Sports Driving Analysis Tool

DigSpice Instruction Manual

Ver. 1.1.1

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Dig Spice Co., Ltd.

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1. Introduction

Thank you very much for purchasing a DigSpice product.
We are certain that this Dig Spice product will be a useful tool in your motorsports life. Please be sure to read this instruction manual carefully to ensure proper use of the product.

Note and Warning

① The GPS logger has to be used between –10℃ to 60℃, otherwise the battery charging capability will be decrease.

② Please leave the GPS logger away from heat and NEVER leave the GPS Logger in the car or place wherever possibly temperature goes up higher than /60℃ High temperature causes overheat of the battery inside of GPS Logger, and this overheats may leads explode or catching the fire on the Logger. It is possible to make big damage on the car or may cause the serious injury on you.

③ Please recycle the +Lithium-Ion battery when its lifetime is finished. Battery is mounted inside of the GPS Logger.

④ Please keep GPS Logger in Dry/Cool places when you are not in use.

⑤ For the safety, keep the GPS logger and all accessories away from children.

⑥ The manufacturer assumes no responsibility for DigSpice and Retail Seller have no responsibility for any trouble or damage due to battery shortage, modification, or any other irregular uses.

⑦ Use only the supplied and approved accessories. Unauthorized accessories, modifications or attachments could damage the GPS logger, and may violate the law of governing radio devices.

⑧ Use a dry, clean soft cloth to clean the unit. Do not use harsh cleaning solvents, chemicals, or strong detergents.

⑨ Do not attempt to open the GPS logger yourself. We will not warrant if it is opened for any reasons.

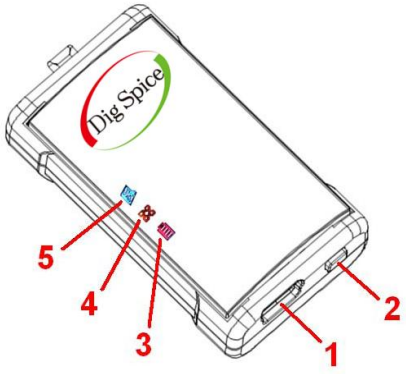
⑩ In order to work the devise properly, we recommend to use the computer with higher specifications than below.

- OS Windows XP, VISTA, 7
- Hardware CPU Celeron® 2 GHz
- Memory 2 GB

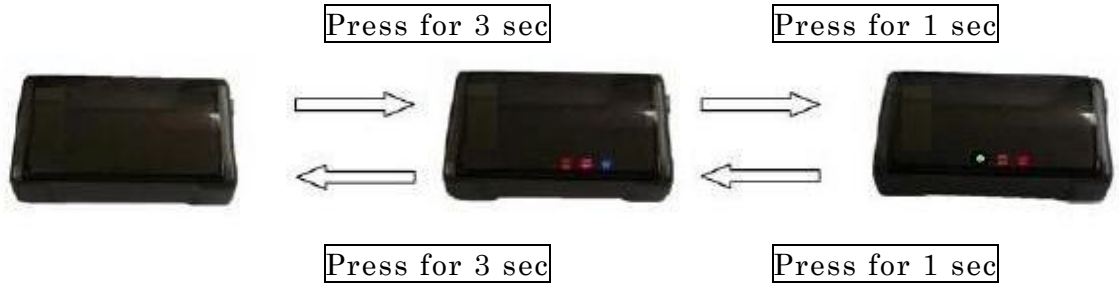
Analysis may be done with lower than above specification, but Driving Animation may not function smoothly. If the animation does not function smoothly, please try with less number of the cars.

1.1 Exterior Parts

1. DC jack (mini USB type)
2. Button (Power On/ Power Off)
3. Battery status LED (Red / Green)
4. GPS status LED (Orange)
5. Log status LED / POI LED (Green)



1.2 Power ON/OFF and Modes



1.3 Navi Mode and Log Mode

■ Navi Mode This mode is not for logging driving data.

It is used for reading the logged driving data and for default setting, and to receive correction information 30 minutes prior to measurement.

LED ☐Power (Red and green Light is on while USB cable is connected, and tuned off if the cable is not connected).
☐GPS (Orange light on)
☐Log (Green light off)

■Log Mode This mode is for logging driving data.
※Make sure the Log LED (Green) and GPS LED (Orange)light is flashing.

LED ☐Power (Red/Green, Green light on with USB connection, light off without connection)
☐GPS (Orange, Flashing when GPS recognition is complete, Light on when GPS recognition is underway)
☐**Log (Green, Flashing while logging**, Light on when remaining memory space is zero)

1.4 LED Display

The GPS Logger has three LED light: Battery Status, GPS Status, and LOG Status. The status table of LED shows as following:

Category	Symbol	Color	Status	Function
Battery Status LED		Red	Blinking	The battery is too low
		Green	On	The battery is charging
		Green	Blinking	The battery is fully charged
GPS Status LED		Orange	Always On	Acquiring satellites, GPS position is not fixed and device is not logging data yet.
			1Sec Blinking	GPS position is fixed and device is logging data.
LOG Status LED		Green	Slowly Blinking	In LOG mode (1 time / 3 seconds)
			Always On	The memory is full
			Quickly Blinking	The memory space is too low(20% left now)

(Caution)

2. What to Check Before Use

2.1 Check product contents

Check that all of the below items are included in the product package before using this system.

If the product is damaged or accessory is missing when you open the package please contact the store where you purchased the product.

① GPS logger
② Mini USB/USB cable
③ Car charger (Adapter for vehicle)
④ Strap
⑤ Mounting stay,BOX
⑥ Dig Spice CD-ROM (Instruction manual, software, driver)
⑦ Driver & Utility CD-ROM (Not normally used)
⑧ Simplified Installation Manual

※Product contents may change without prior notice.
※Do not use the car charger (Adapter for vehicle 12-24V) for any device other than Dig Spice.

2.2 Preparations before use

Battery charge

Please use USB cable to charge the battery before you use. The battery may be uncharged or very low voltage. It may be done from either personal computers or cigar lighter connecter on the car.

Charge will take approximately 90 minutes.

When using the product for the first time, be sure to fully charge the battery.

You will be able to use approximately 10 hours with full charge.

LED status
charging Green LED ON
charge is complete
Green LED Blinking

(Caution)

① Use the accessory cable to charge directly from a USB connector, and do not use a USB hub without a power supply.

This icon indicates battery status.

■ LED (Red) flash ・・・・ Indicates that remaining battery is very low. Battery needs to be charged.

■ LED (Green) light on・・・・ Indicates that battery is being charged.

■ LED (Green) flash・・・・・ Indicates that battery charge is complete.

2.3 Other

① The GPS logger may not be able to receive GPS signals when used inside of house.

② When the GPS logger is not in use, make sure to turn the power OFF to ensure the life of LED and other components.

③ Some vehicles have special coating on the windows, which may affect GPS reception.

④ Driving in an area with high risers may affect on GPS reception.

⑤ Using the system with poor signal condition, such as inside tunnels, may affect on GPS reception.

⑥ some courses in mountain areas have poor satellite reception due to trees and other objects.

⑦ The GPS generally shows maximum performance when used in open sky areas.

⑧ Weather conditions affect on GPS reception. The signal is poor when it is raining or snowing.

⑨ If the battery level of the GPS logger becomes very low, it may affect on GPS reception.

⑩ When starting up the GPS logger for the first time, it will take one to three minutes to receive signals to display the location. This is called cold start. If the GPS logger does not receive signals and display location after 20 minutes, We recommend trying again at open-air area.

⑪ Please confirm the setup contents before use.

⑫ If a communication error or time out occurs or if the USB cable is pulled out when the GPS Logger is reading the log, make sure the go through the setup again.

⑬ When the memory is full, you cannot setup properly.
(“Fine Mode,” “Standard Mode” and “Long Time” may not Switch)
Erase the log data and try the setup again.

3. Driving Analysis Software Installation

3.1 USB driver installation

Please refer to the enclosed Installation Manual.

3.2 Driving analysis software installation

Please refer to the enclosed Installation Manual.

3.3 Folder structure after installation

C:\User\Document\DigSpice\DigSpice.exe	Driving analysis program
C:\ User\Document\DigSpice\Circuit	Circuit display data
C:\ User\Document\DigSpice\ControlLine	Control line data
C:\ User\Document\DigSpice\Data	Driving analysis completed data
C:\ User\Document\DigSpice\Help	Help data
C:\ User\Document\DigSpice\Raw	Log data
C:\ User\Document\DigSpice\Sector	Sector data

Downloads from the website can be conveniently stored in relative folders.

4. GPS LOGGER MOUNTING INSTRUCTIONS (IMPORTANT!)

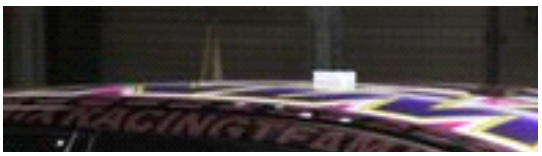
Mounting stay and black plastic case are included with the product for mounting the device on the car.

※ When mounting the device, make sure the DigSpice logo on the logger is facing the satellite.

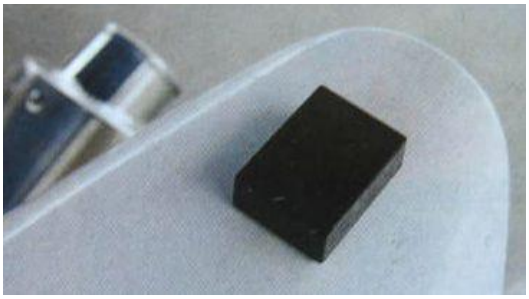
※ GPS signals can attenuate significantly due to metals, human body, and water.
Be sure to mount it where the satellite is always visible.

■ **Black Plastic Case**

Use the case for mounting on car exteriors, motorcycles and karts.
Reinforce it with adhesive tape if there's risk of it flying off.
※GPS signals barely attenuate with adhesive tape.
The case is not waterproof. Please take measures such as covering the joint sections with vinyl tape for use in rainy conditions.
※Car: Signal reception inside the car may worsen due to metals such as the roof or pillar, and glass coating.
Receiving sensitivity is better when the device is mounted on the exterior compared to the interior. Mounting it on the middle of the roof or trunk is recommended.



※Bike: Mounting on the rear cowl, etc. is recommended. If mounted on top of the tank, signal reception may worsen if the rider covers the device with the body.

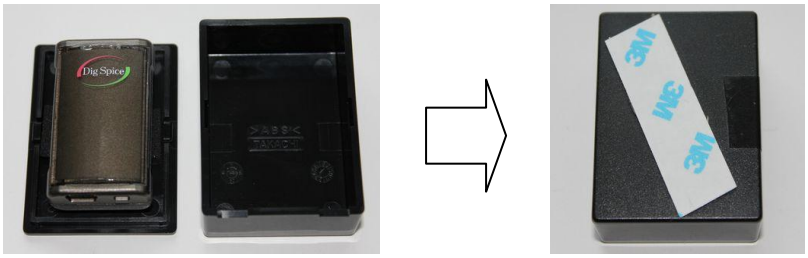


※Kart: Mounting on the front cowl, etc. is recommended.

【Motorcycle, Racing car, etc.】

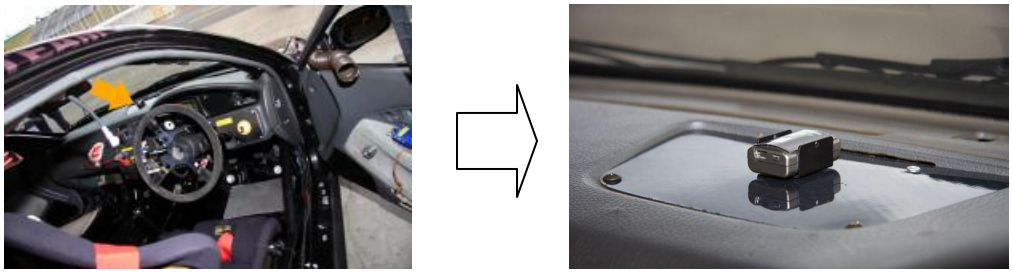
Mount the device where there is no obstacle in the skyward direction and GPS signals can be directly received, using the mounting stay so

that it does not fall off due to vibration. Mount the device using strong double-sided adhesive tape on the case bottom.



■Mounting stay

If the device cannot be mounted on the car exterior, mounting it on the middle of the dashboard, etc. is recommended.



When mounting the device inside the car, place it where the sky is visible and GPS signals can be directly received. Use the mounting stay to anchor the device not falling off due to vibration.

(Caution)

① Strong vibrations on vehicles such as motorcycles, formula cars, or racing cars that affect the GPS logger may cause a malfunction. Be sure to take vibration isolation measures using items such as rubber.

② The GPS logger is not made waterproof. Be sure to take waterproof measures if there is the possibility of the device getting wet.

5. Data Log

5.1 Important points before measuring(Hints on collecting accurate data)

Dig Spice uses the GPS to locate your car's position, and it needs to receive correct signal from the satellite to accurately measure its position. It may take about 30 minutes to receive all of the correct data. Therefore, you must need to turn on the GPS Logger and wait about 30 minutes before start driving in order to be ready the unit.

Beginning the drive immediately after starting to receive data may result in errors in position information. If you start driving right after start receiving the data, the device does not work properly due to the positioning error.

In addition, please note that turning the power on inside a roofed area and starting the drive before capturing satellite signals, or starting the log without having captured satellite signals may cause an error as well.

You do not need to wait 30 minutes if you take the data 2nd or more times at the SAME course, but you need to wait at least 5 minutes to capture the satellite signal.

