ChassisSim
The Winner's Edge

Creating and refinining tracks in ChassisSim lite.

So you have just bought or downloaded your copy of ChassisSim lite. You have worked your way through the quick start and your ready to load your own circuit and refine the results.

The purpose of this guide is two fold.

- To show you how to create a monster file and curvature file.
- How to refine the results of an exisiting circuit.

Once you are familiar with this you will be in a position of creating a circuit from scratch to a fully functional circuit in a matter of minutes.

Step – 1 Creating the Monster Import File

The first step is to use your logged data to create a monster import file. This monster import file contains all the information that ChassisSim needs to create a circuit and bump profiles and run the toolboxes. This data is taken from a flying lap of the data at speed exported at 50Hz. The format of the file is an ASCII tab delimited file of the data with no headers and footers. The data that is required is,

lap distance (m)
rpm
ay (g)
ax (g)
damp front left (mm)
damp front right (mm)
damper rear left (mm)
damper rear right (mm)
steering (deg) – This is the angle of the tyre as opposed to the steering wheel.
throttle pos (%)
Vehicle speed (km/h)

If you have strains,

Strain Front Left (kgf)
Strain Front Right (kgf)
Strain Rear Left (kgf)
Strain Rear Right (kgf)

These are added at the end of the other listed parameters. What it would look like in a file is shown below,

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Without loads,

0	7392.94	-0.03	0.1	4.65	4.87	5.51	5.57	0	100	207.92
1.174	7395.56	-0.03	0.11	5.01	4.58	5.16	4.72	0.03	100	207.99
2.346	7398.33	-0.02	0.11	5.08	4.85	5.98	6.57	0.06	100	208.07
3.52	7401.26	-0.02	0.12	4.83	4.81	10.52	11.16	0.08	100	208.15
4.693	7404.28	-0.02	0.12	3.93	3.96	13.22	13.3	0.09	100	208.24
5.867	7407.27	-0.02	0.12	4.07	3.72	12.74	12.42	0.1	100	208.32
7.042	7410.23	-0.02	0.12	6.22	5.88	13.07	12.63	0.06	100	208.4
8.217	7413.14	-0.03	0.12	5.77	5.69	11.26	11.23	0.02	100	208.49
9.392	7416.04	-0.03	0.12	5.52	5.44	10.26	10.61	-0.01	100	208.57
10.568	7418.92	-0.03	0.11	7.27	6.85	11.73	11.65	-0.03	100	208.65
11.744	7421.78	-0.04	0.11	7.36	6.88	12.43	11.88	-0.03	100	208.73
12.921	7424.61	-0.05	0.11	5.72	5.62	10.39	10.2	-0.01	100	208.81
14.098	7427.42	-0.05	0.11	5	5.05	8.36	8.39	0.01	100	208.89
15.276	7430.27	-0.05	0.11	6.46	6.37	8.75	8.48	0.03	100	208.97
5865.339	7392.94	-0.03	0.1	4.65	4.87	5.51	5.57	0	100	207.92

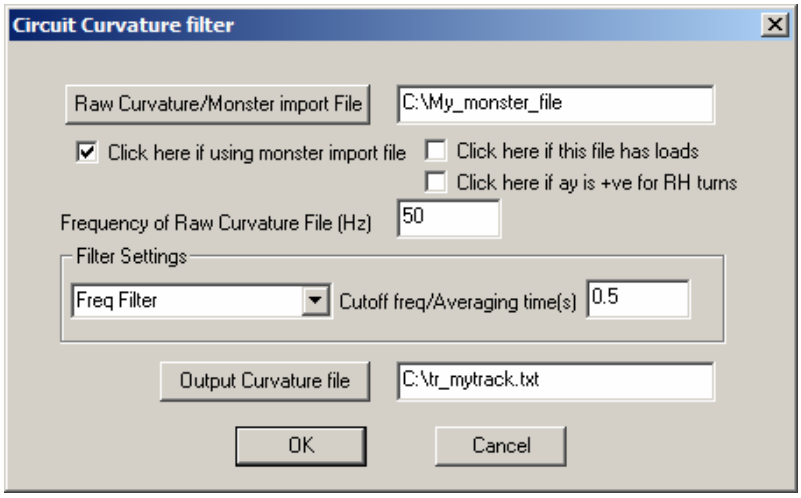
With loads the file looks like

```
0      7392.94   -0.03 0.1       4.65   4.87 5.51 5.57   0 100   207.92 166.98 157.86 216.53
         202.85
1.22   7392.94   -0.03 0.1       4.65   4.87 5.51 5.57   0 100   207.92 166.98 157.86 216.53
         202.85
4.55   7392.94   -0.03 0.1       4.65   4.87 5.51 5.57   0 100   207.92 166.98 157.86 216.53
         202.85
```

