

# CarMotion and Windigipet diorama

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# 1 Background

In this document, I describe how the diorama "CarMotion and Windigipet Diorama" was constructed.

My interest in CarMotion began at Nettog's open house on July 2, 2023, where Anders Haslund demonstrated the system. The really clever idea Anders had come up with was that you could control the cars directly from your Central Station as if they were a regular DCC locomotive. Instead of sending digital commands to the train via the track network, they are sent via infrared LEDs to the car's receiver at the front.

After seeing this, I was hooked—I bought a starter set and started experimenting further with the system.

I first built a small test track using the guide wire that Faller cars use, along with the standard switch that comes with Faller. There were some challenges in getting the Faller switch to work. The magnet interfered with the car and, in some cases, even held it in place. And what about the guide wire—would it be better to use magnetic tape instead?

The final decision to create a version of the test track was made when our 8-year-old grandson, Alexander, told me, "Grandpa, no one wants to look at a bare board like that." I had proudly shown him the test track and explained that it was going to be exhibited at various model train exhibitions.

So now I was motivated to build a version 2 of the track that people would hopefully *want* to look at 😊

The specification requirements for the diorama were now:

- Exciting to look at
- Two trucks run simultaneously
- Everything is controlled by Windigipet – together with the Magnorail diorama "*The Accident in Kælderløbing*"
- Buttons on the front to start the system

## 2 Construction of the box – milling the track for magnetic tape

A 12 mm plywood board is used as the base for the layout. It measures approximately 130 x 50 cm.

Magnetic tape and switches were purchased from microumbau.de.

The magnetic tape is 3 x 1 mm. I used a router to mill the groove. As a router bit, I used a 3.2 mm bit. It is beneficial that it is slightly wider than the tape when making turns.

The depth was set to approximately 1.2 mm—just enough so that the tape was slightly below the surface of the board.

The switches were installed by drilling 30 mm and 32 mm holes in the board.

The magnetic tape was then glued to the board using contact adhesive.

**REMEMBER to orient it correctly!**



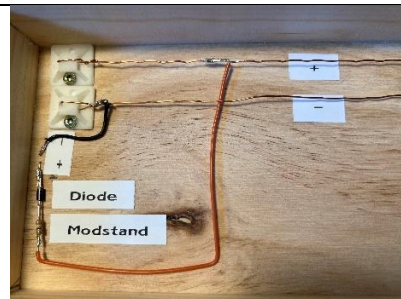
At the end of each straight section, an infrared LED (IR-LED) is placed. A total of 8 IR-LEDs are placed around this diorama. They will later be hidden—however, there must be a 'clear path' to the front bumper of the cars where the receiver is located.


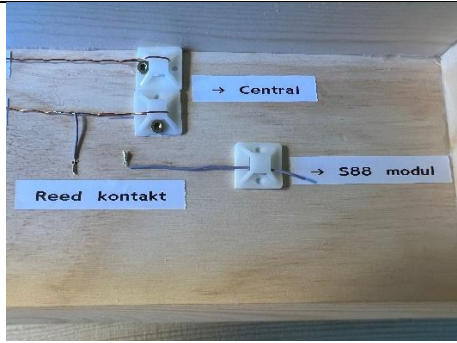





IR-LED is connected with + (the long leg) to a diode (1N400x) and a resistor (330 ohm) – and this is then connected to digital current +

The short leg – connects directly to digital power – (zero)

More here: [her](#).



<p>REED contacts are placed in several places on the facility (7 units) so that you can use these to determine where the cars are located. They must be placed just above the magnetic tape and the surface of the contact must lie just below the surface of the plate.</p> <p>You have to be careful when you bend your legs!</p>	
<p>The reed switch is connected with one leg to digital power (zero) – and the other leg is sent to an S88 feedback module. I use a Digikeijs DR4088 module - but many others can also be used.</p>	
<p>Faller models without associated electronics are used as light curves. Each of the 2x3 = 6 lamps is connected to a decoder so that they can be turned on and off individually. They are then configured in Windigipet to switch like a real light basket - more on this later.</p>	
<p>The road surface is now cut out of a 0.5 mm PVC foil plastic sheet.</p> <p>The road surface is placed loosely on top of the plywood sheet and it is now tested whether everything works ok.</p>	
<p>The plate is now primed with spray paint - and thoroughly tested again.</p>	

The roadway is now getting its final spray paint. I use one black – one gray and one white.

