# How should I set up "Waveform recognition?"

In this document, we will show you the steps to set up "Waveform recognition" through an example of recognizing Delta waves.

  *Sample data: "Rat_DEMO.kcd" enclosed in the SleepSign CD-ROM is used in this example. The method described here is only an example for typical wild type rat EEG, and it is not necessarily the best way for all kinds of data.

  *For detailed explanation on the Waveform recognition logic, please refer to the basic operation manual.

In this example, "Band 1" is used to recognize Delta waves. Those parameters and buttons marked in red below will be referred to in this example.
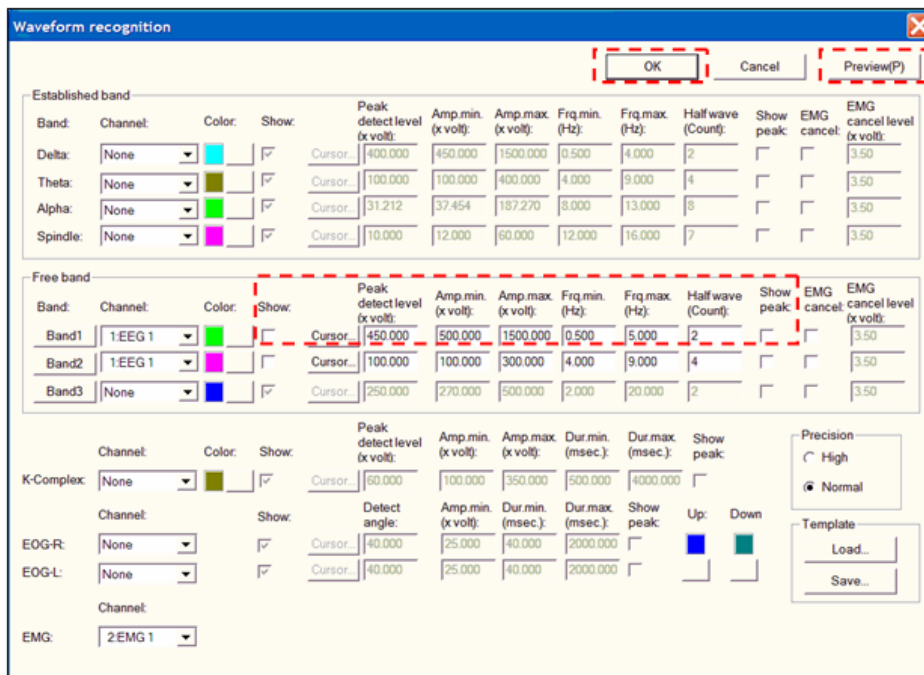
## 1. Find the transition from NREM to REM manually

This makes it easy to confirm if delta wave and theta wave are recognized appropriately.
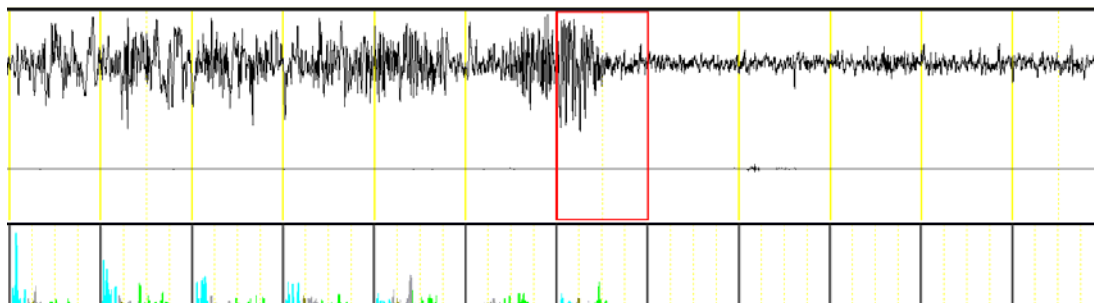
2. Adjust the scale

