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Symbols used in the text



In the paragraphs highlighted with this symbol, you will find tips and practical advice to work with the 2D-Software.



In the paragraphs highlighted with this symbol, you will find additional information and it is very important that you follow the instructions given.



Documentation reference

- A user manual reference number is provided so the user can seek further assistance

1 Overview



The 2D USB stick logger records all values directly onto a USB memory stick. Therefore a download via cable is not necessary as the memory stick is plugged directly into the computer. This enables the user also to quickly swap memory sticks and retrieve data at pit stops.

1.1 Stick logger related software

Prep2DStick.exe	2D uses a unique method to write data onto the memory stick. Before using a stick for the first time, the program <i>Prep2DStick</i> has to be used. The program will install the specific 2D file system on the stick. Only this ensures that all data are saved and the file system is accessible even if the memory stick is removed from the logging device while working. A detailed description can be found in following pages.
Handle2DStick.exe	When a 2D USB memory stick is plugged into the computer it is recognized by <i>Handle2DStick</i> which runs in the background. The program checks if the memory stick contains a specific 2D FAT32 file system as only this can be used with the 2D USB stick logger. The program checks if the folder <i>2D-Datarecording</i> is on the memory stick and contains measurement files and settings. If a matching measurement and setting are found they are decompressed into the temporary folder of the computer and deleted on the memory stick by two sub programs.
Decompress2D.exe	<i>Decompress2D</i> decompresses the files into the 2D format and starts the analysis software <i>2D Analyzer</i> for further processing.
Clear_2D_Stick.exe	Once the data are available for analysis, <i>Clear_2D_Stick</i> is started automatically, which prepares the memory stick for the next use, and a message will be shown that the memory stick is ready.

1.2 Use of the software

1.2.1 Preparation of the memory stick before first use



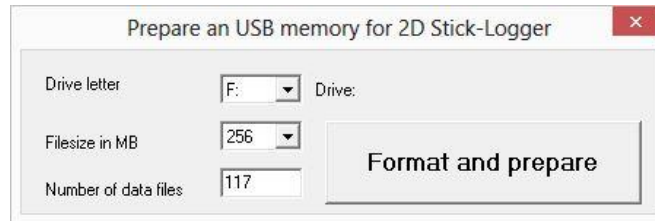
Any USB memory stick can be used. A USB3.0 compliant stick can be used as well.

Prep2DStick can be found in *WinARace* in the menu **<Modules>**:



The stick has to be formatted with the specific 2D FAT32 file system. The maximum size of a stick is limited only by the FAT32 file system (up to 8 TB). Some sticks may not be fast enough for storing all data during recordings. No general recommendation for a specific stick type can be given. Suitability of a certain stick can only be asserted by testing.

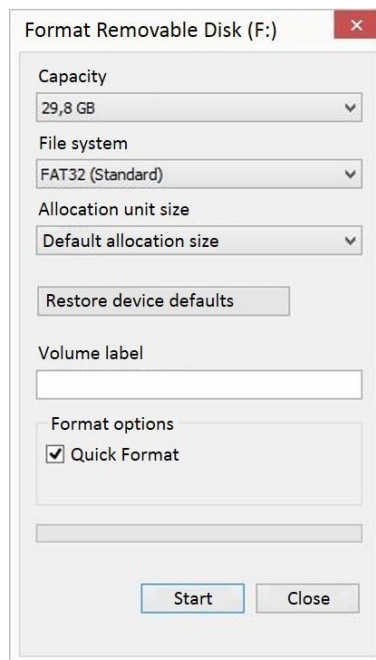
After starting the program *Prep2DStick.exe* the following window appears:



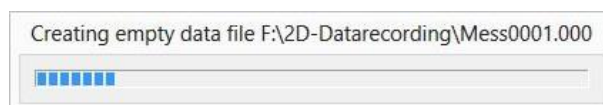
In the first drop down box the drive letter has to be chosen where the USB memory stick is accessible. If the memory stick is connected while the program is running the correct drive letter is selected automatically. *Prep2DStick* allows formatting of USB sticks only. Hard disks will not be formatted.

Prep2DStick will prepare the stick with the specific 2D file system. The next two input fields specify the default number and the default size of the measurement files depending on the size of your memory stick. The proposed values are suitable for most situations. (If you want to change these values please refer to the [appendix](#) of this document which explains how to do that.)

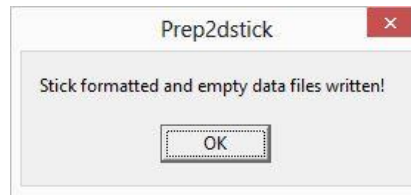
Press **<Format and prepare>** to start the process. Choose **<Quick Format>** and press **<Start>** and **<Close>** after the stick is formatted.