5.2 Begin data logging

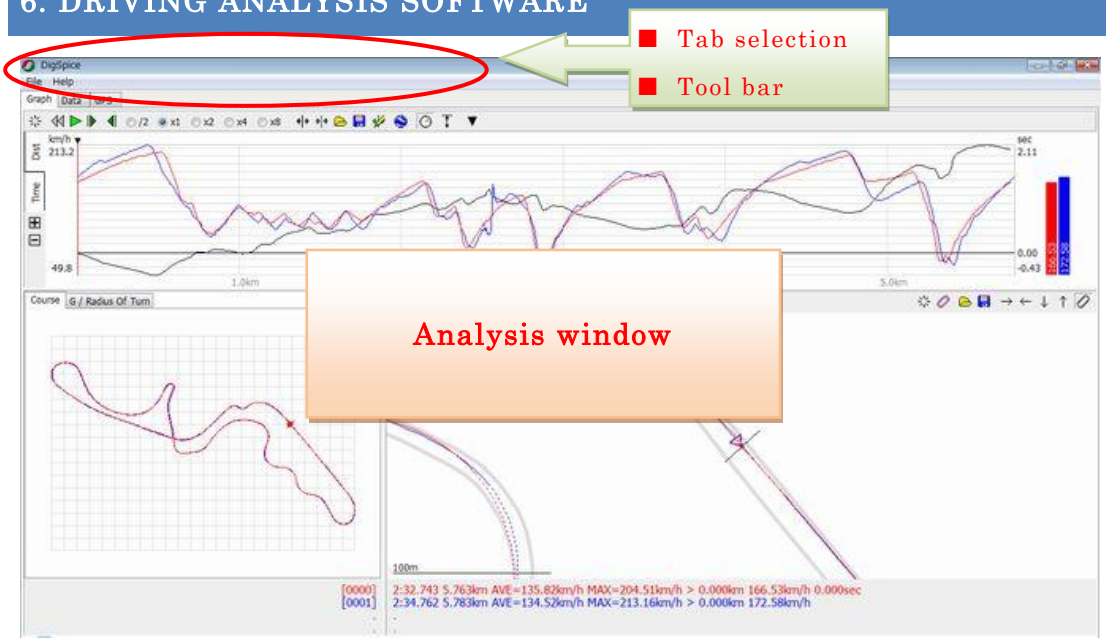
The GPS logger should be in Log Mode for the sports drive.

(Caution)

Turn the power OFF after the drive.

If you do not turn off the power right after the sports driving, GPS Logger will keep logging the data, so the unit will miss-read the signal and will not identify the actual sports driving. (Refer to Section 6.3.3)

6. DRIVING ANALYSIS SOFTWARE



6.1 Screen display explanation

☐Tab　　Graph　Analysis of Log data
　　Data　Save/Load of Log data
　　GPS　GPS logger settings

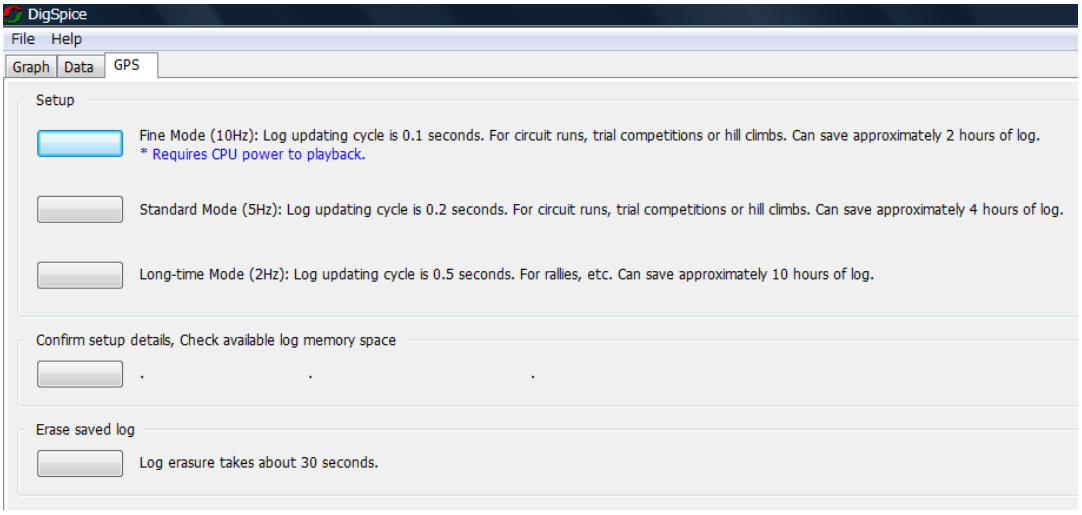
☐Tool bar　　For conducting various analyses

☐Analysis window　For displaying data analysis results, animation, etc.

6.2 Default setting

Default setting of the GPS logger is done with【GPS】.

The setting should be done in Navi Mode by connecting the GPS logger with the PC using the USB cable in the package.



6.2.1 Log time setting

■Setup

Fine Mode　The log updating cycle is every 0.1 seconds. Log for approximately two hours can be stored.
Drives GPS logger is pre-set to be able to use up to 2 hours continuously.　Please use the races that finish less than 2 hours.
When you use with Detailed Mode, the data will be large.　In order to display animation, the high spec PC is required.

Standard Mode　The log is updating every 0.2 seconds. Log for approximately four hours can be stored.
Use this mode for circuit drives, trial competitions or hill climbs that finish within four hours of continuous log time. **(Dig Spice recommended mode)**

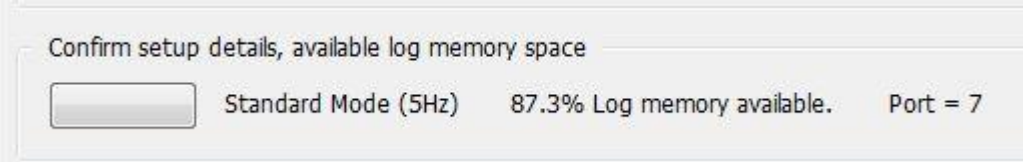
Long-time Mode　The log updating cycle is every 0.5 seconds. Data can be stored approximately 10 hours.
You are able to log the data more than 4 hours continuously, so you are able to use at the race such as Endurance race with this mode.

Once the mode setting is completed, the GPS logger setting status will appear on the “Confirm setup details, Check available log memory space” section.

When the log data memory is full, the log will stop and data cannot be obtained. In order to continue the log, delete the saved log as per Section 6.2.3.

6.2.2 Confirm setup details, available log memory space

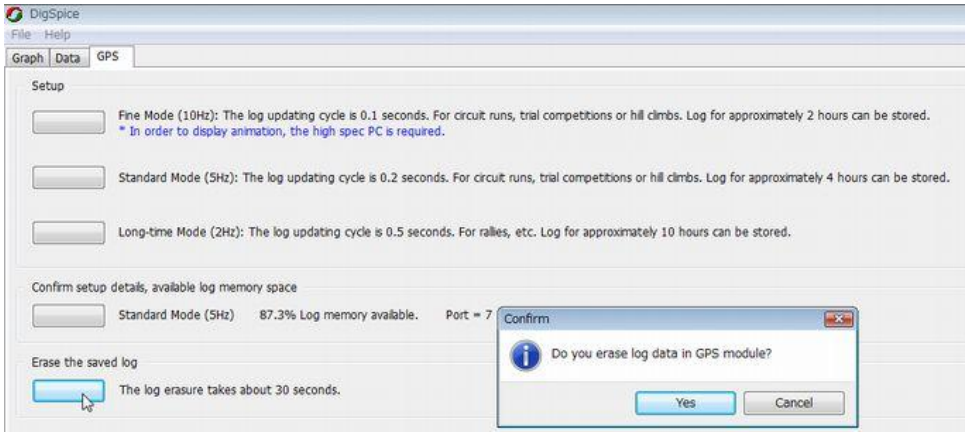
This confirms the GPS Set Up Mode and the availability of memory status.



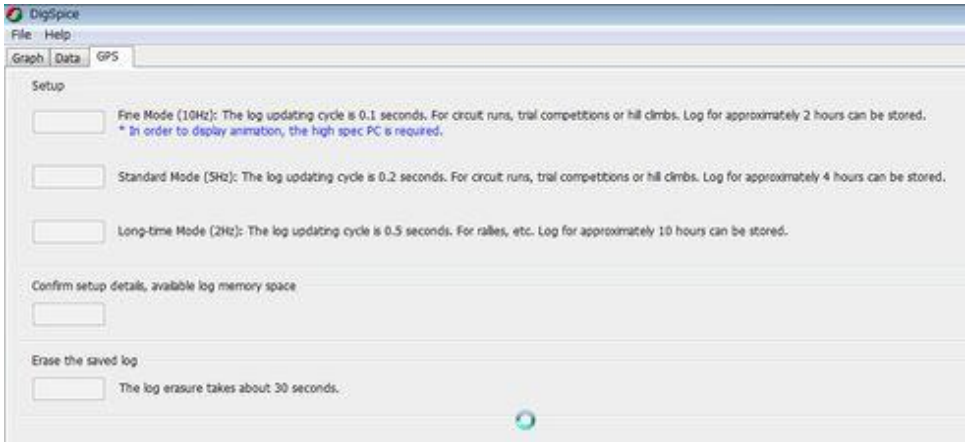
6.2.3 Erase the saved log

The following shows how to erase the saved log data in the GPS Logger.

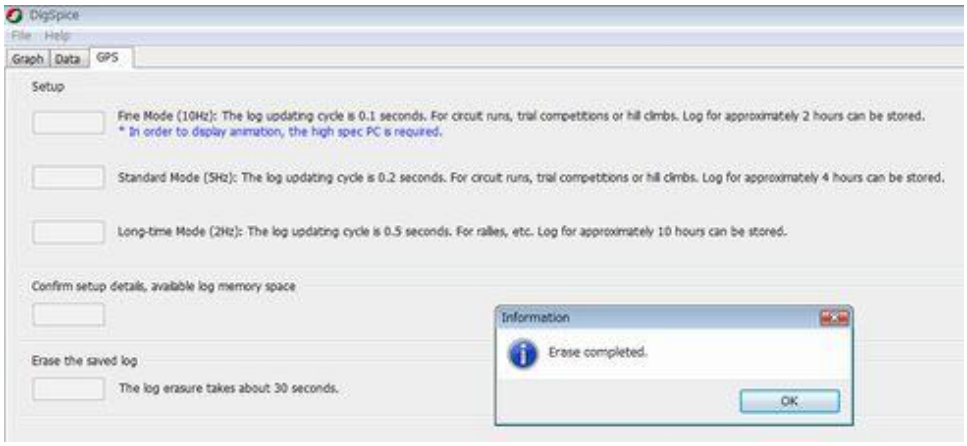
(Caution) Data cannot be recovered once it is erased. Be sure to save the data in the PC before erase.



Click Yes to begin erasing log data. The mouse will change to ○ and take about 30 seconds to erase data.

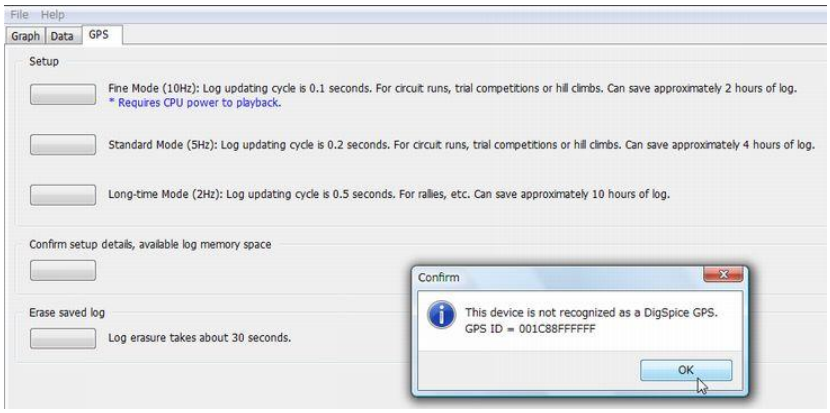


Erase Finish



Select OK

≪ Error Message ≫

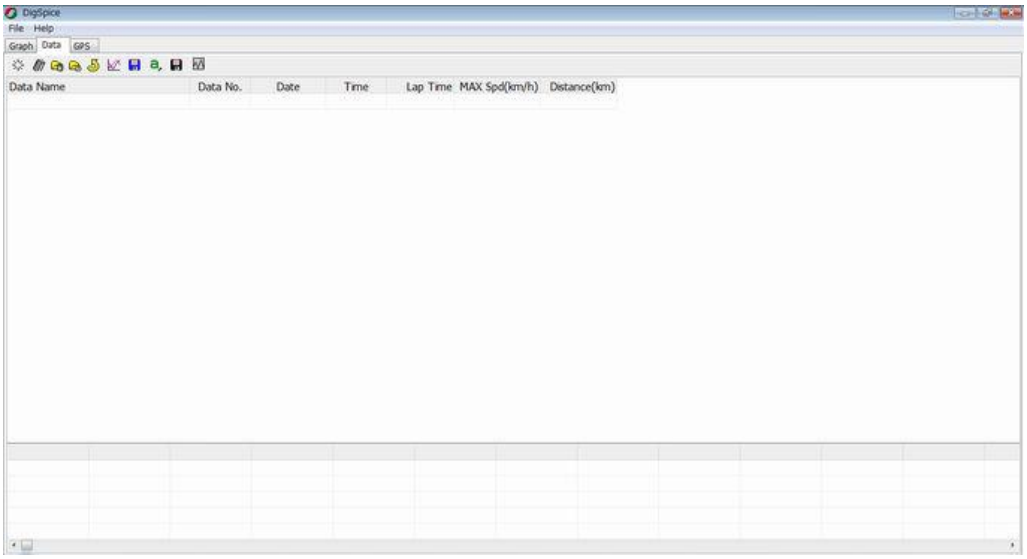


The message above means that the program could not recognize it is Dig Spice products.

Please specify the identification number on the error message and contact Dig Spice via the website.

6.3 Read driving data from the GPS logger

6.3.1 Launch the driving analysis software from the desktop



<Initial screen after launching the driving analysis software>

6.3.2 Connect GPS logger and PC

Make sure that GPS Logger contains Driving Data and Power is OFF before connecting to the computer.

Connect to USB port on PC using Accessory USB cable	

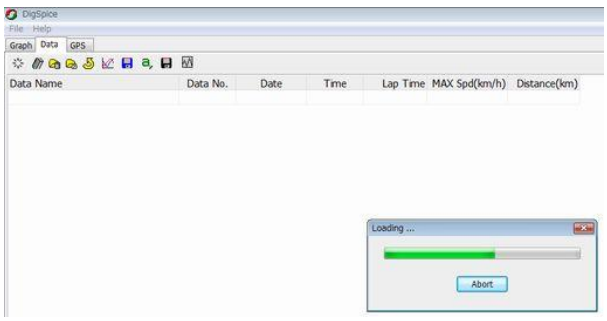
6.3.3 After connection is complete, with the cable connected, please change to Navi Mode. (Refer to section 1.2)

LED ☐Power
(Green light on)
☐GPS
(Orange light on or flash)
☐Log (Green light off)

(Caution) Some PCs may take around 15 seconds to recognize the GPS logger.