Please note the distance vector needs to have at least 2 decimal places. This is very important. If you don't have damper pots just record them as a bunch of zeros. What this means is you can't use it to create bump profiles

Step – 2 Curvature File creation

Now we have the monster import file we can now create the curvature file.Go to Circuit->Filter Curvature file. This will bring up the following dialog,



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To import the monster import file, click on the Raw Curvature/Monster Import File and navigate to your monster import file. Click on the monster import file check box and if you have loads click on the check box as illustrated. Input the frequency of the Monster import file, and click on Output Curvature tab to indicate the file you want this written to.

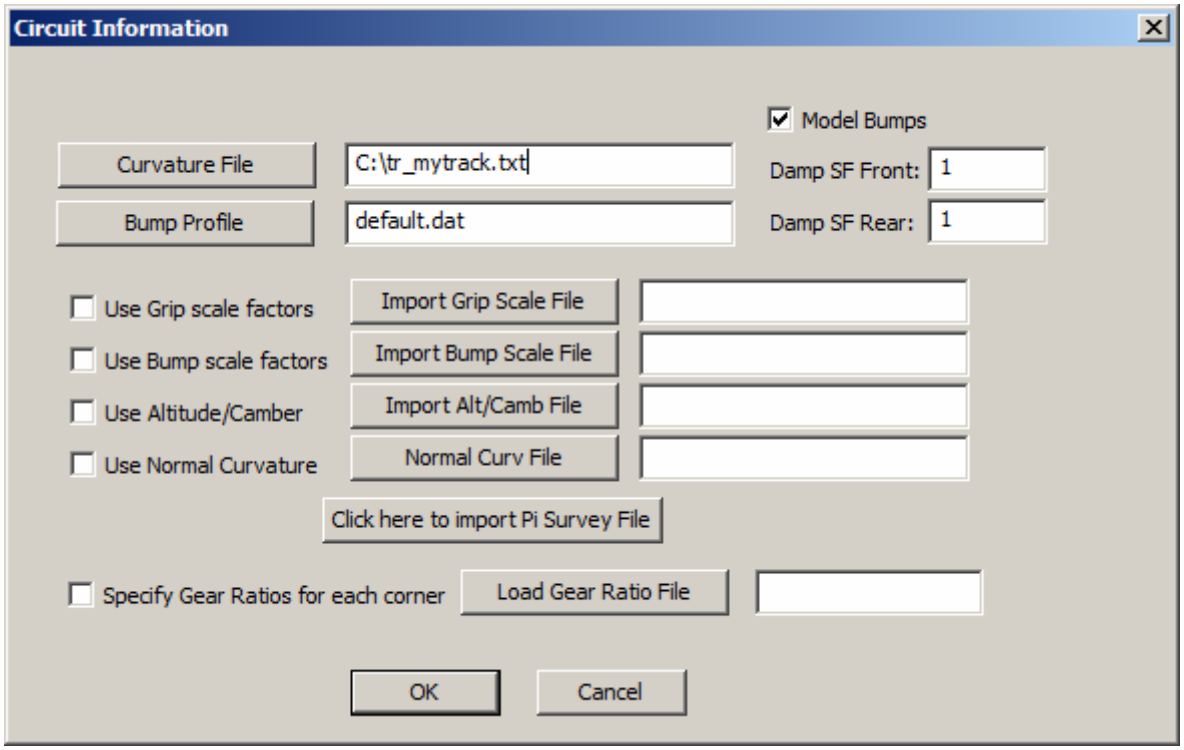
Just a note on track naming. My personal convention for curvature files is tr_trackname.txt. You can use any convention you wish just be consistent!

