RC-808 “Re-Create the 808”
Reference Manual

1. Getting Started

The RC-808 “Re-Create the 808” emulates the original TR-808 sound with analog manner synthesis. Starting from this criterion, explore the multiverse of sounds, stretch your vectors, to find out new criterion of your own.
Hence it is not a drum machine but is a drum synthesizer. No samples nor effects processing are being used, just genuine synthesis only, all in analog manner.

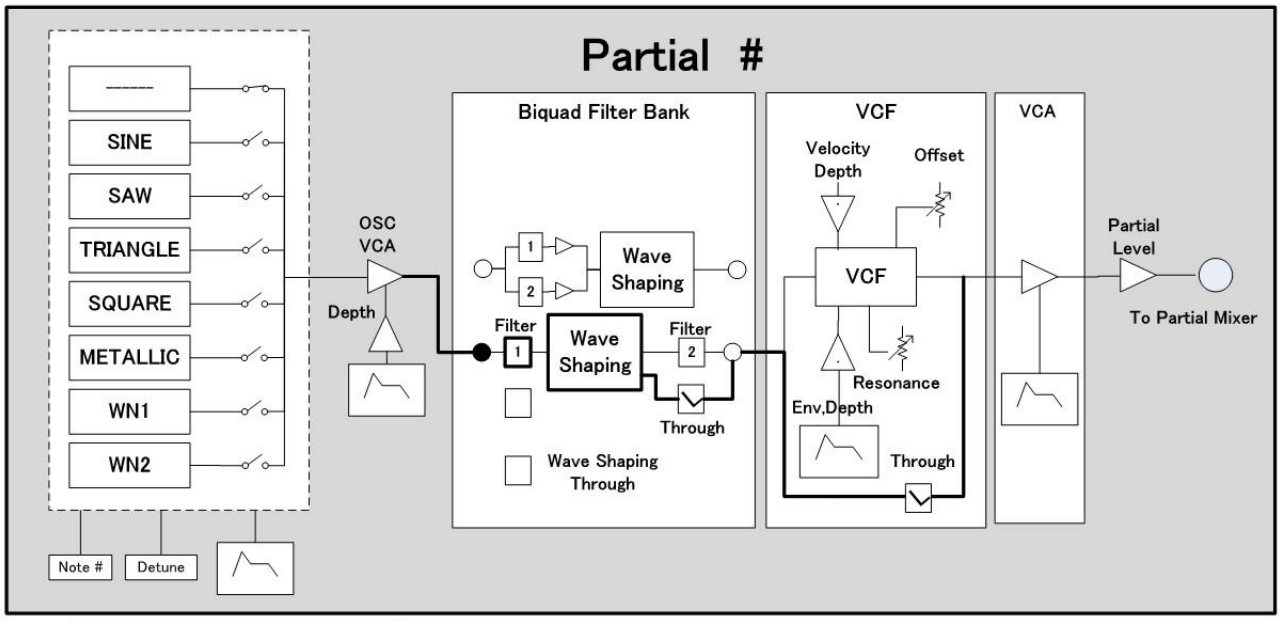
The sound source employs DCO which is in this case Down Chirp Oscillator, combined with a noise source that outputs various kinds of noises including metallic noises. There is also a programmable infinite point wave shaper, variable Biquad Filters, infinite point envelope generators and so on. With maximum 8 partials per voice, it allows sound designing in subtractive synthesis manner which is familiar to all and yet still with vast space out there beckoning to be discovered.
Thanks to this flexible architecture, all instruments can have new expressions such as Open and Close variations to all kinds of percussions just like Hi-Hats or cymbal choke performance. Coupled with piano-roll sequencer utility this brings new art of sound with gate time programming, that you don’t often see on a drum sequencer.

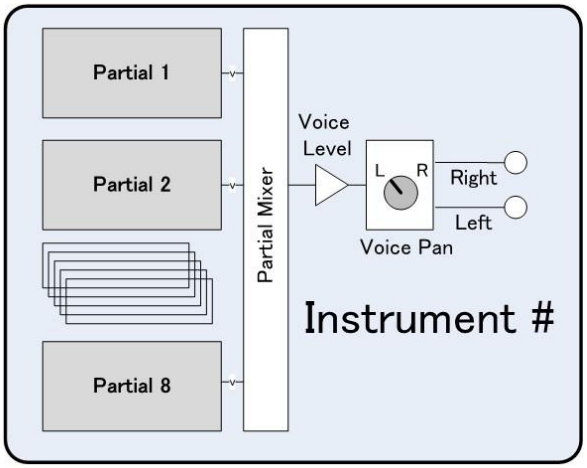
Please note that the RC-808 "Re-Create the 808" however is merely a conceptual model to show the originally intended architecture of the TR-808, and thus is not fully developed as an instrument for actual usage. *We do not bear any responsibility for any possible inconvenience or damages caused by this. We cannot answer to any inquiries for this product as well.*
Also we are independent from Roland Corporation. *Therefore, Roland cannot answer to any inquiries about this or us too*.

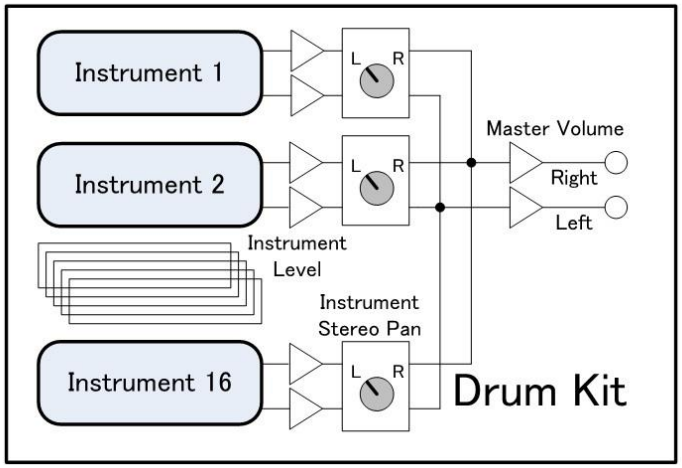
We sincerely appreciate your understanding on above all.

1.1 Configuration

- A Drum Kit on the RC-808 is comprised of 16 Instruments.
- An Instrument consists of maximum 8 Partials.
- A Partial is a subtractive synthesizer in analog manner.







Partial

- A Partial is a subtractive synthesizer, but with a dynamic Down Chirp Oscillator, which can also be used as a Metallic Oscillator.
- The Biquad Filter pair can be configured either in serial or in parallel. The location of the Wave Shaper changes accordingly to the Biquad Filter configurations. In above diagram example, the Biquad Filters are in serial, with the Filter 2 set to be bypassed.

Instrument

- Voice Level
  Partial Mixer allows you to mix the 8 Partials with the Partial Level ratio of your like. Normalize the sum by the Voice Level to approximately 1.0.

- Voice Pan
  This sets the pan of Instruments so that it can match with stereo PCM sound sources. The Partial Mixer on the RC-808 outputs in monaural so it will be converted to stereo signal at here. But normally this should be set to center.

Drum Kit

- Drum Kit is a collection of 16 Instruments, each with Instrument Level, and Instrument Pan.
- The final Instrument Level will be the aforementioned Voice Level and Voice Pan being multiplied.
- The user can adjust Instrument Level and Pan with an external sequencer or a DAW via MIDI Control Change. That revised value will be part of the song data created on the DAW. Thus the original Drum Kit balance parameters stay untouched, and will be loaded again once a new Drum Kit is selected.
- The Instrument Level and Pan will be shown and can be adjusted with the red and white knobs on the Main Panel.

Master Volume

The Master Volume defines the final total sound volume level. This value cannot be saved as a song data file from external sequencer nor a DAW.

Audio Processing

The audio is processed at the sampling rate of 44,100Hz, and 16bit Monaural.

2. Installation

Once you downloaded the RC-808 kit file, place the unzipped folder to the directory you wish.

Then, as for the Windows version only, install the LoopBe first. This is a free software utility supplied by a third party.
Mac version needs no such pre-installing in beforehand.

