alone to set your speed.

Where a road is not wide enough for two vehicles to pass, consider doubling your stopping distance to give an oncoming vehicle enough space to stop as well. On a left hand bend on a single track road, the limit point is where the two kerb lines meet.

Information



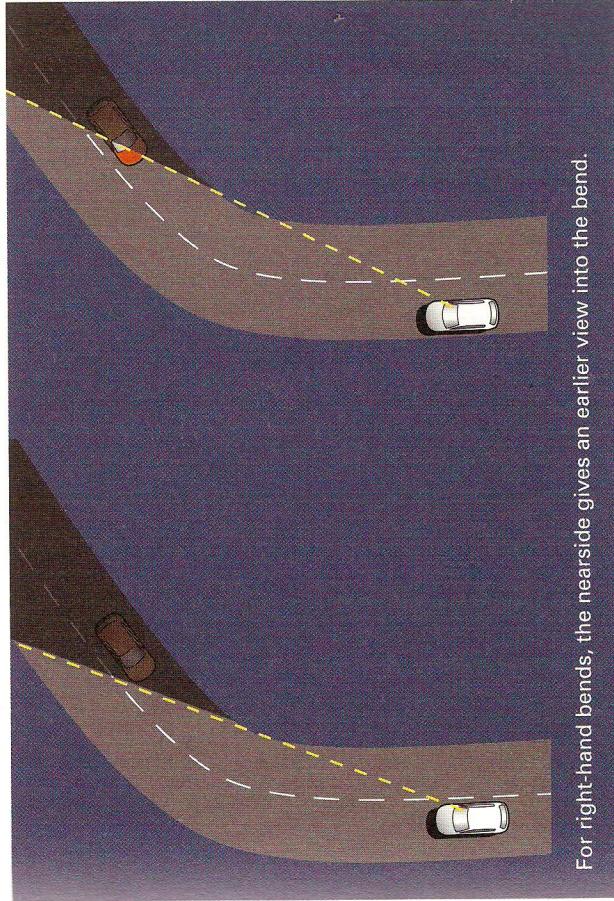
Position

You need to consider three things when positioning your vehicle for cornering:

- safety
- view
- stability.

Safety

Position yourself so that you are least likely to come into conflict with other road users; for example, look out for pedestrians to your nearside and oncoming traffic to your offside. Never sacrifice safety for position.



For right-hand bends, the nearside gives an earlier view into the bend.

How you can get the best view

- Your position will determine how much you can see when you enter a bend.
- Put the car in the best position for you to see, with due regard to safety. The position that gives you the clearest view is different for a left-hand bend and right-hand bend.

- **Right-hand bends** – position yourself towards the left of your road space, leaving enough clearance for parked vehicles and pedestrians. Watch out for blind junctions or exits, adverse camber and poor condition of the nearside road surface.

Practise matching your speed to the movement of the limit point.

Try this on different types of bend – from very gradual to hairpin – and note how using the limit point enables you to adjust to the characteristics of each bend. Always adjust your speed so that you can stop safely within the distance you can see to be clear. Make a special point of using the limit point to set your speed for bends and corners on roads you know well. It is on familiar routes that your attention is most likely to wander.

Firstly, look across the bend through gaps in hedges or between buildings for more information. Use the curved line of hedgerows and lamp posts to give you information about the severity of the bend. Look for early warning of other hazards as well.

Match your speed to the speed at which the limit point moves away from you, provided you can stop safely within the distance that you can see to be clear.

Using the system of car control to corner

- Do you position yourself to get the best possible view when cornering, with due regard to safety?

- Think about your driving behaviour on more open roads. As you plan your approach to corners, what's your priority?

- Do you think first about the correct speed and gear for control on the curve, or about safe stopping distance?

- Next time you take a significant corner on an open road, imagine there is a pregnant woman with a toddler in a pushchair about to cross the road just beyond your limit point. Does this alter your driving?

Remember your aim is to be able to stop safely within the distance you can see to be clear, not to take the bend as fast as possible.