After the memory stick is formatted close the format box. After that, a bar graph shows the progress of writing the files on the stick.



When the last file is written, following message appears and the memory stick can be removed from the computer and is ready for use.



1.2.2 Changing the setting of the USB stick logger

The 2D USB stick logger can be programmed in two different ways: via a USB connection to the PC or via storing a setting file on a USB stick.

Programming via a USB connection is the same as in the case of communicating loggers and not described any further in this manual.



The 2D USB stick logger is programmed by copying an ".ldd-file" onto the memory stick and renaming that file to *setup.ldd* file onto the memory stick before it is inserted into the logger. The logger reads the file and will reprogram itself. When the programming is completed successfully the *setup.ldd* is renamed to *setu!.ldd* on the memory stick. The file "Setup.txt" contains the info about the outcome of the programming process.



The maximum length of the setting file name "*setup-xxxx.ldd*" is 32 characters including the .ldd extension.

To retrieve a base setting, plug a memory stick into the logger and the logger will save the current setting file named *Default.ldd*. This setting can be loaded into *WinIt* and modified to suit the user's requirements. After all changes are done the file can be saved as *setup-xxxxx.ldd* onto the stick and be used to program the logger.

When an existing setting should be used as a base setting use the *xxxxx.ldd* file out of the last memory stick measurement folder as a base.



For detailed description how to program CAN and GPS channels refer to the manual Art.No. AC-DOC-Logger_setup-000.

Take a look at the 2D homepage 2d-datarecording.com
<SUPPORT> - <download> - <manuals>

1.2.3 Transfer of measurement data



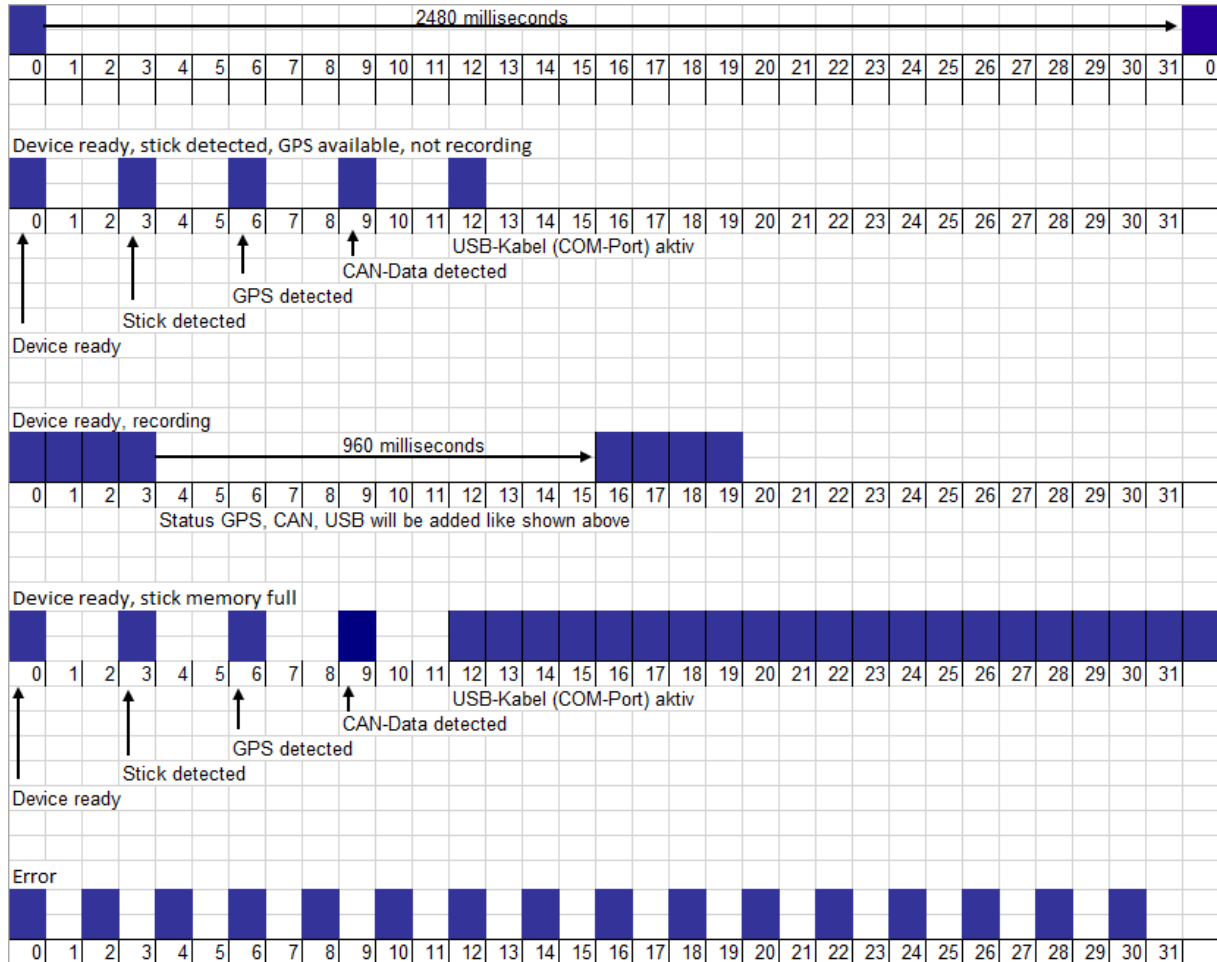
Make sure the correct data directory is set in *WinARace* before plugging in the memory stick into the computer for data transfer.