Launch the RC-808 by double clicking the icon.
Pull down the menu Setting (S), the go to Device to open the Device Setting Dialog. Set the following parameters:

- Audio Output: Choose your own audio device
- MIDI Port: Select LoopBe Internal MIDI to the MIDI In, and set MIDI CH to 10

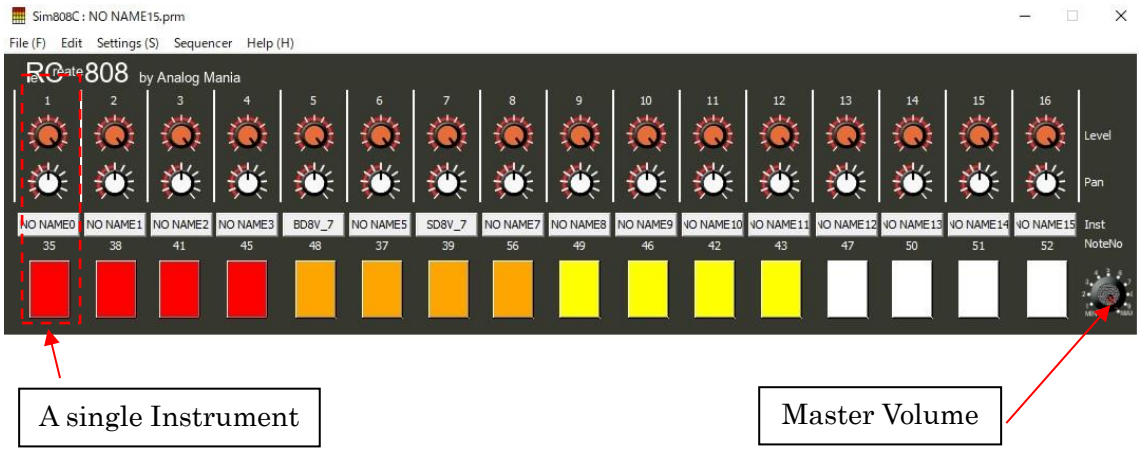
In the Systems Settings, check the box Enable Note Off.

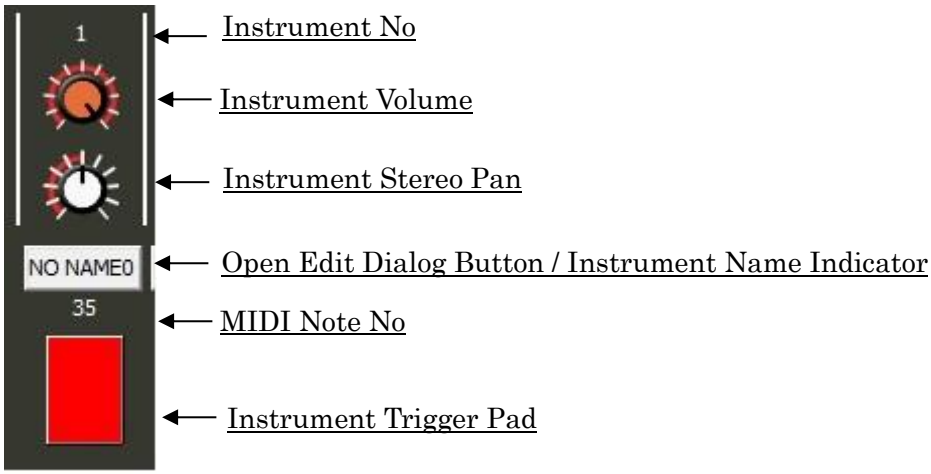
3. Main Panel

Launch the app by double clicking the RC-808 icon.

The Mac OS version apps has the variable Menu Bar as a part of macOS function, whereas the Windows OS places the menus on the active and focused application Window. The screenshots here on this Reference Manuals are from Windows version, but the explanations are for both.

3.1 Names and Functions of the Main Panel

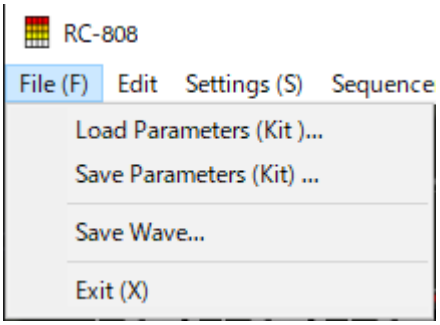




3.2 Menus

As mentioned, the Mac OS version apps has the variable Menu Bar as a part of macOS function, whereas the Windows OS places the menus on the active and focused application Window. The screenshots here on this Reference Manuals are from Windows version, but the explanations are for both

3.2.1 File Menu and Files



Files

*.prm: A file with extension .prm is an Instrument with all of its parameters saved in XML format. More on this later on 4. Edit Dialog.

*.allprm: A file with extension .allprm is a Drum Kit comprised of maximum 16 Instruments names and others. 1 line is 1 Instrument.
The file defines the data in order of the Instrument Number, Instrument File Name, MIDI Note Number, Inst Level, and Inst Pan. The file format is in .txt.
The Instrument's Level and Pan here are the Drum Kit values. They can be overridden on an external sequencer or a DAW. The overridden values can be saved as part of the sequence data, but the originals in the Drum Kit will be left untouched.

Caution!
Save the all Instrument files and Drum Kit files in same single folder.

If all 16 Instruments are set, then the files will be as follows:

.

1,Inst0.prm,35, Instruments Level, Instruments Pan
2,Inst1.prm,38
3,Inst2.prm,41
4,Inst3.prm,45
5,Inst4.prm,48
6,Inst5.prm,37
7,Inst6.prm,39
8,Inst7.prm,56
9,Inst8.prm,49
10,Inst9.prm,46
11,Inst10.prm,42
12,Inst11.prm,43
13,Inst12.prm,47
14,Inst13.prm,50
15,Inst14.prm,51
16,Inst15.prm,52

In below example, only five Instruments are being written:

1,Inst0.prm,35, Instruments Level, Instruments Pan
2,Inst1.prm,38
3,Inst2.prm,41
4,Inst3.prm,45
5,Inst4.prm,48

Provided that the RC-808 Main Panel is active and is focused,

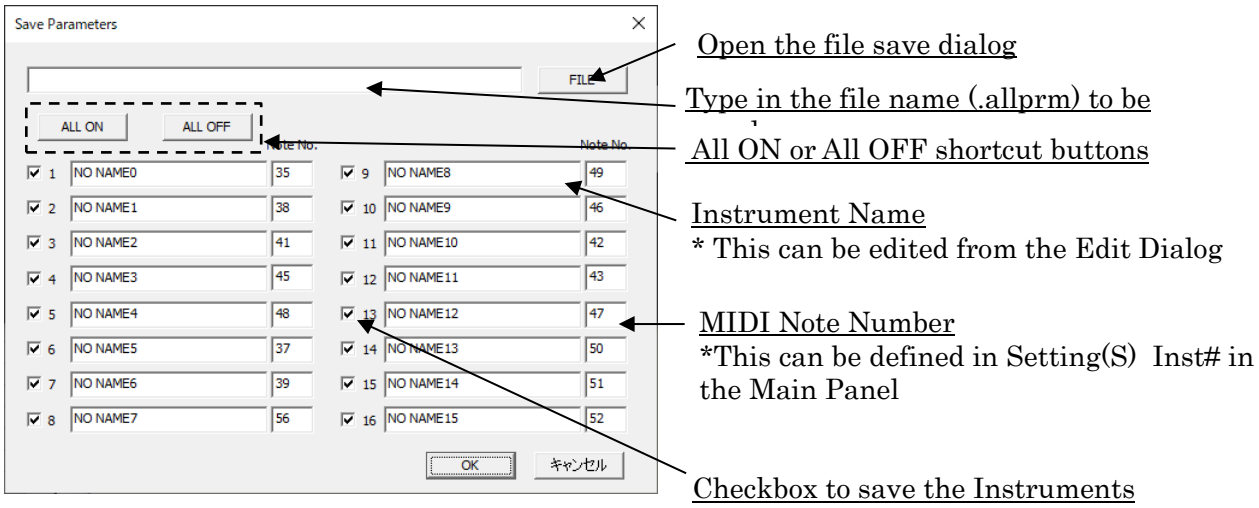
- File > Load Parameters (kit).....Load a Drum Kit (.allprm) file
- File > Save Parameters (kit).....Save the Drum Kit (.allprm) file.

Load Parameters (Kit)…

This opens the file dialog. Open a folder, and select a Drum Kit file (.allprm) to load it to the Main Panel. 16 Instrument files (.prm) will be loaded to the RC-808 as Instrument 1-16. The Edit Dialog buttons will show their own Instrument names. Under them the corresponding MIDI Note Numbers will be displayed. Individual Instruments can be triggered from corresponding Instrument Trigger Pad button.

Save Parameters (Kit)…

This will save the Drum Kit with maximum 16 Instruments and corresponding MIDI Note Number for triggering into an .allprm file.

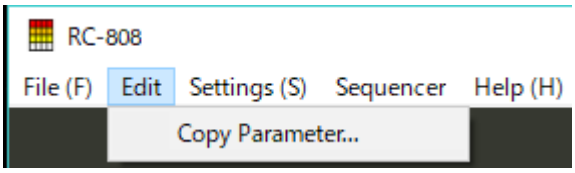


In case of saving a Drum Kit named "Test.allprm", followings will be saved in a same folder.

