BRCA 12th Section Track Design Guidelines

Why compromise?

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Photographs courtesy of
Radio Race Car International
Radio Control Car Racer
Peter Winton

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Introduction

Designing a good 12th BRCA National track is an art, not a science. Like all art, the techniques used can be examined, and then copied in making other works of art. These guidelines are just that – an examination of the art of track design. The 'art' is to make a track that pleases some of the drivers some of the time, and that's probably enough! However, the track must be safe for marshals and spectators, and in that respect it must please all the people all the time.

There is no right or wrong answer to your track design. The 12th Committee are not awarding trophies, or black marks, for your National track design – it's yours. The way you executed that design is part of the Steward's job on race-day, and he'll support you in getting the best from what you have, how you've laid it out, and what's best for the National Event ahead.

Track design has two components – the shape, and the way it is marked out. The shape has to be a technical challenge so that good driving gets its reward, yet have enough space for the less talented to make mistakes without getting frustrated. Additionally, opportunities to overtake, and to allow faster cars to pass, can be provided to make racing on your track a pleasure to watch, and drive.

There aren't many Rules about 12th Section tracks, and here's the one's we have…

7.4 The track should be positioned to minimize any unfenced (over and above the track edging) track edges accessible to the public or racers. Organisers can check acceptable venue layouts by sending a sketch to the safety officer prior to the event.
7.6 Health & Safety - In addition to the BRCA General Rules (Handbook pages 12 & 13). The main straight and any associated sweeping corners must be fenced or located so they are adjacent to the building walls.
11 Track Specifications
11.1 The width of track is to be measured between the tape markings or barriers whichever is the narrower.
11.2 Minimum track width is 2m.
11.3 The start line and following straight must be at least 2m wide.
11.4 Corner cutting must be discouraged by the placing of adequate corner markings and barriers.
11.5 Track marking equipment must be such a shape and size to prevent the entrapment of a car or the driver's view becoming obscured.
'Horizontally laid triangular column' shaped barriers and 'Bot dots' are not to be used.
11.6 The start, 1m penalty and finish lines must be clearly marked on the track. The start line must be placed so that race officials have a clear view to identify any jump starts.
11.7 Drivers must have a clear view of the full track from any position on the rostrum. The rostrum must be positioned to minimise the risk of people obstructing the drivers view. The minimum distance from the rostrum to the edge of the track is 2m. The minimum length of the rostrum must be 7.3 (24ft) metres between 1m (min) and 2.1m (max) high, and of a suitable width. For finals the drivers will take their positions in qualifying order to allow them their preferred position.
11.8 The main straight must be on the opposite side of the track to rostrum.
11.9 No competitor should be pitting in the area designated as race control.

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Make it safe for everyone by using the hall layout to help

Safety takes priority over layout. Two aspects dominate safety. Firstly, cars must not be able to leave the track area at any speed, and endanger the safety of marshals and spectators. The overall layout of the hall will give the biggest benefits in securing safety.

Place the track against two sides of the hall

- Fit the rectangle of the track into one corner of the rectangle of the hall. By bounding the track on two sides by walls, where only the marshals are present, spectator safety is increased.
- If possible, place the track at one end of the hall, so that the track is bounded on three sides by the walls of the hall.
- Ensure that any Fire Exits, or other emergency access, is clear, so people can get across the track to the exit, or come in across the track to the main area of the hall.
- Use the bounded sides of the track to set up the straight and any sweeping corners (see Rules 7.4 and 11.9)

Where one side of the track is used by people for access (to the Race Control and rostrum area, for example) it may be necessary to install a barrier to prevent cars leaving the track, or people entering the track.