Click
《 Load log Data from GPS device》

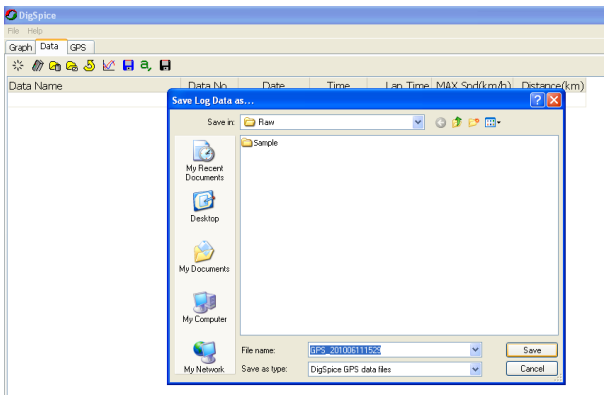
< Load start>



This will automatically start loading the Log data.

<Loading log data>

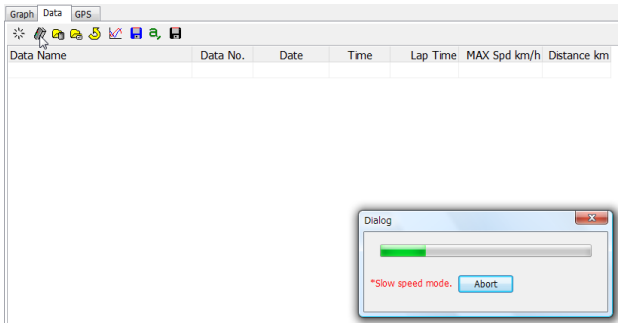
When loading is complete, the “Save log under a new file name” window will open, so save the file under a new name. (The initial file name will be the downloaded date and time.)



When loading is complete, the “Save log under a new file name” window will open, so save the file under a new name. (The initial file name will be the downloaded date and time.)

＜Display for saving GPS log name＞

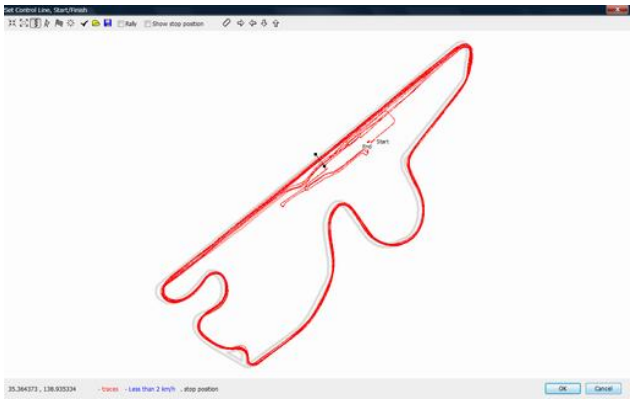
If the readings possibly do not succeed, the program will re-start the reading with Slow Speed Mode.



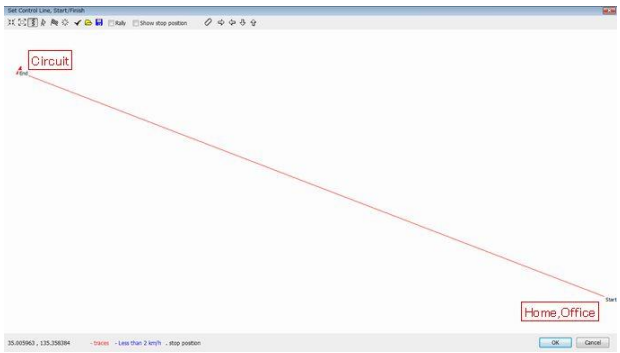
Slow Speed Mode

＜Slow Speed Mode＞

(Caution) Slow Speed Mode will be back to normal after restarting the Dig Spice Analysis Program. If the program miss-reads frequently, please adjust the program that is locate in the following place:
c: Programfiles￥DigSpice￥usbqual.txt
“0”: Standard Mode (Communication time 1 min. 20 sec.)
“1”: Slow Mode (Communication time 6 minutes)
“2”: Slow Mode (Communication time 4 minutes)
Communication errors may be caused by resident software such as antivirus software. If the miss-reading frequently happens, please stop the antivirus software and try again.
Once the data is saved, all data will be displayed on the “Control line, Start line / Finish setting” window.

	Log Data Graphic Display

<Log Data Graphic Display>

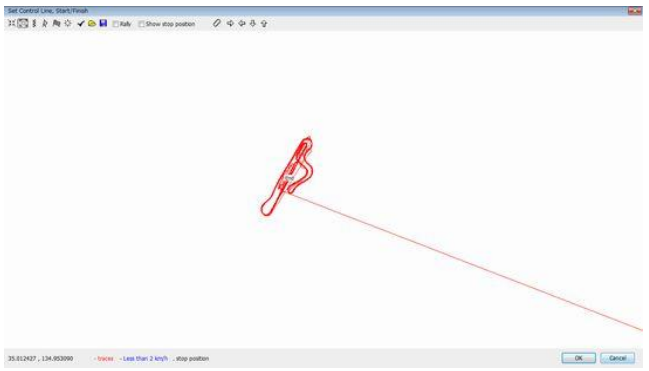
	The screen shows a straight line,

＜The screen shows a straight line＞

	Zoom range select

＜Zoom range select＞

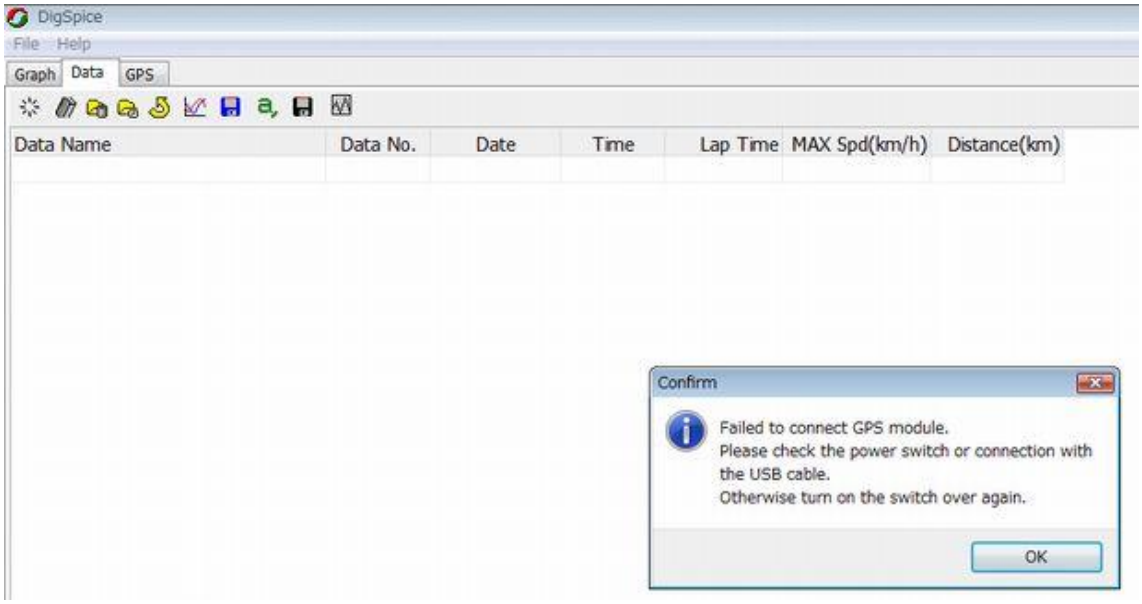
If the screen shows a straight line, this is because log data was obtained in multiple locations (such as home and circuit). Zooming in on the START or END section will display the log data. (Specify the zoom range using the below icon or the mouse wheel.)

	Zooming in on the START or END section
	It is displayed by zooming

＜Zooming　data＞

6.3.4 Error message

6.3.4.1 Connection failure with GPS logger



■Measures

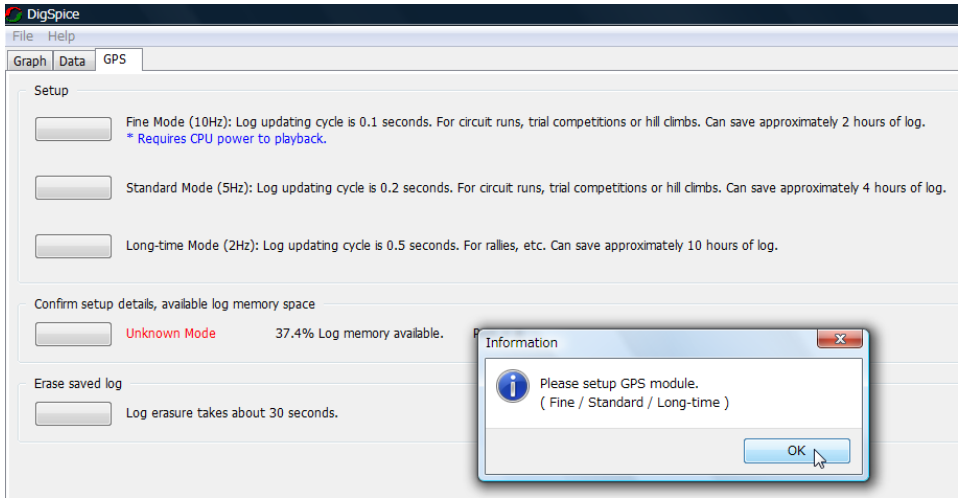
① Make sure the GPS logger and the PC are firmly connected with the USB accessory cable.

② Make sure the GPS logger is set to Navi Mode.

③ Turn the GPS power OFF, and then set it to Navi Mode and try again.

④ Restart the driving analysis software and try again.

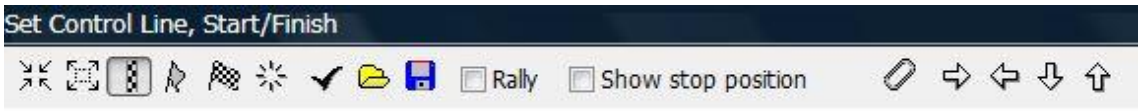
6.3.4.2 Not recognized as Dig Spice GPS



■Measures

【GPS】Tab＞“Confirm setup details, Check available log memory space” status (Refer to Section 6.2.2)

6.4 log data shift.



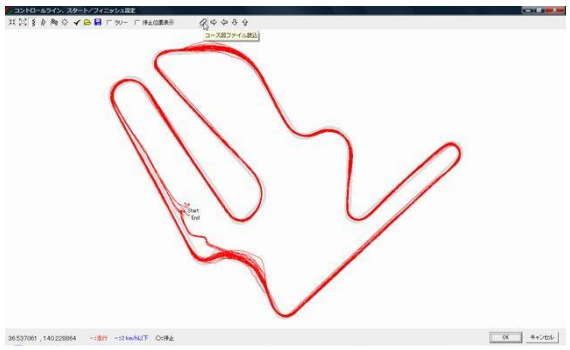
	Cancel zoom/Specify zoom range (Can zoom in or out using the mouse scroll wheel)
	Control line setting (Use the grid extension lines to adjust it at a right angle to the course)
	Start/Finish setting (Used when start/finish positions are different, such as in rallies and hill climbs)
	Delete control line, start/finish
	Marker setting (Used as a marker when latitude and longitude are available, such as in rallies)
	Load and save control line, start/finish (Available for download from Dig Spice website)
Rally	Set start time at 00 sec. to correspond to rally SS.
Show stop position	The stop position is indicated with a circle ● for competitions such as rallies, trials and hill climbs with the same stop and start position.
	Load Circuit Map
	Adjiust Trace (Right/Left/Down/Up)

6.4.1 LOG data shift

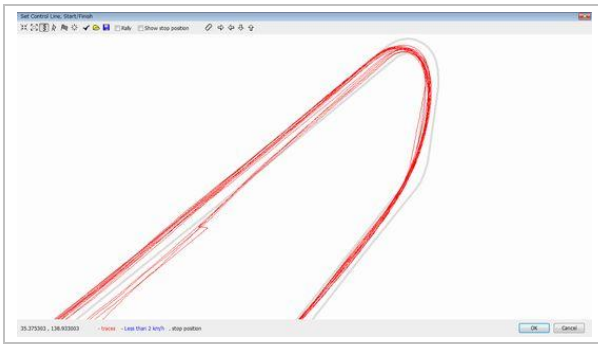
Before setting the control line, display driving data and circuit map and use the arrow key to adjust log data to the circuit map. This will let you obtain a more accurate driving data.

	Load circuit map.

＜Load circuit map＞

	Log data and circuit map Graphic display.

＜Display driving data and circuit map and make adjustments＞

	Log data and circuit map expand display

＜Log data and circuit map expand display＞

	Adjust log data to the circuit map

＜Log data adjust＞

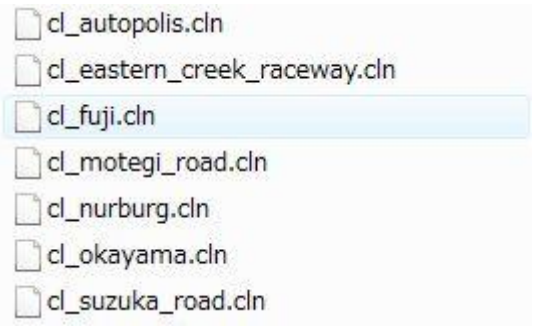
6.4.2Setting the Control Line

Circuit:Specify the control line with the Control Line Setting

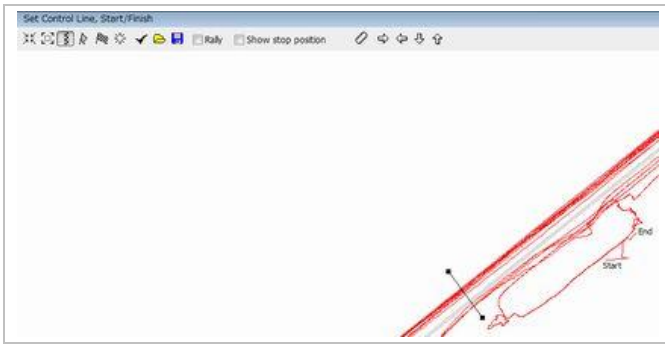
☐If you have an official or personally created control line

	Load Control line, Start/Finish

<Load Control line, Start/Finish>

	Choose the control line data of the run circuit and push "OK".