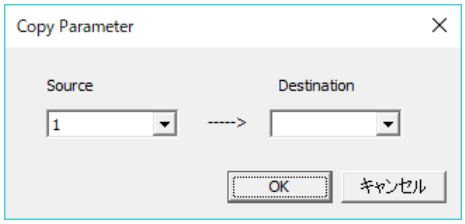
Test.allprm
Inst1.prm - Inst16.prm

Caution!
The Instrument Names and MIDI Note Numbers on the File Save Dialog is only for display purpose. Editing them can be done from their respective dialogs: The Instrument Names can be edited from Edit Dialog, and the MIDI Note Number can be set from the pull down menu Settings and the "Inst# <- Note No". More on this later.

3.2.2 Edit Menu

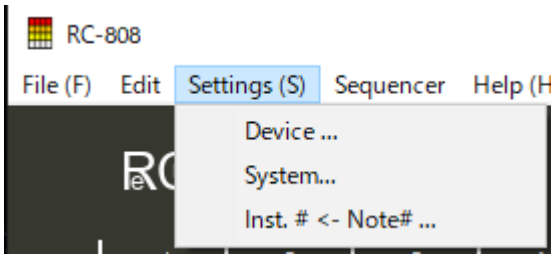


Copy Parameter

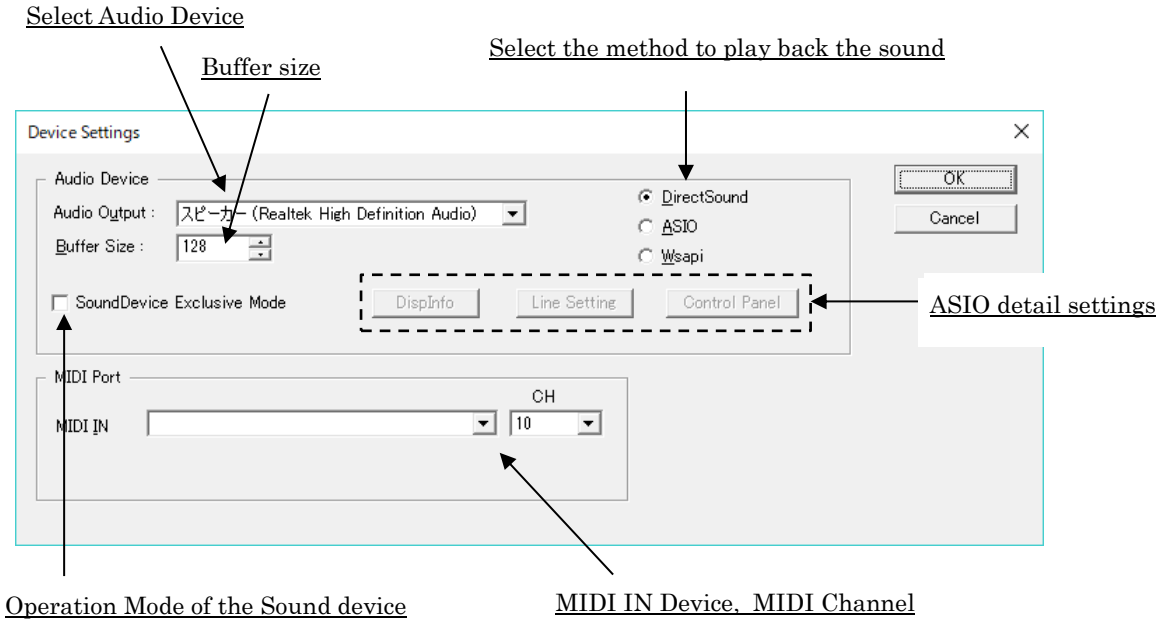


It allows you to copy an entire Instrument to another within a same Drum Kit. Specify the source and destination Instrument Numbers and click OK.

3.2.3 Settings Menu



Device...



Audio Device

Select Audio device connected PC from where the sound will be heard.

Buffer Size

Small sized buffer allows low latency, but too small size may force the PC to be unable to catch up the processing and cause noise to be generated.
Larger buffer however may eliminate noises.

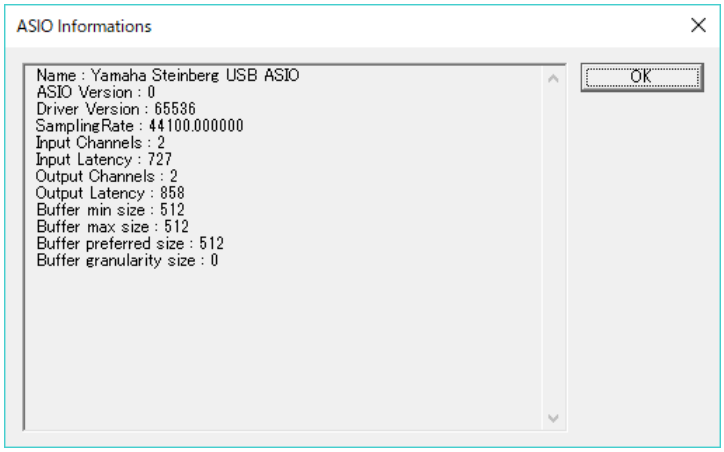
Sound System

DirectSound, WASAPI, ASIO can be selected.
DirectSound, WASAPI are Windows OS standard.

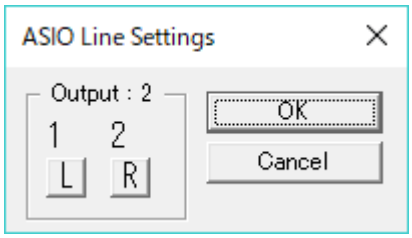
- WASAPI has smaller latency than DirectSound.
- ASIO requires dedicated sound device.
- Latency-wise : DirectSound > WASAPI ≒ ASIO

ASIO details

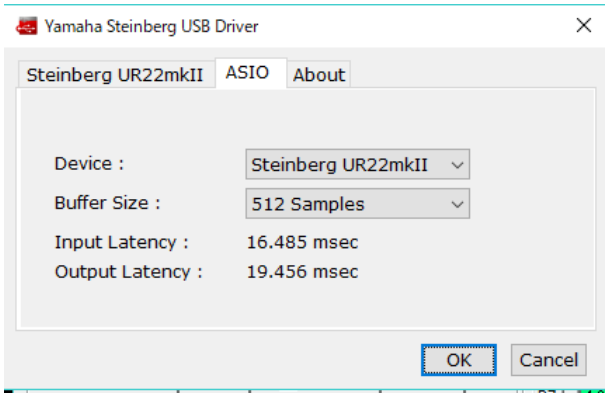
DispInfo example



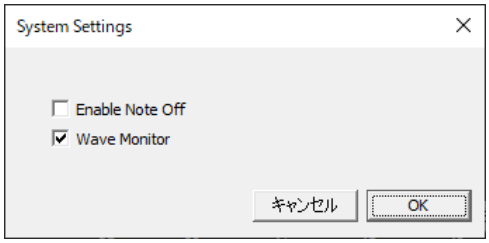
Line Setting: ASIO Setting of Output



Open the control panel of your ASIO sound device, and set the parameters accordingly.
The dialogs and content may be different from the sound device models. Here is an example for a Steinberg UR22mkII:



System...



Enable Note Off:

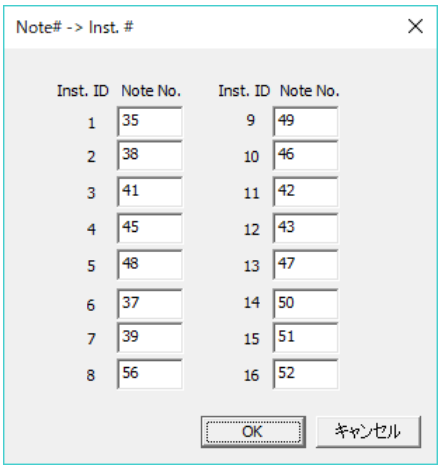
RC-808 accepts MIDI Note Off to mute, truncate, and stop the sound generation.
If not check marked, then the RC-808 ignores Note Off and will play the Instrument all the way till the end when the VCA envelope is completely closed.

Wave Monitor:

Allows the sound generated by the RC-808 to be graphically rendered and displayed in the corresponding RC-808 screens.

Caution!
Wave Monitor function consumes a lot of PC power. Remove the check if graphical wave rendering is not necessary, for example while you are not editing an Instrument.