- Ensure that high-speed sections of the track do not point towards the open side
- Use fixed barriers to prevent people inadvertently straying into the track area, or driver's line of sight (Rule 11.7)

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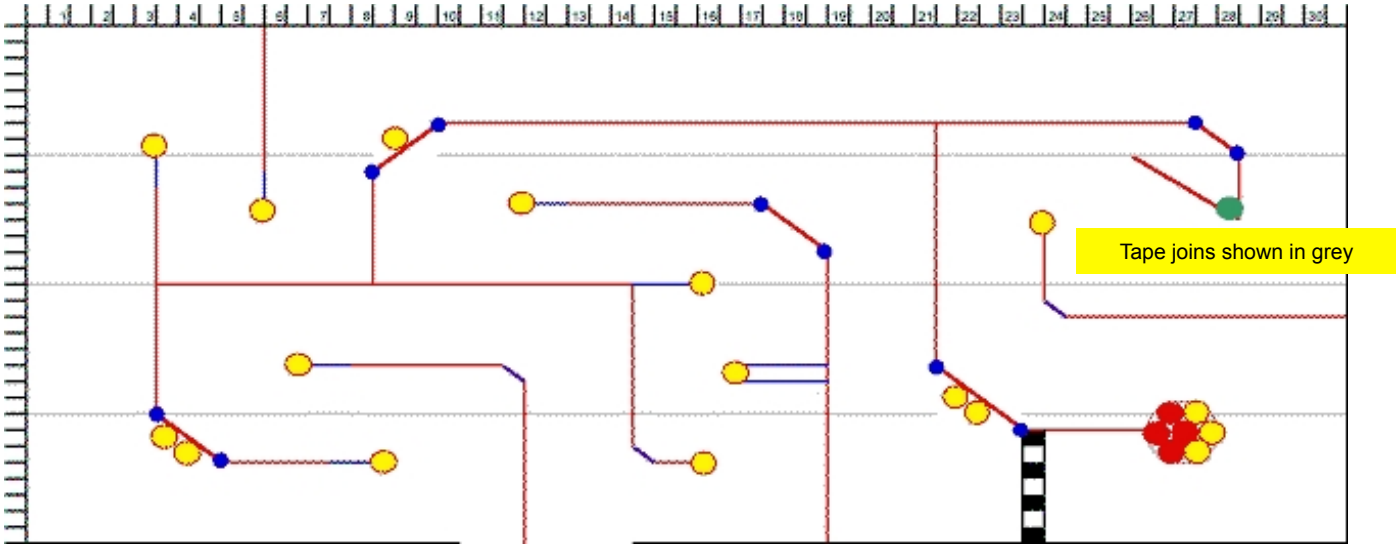
Start with a plan on paper, and check all the features against the Rules



Draw the carpet size on a piece of paper (to scale). Show where in the hall the track is going to be, and mark the sides bounded by the walls. Now start designing!

Mark all of the tape joins on the paper…

This is extremely important, as cars turning on tape joins when entering OR exiting corners will spin into the track markers, or other cars, and require marshals to run onto the track.

Hints and tips

Restrict the track to two or three technical sections in the design (Chicanes or narrow parts). The rule on the minimum width of the track is exactly what it states (a minimum) not a width that the entire track needs to be designed to.

If the minimum width is used several times throughout the design and the rest is wider sections it gives chances for slower cars to allow their faster competitors past and for overtaking manouvres.

Keep chicanes off the centre of the track, where a marshal must cross one or two lanes to reach crashed cars.

Chicanes slow cars down, so use them to prevent high-speed approach to, or along, areas of the track not bounded by the walls