< Choose the control line>

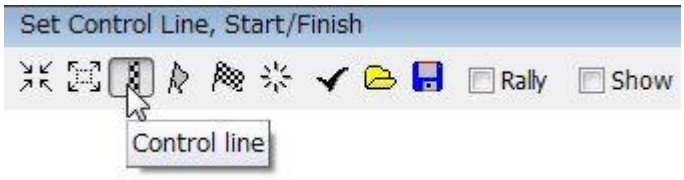
	Control line is drawn (Black Line)

< Control line is drawn >

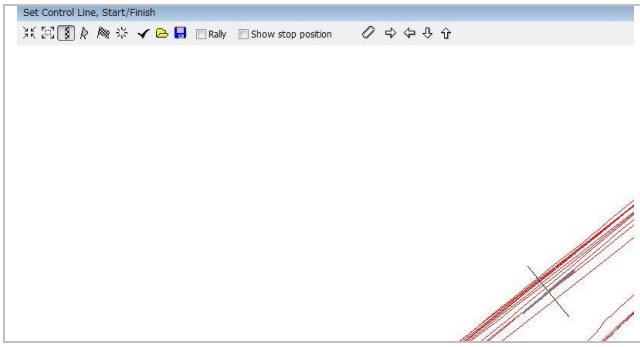
	Click “OK”

■When a control line is not prepared.

Please set a control line by manual operation.

	Choose the control line

＜Control line setting＞

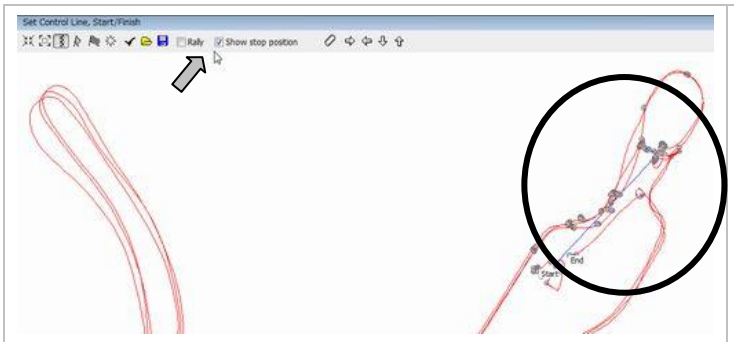
	At the control line position, click the right mouse button and adjust the center of the ＋mark to the control line position to set the line.

＜The manual setting control line＞

	Click “OK”

☐Rally, trial, hill climb:

Specify the positions with Start setting and Finish setting.

	Check the Display Stop Position box and a circle ○ as shown in the diagram below will appear, which will make it easier to indentify Start/Finish positions.

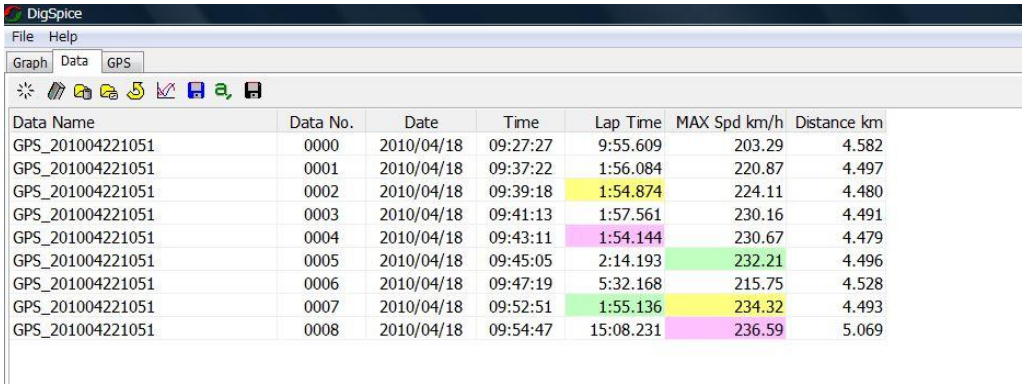
<Show stop position>

	Start Gate SET
	Finish GATE SET

＜Start/Finish GATE SET＞

	Click “OK”

Once the measurement line is set, click OK and the detailed data by lap will be displayed in the analysis window under the 【Data】 tab.



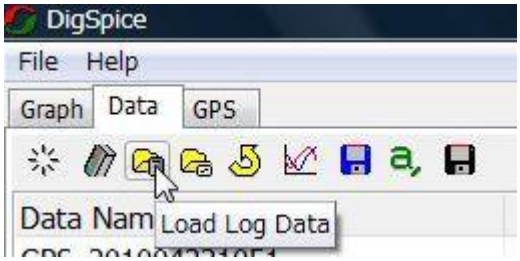
Data Name	Data No.	Date	Time	Lap Time	MAX Spd km/h	Distance km
GPS_201004221051	0000	2010/04/18	09:27:27	9:55.609	203.29	4.582
GPS_201004221051	0001	2010/04/18	09:37:22	1:56.084	220.87	4.497
GPS_201004221051	0002	2010/04/18	09:39:18	1:54.874	224.11	4.480
GPS_201004221051	0003	2010/04/18	09:41:13	1:57.561	230.16	4.491
GPS_201004221051	0004	2010/04/18	09:43:11	1:54.144	230.67	4.479
GPS_201004221051	0005	2010/04/18	09:45:05	2:14.193	232.21	4.496
GPS_201004221051	0006	2010/04/18	09:47:19	5:32.168	215.75	4.528
GPS_201004221051	0007	2010/04/18	09:52:51	1:55.136	234.32	4.493
GPS_201004221051	0008	2010/04/18	09:54:47	15:08.231	236.59	5.069

<Lap data analysis window>

※The analysis data will indicate the best three times in color.

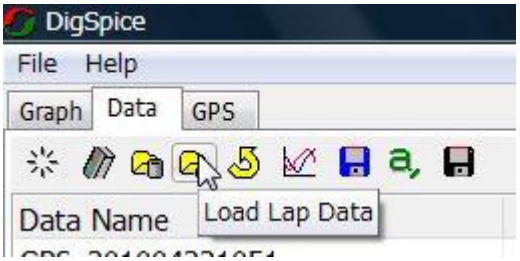
Best Pink 2nd Yellow 3rd Green

6.5 Load Log Data



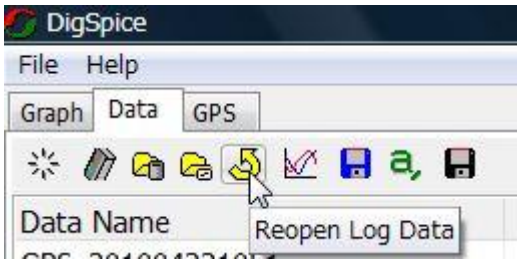
This will read a saved GPS data

6.6 Load Lap Data

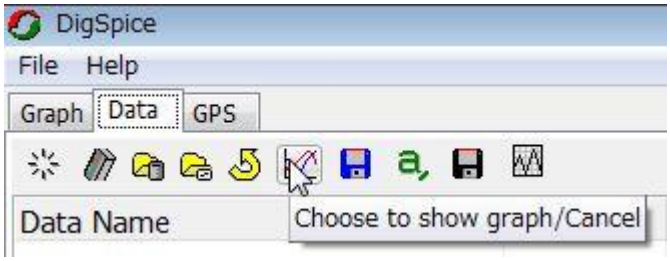


This will read a driving data file that
has been analyzed.

6.7 Reopen Log Data

	Returns to “Control line, Start/Finish setting” window. Displays “Control line, Start/Finish setting” window.

6.8Choose to show graph/Cancel 【Graph】

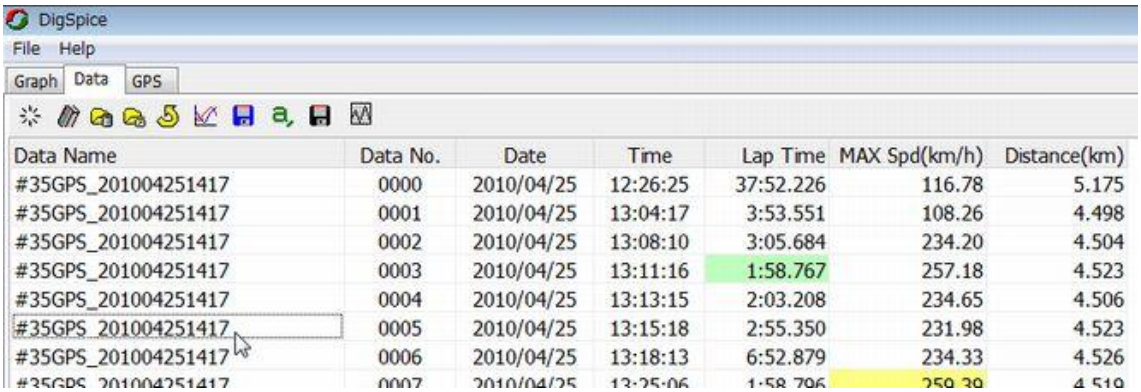
	Go to the Graph tab to select the data for analysis. Up to 4 driving data can be selected. The selected data will be color coded in order from Red→Blue→Green→Yellow. You can also double click the data to select the data. Double click again to cancel the selected driving data. Go to the Graph tab to select the data for analysis.

6.9 Save lap data

	This saves a file for one lap data.

6.10 Save the lap data list as CSV file

This saves the lap data list as a CSV file

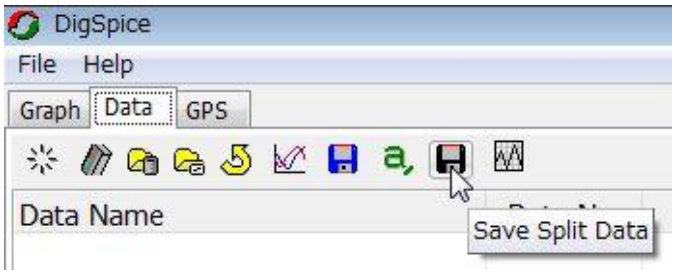


<Display>

	A	B	C	D	E	F	G
1	Data Name	Data No.	Date	Time	Lap Time	MAX Spd(km/h)	Distance(km)
2	#35GPS_201004251417	0	2010/4/25	12:26:25	37:52.2	116.78	5.175
3	#35GPS_201004251417	1	2010/4/25	13:04:17	03:53.6	108.26	4.498
4	#35GPS_201004251417	2	2010/4/25	13:08:10	03:05.7	234.2	4.504
5	#35GPS_201004251417	3	2010/4/25	13:11:16	01:58.8	257.18	4.523
6	#35GPS_201004251417	4	2010/4/25	13:13:15	02:03.2	234.65	4.506

<OUTPUT FILE>

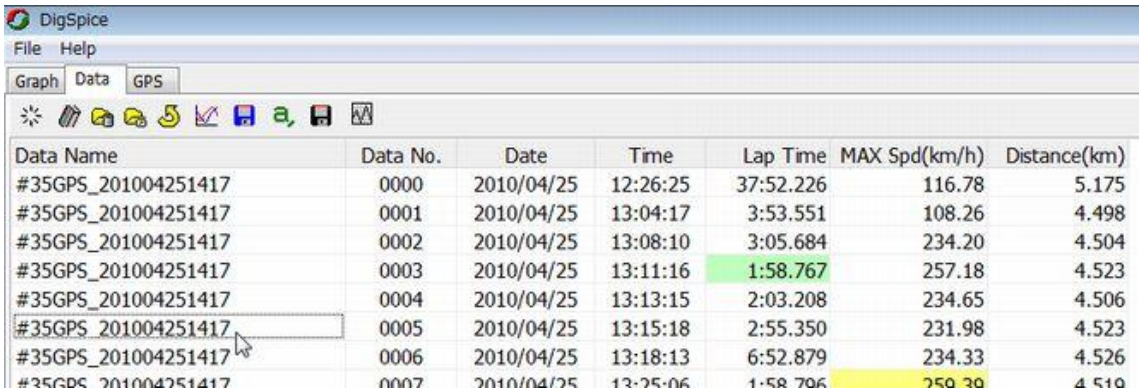
6.11 Save split data



This saves one split data as a driving data file.

6.12Save Lap Data as CSV

This saves one Lap data as driving data as CSV file. Select Lap data.



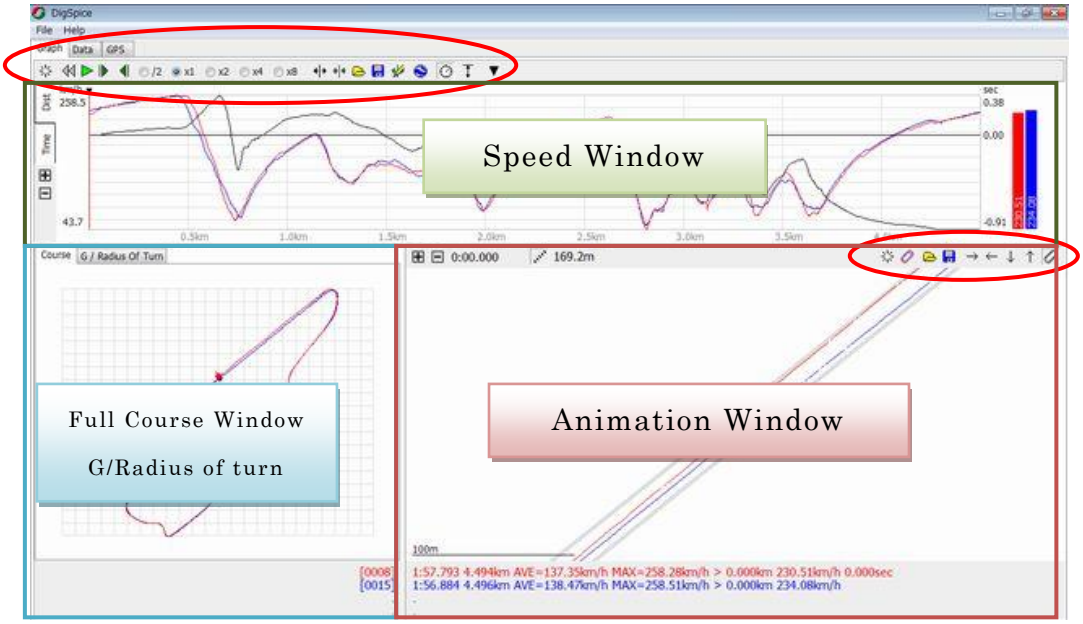
Data Name	Data No.	Date	Time	Lap Time	MAX Spd(km/h)	Distance(km)
#35GPS_201004251417	0000	2010/04/25	12:26:25	37:52.226	116.78	5.175
#35GPS_201004251417	0001	2010/04/25	13:04:17	3:53.551	108.26	4.498
#35GPS_201004251417	0002	2010/04/25	13:08:10	3:05.684	234.20	4.504
#35GPS_201004251417	0003	2010/04/25	13:11:16	1:58.767	257.18	4.523
#35GPS_201004251417	0004	2010/04/25	13:13:15	2:03.208	234.65	4.506
#35GPS_201004251417	0005	2010/04/25	13:15:18	2:55.350	231.98	4.523
#35GPS_201004251417	0006	2010/04/25	13:18:13	6:52.879	234.33	4.526