First spray with the black so that it almost covers the gray primer. After this, it gets 'dusted' once with the white. I spray into the air so that the white falls down like little white dots on the black. Same treatment with the grey.

Continue until it looks like a road - or you don't want to anymore 😊



The white lines along the border are made with a white marker pen from Panduro hobby. A ruler or a circle stroke is used for the curves. Here you can use the same center as was used for milling. Arrows and pedestrian crossings are from Faller road marking sheets.



### 3 Buildings and landscape – ‘decoration’

#### 3.1 petrol sign

In the ‘mess-box’ I found an Arduino – or actually a NodeMCU. They are in the same family and can be used for many fun things on the model range. Since I have an Aral gas tank at the facility I thought a gas price sign would be fun.

The screen was also in stock so it's just a matter of getting started. It is a 1.77 inch TFT LCD screen.

The screen is 'wrapped up' in materials from the ‘mess box’ 😊



Code is written in the usual way for the NodeMCU. The code can be found [here](#). Prices change every 30 seconds.

First, the price of 95 octane is calculated – as a random price between DKK 13.01 and DKK 15.99/l.

100 octane is then calculated as the 95 octane price + 87 øre.

And finally, the diesel price is calculated as 95 octane - DKK 1.11/l

Regarding cabling between NodeMCU and Screen –

Code [her](#).

```
/*
Benzin-Pris-Skilt - BPS
Skiltet viser for ARAL 3 priser, der skifter hvert
30. sekund
  95 oktan -tilfældig pris mellem 13,01 kr/l og
15,99 kr/l
  100 oktan - 95 oktan + 87 øre/l
  Diesel - 95 oktan - 111 øre/l
Koden er beregnet til en 1.77 inch TFT skærm - RGB
- 160x128
Visningen er drejet således at stikket vender
nedad
```

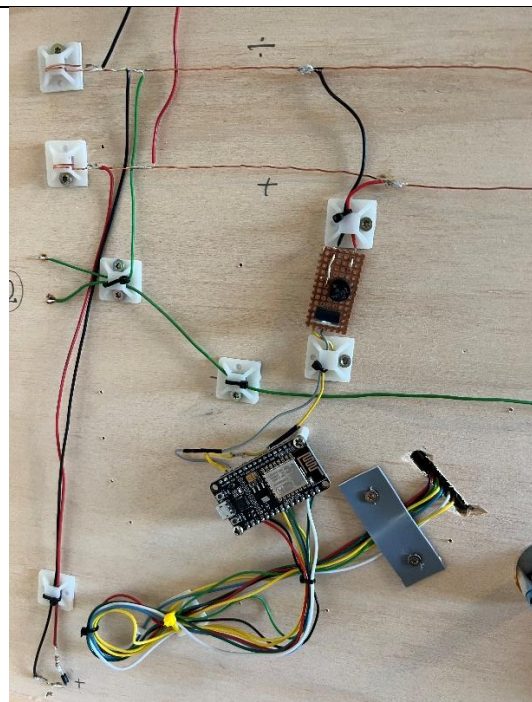
Kabling mellem ESP8266 og TFT - se denne side:  
<http://goran-juric.from.hr/blog/2020/03/connecting-177-inch-TFT-LCD-screen-ESP8266/>

9-9-2023 - Jens Krogsgaard  
Benzinpriser\_TFT\_2.ino

\*/

Here you can see the installation of the NodeMCU under the plate.

It is supplied from digital power via a bridge coupling and a voltage regulator to 5 volts.



### 3.2 Buildings and landscape

Of course, there must be a gas tank - it's about cars after all 😊

The tank is from Kibri 38544.

As you can see in the picture, there are 2 motorcyclists who are about to leave the tank. They are from Noch 12844 - and they have a sound that can be activated by pressing one of the buttons on the front of the diorama.



Here there is a small beer garden with various effects from the warehouse.