If a USB memory stick is detected, the program *Handle2DStick* checks if the memory stick contains a FAT32 file system as only this can be used with the 2D USB stick logger. The program checks if the folder *2D-Datarecording* is on the memory stick and contains measurement files and settings. If such files are found they are copied into the temporary folder of the computer. *Decompress2D* decompresses the files into the 2D format and starts the analysis software *2D Analyzer* for further processing. Once the data are available for analysis, *Clear_2D_Stick* is started automatically which prepares the memory stick for the next use. After that a message will be shown that the memory stick is ready for further measurements.

2 Blink codes



The table below shows a detailed overview of the blink codes of a USB stick logger. A single blink of the blue LED is 80 ms.



3 Appendix

3.1 Configuring the operation mode of the software

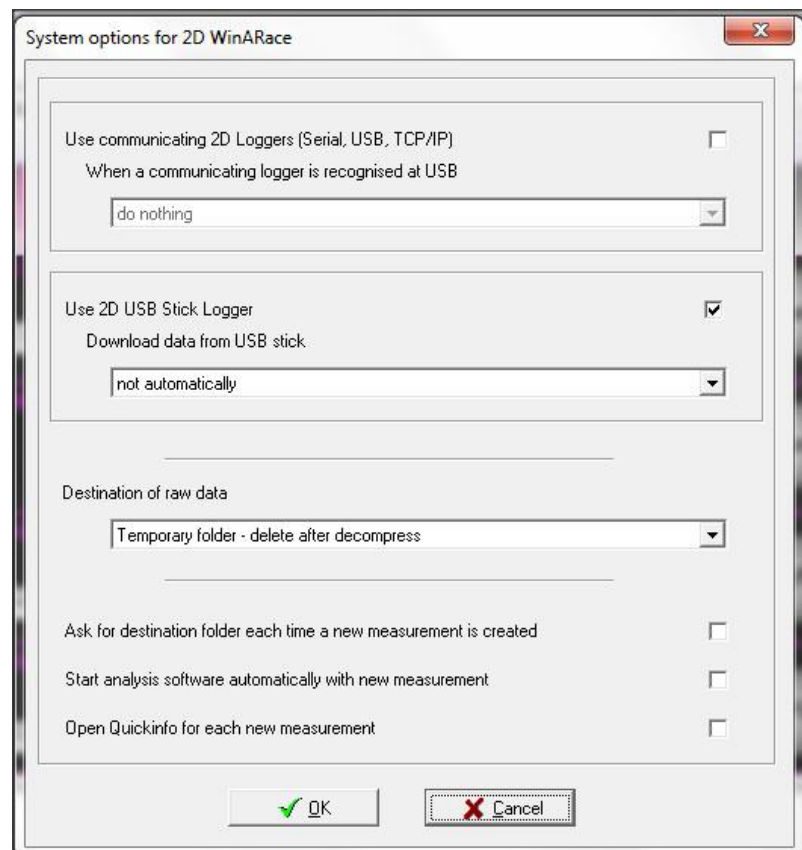
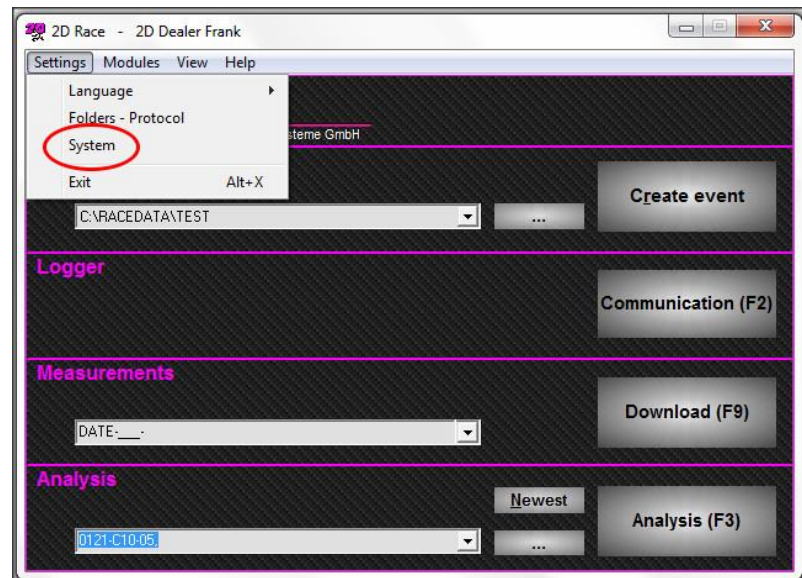
The operating mode of the 2D software depends on the type of logger you are using. With the software you can use communicating loggers (loggers connected to the PC via USB or TCP/IP) and USB stick loggers (loggers which record measurement data onto a USB stick and where the data is transferred via the USB stick to the PC)