<Display>

	A	B	C	D	E	F	G	H
1	Sec	Time	Distance(km)	Altitude(m)	Speed(km/h)	RadiusOfTurn(m)	LateralG	Accel/BrakeG
2	0	00:00.0	0	621.19	225.17			
3	0.005	00:00.0	0	621.19	225.22	3763.09	0.106	0.038
4	0.105	00:00.1	0.007	621.26	224.33	3397.72	0.12	0.045
5	0.205	00:00.2	0.013	621.34	224.53	2714.57	0.021	-0.149
6	0.305	00:00.3	0.019	621.33	223.65	2042.64	-0.105	-0.065
7	0.405	00:00.4	0.025	621.39	223.64	1582.98	-0.052	-0.03
8	0.505	00:00.5	0.031	621.43	224.21	1339.29	0.12	0.045
9	0.605	00:00.6	0.038	621.48	224.13	1296.78	0.306	0.138
10	0.705	00:00.7	0.044	621.51	225.1	1401.81	0.121	0.051
11	0.805	00:00.8	0.05	621.56	224.75	1684	-0.049	0.132
12	0.905	00:00.9	0.057	621.6	225.53	2087.34	-0.199	0.159
13	1.005	00:01.0	0.063	621.62	226.78	2473.7	-0.165	0.079
14	1.105	00:01.1	0.069	621.64	225.59	2777.86	-0.056	0.073

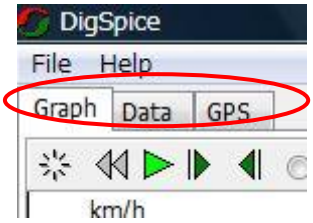
<OUTPUT FILE>

7. Detailed Analysis 【Graph】



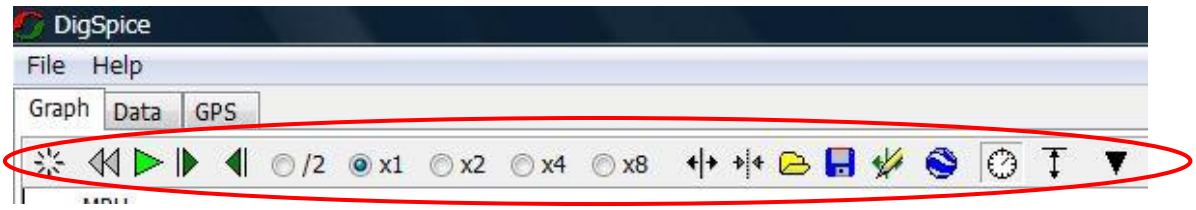
7.1 Description of displays (Switch)

7.1.1 Tabs

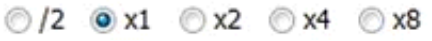


Graph：Analysis of driving
Data：Input/output of driving data
GPS：GPS logger settings

7.1.2 Graph Tool Bar



※Used to display log data as animation.

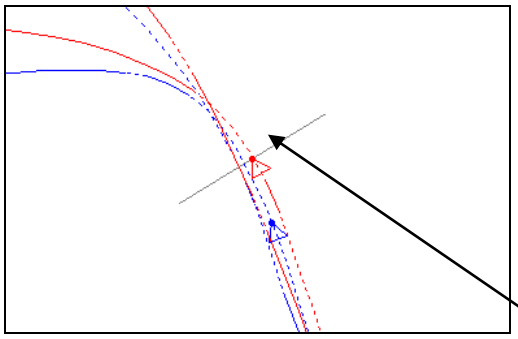
	Clear graph
	Reset playback time
	Playback/stop (Space bar)
	Step next frame("F"Key)/Setp previous frame("B"Key)
	Playback speed
	Set sector Gate/Clear sector Gate
	Load sector Gate/Save sector Gate/Edit sector Gate
	Export to google Earth
	Show/Hide Compare Time
	Show/Hide Altitude
	Adjust X-axis(Dist) on Sector

※Please use Google Earth when the PC is connected to the Internet.

※Use the Space key to Play/Stop, F key for frame advance, and B key for frame rewind.

7.2 Sector setting when passing the same point more than once

Used mainly for slalom competitions (such as gymkhana, dirt trial).
If the sector setting includes a same point that is passed more than once, this function can measure the passing for the second time and after.
Move the standard car to the position for the second lap (or after) and set the sector.

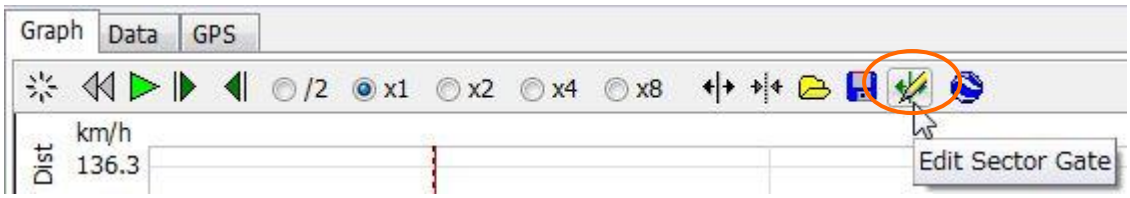


Measure the 2nd passing

-S1 split time	-S1 distance	S1 pass time	S1 pass speed	S1- split time	S1- distance	lap time
0:12.399	0.233	0:12.399	73.53	1:23.054	1.536	1:35.453
0:12.358	0.233	0:12.358	69.36	1:23.623	1.514	1:35.981
0:12.358				1:23.054		1:35.412

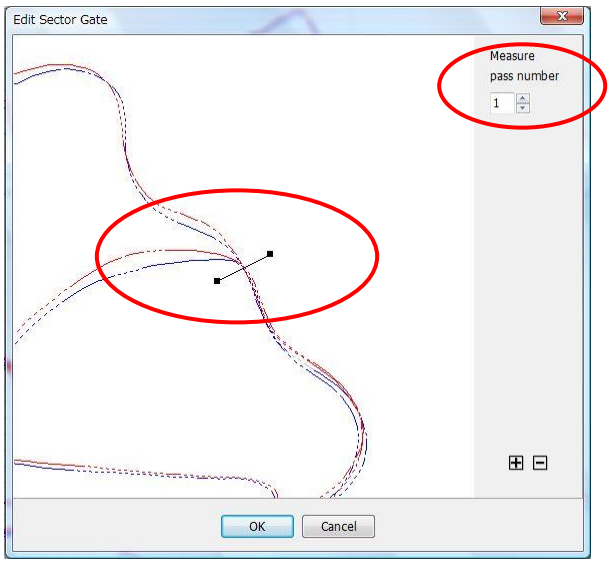
7.3 Adjustment function of set sectors

Set the sectors and click the below button.



Select the sector to be adjusted.

Specify the location and lap number to be measured.



Please note that changing the lap number may also change the sector numbers.

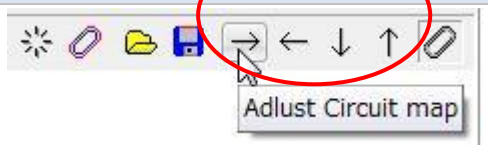
Move the gate by dragging the ■ with your mouse.

Specify the lap number to be measured.

7.4 Display/hide course layout tool on animation window

	Clear circuit map
	Genarate circuit map
	Load / Save circuit map
	Adjust circuit map
	Show/Hide circuit map tool

7.4.1 Adjust course layout

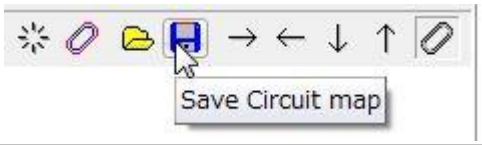


Minor adjustments can be made to the course layout using the arrow switch.

7.4.2 Load course layout file

Display saved course layout data on animation window.

7.4.3 Load/Save course layout file



Display saved course layout data on animation window.

Save course layout data after making minor adjustments.

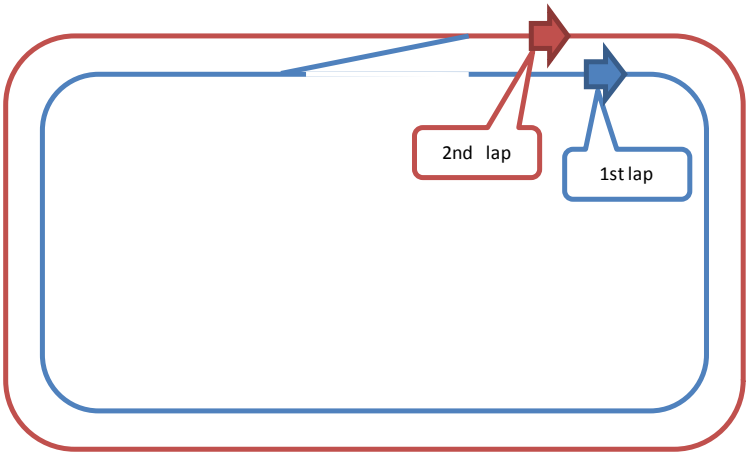
7.4.4 Create course layout

You can create original course layout.

Follow the following steps when creating a course layout.

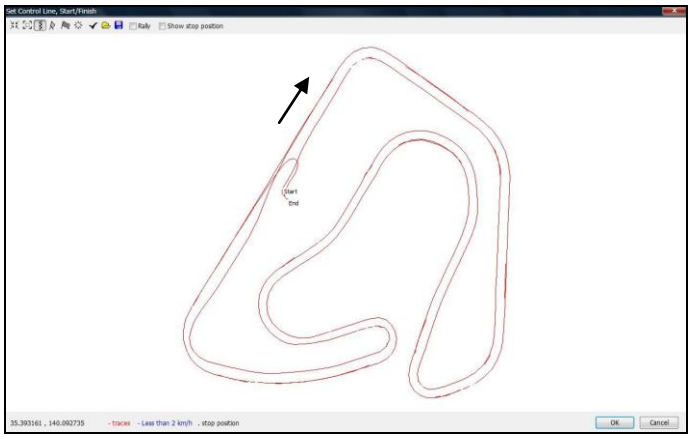
① Make a circuit of the inner rim of the course.

② Move to the outer rim of the course with a straight line and make a circuit of the outer rim of the course. (Refer to the image below)

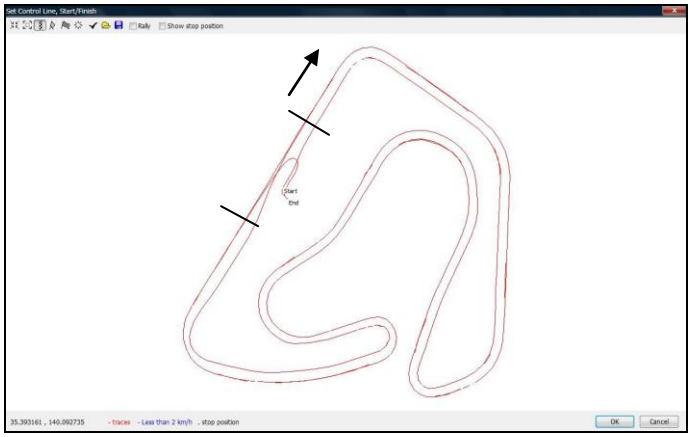


※The first lap can be either the inner or outer side of the circuit.

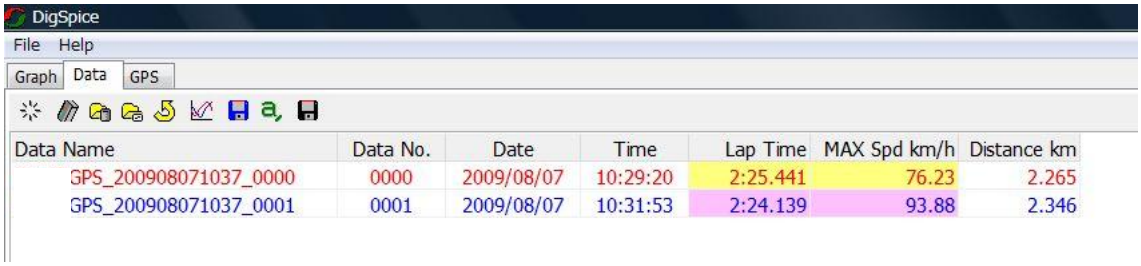
③ Actual data sample



⑤ Set the start/finish gate by avoiding the section where the straight lines cross.

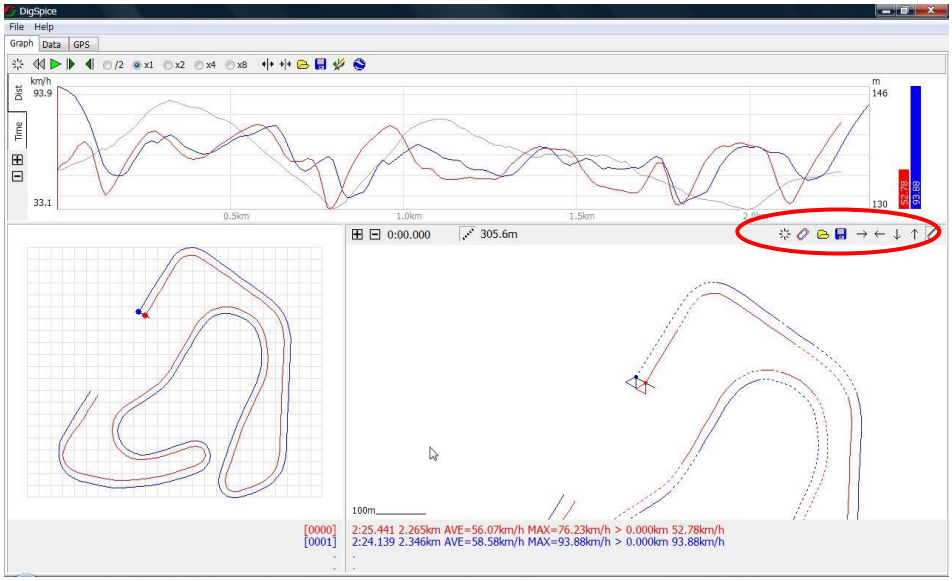


⑥ Select OK to display lap data.

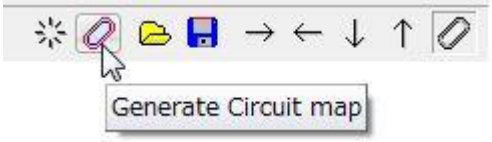


Select the driving data for the inner rim and outer rim of the course.

⑦ Create course layout



The course layout will be displayed without the crossed section.