There are beer-drinking guests from Noch and from Viessmann. And these two-time old men can start drinking if you press the button on the front.

The nice little kiosk is a gift from Mipemo. It has a light in the sign that can be switched on via a button on the front together with the street lamp.



A right-of-way with a bus stop has been made at the facility.

It is a preparation for when you can one day get a Carmotion bus. There is an electric track switch and a reed switch on the siding.

The reading shed is from Kibri.



The cows must feel good so that they thrive among old scrap from the model track.



The 8 IR LEDs are hidden in old sheds - in bushes and also in an old car.

Here you can see an old shed that hides a joint.

The rest of the facility is decorated with grass sown with the grassmaster and guardrails, road signs, trees, hedges and more are set up.



## 4 Technology – boxes and cabling

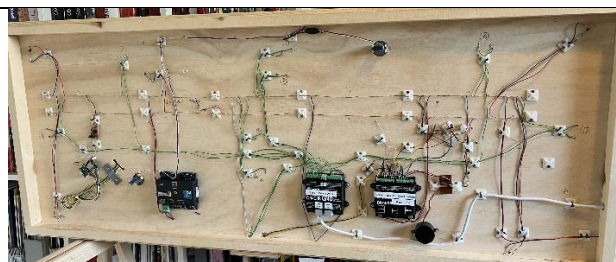
The CarMotion and Magnorail dioramas must be operable with the same Windigipet and therefore must be connected together.

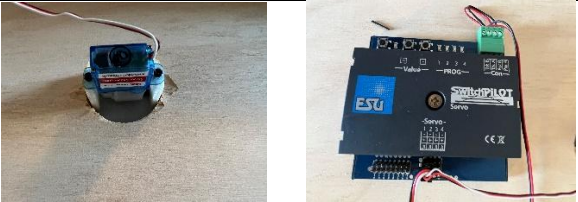
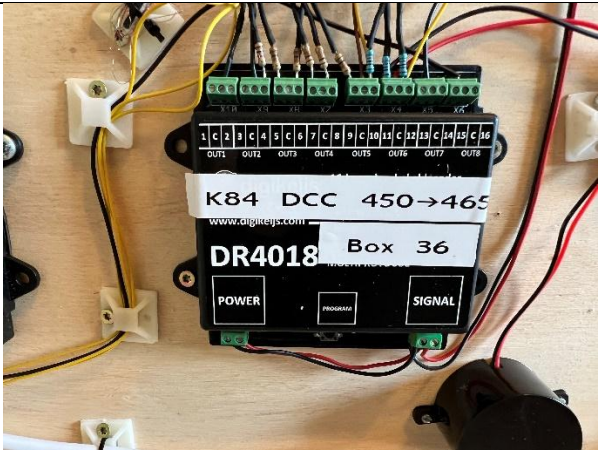
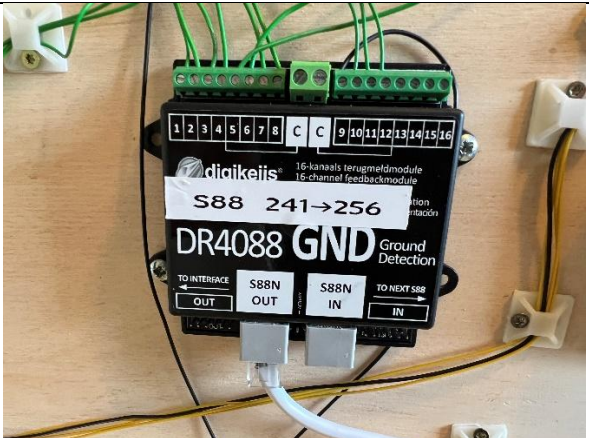
Digital power for the two dioramas is therefore connected and sent together to my old CS2.

The feedback box from the CarMotion facility is connected to the corresponding box in the Magnorail diorama and from here connected to CS2.



Here you can see the installation 'Behind the scenes'. The input is digital current that supplies the 8 IR LEDs as well as various boxes and reed switches.