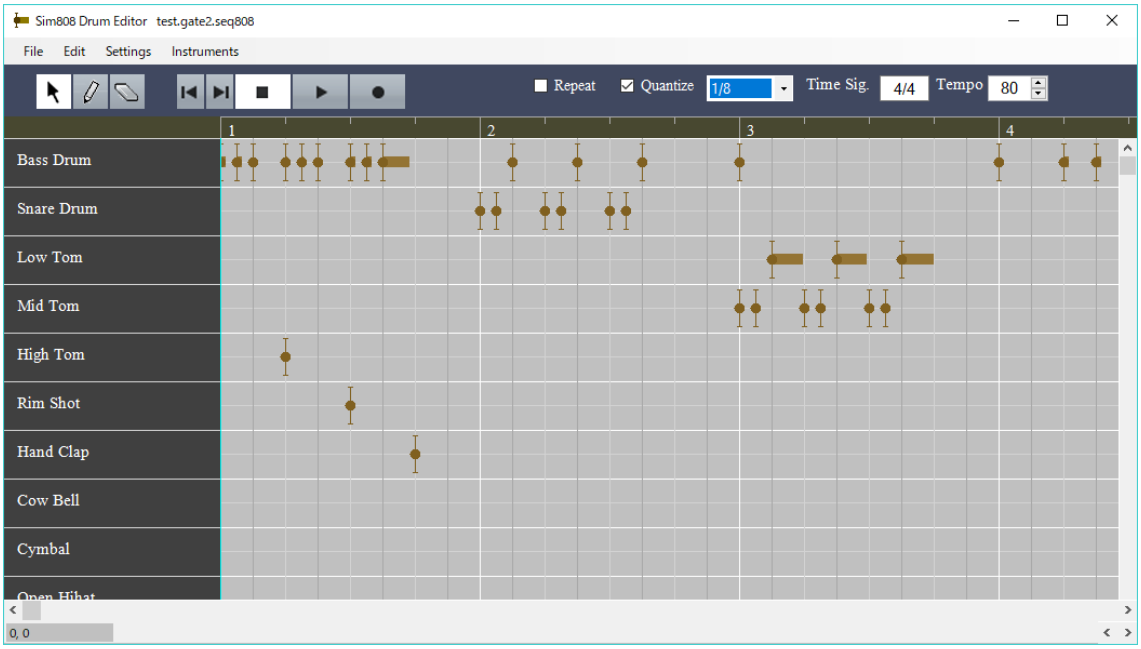
Inst # <- Note #



A table for Instruments Number, and allocated MIDI Note Number.
Allocation table is saved in ini file and reloaded every time the app is launched. This data is also saved into Drum Kit file (.allprm) together with Instrument Name with the File -> Save Parameters (Kit) menu.

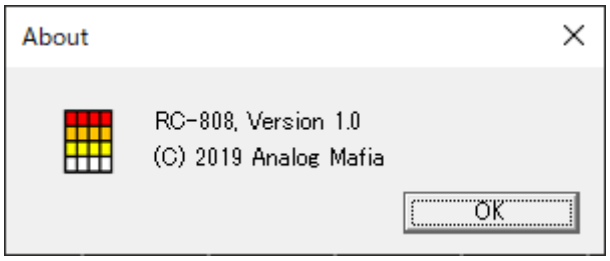
3.2.4 Sequencer

See the Sequencer Operation manual for onboard Piano-Roll Type Sequencer operation.



3.2.5 Help Menu

About...



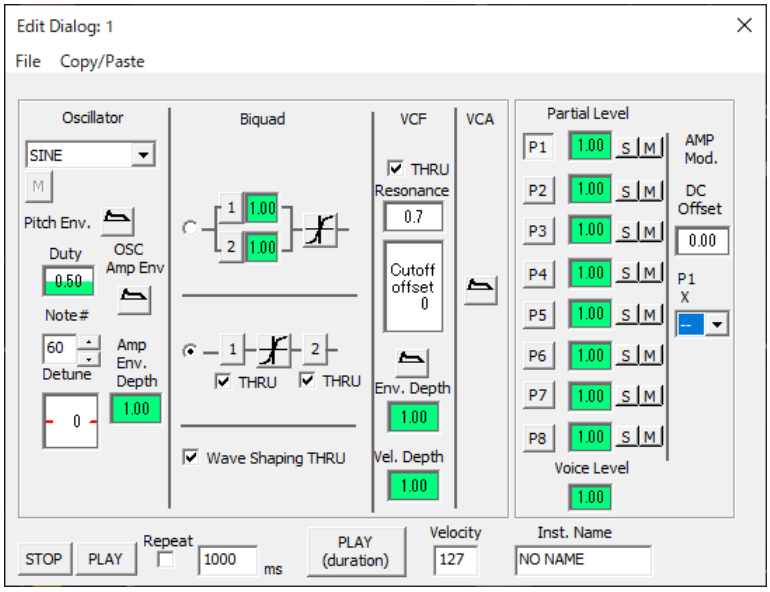
The app settings are saved in the following ini file. Note that the user name will be your PC user name.

C:\Users\(*user name*)\AppData\Local\RC-808\RC-808.ini

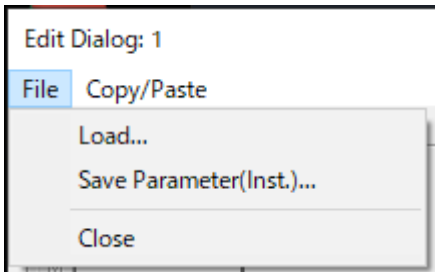
Caution!
The folder name is automatically set to the name of this app which is "RC-808". If you edit the name of this app, then the new ini file will be made with the name of the renamed app, making the previous ini file to be unable to be used any more.

4. Edit Dialog

This is for editing Instrument sounds on the RC-808 Conceptual Model.
To open the Edit Dialog, click the Instrument Name above the Instrument Trigger Pad.



4.1 File Menu



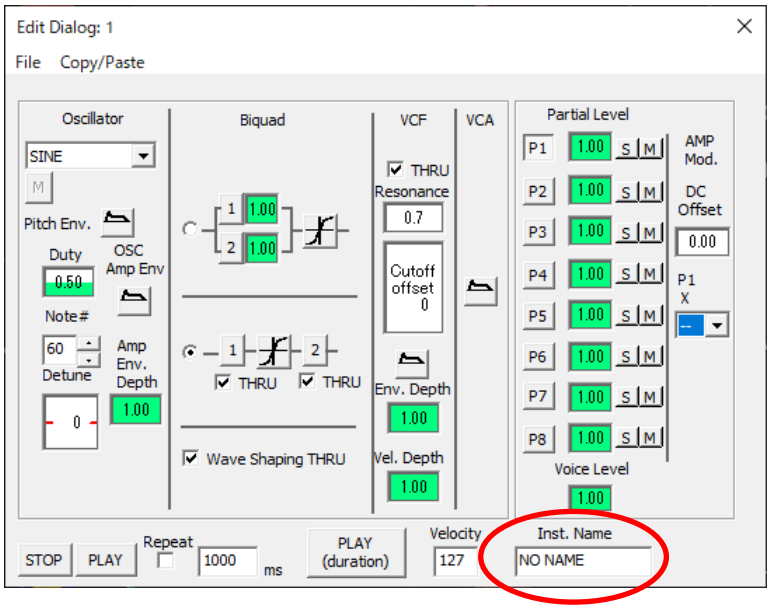
Load Parameters (Inst)

This opens a file dialog to load a single Instrument file (.prm) that defines all the parameters to comprise the Instrument, into the Edit Dialog. Its name will be shown on the Inst Name field, and it can be triggered from the Play button

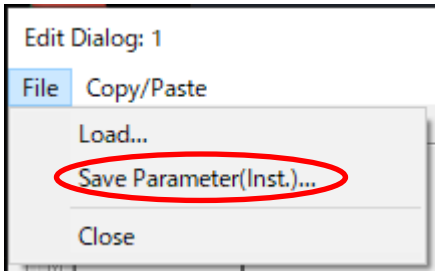
Save Parameters (Inst)

Windows version

Be sure to edit the Instrument Name shown in the Inst Name field in beforehand. Then the newly made Instrument file can be saved as the Instrument Name.prm file, from this menu.