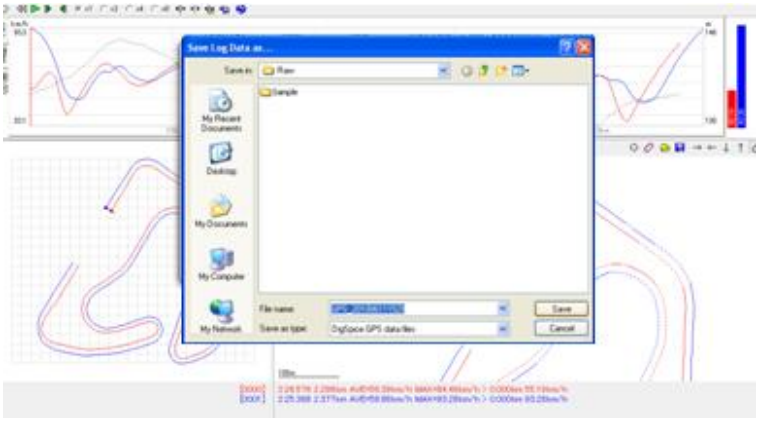


Click “Generate Circuit map” button.

This step will link the disconnected ends of the course layout.

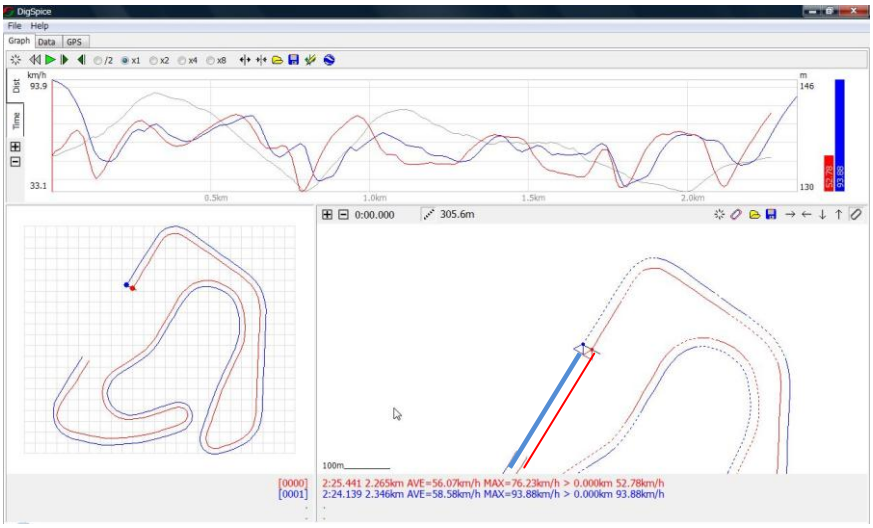
⑧Save course layout

Save the created course layout with a name.



⑨ Completed course layout

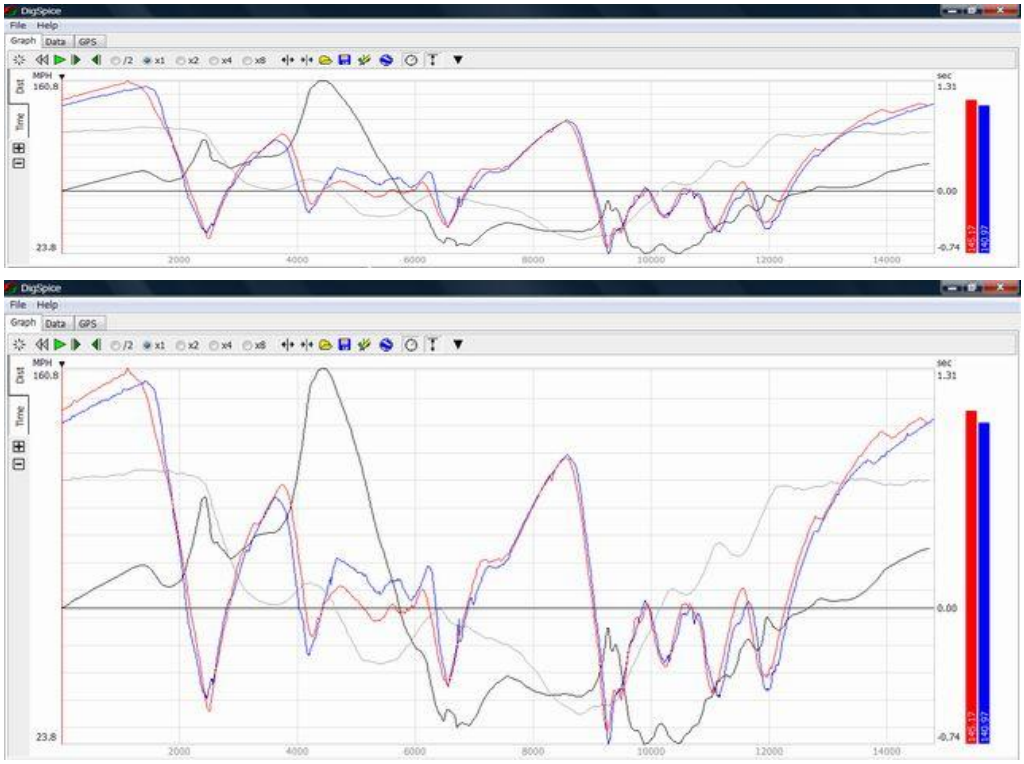
When you open a saved course layout, the disconnected ends of the course layout will be linked as shown below.



7.5 Window

The window sizes can be scaled to any size by dragging the borderlines of the graph with your mouse.

7.5.1 Speed window



【Zoom in】

The analysis data selected in 【Data】is displayed as a graph.

X-axis (Horizontal): Driving distance/Driving time (Can be switched)

Y-axis (Vertical): Speed

The black line indicates the red & blue compare time.

Black line shows the time differences between Red Line (car A) and Blue Line (car B). It is shown based on Red Line

When the black line moves up vertically, it shows Red Line (Car A) made a better lap time than Blue Line (Car B). On the other hand, when the black line moves down, it shows Blue Line made a better lap time.

Time Difference Graph can be different by the distance of driving. In order to correct this difference, setting the sectors where the driving line is different. The data will be corrected at this point. When you wish to measure the time difference at specific ZONE, such as just one corner, set the sector before and after the ZONE.

If you set in the Middle of the ZONE, you will get more specific result.

▼ Speed Graph Base Point

This Triangle shows the agreement of driving line and speed graph of all cars at this point.

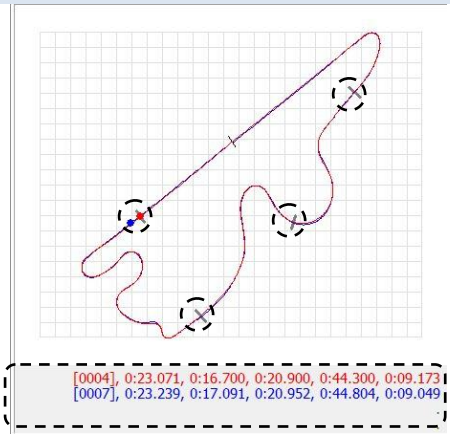
The red line (car A) data is always agreed because it is basis. The other car can be disagreed the driving line and speed graph in some points because of the difference of driving distance. Set the sector and click the ▼ icon. ▼point will be the base point of the speed graph and you will be able to compare more exactly the time differences from this point.

The gray line indicates the altitude.

Double click on the graph to display the position line, and the speed at that point will be displayed as a bar graph at the far right.

Use the ⊞ ⊟ or scroll wheel to scale the graph size centered around the position line.

7.5.2 Full course window

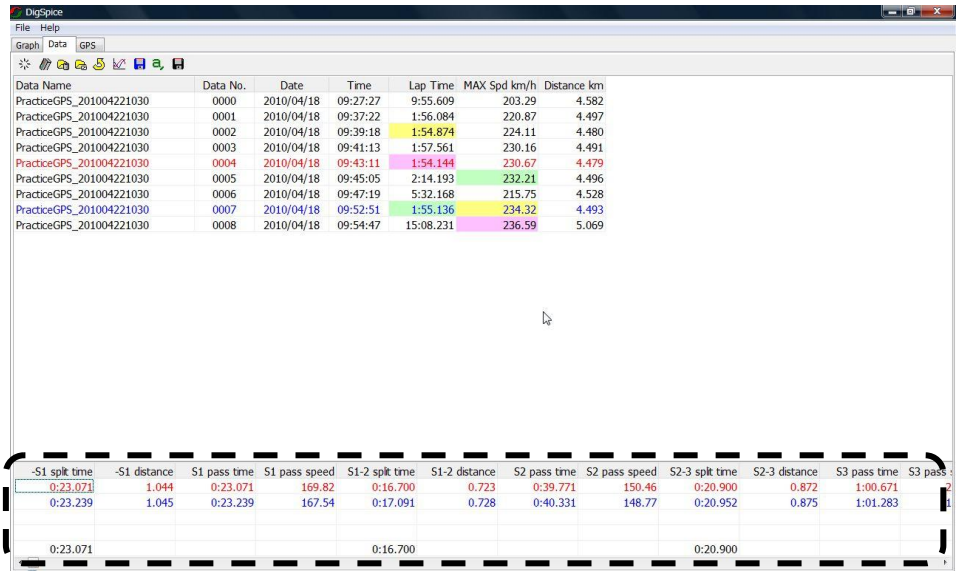


The analysis data selected in 【Data】 is displayed as a graphic.

○ sections indicate areas arbitrarily set as sectors.

□ sections indicate the total sector times.

※ Details of the total sector times can also be viewed in 【Data】 tab.



<Sector details>

The sector details will display the best lap for the sector among the selected laps, and then display the total time for these sectors as the "best virtual time."

7.5.2.1 G force/Radius of turn

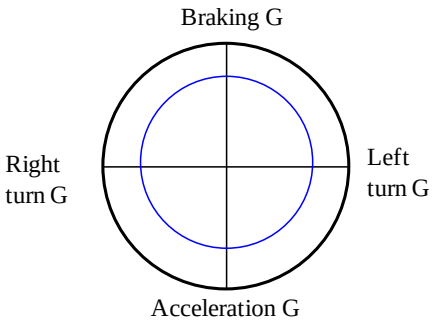
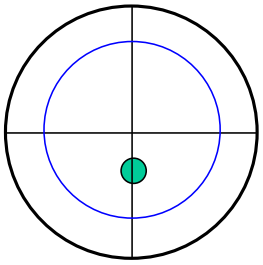
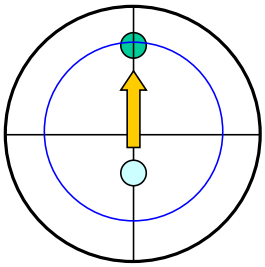
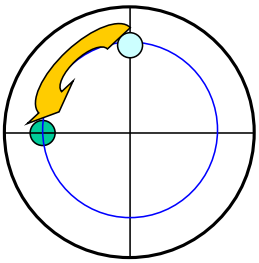
This section is on how to display G force and Radius of turn.

(Attention)

The data used in this section is calculated based on the speed recorded with the GPS logger, plane coordinates and sampling period. They are not values detected using sensors.

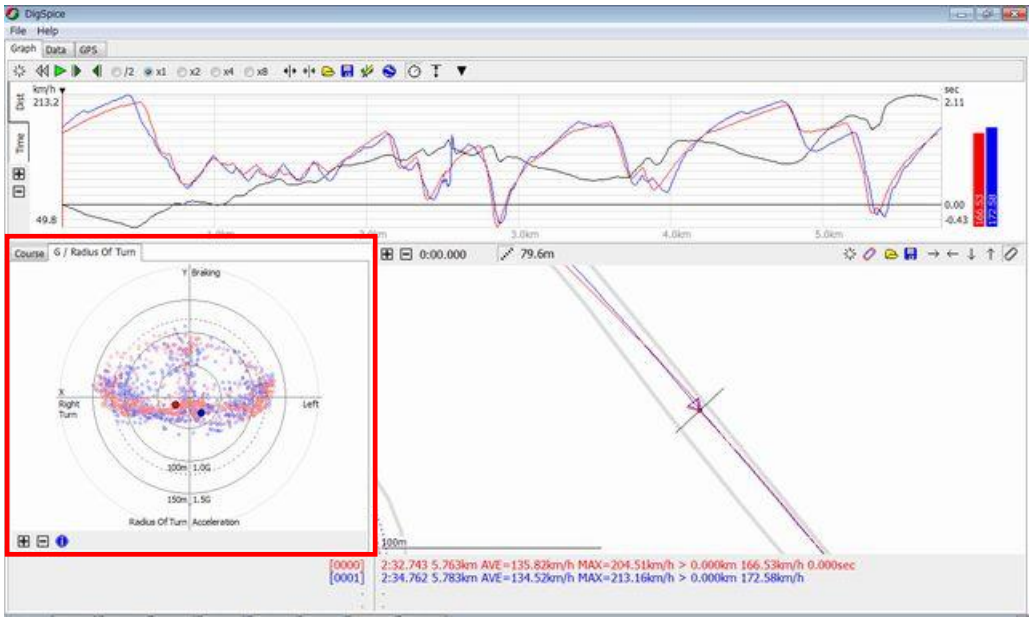
Erroneous values may be calculated due to the GPS signal reception status during recording.

【Friction circle】

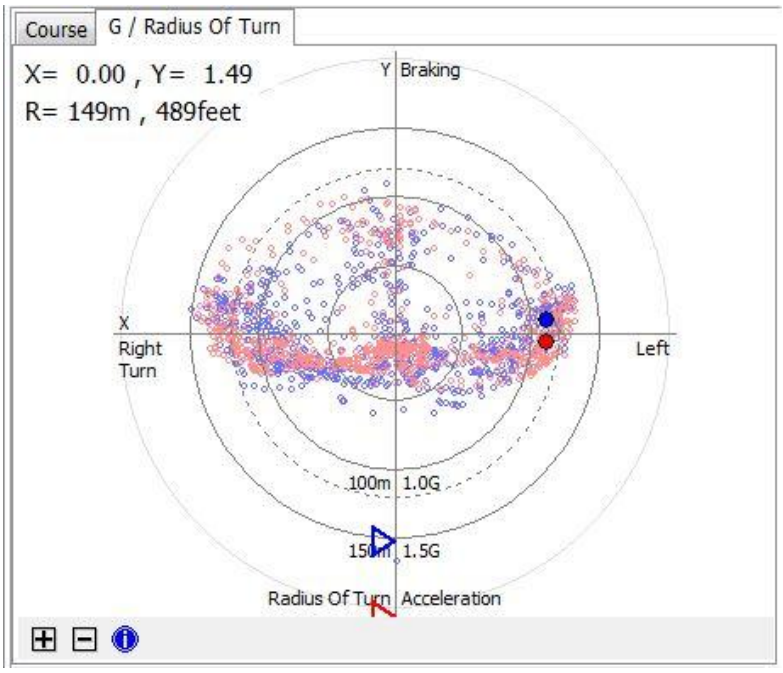
	This figure shows Acceleration G on the vertical axis and Cornering G on the horizontal axis.
 Acceleration	■Acceleration
 Acceleration→ Braking	■Braking
 Turn Apex	■Cornering

【Graph】

（Example）Analysis of driving data on SUZUKA Circuit（2 vehicles）



【G Force／Radius of turn】



【G／Radius of turn Graph】

□G Force

X axis : The cornering of right turn and left turn G Force.