<p>The two turnouts with servos are connected to an ESU servo control. This is again connected to digital power.</p>	
<p>The 2 light curves with a total of 6 LEDs are supplied from this Digikeijs 4018. You can therefore switch each of these LEDs on and off from here. The rest of the management is done by Windigipet. The box also takes care of:</p> <ul style="list-style-type: none"> <li>• Turn lights on/off</li> <li>• Motorcycle light on/off</li> <li>• Beer brothers – on/off</li> </ul>	
<p>As previously described, the S88 feedback box is connected to the box on the Magnorail diorama that has TBK no. 1 to 16. This box therefore has numbers 17 to 32.</p> <p>Nos. 17 to 24 are connected to the 8 Reed contacts.</p> <p>Nos. 25 to 28 are connected to the 4 buttons on the front of the system. Thus, when you press one of these buttons, the contact is occupied and the action starts. See more under Windigipet.</p>	

## 4.1 Buttons

With the large button on the left, the Windigipet automatic system is activated and the cars start driving. It can be configured where laps are to be run.

The 3 yellow buttons initiate:

- Beer drinking brothers
- Motorcycle sound - noise 😊
- Lights at the beer festival.

The 3 above activities continue for 30 to 60 seconds.



## 5 Cars – trucks

I currently have 2 CarMotion trucks.

The blue from the starter set catalog no. 8000 and the red with catalog no. 8011.

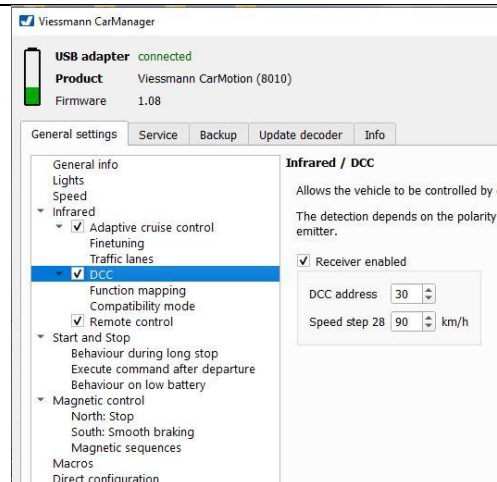
They are basically the same - however, the blue one has a shelf and the red one has a 'stool' that can be used when trailers arrive.



With the free program CarManager and the programming cable, you can change the standard address DCC 3 to a new address.

My cars have the addresses DCC 30 and 31

In the program, you can also change many other parameters and you can also take a backup of the current configuration.



## 6 Windigipet

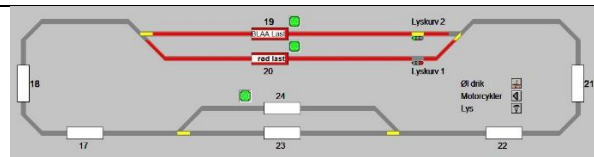
Windigipet 2021 – the demo version is currently being used.  
With this free version, one can have a maximum of 4 vehicles and 12 magnet items.

This complies with the two dioramas together, so this version is therefore used.



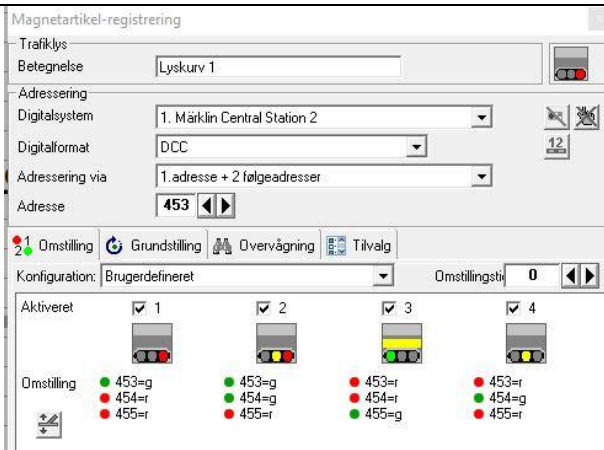
The track is created in the usual way in Windigipet.  
There are 2 electric switches for the tank and the bus stop.

There are 8 TBK (feedback switches) – they are defined as torque switches and are numbered 17 to 24

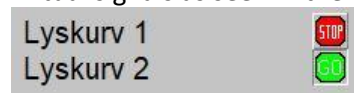


The light curves are defined with 1 address and 2 following addresses. So 1 address for each color.