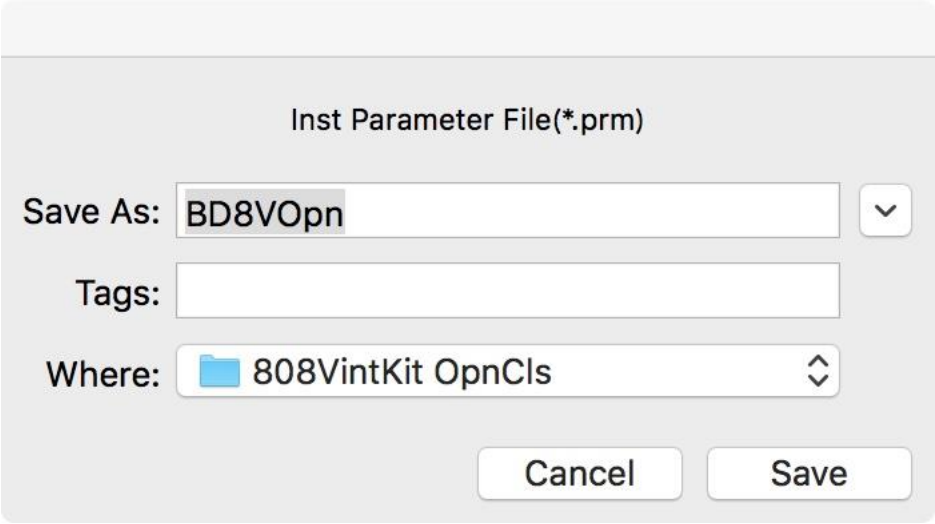
In the Save Parameters (Inst) menu, confirm the file name is identical with Inst Name and then perform saving.
If you don't need to change the name, then you can simply overwrite the parameters from this menu.



Caution!
Do not edit the file name shown on the File Name (N) field in the explorer dialog. Doing so will make the Instrument Name and File Name to be discrepant, and cause malfunction.

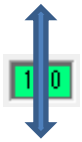
Mac version (Save Parameters (Inst))

Mac version lets you specify the Instrument Name on Save dialog, where you click FILE button, and input the name on Save as field.



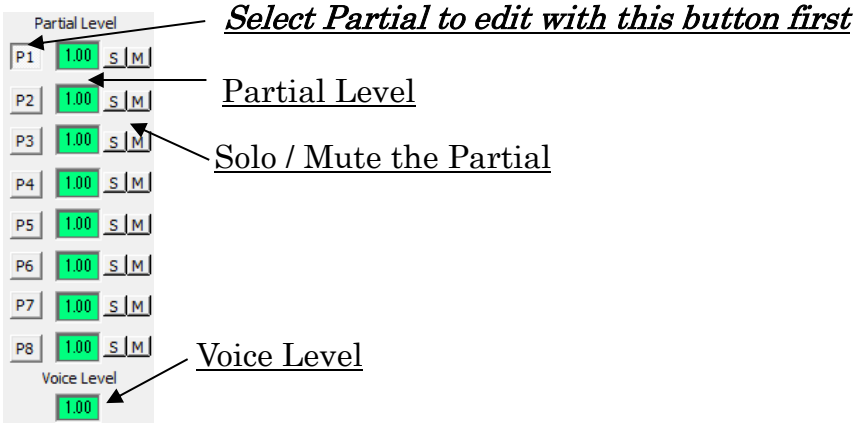
How to edit values

To change a value, click and drag up or down the center of the parameter edit box.
The mouse wheel can be used also.



4. 1 Partial Mixer

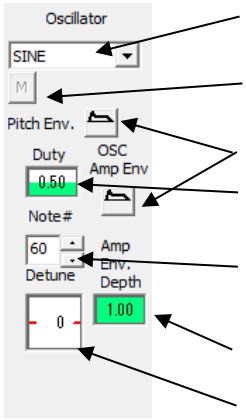
This is where you select the Partial you want to edit.



The Voice level is for setting the sound level after all 8 Partials are mixed. It is saved as an Instrument parameter.

Caution!
The Voice Level is not the Instrument Volume on the Main Panel. The Instrument Volume can be controlled by an external sequencer or a DAW. .

4.2 Oscillator



Wave Select

Open Metallic parameter dialog
This is available only when the Metallic wave is selected

Open Envelope Editor

Square wave duty control

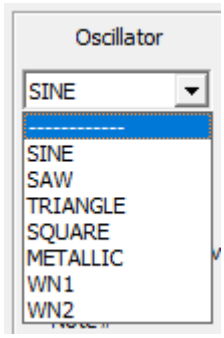
Oscillator frequency in Note Number.
This frequency is when the Pitch Envelope being set to 1.0.

Oscillator Amp Envelope depth

Oscillator Detune (cent)

4.2.1 Wave Select

Here you select the oscillator waveform.

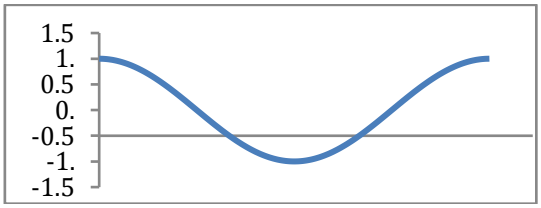


"-----"

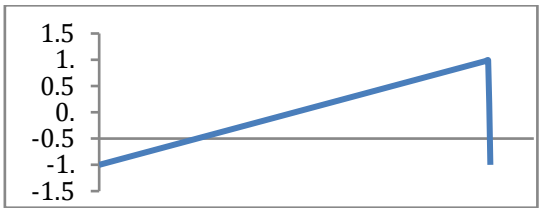
This means not just no waveform is available, but also means that the partial is deactivated. Select this for any unused partials to save the PC processing power.

SINE

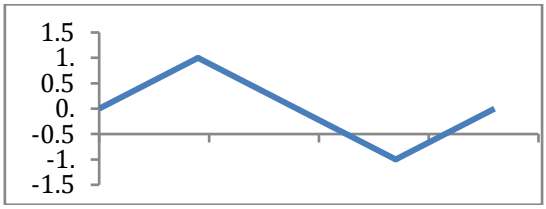
Actually it starts from phase 90 degrees or amplitude 1.0 as a Cosine wave.



SAW

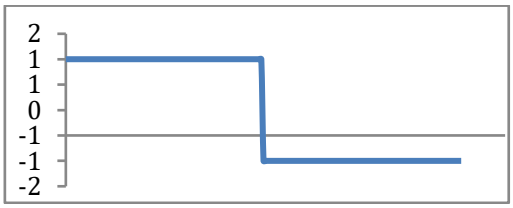


TRIANGLE



SQUARE

The duty ratio is variable.

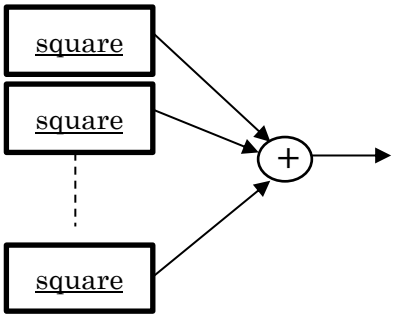


WN1, WN2

These are White Noise generated by different random generator algorithms.

METALLIC

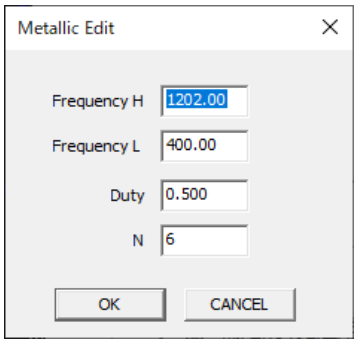
Metallic Oscillators that were originally used in the TR-808 are emulated here.



It is a group of square wave generators with their fundamentals covering a certain bandwidth. The fundamental frequency of the lowest and highest pitched generators mark the both ends of the bandwidth. Then the bandwidth is divided by a certain number to yield individual frequency ranges that are covered by the fundamentals of the rest of the generators.

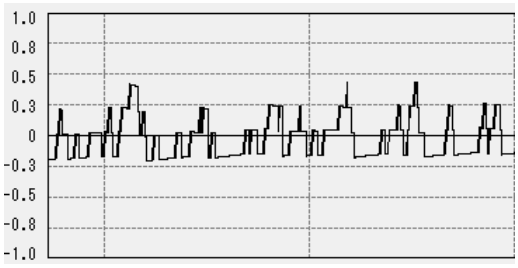
The Metallic Oscillator parameter dialog box is available only when this waveform is being selected. Click the M button to open the dialog box.

Metallic Oscillator parameter dialog



Frequency H: The highest pitched square wave generator fundamental frequency in Hz.
Frequency L: The lowest pitched square wave generator fundamental frequency in Hz.
Duty: The duty ratio of the individual square waves for the Metallic Oscillator.
N: Number to logarithmically equally divide the frequency band between the Frequency H to L. As the result, square wave generators will be from 1 to N.

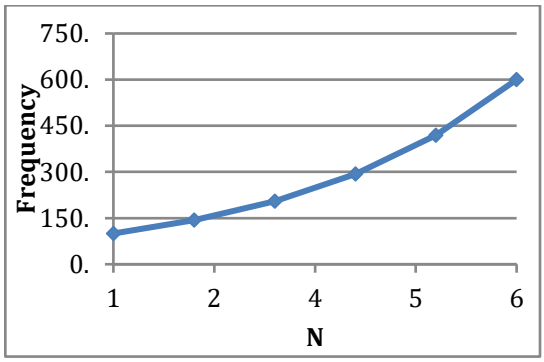
An example of the Metallic Oscillator:
In the dialog box, set the Frequency L = 100, Frequency H = 600, and N = 6.