Move to epochs in which Delta waves are dominant. Adjust the scale to the approximate top peak and bottom peak by following steps:
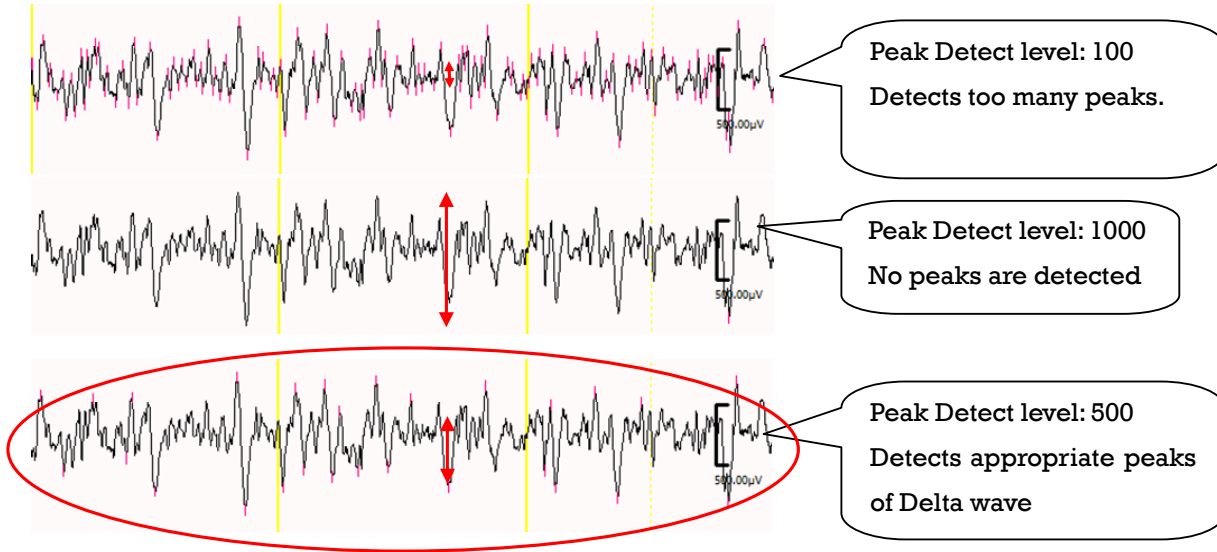
 ①   Click the right mouse button on the waveform,
 ②   Select "Scale" from the popup menu
 ③   Select the EEG channel and type the scale value
 ④   Click "Apply" and click "OK".

Adjust the scale to the approximate top peak and bottom peak.
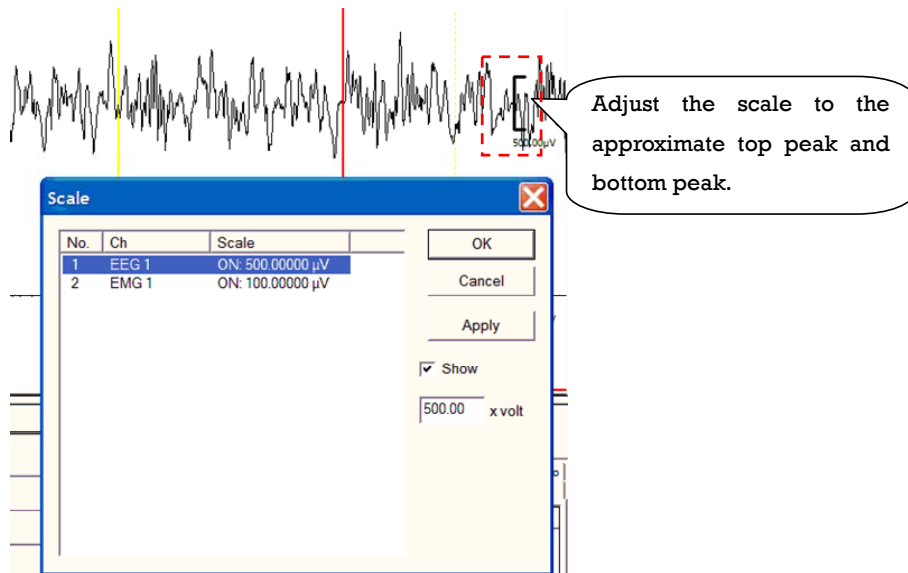
3. Specify the "Peak detect level" referring to the scale