Here you can see the 4 'signal images' - or 'light curve images'.

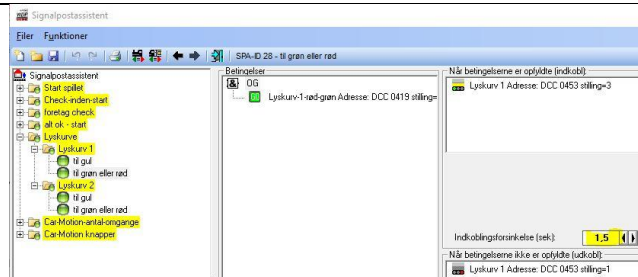


In order to achieve the right delays between the individual 'light curve images', I have created a couple of virtual signals as seen in the image:



As can be seen in the picture on the right, there is a built-in delay of 1.5 seconds on the yellow light when changing from green to red.

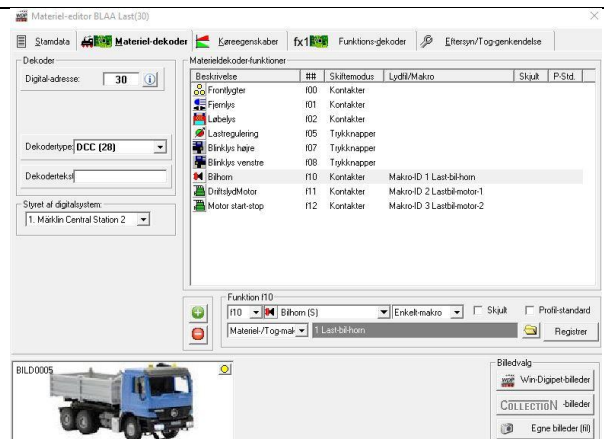
It is thus these 2 virtual light curves that are used in the railways to achieve the correct appearance.



The cars are created in Windigipet completely as a locomotive with the DCC address specified earlier (30 or 31)

The function keys F1 to F8 are created according to the manual for the car.

An mp3 file with horn and truck engine sound is also downloaded. These are put into macros and then mapped to F 10 to F12.

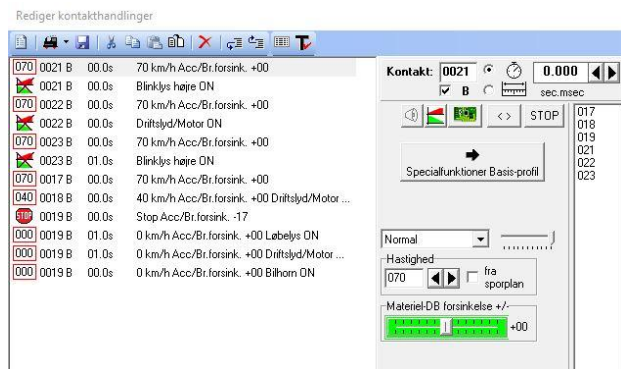
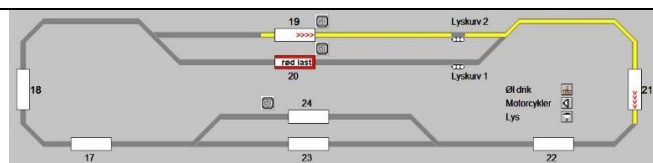


A total of 4 train routes will be created:

- 19 -> 21
- 21 -> 19
- 20 -> 21
- 21 -> 20

A profile is created for each of these train routes. These are used to activate the car's functions – for example turn signals in appropriate places as well as the engine sound and horn. They are also used to ensure that the car stays in the right place on the tank.

The 4 train routes are combined into 2 two trips so that there is a trip from 19 and return to 19 and a trip from 20 and return to 20.



The automation from the Magnorail diorama is expanded with the option of driving with the CarMotion cars - see the two bottom lines in the automation. There is 1 line for each of the 2 tours.

