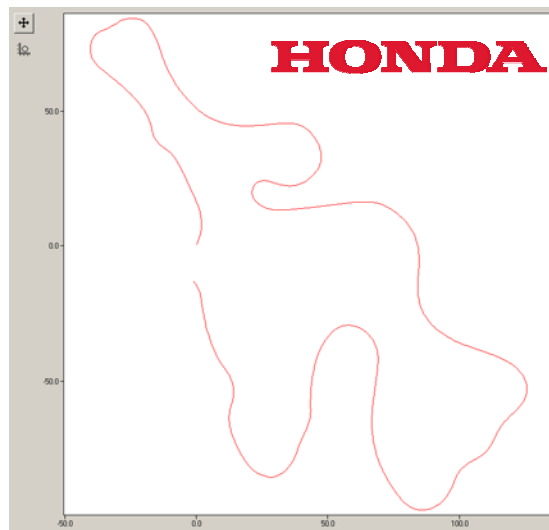


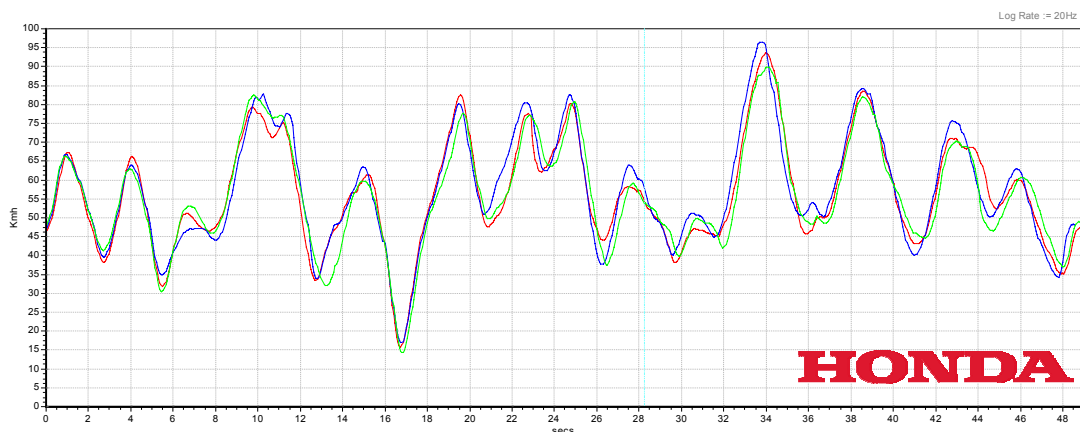
## Formula Student Event Track Data

A VBox II GPS based data acquisition system owned by Honda Research and Development UK Ltd was placed on the Leeds 237 car for the Endurance Event and on the Oxford Brookes 13 car and Leeds 5 car for the Sprint Event.

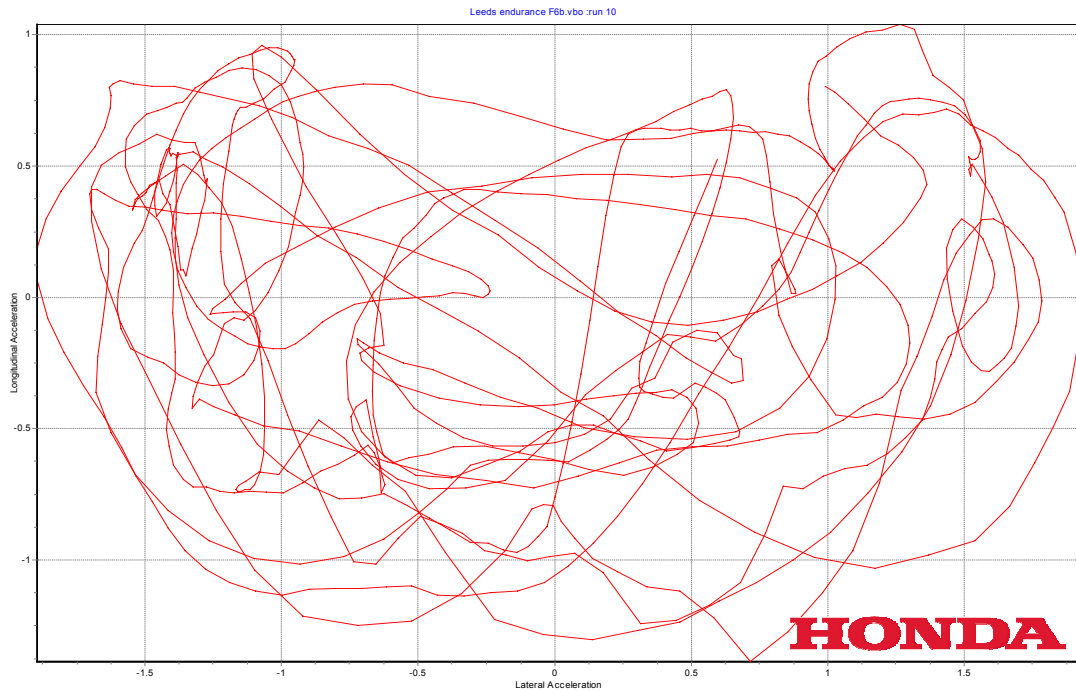
The acquisition system measures vehicle velocity and derives its lateral and longitudinal acceleration using GPS (<http://www.racelogic.co.uk>). Below is a GPS plot derived map of the Endurance track.



