# 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.

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Establishe	d band				Peak			_		-		_	EMG
Band:	Channel:	Color:	Show:		detect level (x volt):	Amp.min. (x volt):	Amp.max. (x volt):	Frq.min. (Hz):	Frq.max. (Hz):	Halfwave (Count):	Show peak:	EMG cancel:	cancel lev (x volt):
Delta:	None	-	N	Cursor.	400.000	450.000	1500.000	0.500	4.000	2	Г		3.50
Theta:	None	-	2	Cursor.	100.000	100.000	400.000	4.000	9.000	4	Г	Г	3.50
Alpha:	None	•	지	Cursor.	31.212	37.454	187.270	8.000	13.000	8	Г	Г	3.50
Spindle:	None	•	2	Cursor.	10.000	12.000	60.000	12.000	16.000	7	Г	Г	3.50
ree band					Deals								ENC
Band:	Channel:	Color:	Show:		detect level (x volt):	Amp.min. (x volt):	Amp.max. (x volt):	Frq.min. (Hz):	Frq.max. (Hz):	Half wav (Count):	e Show peak	EMG cancel	cancel lev (x volt):
Band1	1:EEG 1	•		Cursor	450.000	500.000	1500.000	0.500	5.000	2	_ F_	Г	3.50
Band2	1:EEG 1	•		Cursor.	100.000	100.000	300.000	4.000	9.000	4	Г		3.50
Band3	None	•		Cursor	250.000	270.000	500.000	2.000	20.000	2	Г	Г	3.50
	Channal	Color	Show		Peak detect level	Amp.min.	Amp.max	Dur.min.	Dur.max.	Show	ſ	Precisio	on
Constant			1		(x volt):	(x voig.	(x rong.	(maee.).	(made.).	peak.		C Hig	h
complex.	INone	<u> </u>	14	Cursor.	100.000	1100.000	1350.000	1500.000	14000.000			Nor	mal
	Channel:		Show:		angle:	Amp.min. (x volt):	(msec.):	(msec.):	peak:	Up: D	own	Templa	te
G-R:	None	•	~	Cursor.	40.000	25.000	40.000	2000.000				Le	ad
G-L:	None	•	V	Cursor.	40.000	25.000	40.000	2000.000	Г			Sa	ave
	Channel:										l		
10	2EMG1	-											

## 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".



## 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):	Halfwave (Count):
	500	500.000	1500.000	0.500	5.000	2



## 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.



### 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):	Halfwave (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	Peak detect level	Amp.min. (x volt):	Amp.max. (x volt):	Frq.min. (Hz):	Frq.max. (Hz):	Halfwave (Count):
Theta wave:	4	(x volt): 500	500.000	1500.000	0.500	5.000	2

## 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.

Show:	Peak detect level (x volt):		Amp.min. (x volt):	Amp.max. (x volt):	Frq.min. (Hz):	Frq.max. (Hz):	Halfwave (Count):
	Cursor 5	00.000	500.000	1500.000	0.500	5.000	2

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.