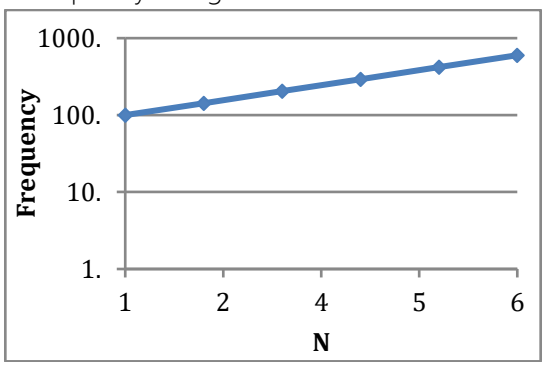
The resulting square wave generator frequencies will be:

1: 100.000000 Hz
2: 143.096908 Hz
3: 204.767251 Hz
4: 293.015605 Hz
5: 419.296271 Hz
6: 600.000000 Hz

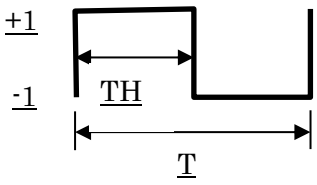
With frequency in linear



With frequency in log



By the way the Duty is TH/T.



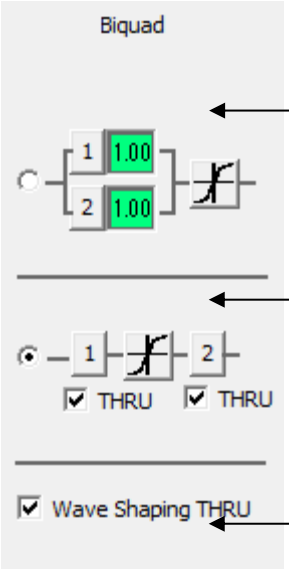
4.3 Biquad Filters / Wave Shaper

This section is a pair of Biquad filters coupled with a wave shaper which is a programmable infinite point wave shaping processor.

The Biquad Filters can be configured serial or parallel. The time variant frequency response curve changes cannot be added, hence that part of the sonic changes is done by the VCF which comes after.

The wave shaper allows the waveform to be freely distorted by passing through a mathematic conversion. This formula can be edited graphically, by means of function graph manipulation that allows infinite increase / decrease of control points and direct curvature control of the graph by the mouse cursor. In other words this is a *programmable infinite point wave shaper*.

The Biquad Filter pair can be configured serial or parallel with the radio button placed by the corresponding diagram.
In below example, serial connection is being selected.

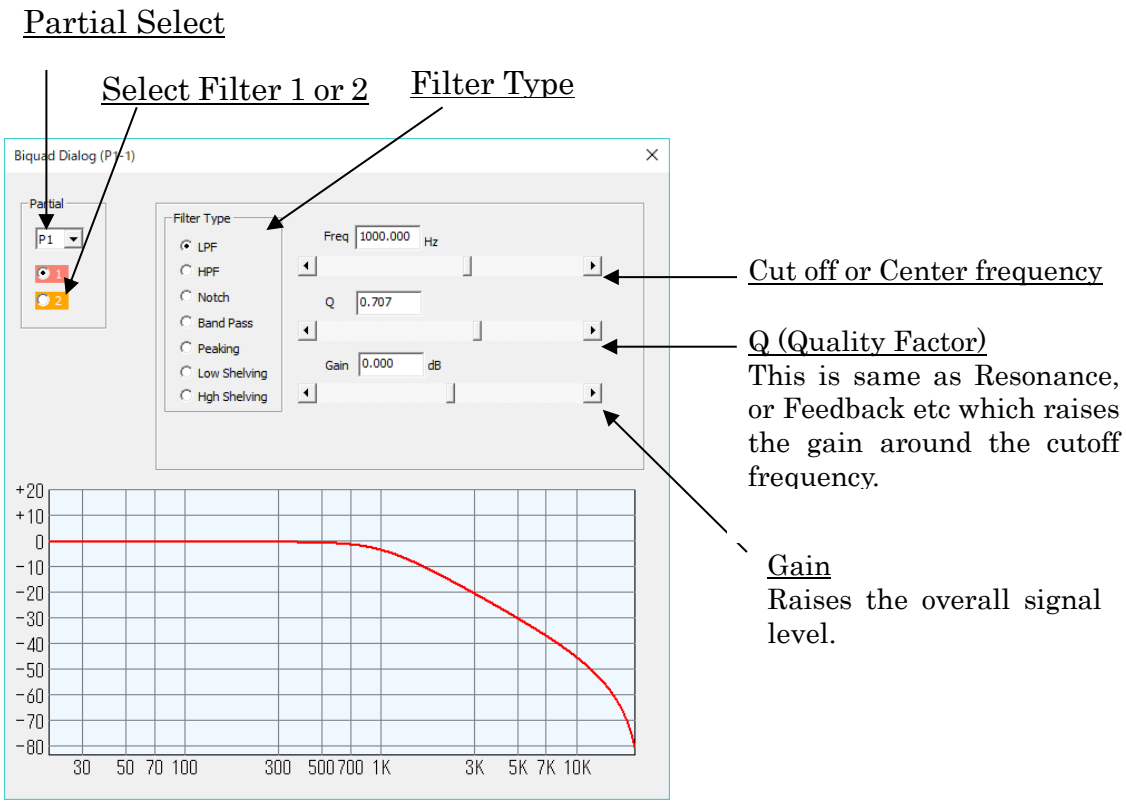


Parallel
* Individual filter gain control is available.
* The Wave Shaper will come after these filters.

Serial
* The Wave Shaper will come between the Filter 1 and the Filter 2.
* THRU switch makes the signal to bypass the filter.

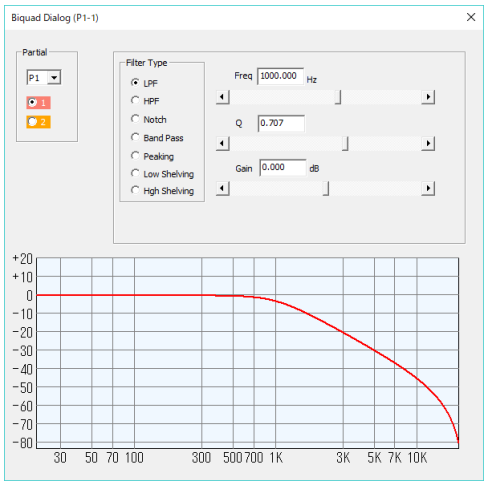
Wave Shaping THRU makes the signal bypass the Wave Shaper

4.3.1 Biquad Filter Dialog

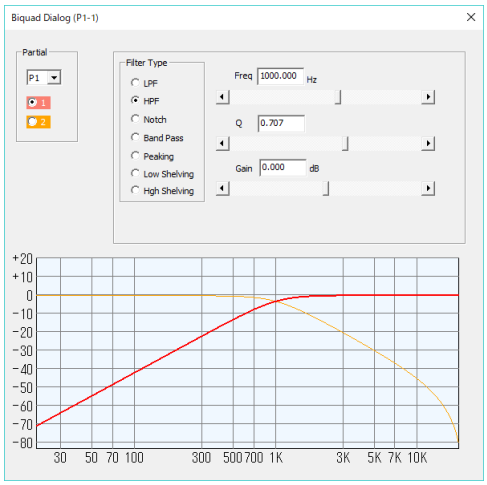


Filter Types

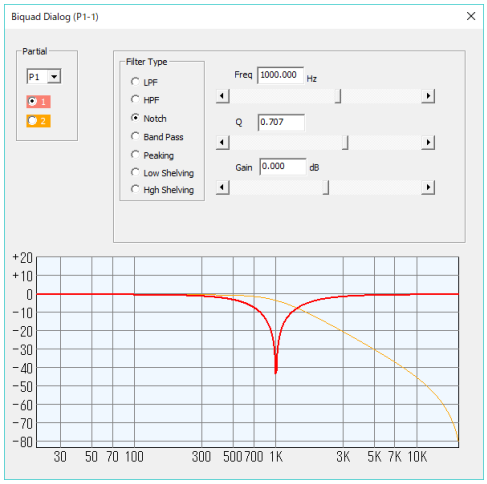
LPF (Low Pass)