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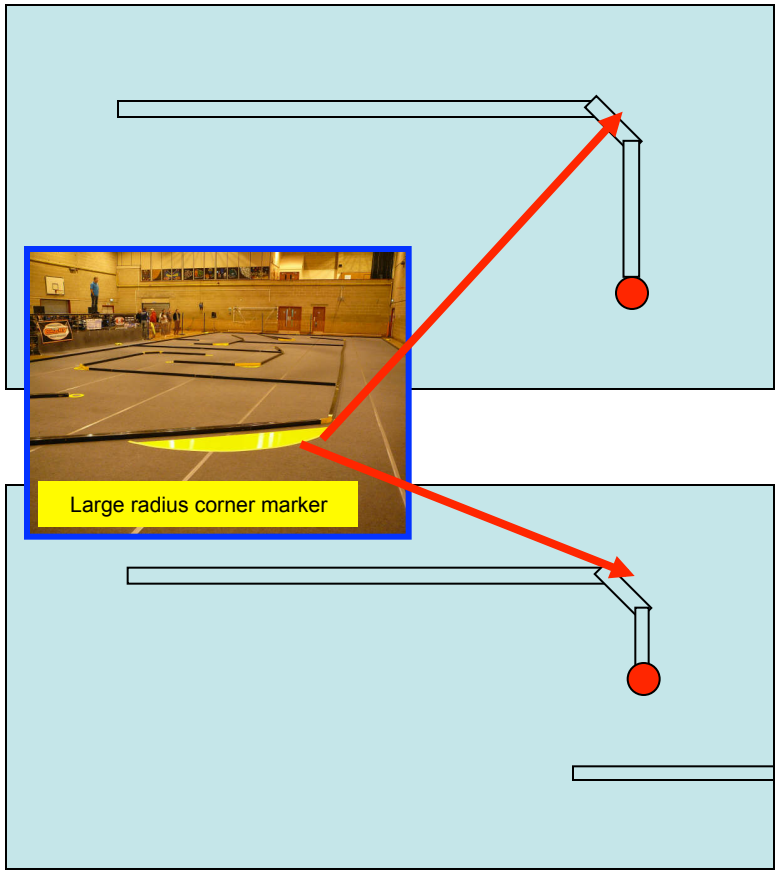
Let's sort the first corner out, from four options…



1) Full Track Width Sweeper

Great to drive, high speed with most of the de-acceleration area in the corner.

There are several potential problems: High speed impact with other cars or track, especially the first corner exiting the straight, either incident may result in cars leaving the track and costly repairs.

If this type of corner is selected then the straight exit track marker MUST be a very LARGE radius as this makes the entry into the sweeper more forgiving.

2) Half Track Width Sweeper

Challenging, as the de-acceleration and timing will probably start on the straight, therefore in many ways safer as the cars are travelling at a slower speed through the corner.

As cars are travelling slower the risk of cars leaving the track are reduced as is impact damage.

As above a LARGE radius entry track marker is required.

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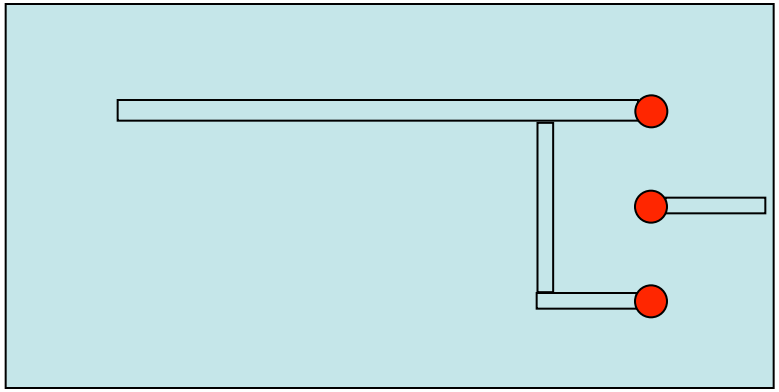
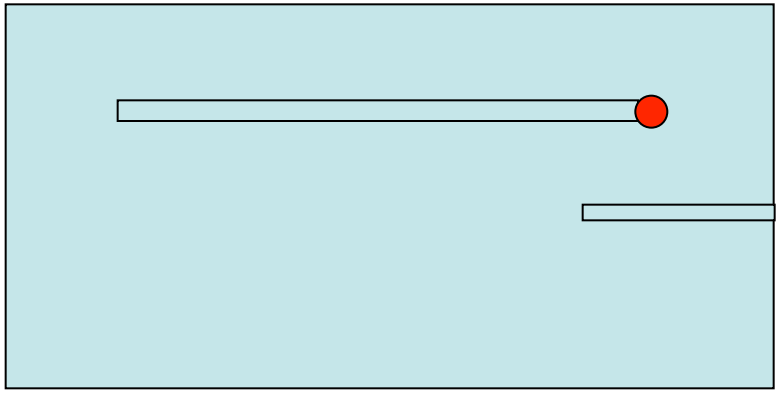
…so that cars do not leave the track at high speed.





3) Chicane or Bus Stop

A good way of slowing the cars down gradually but with a higher risk of collision with the track markers.