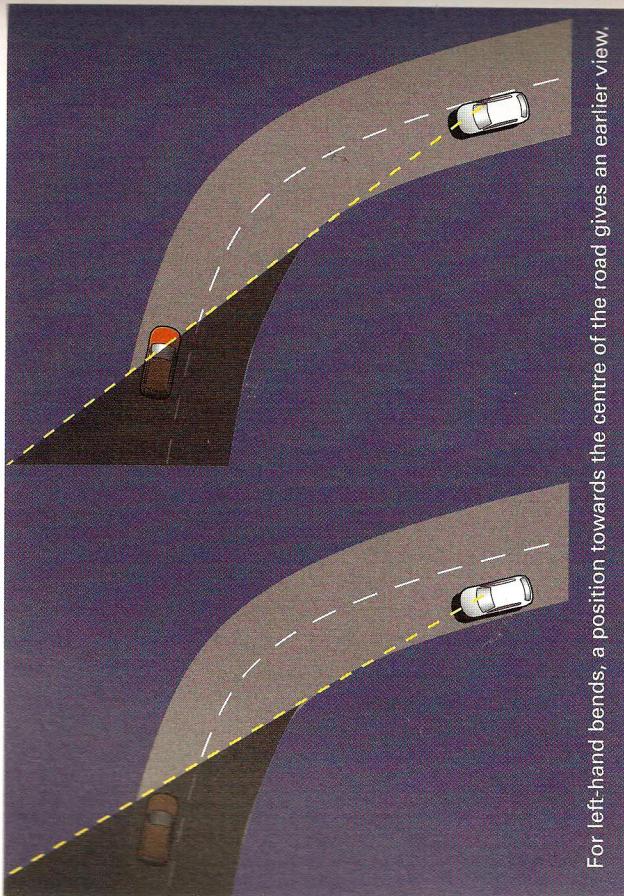
Gear

When you have achieved the correct speed and before you enter the bend, choose the appropriate gear for that speed. Select the gear that gives you greatest flexibility.

Think also how you expect to accelerate on the far side of the bend.

If you expect to come out of the bend into a 30 mph area, plan for gentle acceleration. If the national speed limit applies to the other side of the bend, consider entering the bend in a gear that will provide maximum acceleration out of it. But always take into account the condition of the road surface; in wet or slippery conditions, if you accelerate harshly in a low gear you may cause wheel spin and lose steering control.

See Chapter 4, Acceleration, using gears, braking and steering, page 86. Using the gears.



Speed

When you are in the correct position for the bend, use the limit point to judge the safe speed to drive round the bend. Before you take this position consider:

- *Left-hand bends* – position yourself towards the centre line so that you get an early view round the bend. Before you take this position consider:
 - approaching traffic or other offside dangers which need a greater margin of safety
 - whether your position might mislead other traffic as to your intentions
 - whether or not you will gain any advantage at low speed or on an open bend.

Where the bend is a constant curve, the limit point remains at a constant distance from you. Apply gentle pressure to the accelerator to maintain constant road speed through the curve until the limit point begins to move away. If the bend tightens, the limit point will appear to move closer, so reduce your speed accordingly to stay within a safe stopping distance.

To assess the correct speed for a bend, also consider:

- the severity of the bend
- the view into the bend
- your vehicle's characteristics
- road and road surface conditions
- traffic conditions
- weather conditions.

As you continue to straighten your steering, increase acceleration to match the limit point. Accelerate until you reach the speed limit or the appropriate speed for the circumstances.

If there are no hazards, start to accelerate when the limit point begins

Review

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In this chapter we have looked at:

- the four principles of safe cornering
- the forces acting on a vehicle on bends and corners
- the characteristics that affect a vehicle's ability to corner
- how camber affects the ability to corner
- the use of the system of car control for cornering
- the technique of limit point analysis
- how to position yourself on the approach to a bend
- how to reduce the curvature of a bend
- how to assess the correct speed for a bend.

Check your understanding

What are the four principles of safe cornering?

What are the forces that reduce tyre grip when cornering?

Why are you less able to steer if you brake or accelerate sharply?

In which direction do you go if tyre grip is lost on a right-hand bend?

How does camber affect cornering?

What is meant by the limit point and how do you use it to corner safely?

Where would you position your vehicle when entering a right-hand bend and what hazards would you need to take into account?

If you have difficulty in answering any of these questions, look back over the relevant part of this chapter to refresh your memory.

Chapter 9 Overtaking



Use this chapter to find out about:

- how to overtake safely
- how to overtake moving vehicles
- which special hazards you need to consider before overtaking
- how to help other drivers to overtake you.