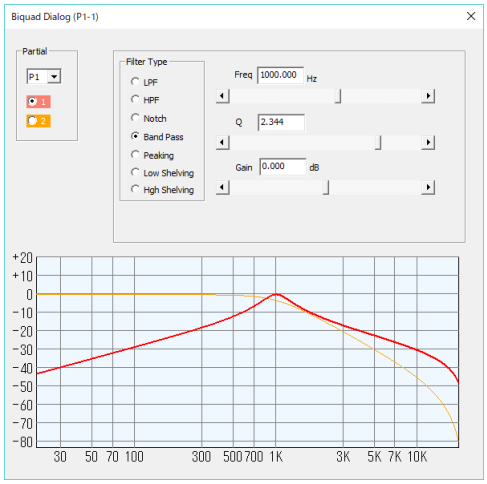
HPF (High Pass)



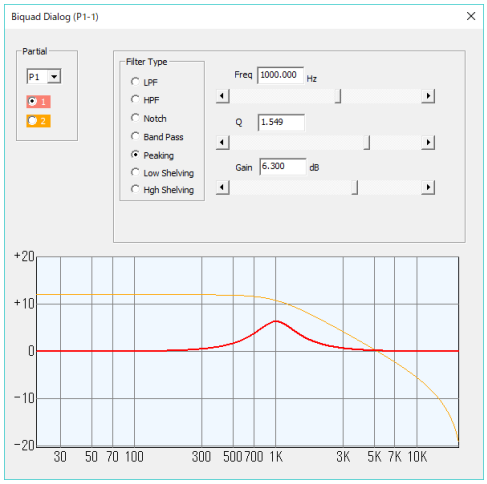
Notch (Band Reject)



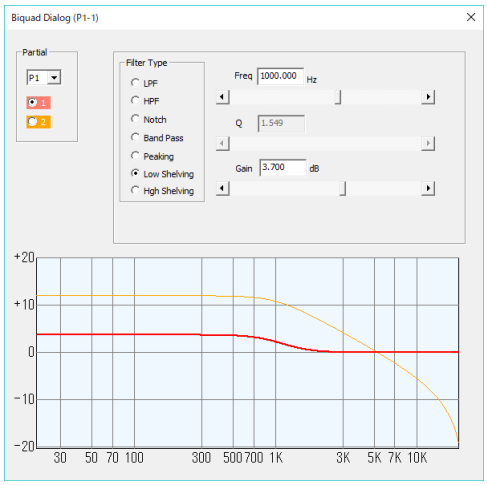
BPF (Band Pass)



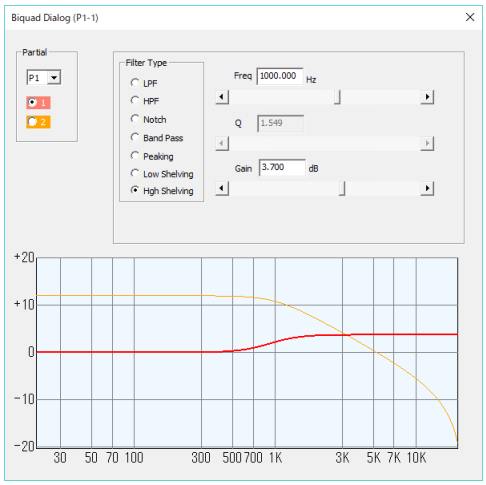
Peaking (Peak)



Shelving



High Shelving



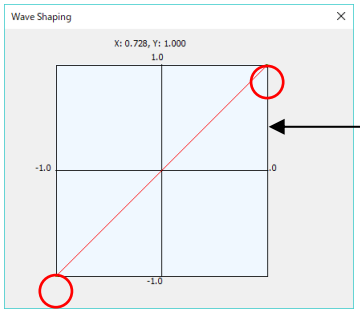
4.3.2 Wave Shaping Dialog

Click to open the Wave Shaping Dialog

Wave Shaper changes its location according to the Biquad Filter configuration:

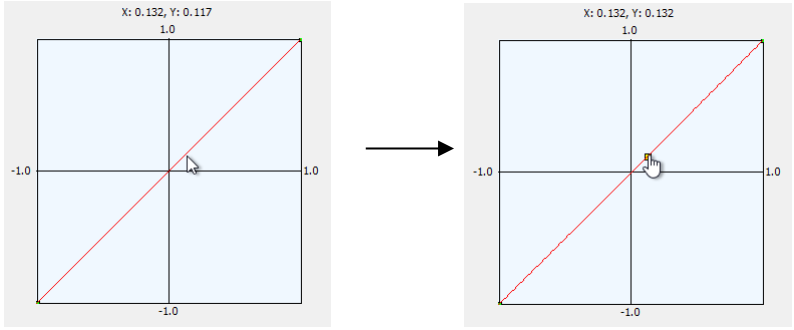
- Parallel: After the both Biquad Filters 1 and 2
- Serial: Between the Biquad Filter 1 and 2

Editing the Wave Shaper



Graphic area
Place the control points to create function for the distortion curve.

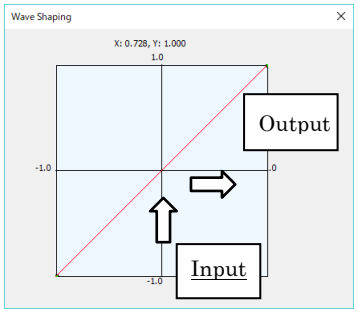
Adding the control points



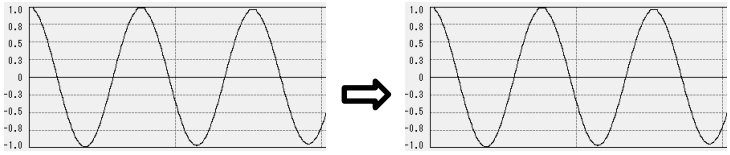
- Place a control point by left clicking the desired location.
- Erase the point by right clicking it.
- Modify the curve by dragging the points. The mouse pointer will be shaped like a palm.

Examples

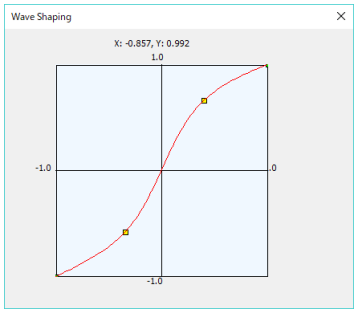
Linear = No distortion

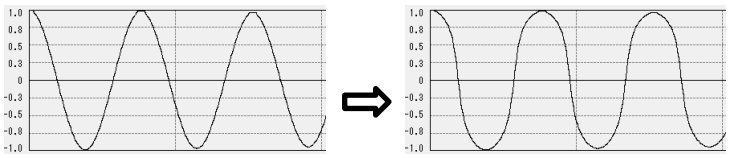


Waveform is unchanged after wave shaping.



Diode Clip style





By activating the Oscillator Amp Envelope, the Wave Shaping effect can be limited to a certain duration of time.

4.4 VCF

THRU Check to bypass the VCF

Resonance

Cutoff Offset

Offset (10 - 7KHz), Envelope (0.01 - 10000)
Cutoff Frequency = Envelope * Depth * Offset
(Limited to 10 - 7KHz)