The success of a Chicane is down to several features, it must have an open entry, almost like a Half Sweeper and the Chicane depth must not be too great. It needs to be a smooth, flowing manoeuvre and not a sudden change of direction.

4) Hairpin

This is a difficult corner as it is all about judging the entry speed, whilst technically it is very good and challenging, in a final, it just about always spells disaster on the first lap for the majority of the finals.

However from a safety point of view it's good, as cars are forced to slow on the straight and are travelling fairly slowly around the corner. Therefore impacts with the track markers are at a reduced speed.

First Corner Summary

To summarise the first corner options, the safest corners are the half sweeper or chicane, but always remember that the higher the speed of the entry into the corner the more room is required, our current rules specify a minimum width of 2 metres, this ideally needs to be 3 metres for the first corner.

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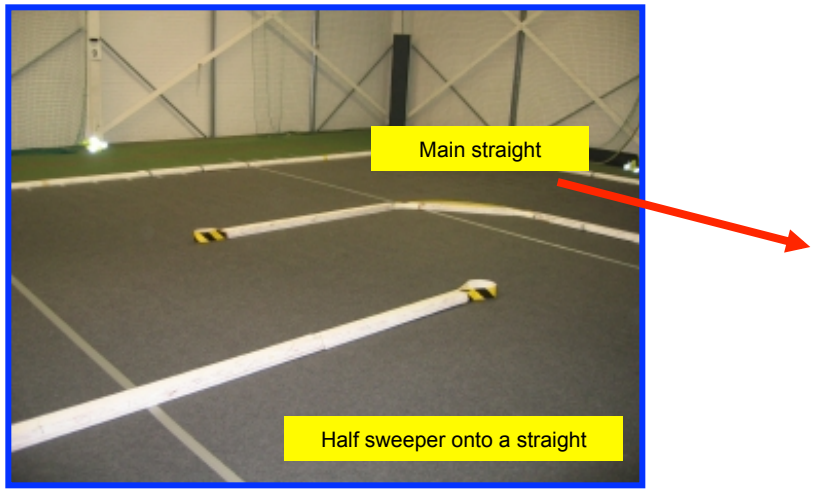
Getting cars onto the straight needs the same solutions



The corner leading onto the straight

Options are as 'exiting the straight' and the pros and cons are similar. We must consider the corner coming on to the straight in the same light - avoid high-speed contact with the markers.

With the full sweeper and chicane, speeds onto the straight could be high; therefore there is a risk of a high speed collision with the track markers or other cars.

With the half sweeper and the hairpin, particularly the hairpin, entry onto the straight is relatively slow, thus minimising the effect of any incident.

Corner leading onto the straight summary

The safest corners are the hairpin and the half sweeper, if the full sweeper and chicane are chosen, be prepared for high speed incidents and provide as much track width as possible, be prepared for the possibility of cars leaving the track.

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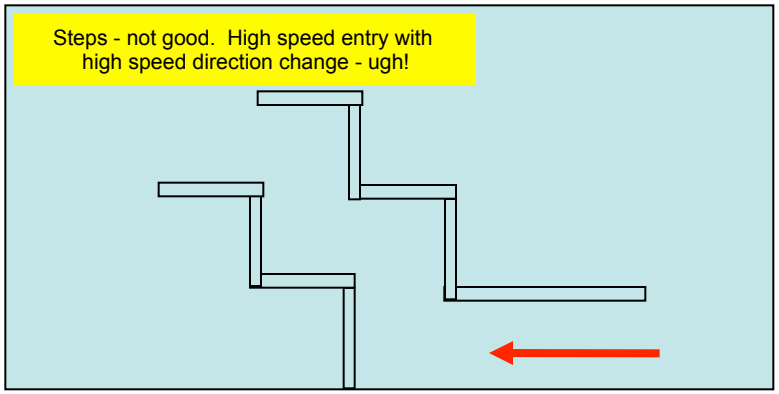
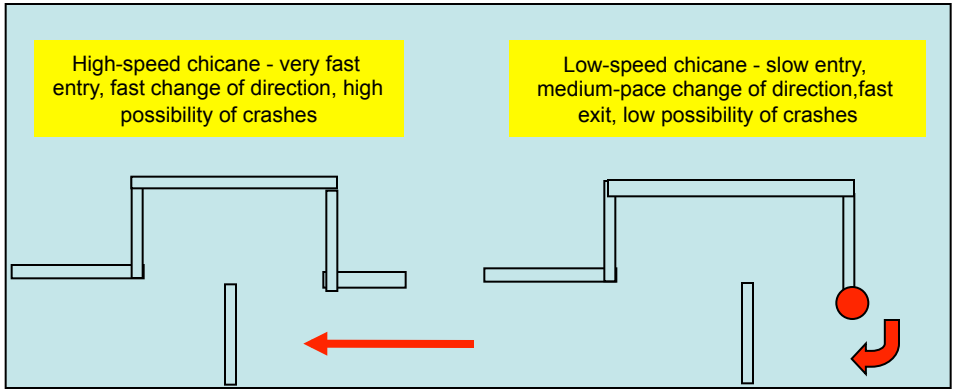
The infield, or where the twiddly bits join the ends of the straight…