Tur-automatik-editor - Magnorail og Car-Motion.FAM

###	Tid	Anm.-K.	Togvej(e)-sekv.	ID	Forløb	Vend	Vent på	Beskrivelse
001	00:00:00	0004	P-cykel->Bro	4	1 - Profil 1			Start cykel fra holdeplads
002	00:00:00	0006	Bro->P-cykel	5	1 - Profil 1			
003	00:00:00	0001	P-ambul->Ulykke	2	1 - Profil 1			Start ambulance fra holdeplads
004	00:00:00	0002	Ulykke->P-ambul	3	1 - Profil 1			
005	00:00:00	0019	I/Rundtur bane 1	2	1 - Profil 1			Car-Motion biler
006	00:00:00	0020	I/Rundtur Bane 2	3	1 - Profil 1			

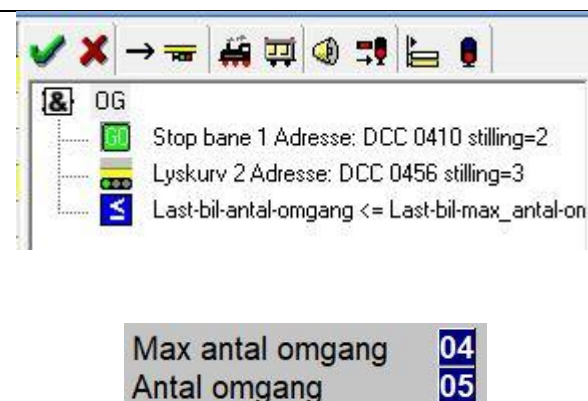
It is assumed that the trucks are on fields 19 and 20 on the tank when starting up.

Here there are Go/Stop buttons that can be manually set to Stop. It must be Go in order to run.

The light curve must be green.

You can set the number of laps to be driven - for example 4.

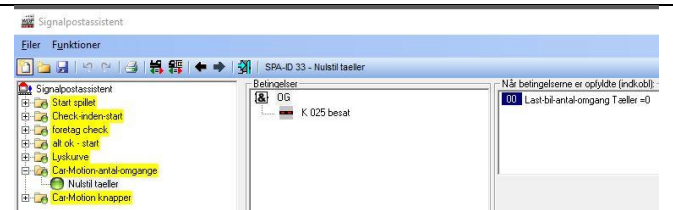
Only if the Number of laps is <= Max number of laps is it run.



Every time the cars pass switch 22, the number of laps is increased by 1.

The start button is connected to TMK no. 25.  
When you press this, switch 25 is set to Occupied - and thus the counter Truck number of laps is set to 0.

This is the condition for the cars to start from the petrol station. They then drive until the desired number of laps is achieved - for example 4 laps.



The 3 yellow buttons on the front are each linked to the S88 feedback.

- Beer – TBK 26
- MC – TBK 27
- Light – TBK 28

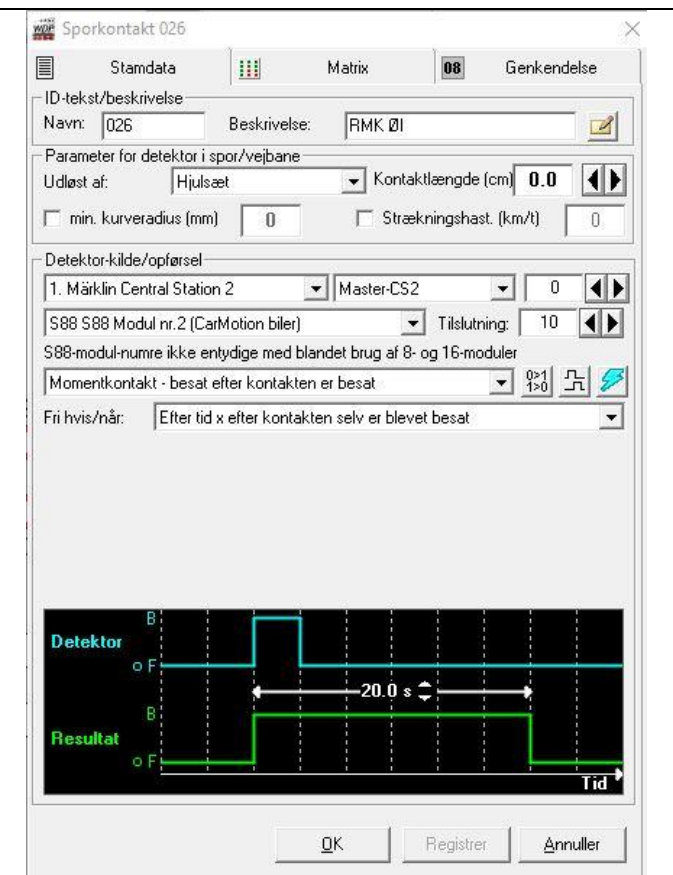
As long as the action is active, an LED lights up under the button. They are typically active for 30 to 60 seconds.