The type of filter you should be using will depend on how your lateral accelerometer is logged. It will depend on a case to case basis. However these are some rough rules of thumb,

- If the lateral accelerometer is being logged directly at 50Hz use the frequency based filter.
- If it is logged through the box at 10Hz use the moving average filter at a time period of 0.3s.

Step 3 - Loading in your curvature and bump profile

To run your curvature and bump profile go to Circuit->Circuit Data. This will bring up the following dialog,



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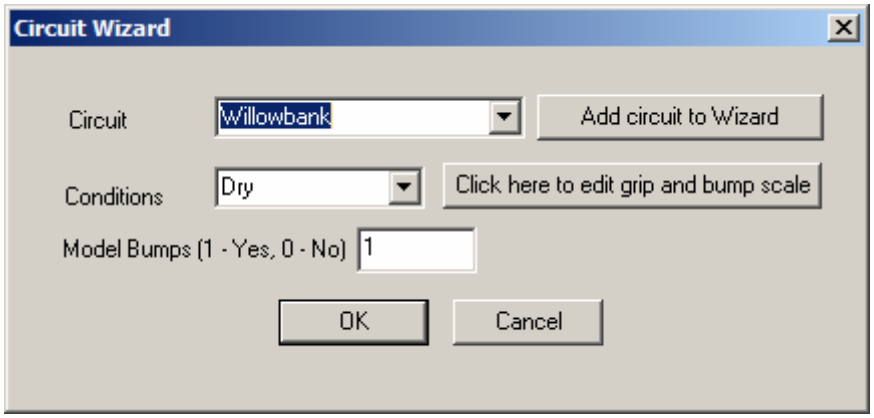
Click on the Curvature file tab to navigate and load in your desired curvature file. Once you have done this click on OK. Don't worry about the fact you don't have a bump profile. If ChassisSim can't find a bump profile it will revert to a smooth circuit anyway.

You are now ready to run the simulation. To do this go to Simulate->Simulate or click the Start button. This brings up the simulation dialog. To start the simulation click on Start simulation tab. The simulation will now run.

Refining the results of your simulation from the fixed circuit menu

Let's say you are using one of the fixed circuits from the ChassisSim circuit wizard and you need to dial in the results. This is typically due to the fact the circuit was derived from a different kind of car and we need to tweak some circuit parameters. To do this we will illustrate by an example.

Clicking on the circuit wizard we are going to take a circuit created for a V8 Supercar and modify it to be used for an F3 car. This is totally appropriate because this circuit is so bumpy open wheelers car's have to run offline! To do the modification let's load the circuit in question,



What we then do is click on the tab that says Click here to edit grip and bump scale. This will bring up the following dialog,

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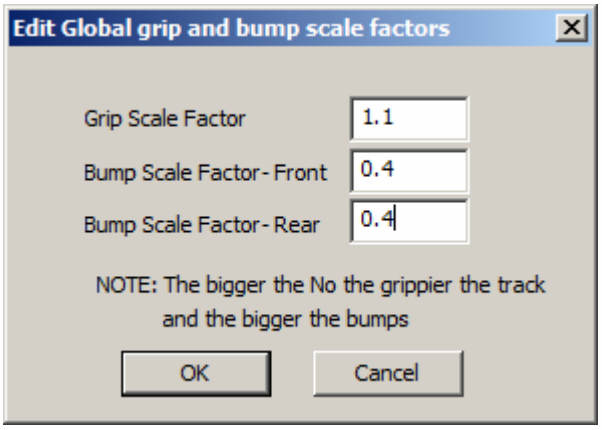

This allows you to edit the global grip scale factor and global bump scale factor of the individual circuit. These are some rough rules of thumb,

- If the circuit has bumps Adjust the bump scale factors first. If the lap time is too slow reduce the bump scale factors. The inverse applies if the laptime is too fast. Increase the bump scale factor.
- Once the lap time is in place then adjust the grip scale factor. If the lap time is too slow increase the grip scale factor. The inverse applies if the laptime is too fast. If it is too fast reduce the bump scale factor.
- Obviously if the bump scale has no impact go straight to playing with the grip scale factor.

Conclusion

The techniques presented here will allow you to quickly construct a circuit model. While the circuit model won't be absouletely perfect it will none the less allow you to construct a representative setup that you can use to determine a setup with.

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