The Infield

Just when you thought the tricky stuff was resolved, the infield throws up a minefield of do's and don'ts. Therefore…

Do's

1) Try and ensure there are equal amounts of left and right hand corners.

2) Try to incorporate a varying type of corner, i.e. tight hairpins, larger radius hairpins, chicanes, switchbacks, medium, fast and slow speed corners.

3) Try to make the track 'flowing' - this is difficult to explain, but try not to include a very sudden change of direction whilst at high speed. For example…
Chicanes and Steps - see diagrams on left

4) Try to ensure that Chicanes have a relatively slow entry and a fast exit, rather than a fast entry which can cause high speed crashes with the track markers.

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…is what makes your track one to remember.

This is wrong in so many ways!

It's a series of steps - or is it a chicane? Either way, it is high speed, it is in the middle of the track, and it's difficult to marshal. Whatever it is, it has no place on your National track. (but it was at a Euros!!)

The Infield

Don'ts

1) Do not place chicanes in the centre of the track as they are a potential accident black spot and also very difficult to marshal efficiently. If a chicane must be used, then consider a 'bus stop' style, as this is much more forgiving.

2) Do keep the more technical elements of the design towards the outside of the track, with the easier elements in the middle, thus reducing the risk of incidents and the consequent marshalling.

Infield Summary

To incorporate everything we have shown above, is probably impossible, that is why it is always a compromise. You can very rarely for example, have equal amounts of left and right hand corners, as we race clockwise, inevitably there will be more right hand corners. To incorporate all types of corners is not easy but you will be surprised how close you get when you start to analyse your design.

Our current rules specify a minimum track width of 2 metres; do not cram a track onto the carpet with everywhere just measuring 2 metres - if in doubt make more room.

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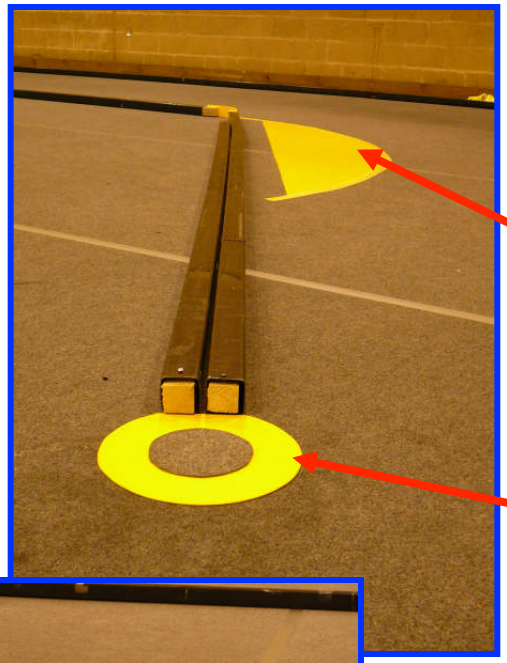
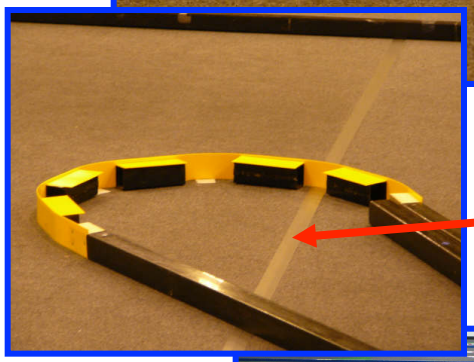
Design your corner markers using these good-practice guidelines