The "Peak detect level" should be slightly less than the minimum distance between the top peak and the bottom peak of the delta wave. Referring the scale, specify the suitable peak detect level. You can confirm if the detected peaks are reasonable by checking "Show peak" and click "Preview" button ("Test" button for some versions).
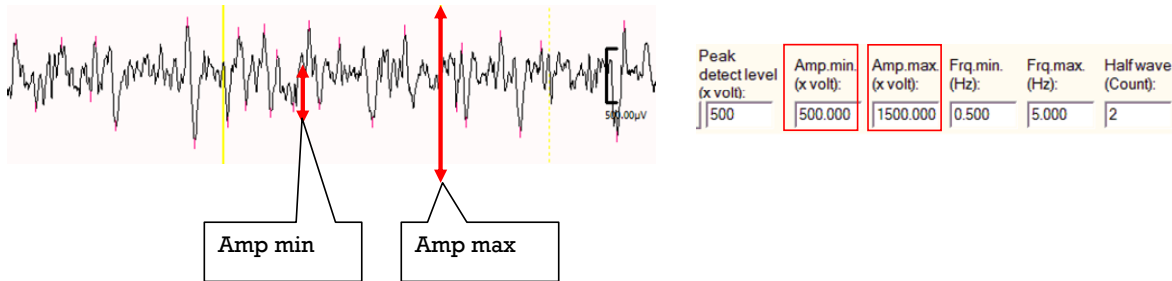
Show peak:		Peak detect level (x volt):	Amp.min. (x volt):	Amp.max. (x volt):	Frq.min. (Hz):	Frq.max. (Hz):	Half wave (Count):
✔		500	500.000	1500.000	0.500	5.000	2

Peak Detect level: 100
Detects too many peaks.

Peak Detect level: 1000
No peaks are detected

Peak Detect level: 500
Detects appropriate peaks of Delta wave

4. Specify the "Amp min" and "Amp max" referring to the scale

Specify the "Amp min" as less than the minimum amplitude of delta waves. The "Amp min" will be approximately the same value as the "Peak detect level".

Specify the "Amp max" as larger than the maximum amplitude of delta waves.

Peak detect level (x volt):	Amp.min. (x volt):	Amp.max. (x volt):	Frq.min. (Hz):	Frq.max. (Hz):	Half wave (Count):
500	500.000	1500.000	0.500	5.000	2

Amp min

Amp max

5. Specify "Freq min" and "Freq max"

The wider you set the range of "Frq min" and "Frq max," the more component of the waveform SleepSign is likely to recognize. It is better to set the range of "Frq min" and "Frq max" slightly wider than common frequency definition of particular waveforms.

ex.) Delta: **0.5Hz – 5.0Hz**

Theta: **4.0Hz – 10.0Hz**

Peak detect level (x volt):	Amp.min. (x volt):	Amp.max. (x volt):	Frq.min. (Hz):	Frq.max. (Hz):	Half wave (Count):
500	500.000	1500.000	0.500	5.000	2

6. Specify the "Half wave count"

A standard of "Half wave count" is approximately as follows:
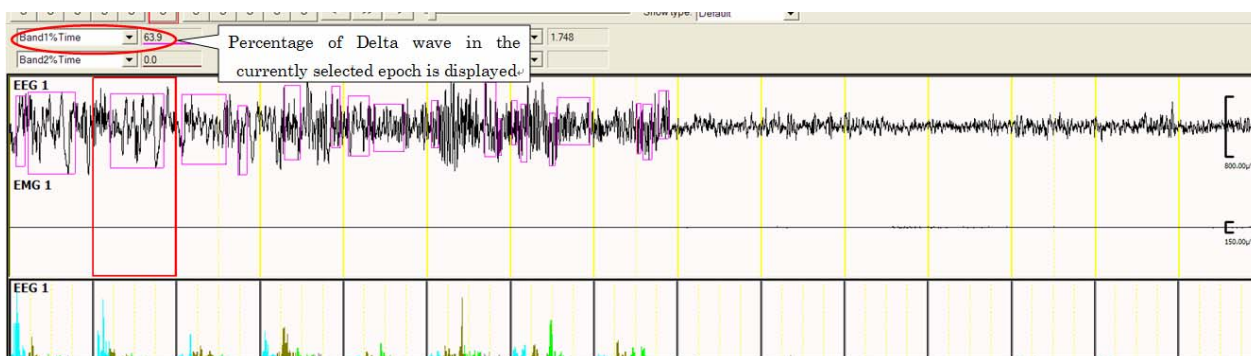
Delta wave: **2**

Theta wave: **4**

7. Confirm if Delta wave is recognized appropriately

You can check the component recognized as delta waves by checking "Show" and clicking the "Preview" button.

Confirm that the amount of Delta waves is high in NREM epochs and low in REM epochs by seeing pages before and after the transition from NREM to REM. The percentage of Delta wave in the currently selected epoch is displayed in the tool bar.

8. Click "OK" if delta waves are recognized appropriately

Specify parameters for theta waves with the same procedure as delta waves.