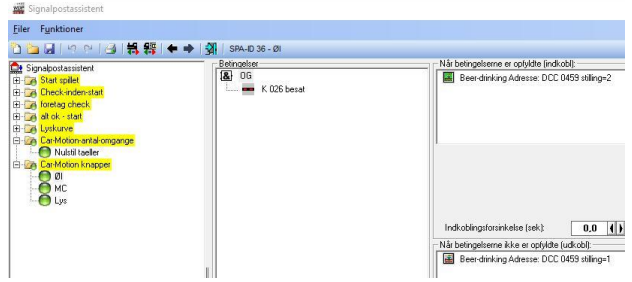


Each of the 3 TBKs is defined as torque switches.  
They are occupied until a selected time has passed.


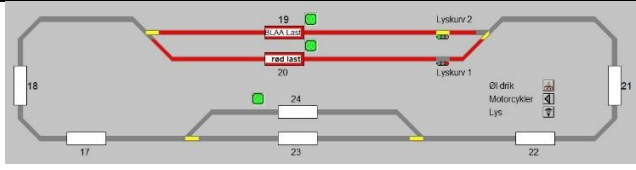
In the example we see TBK 26 – for the beer drinking brothers.

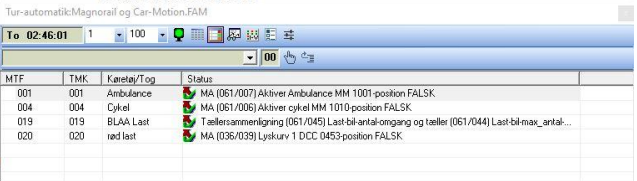
As can be seen, the switch is active for 20 seconds after it has been activated.



<p>Here in the Signal post assistant, an activity is defined for each of the 3 yellow buttons.</p> <p>In the example it can be seen that when contact 26 is occupied - yes, the drinking brothers are activated - otherwise they are deactivated.</p> <p>So when the Beer button is pressed, the brothers drink for 20 seconds - the LED under the button is lit. They then hold it in and the LED switches off.</p> <p>Exactly the same principle for the other 2 buttons.</p>	
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## 7 How-to – start the show

<p>The cars must keep their tank in front of the light curve and they must be switched on.</p>	
<p>TBK 19 and 20 must be red - AND NO ONE ELSE must be red!</p>	
<p>Number of laps must be &gt; Max number of laps</p>	<div data-bbox="909 1657 1268 1747"> Max antal omgang  Antal omgang </div> <div data-bbox="1220 1657 1268 1747"> 04 05 </div>
<p>One light basket must be green - the other red</p>	<div data-bbox="909 1780 1268 1870"> Lyskurv 1  Lyskurv 2 </div> <div data-bbox="1220 1780 1268 1870"> STOP GO </div>

The automatic system "Magnorail and Car-Motion" must be started	
Now you can press the big button and one car would like to drive.	

## 8 Promotion

This description	<a href="https://www.krogsgaardsmodelbane.dk/Projekter/03-Carmotion/CarMotion%20and%20Windigipet%20diorama%20GB.pdf">https://www.krogsgaardsmodelbane.dk/Projekter/03-Carmotion/CarMotion%20and%20Windigipet%20diorama%20GB.pdf</a>
Youtube video	<a href="https://youtu.be/Ofp3p-sA4Hc?si=a-szhr1WgPsrUHOg">https://youtu.be/Ofp3p-sA4Hc?si=a-szhr1WgPsrUHOg</a>