The second contributor to safety is the design of the corner markers. These may also influence how you design your track, so let's look at the good practice of corner marker. These are ideas we know work, but are not compulsory. Use other designs that achieve the same results if you wish. Corner marker design varies depending on the corner that is being marked…

Sweepers – use a flat sheet of 2mm thick plastic sheet, painted yellow on the underside. The marker must be large enough to shield the corner. Chamfer the edges slightly. Affix to the track using double-sided tape.
Markers need to be highly visible from the rostrum (note how this marker is spaced away from the track barrier) Attach the marker to the carpet with double-sided tape - industrial quality!

Slow corners – use a 15” (400mm) diameter disc of plastic sheet, with a 6” (150mm) disc of carpet in the middle. There is no need for any other feature, as cars have room for error, and can drive over the marker. Use double-sided tape to attach to the carpet.

Fast corners – use plastic strip, to which short sections of track barrier are attached (screws) and wooden blocks provide location into the end of the barrier. Each short section is secured to the carpet using velcro, and topped with a strip of plastic to make it very visible

Chicanes – use the same marker as the slow corner, or this alternative. Wooden discs are used, about 2mm thick, with well-chamfered edges, and painted in highly visible, contrasting colours. In this case, these are screwed to the floor - double-sided tape is probably better!!

Details of the materials used, and the tape types, can be obtained from the BRCA 12th Section Committee. For Season 2010/11, additional funding can be obtained from the Committee for track markers - please ask

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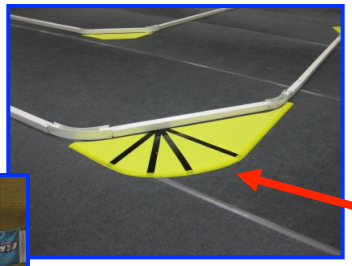
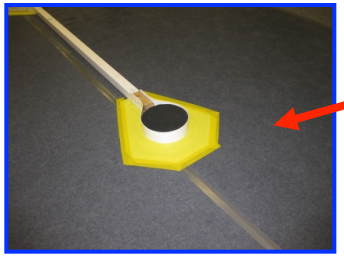
Size and shape of corners and their markers

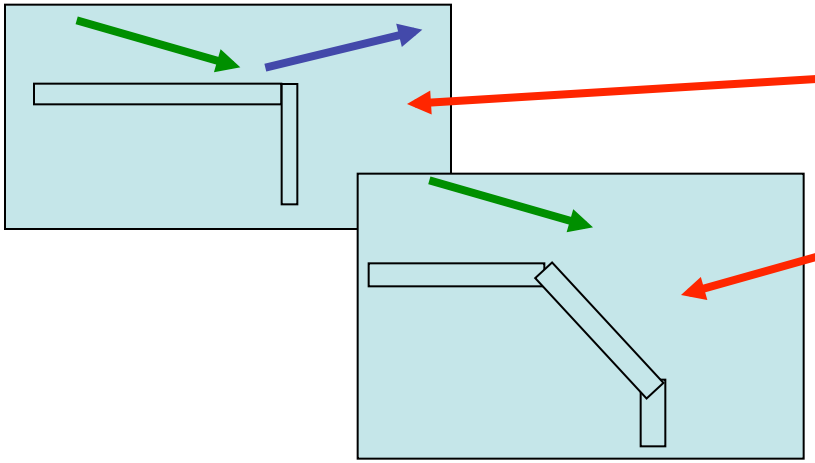


The way you make and size your corners and their markers also makes a significant contribution to the flow of the track and it's safety. When placing corner markers, look at them from the rostrum. When designing corners, consider the angle the cars will approach, and make sure that if they hit the corner, they do not cause the car to leave the track.