Y axis : Acceleration and Braking G Force.

※This figure is generally called Friction Circle.

The light Red○ and Blue○ show the G dispersion of all data for the 2 vehicles being analyzed.

The dark large Red○ and Blue○ show...
The G Force at the standard vehicle position (Red vehicle) if the horizontal axis on the speed graph is “Distance, or
the G Force at respective time points and vehicle positions if the horizontal axis on the speed graph is “Time.”

□Radius of turn

Red and Blue▷ indicate radius of turn (m) at the red vertical line point inside the speed window.

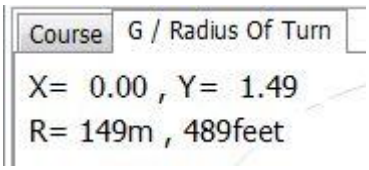
The radius of turn can vary even on the same corner depending on the racing line.

They show the radius of turn at the standard car position (Red vehicle) if the horizontal axis on the speed graph is “Distance” or

Radius of turn at respective time points and vehicle positions if the horizontal axis on the speed graph is “Time.”

□Numerical display of G Force and Radius of turn

The G Force and radius of turn values of the mouse cursor position are displayed.



Indication explanation

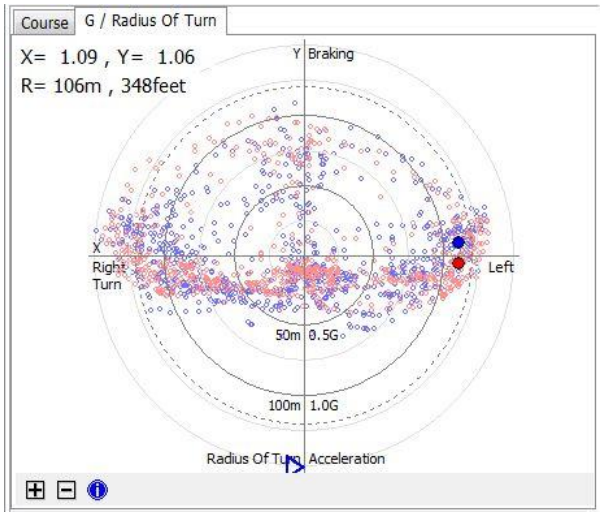
X=0.00 (Cornering of right turn and left turn G Force.)

Y=1.49 (Acceleration and Braking G Force.)

R=149m,489feet (Radius of turn)

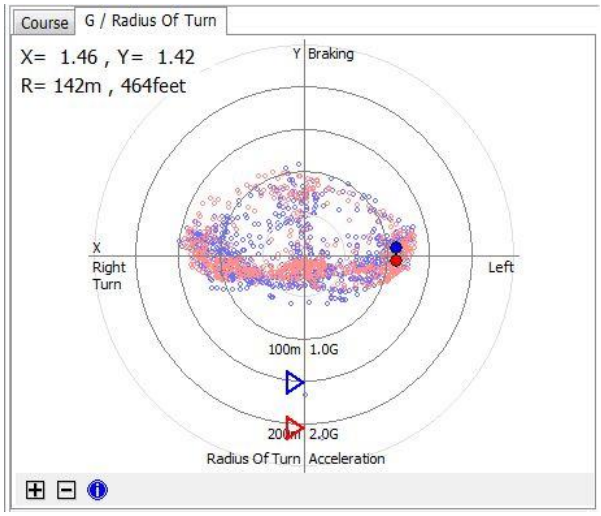
□Zoom IN , Zoom OUT, Information

＋ : Zoom IN of the graph(The enlarged reduction is possible by a scroll wheel)

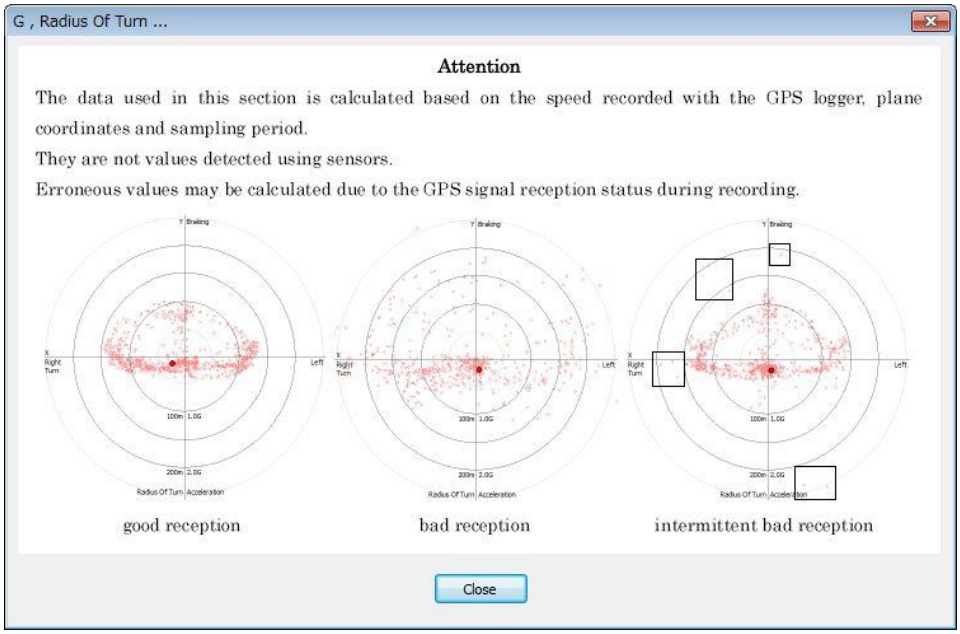


－ : ＋ : Zoom OUT of the graph

(The enlarged reduction is possible by a scroll wheel)



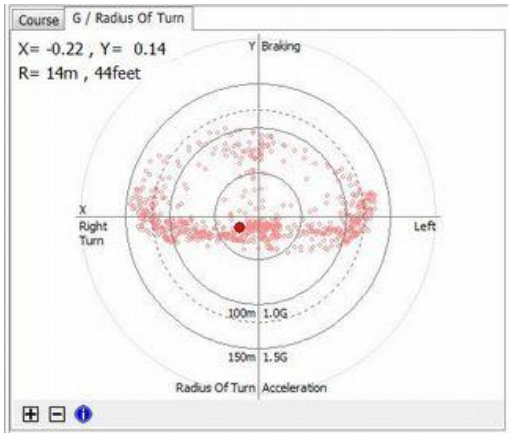
ⓘ : This shows the points to note when displaying G Force and radius of turn with DigSpice.



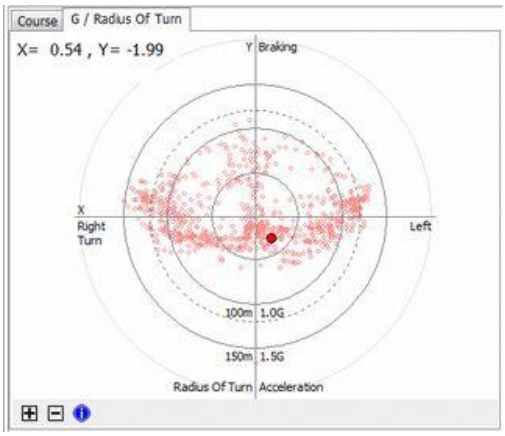
7.5.2.2 How to read the graph

A larger G Force distribution indicates that the tire performance is being fully used in the driving. (However, acceleration will depend on engine performance. Also, it is not likely to hit the tire limit's G Force during acceleration.)
The limit G Force will vary depending on the tire you use.

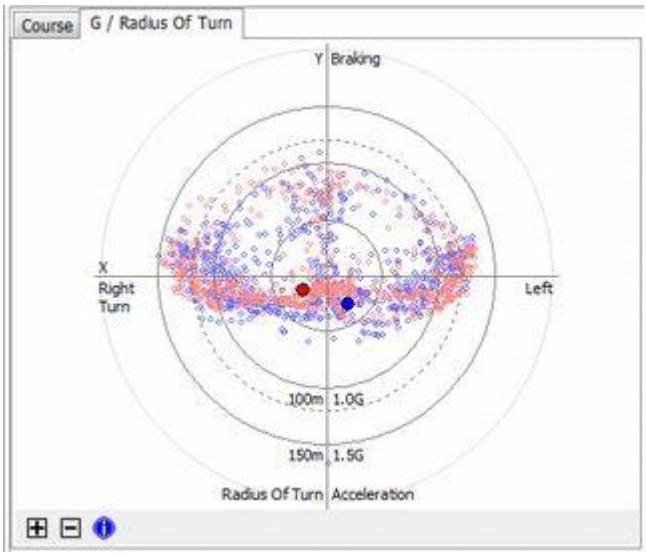
The following data show driving data for 2 vehicles.



A vehicle : G Force distribution is on



B vehicle : G Force distribution is dispersed the circumference.



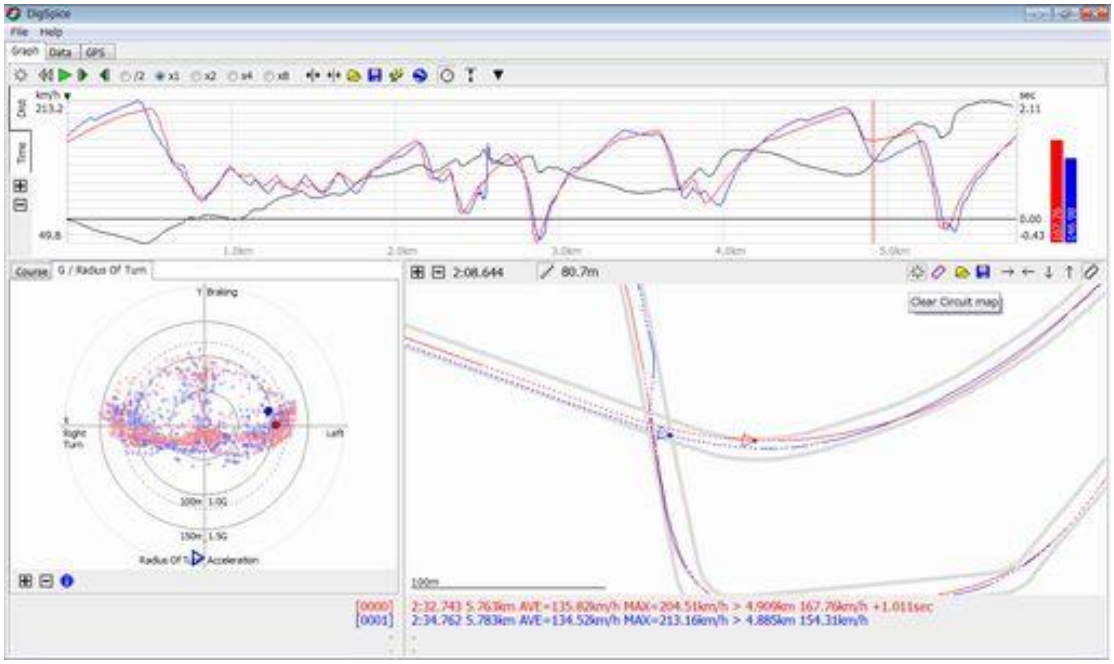
Display for both vehicles (A vehicle＝Red, B vehicle＝Blue)

The Red vehicle data is dispersed outside the Blue vehicle for braking and cornering, which shows the Red is using the tires well in braking and cornering. However in accelerating, the G Force for Blue is dispersed below the Red, which indicates the Blue vehicle is superior in accelerating performance.

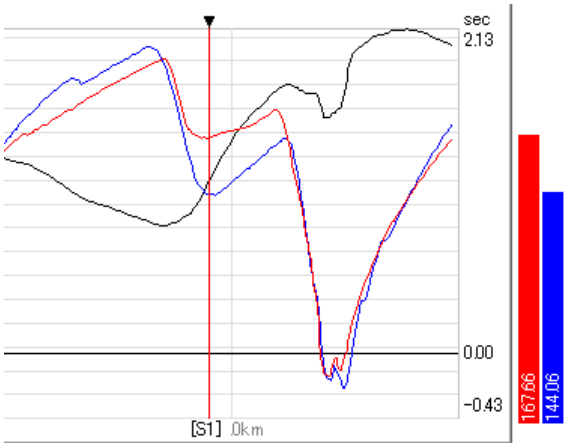
G Force calculation formula is as follows.
Cornering G＝(Speed [m/sec])^2／(Radius of turn [m])／(Acceleration of gravity 9.80665[m/sec2])
Acceleration G＝(Speed difference [m/sec])／(Time difference [sec])／(Acceleration of gravity 9.80665[m/sec2])

Even if the speed is the same,
　If radius of turn is small, cornering G becomes larger.
　If radius of turn is larger, cornering G becomes smaller.
Even if radius of turn is the same,
　If speed is faster, cornering G becomes larger.
　If speed is slower, cornering G becomes smaller.

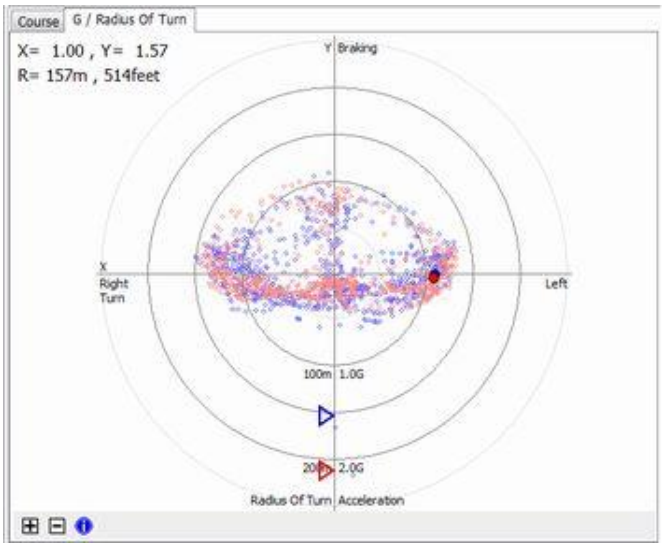
□The above is explained below using the example of Suzuka Circuit130R.