Several other plots are shown which basically illustrate the performance of the vehicles on the track.

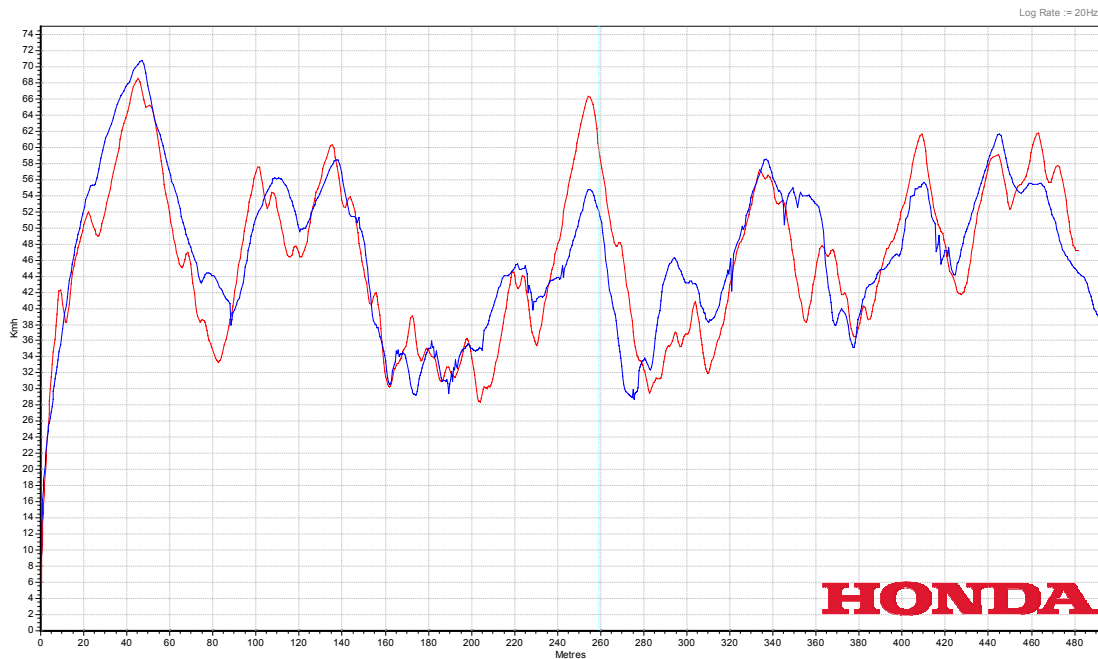


The first plot is of time in seconds on the X-axis versus Velocity in  $\text{kmh}^{-1}$  on the Y-axis and is of the three fastest laps of the Endurance Track by the Leeds 237 car: Red is lap 9 at 48.90 seconds, Blue is lap 10 at 48.60 seconds, Green is lap 16 at 48.85 seconds. As you can see the driver laps with a very consistent time but carries a different amount of speed at each corner to complete each lap. The maximum speed is just over  $95 \text{ kmh}^{-1}$ .



This is a plot of Lateral Acceleration in g on the X-axis versus Longitudinal Acceleration in g on Y-axis for the Leeds 237 for the fastest lap of the Endurance Track: Lap 10 @ 48.60 seconds. It can be seen that the driver effectively uses the performance envelope of the vehicle to complete the lap in the shortest time by using combined lateral and longitudinal accelerations and by moving around the edge of the g-g diagram.

Maximum lateral acceleration is in the order of just under 2g, but this is probably slightly overestimated by the GPS measurements and is not corrected for vehicle roll. There is a similar case for longitudinal accelerations, but even so, the vehicle is still negotiating the course at very high levels of acceleration compared to the average road car (maximum lateral acceleration for a road car is around 0.8g).



The final plot is of distance travelled in metres on the X-axis versus Velocity in  $\text{kmh}^{-1}$  on the Y-axis. It is also a comparison between cars from the Sprint Track with Oxford Brookes 13 car in Red with a 34.00 second lap and the Leeds 5 car in Blue with a 38.17 lap. Oxford Brookes had the fastest lap and this can be seen in the higher speeds as it progresses around the lap. Although the traces are similar, in the middle of the lap the Leeds driver appears to have made a mistake loosing him time.