This looks like a big corner marker, bigger than one might think necessary…
…however, when viewed from the rostrum, the driver can only see the tip of the marker. Make sure that drivers can see your markers!



Corner markers don't have to be pretty, or a set shape, they have to be visible. Here's a simple corner marker to make, using straight sides, but is is very visible.



The use of right angle corners in high- and medium-speed corners is not advise. Any slight error in line will be punished by the car (green arrow) striking the marker, and cannoning off into the racing line, or worse, off the circuit (blue arrow).

These corners must be chamfered such that if a car turns in too early, they will only strike the chamfer, and thus be deflected away from the racing line, and not be cannoned off the track. This point will be inspected at all National tracks, and changes requested where necessary.

If in doubt, make the chamfer larger.

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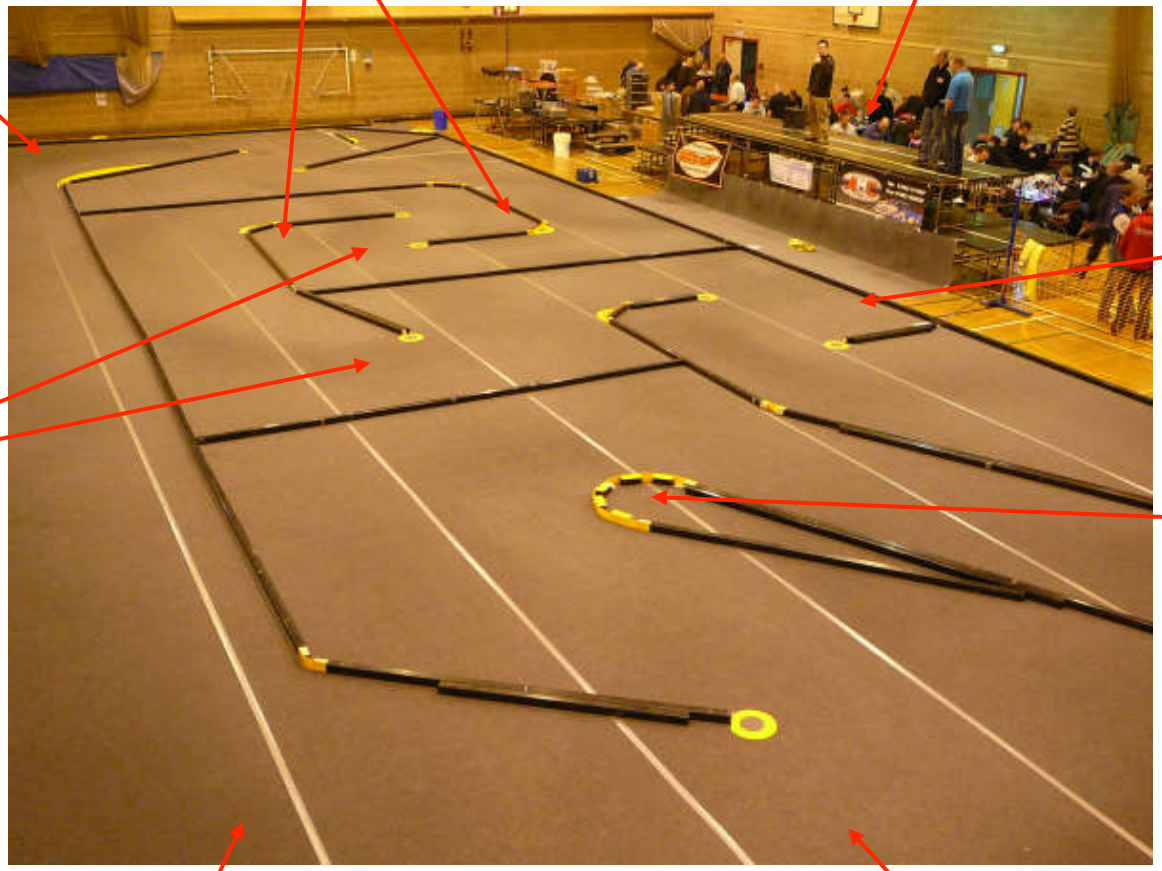

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