SUZUKA Circuit130R analysis

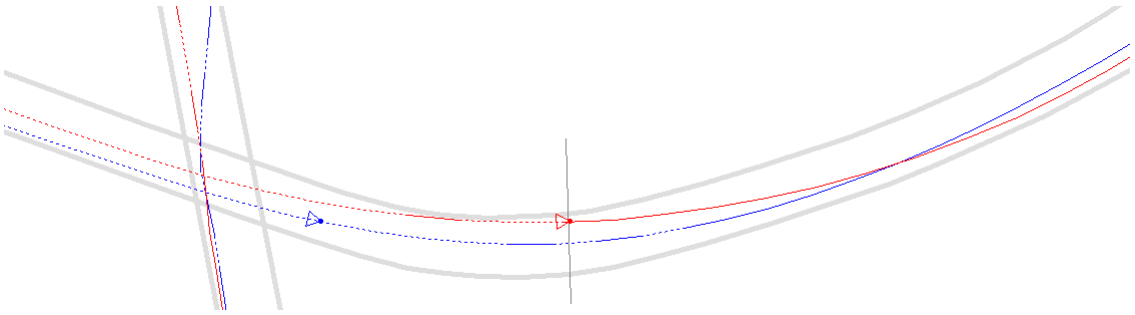


If we compare the bottom speed at 130R, there is a difference of 23km/h. Should the Blue vehicle simply speed up here?



This is a comparison of Cornering G.
Both vehicles exceeded 1.1G, which are values close to the tire limit.
Therefore, it tells that the Blue vehicle cannot speed up any more than this.

Next, let us compare radius of turn.
Blue＝150m
Red＝205m
The figures show a big difference.
In other words, the Blue vehicle is following a racing line with a small radius of turn, and therefore must decelerate in the cornering to a slower speed than the Red vehicle.



The Blue vehicle can review its racing line at the 130R and increase the radius of turn, which will enable cornering at a faster speed than before.

7.5.3 Save a specified sector out of the displayed driving data

-S1 split time	-S1 distance	S1 pass time	S1 pass speed	S1-2 split time	S1-2 distance	S2 pass time	S2 pass speed	S2-3 split time	S2-3 distance	S3 pass time	S3 pass
0:23.071	1.044	0:23.071	169.82	0:16.700	0.723	0:39.771	150.46	0:20.900	0.872	1:00.671	2
0:23.239	1.045	0:23.239	167.54	0:17.091	0.728	0:40.331	148.77	0:20.952	0.875	1:01.283	1
0:23.071				0:16.700				0:20.900			

Double click the sector information cell. Or select the sector information cell and click the below button.

7.5.4 Animation window

The data replayed in the speed window can be displayed as an enlarged animation.

☐Zoom in/out Use ⊞ ⊟ or scroll wheel to scale the size.

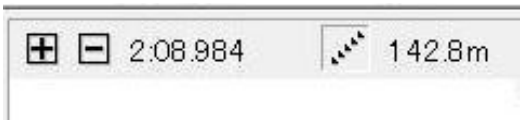
☐Time display Displays the time from the starting point for the Red car.

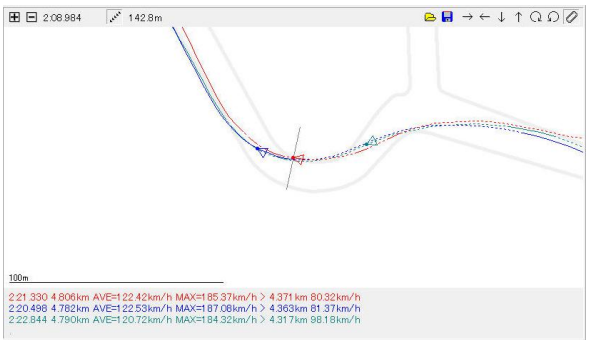
☐Dotted line Select display/hide dotted line during deceleration.

☐Distance Displays the difference from the head of the Red car to the mouse position.

Line of drive on the course and braking positions can be measured.

Displays the lap time, average speed, maximum speed of the selected



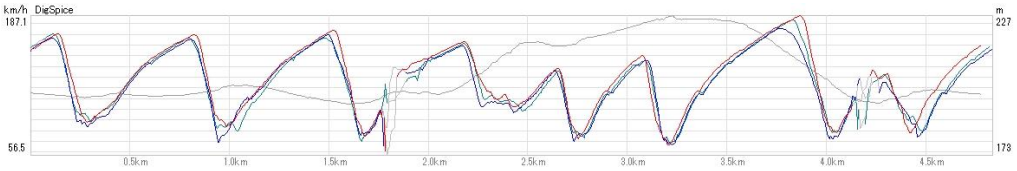


lap, as well as the distance and speed from the start of the position line for the selected lap.

7.5.4.1 Animation

Solid line (Red－Blue－Green－Yellow)・When at constant speed and accelerating

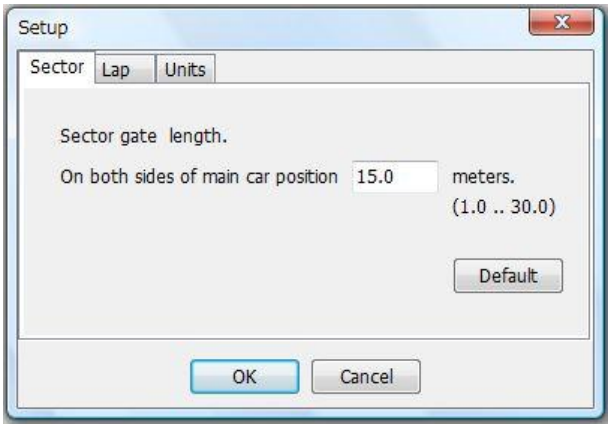
Dotted line ・・・



8.SETUP

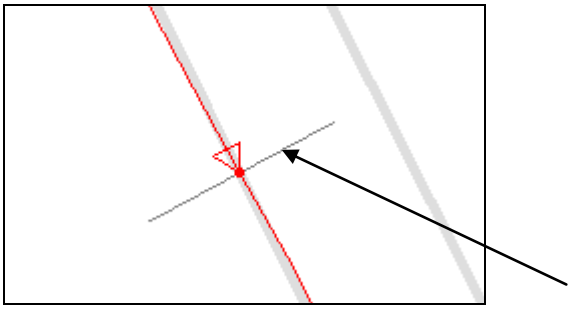
8.1 Setting Sector Gate Length

Set the gate length when sectors are setup. (Default 15m)



Specify the gate (line) by setting how many meters the gate will extend on both sides of the standard car position.

If the setting is “15.0,” a 30-meter gate will be set with the standard car at the center.



Set this length

※Guideline for setting value

Circuit: 15～20 meters

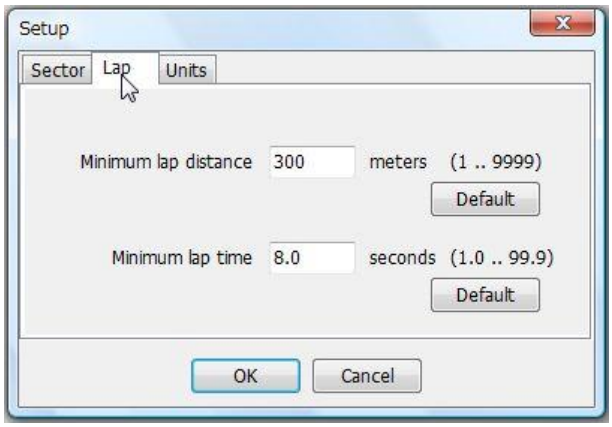
Mini circuit: 10～15 meters

Cart circuit: 8～10 meters

Trial competition: 8～10 meters

8.2 Setting minimum lap distance/minimum lap time

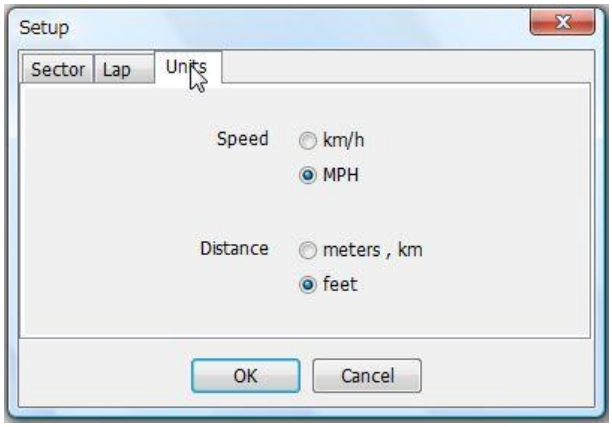
(Default 300m.8 Second)



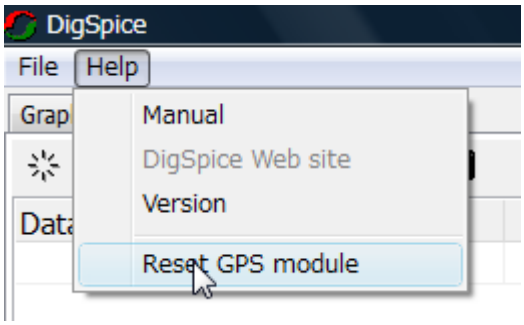
Set the minimum distance of the lap and time. (Initial Setting: 300m 8sec)

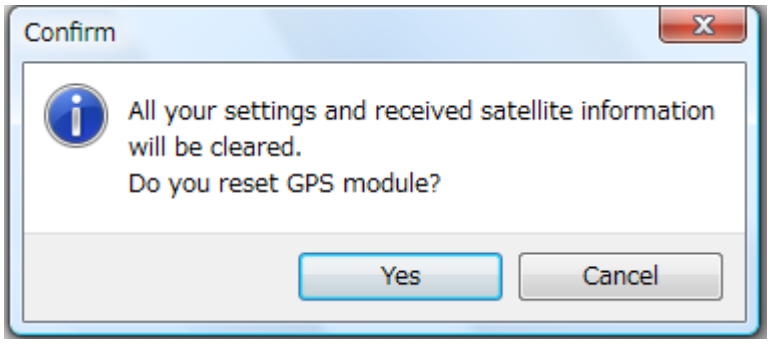
Please use this mode when the course is very short.

8.3Setting Speed/Distance indication



9. RESET GPS MODULE





Please operate when the Logger does not work properly.

When you need to operate the Rest GPS module,

【GPS】> Setup　Set the mode.

Operate revise data reception (30 min of the data that logged BEFORE the data reception)

10. FAQ

9.1 Analysis Software

Q: How much disk space do you need to install the software in a PC?

A: 200MB is needed. Be sure to use a PC with enough disk space.

Q: Is the analysis software operable with a GPS logger other than that of Dig Spice?

A: No, it is only operable with the Dig Spice GPS logger.

Q: Is the software operable with non-Windows computers?

A: Unfortunately, at this point, the software is not operable with non-Windows computers.

Q: What are the required PC specifications?

A: Analysis may be done with specifications that is less performance than specified at the PC spec requirement before, but animation driving may not function smoothly. In this case, try operating the system with less number of cars.

Q: Can the analysis software be installed in more than one computer?

A: Yes, it can be installed in a multiple number of computers.

9.2 GPS logger

Q: The acquired data is incorrect. What should I do?

A: Check the GPS setup details. Redo the setup if necessary. (Refer to section 6.2)

Q: Log data cannot be obtained at all. What should I do?

A: Make sure the GPS logger mode is set to Log Mode. (Refer to section 1.2 Power ON/OFF and Modes)

Q: The device is mounted on a cart (motorcycle), but some parts of the data are missing. How can I solve this problem?

A: The vibration may be directly affecting the GPS logger. Use rubber or other material to prevent GPS Logger from the vibration.

Q: What is the maximum duration of log time?

A: The system specification described is approximately 4 hours with Standard Mode and 10 hours with Long Time Mode, but it can log the data more than this time upon the condition. Even the data can be logged more than 10 hours,) the battery only lasts about 10 hours.

Q: The GPS logger will not change modes by pushing the switch. What should I do?

A: Wait until the battery drives out, then recharge the battery and check the operation.

Q: Can the data be improved in areas with poor GPS reception, such as in tunnels and mountain roads?

A: Set the AGPS function as per Section 8 Gap View, which will shorten the time required to acquire the GPS signals, but data may not necessarily be improved.

Q: From where can I download data on course charts?

A: Course charts, control lines, driving data can be downloaded from the Dig Spice website. (To be uploaded as they become available)

Q1: I'm using the software with Windows VISTA, and the File/Help flicks. What should I do?

11. Hardware Specifications

General	
Frequency	L1,1575.42MHZ
C/A Code	1.023MHZ
Datum	WGS84
Performance Characteristics	
Position Accuracy	Without aid: 3.0m 2D-RMS
	<3m CEP(50%) without SA(horizontal)
	DGPS (WAAS,EGNOS,MSAS):2.5m
Velocity Accuracy	Without aid: 0.1m/s
	DGPS (WAAS,EGNOS,MSAS):0.05m/s
Acceleration	Without aid:<4g
	DGPS (WAAS,EGNOS,MSAS):<4g
Timing Accuracy	50 ns RMS
Reacquisition	Time <1s
Hot start	1.5s
Warm start	34s
Cold start	35s
AGPS	<15s
Sensitivity	Tracking:-165dBm Max, Acquisition:-148dBm Max.
Update	10Hz,5Hz,1Hz
Dynamic	
Altitude	Maximum 18,000m
Velocity	Maximum 515m/s
Acceleration	Maximum 4g
Power	
Input Voltage	Vin : 5.0V±5%
Battery	Built-in chargeable + Lithium-Ion battery
I/O	
Available Baud Rates	115200 bps
Protocols	NMEA 0183 v3.01
Environment	
Operating Temperature	-10 ~ 60C
Storage Temperature	-20 ~ 60C
Charging	0 ~ 45C
USB Bridge	
Standard	Fully compliant with USB2.0
Full speed	12Mbps
Dimension	44 x 26 x 15 mm
Data Log	
Log GPS data by time interval/ distance/ speed limit	
User can configure settings by using utility	

＊.Citation of chipset spec. is from MTK

Recommended System Environment

The minimum specifications recommended for the computer using the driving analysis software are as follows.

・OS　　Windows XP, VISTA, 7

・Hardware　　CPU　Celeron®　2 GHz

・Memory　　2 GB

Analysis may be done with lower specifications than above, but animation driving may not function smoothly. try operating the system with less number of cars.