Start the program *WinARace*.
For setting up the operating mode, open the menu **<Settings> - <System>**.

In this form you can select the type of logger you are using. Please note, that if you want to use both types of loggers you have to select both modes. You do not have to switch between the two modes. In addition you can specify whether *WinARace* shall perform an action if a logger is detected.

If you select the stick logger operating mode you can tell the software when measurement data shall be downloaded, only if the program *WinARace* is running or always if a 2D stick is detected. Downloading is handled by the program *Handle2DStick*. You can check the system tray of your PC whether this program is running.

By default both logger types are selected.



3.2 Computing the number and default size of measurement files

For measurements with a lot of data it may happen that a single measurement run does not fit into a single file on the stick. The data will then be split into several files. (It may happen that several seconds of data may be lost until the second file is opened for recording.)

If you want to avoid such situations, you can adjust the number and size of the measurement files when preparing the stick with the 2D file system.

The *minimum* size requirements can be calculated from the current logger configuration. (The program *WinIt* shows this calculated value in the "memory" tab of the logger. The value is calculated based on the number of channels, their sampling rate and the size of the data.)

The expected data rate is not the only factor which has influence on the file size. In an ideal environment the stick logger is connected to two different kinds of power supply, a permanent 12 V one and the power on/off signal (ignition). When the logger is recording data and it detects the power down signal (ignition off) it still can write all recorded data to the memory stick before powering down. On the next power on signal the logger will select the same data file if there is still space in the file. Otherwise it will select a new file.

However, if there is no permanent power supply it may happen that the logger cannot write all recorded data to the stick in case of power down. In such cases up to 4 kB of data recorded last may be lost. At the next power up the logger will select a new file when the next recording is started. The same may happen if the memory stick is detached during a recording session.

In normal operation conditions (both 12 V signals are connected) it is suggested to format the USB stick with some big files because a total loss of power is very unlikely.

In cases where the permanent power supply may be cut off very often (e.g. by a main power switch) more small files (big enough to record a complete normal run) are the preferred choice when formatting the memory stick because recording continues with a new file once the power is available again.

Example: Calculating the minimum file size for a measurement run. The logger is programmed to record the following:

1. 13 2 Byte channels with a rate of 800 Hz
2. 12 2 Byte channels with a rate of 50 Hz
3. 3 4 Byte channels with 50 Hz.

This means that a total data rate of

$$(13 \times 800 \text{ Hz} \times 2 \text{ Byte}) + (12 \times 50 \text{ Hz} \times 2 \text{ Byte}) + (3 \times 50 \text{ Hz} \times 4 \text{ Byte}) = 22600 \text{ Byte/s}$$

has to be recorded. If a typical measurement takes around 20 minutes the minimum file size is 27.12 MB if the data shall be stored in a single file.

Furthermore, setting the right start condition may avoid loss of data.

Example: The start condition is set to be "start recording if speed > 10 km/h" and the logger is configured to be in "automatic mode". Then the logger only records data if the value of the speed channel is greater than 10 km/h. Usually the ignition is turned off when the vehicle is not moving (speed = 0 km/h or close to). When slowing down the vehicle, the logger stops recording as soon as the speed is below 10 km/h. Then all data is written to the memory stick. Usually the time between slowing down and turning the ignition off is long enough to complete all write actions.

Example: The start condition is set to be "start recording after 30 seconds". That setting enables ignition on/ off within a 30 seconds time window without the logger starting the recording.

2D recommends 256 MB as default file size (1-2047 MB are possible sizes).

In the third box the total number of files needs to be specified. **Use as many as possible** but allow some space (512 MB) for small programs or calculation files on the stick.

Rule of thumb: $\langle \text{nbr of files} \rangle \times \langle \text{file size} \rangle + 512 \text{ MB} \leq \langle \text{size of stick} \rangle$

Example: $13 \text{ files} \times 256 \text{ MB} + 512 \text{ MB} \leq 4 \text{ GB stick}$