Open Envelope Editor

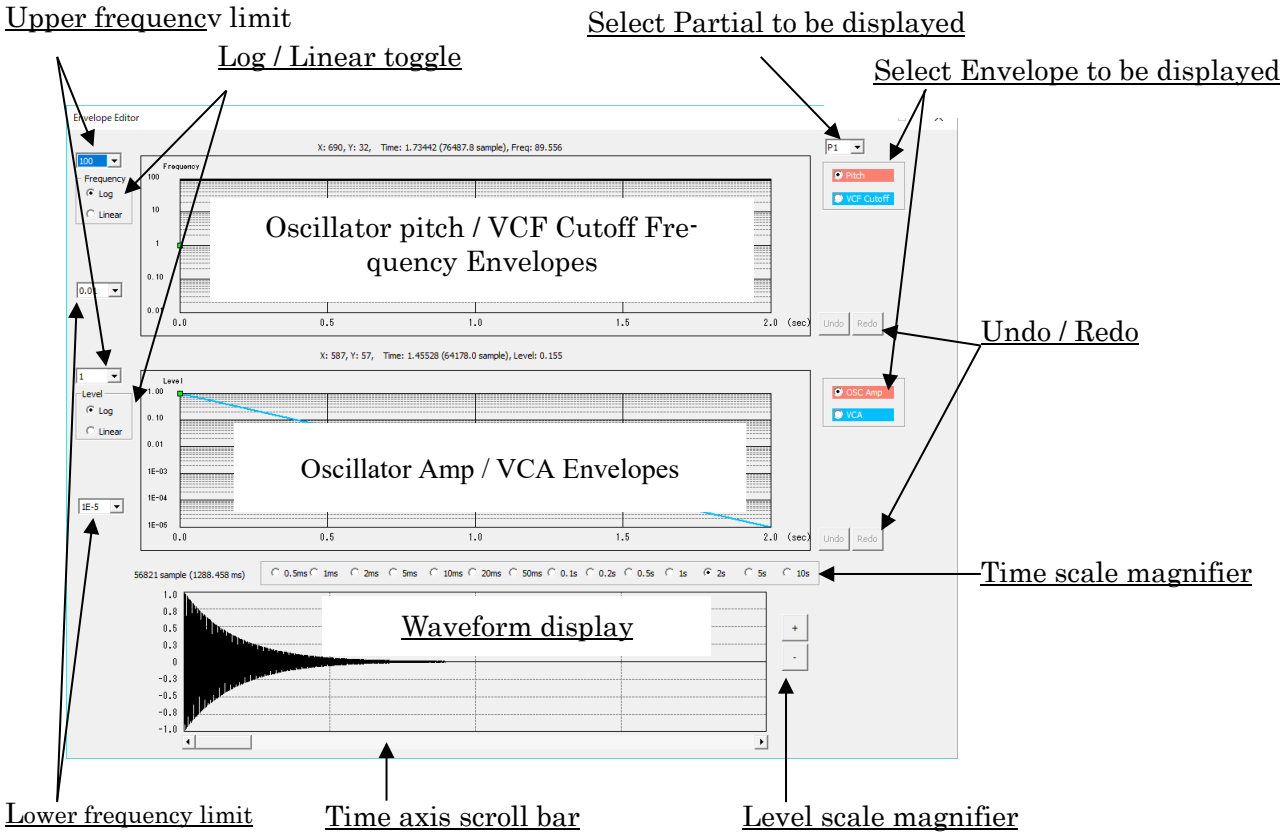
VCF Envelope Depth

MIDI Velocity Depth

4.5 VCA

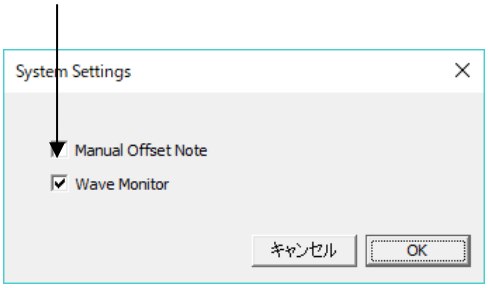
Open Envelope Editor

4.6 Envelope Editor



4.6.1 Wave Display

Before editing Envelopes, open the System Setting Dialog from the Main Panel: Setting (S) > System. Then, check the Wave Monitor.
The display is fixed to 2 seconds long.



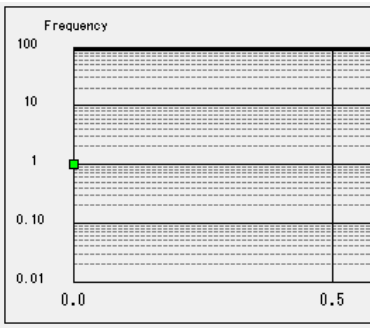
4.6.2 Frequency Envelopes

Oscillator Frequency Envelope

Vertical scale of Envelopes is the multiplier to Frequency (MIDI Note No)

An example:
If Note# = 60 (261.625565Hz), then…

Vertical Scale	Frequency (Hz)
0.1	26.1625565
1.0	261.625565
10.0	2616.25565



Oscillator Frequency = Frequency (MIDI Note No) * 1

VCF Cutoff Frequency Envelope

Vertical Scale of Envelope is the multiplier to VCF Cutoff Offset frequency

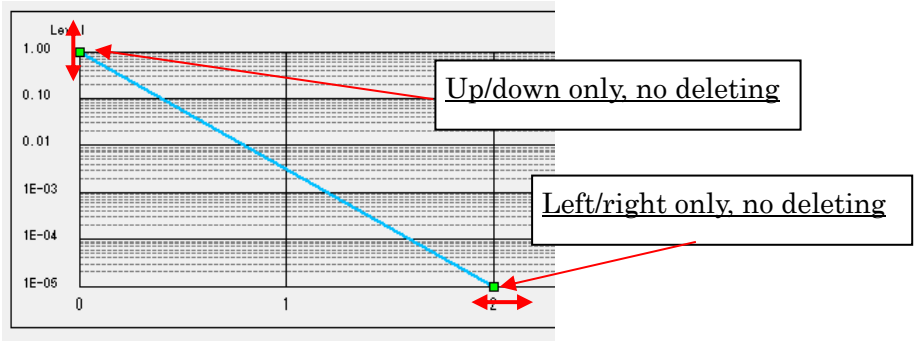
- 100Hz < Cutoff Offset frequency < 7,000Hz
- VCF Cutoff Frequency = Cutoff Offset * VCF Envelope * EnvDepth
- VCF Cutoff Frequency therefore will be limited as follows
  100Hz < VCF Cutoff Frequency < 7,000Hz

4.6.3 Break Points

Green 1D Break Points

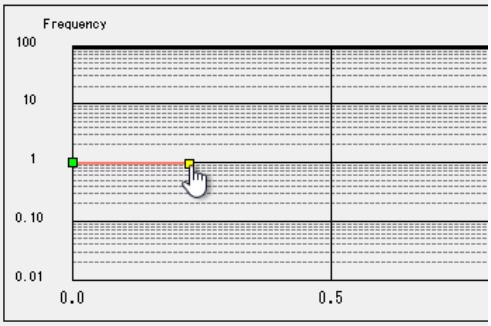
Envelope Start / Stop are indicated by Green Break Points.

- The Break Point at the vertical scale can be moved up/down only.
- The Break Point at the horizontal scale can be moved left/right only.
- They cannot be deleted.

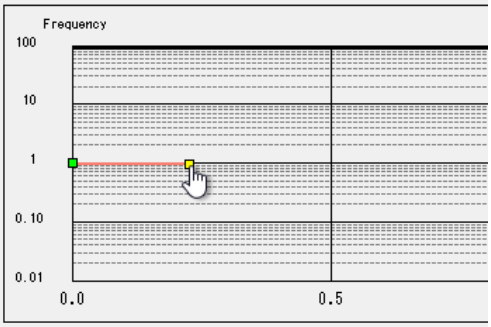


Yellow 2D Break Points.

Left click adds a new Yellow Break Point between the Green Start / Stop Break Points.

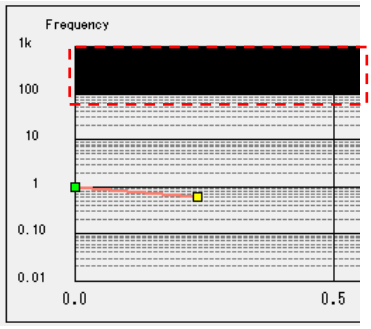


Right click deletes the Yellow Break Point.



Left click and Drag moves the Yellow Break Point around.

Off limit Area



Black Area is Off Limit Area.

Pitch Envelope Break Points cannot be placed in the black area. Therefore, this will be shown only when the Pitch envelope is selected.

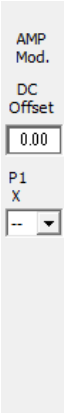
The area changes according to the Note #

Undo/Redo

Break Point adding, deleting, or moving around, can be undone or redone. Undo/Redo history will be lost when Envelope Editor is closed.

4.7 Amp (Ring) Modulator

Partial 1 (P1) will be Amp (Ring) Modulated by another Partial.

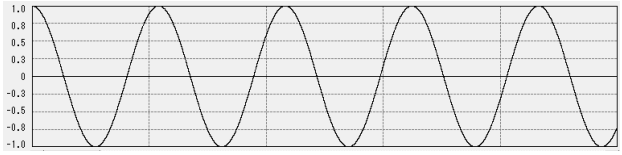


Add DC offset on the signal from the another Partial.

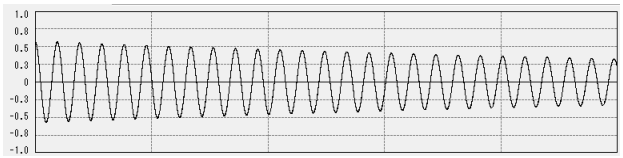
Select another Partial to modulate Partial 1.

An example of Partial 1 being Amp Modulated by Partial 2.

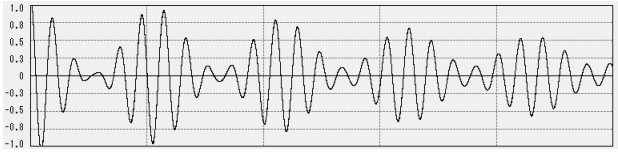
Partial 1 waveform



Partial 2 waveform with DC offset = 0



Amp (Ring) Modulation result of Partial 1 * Partial 2

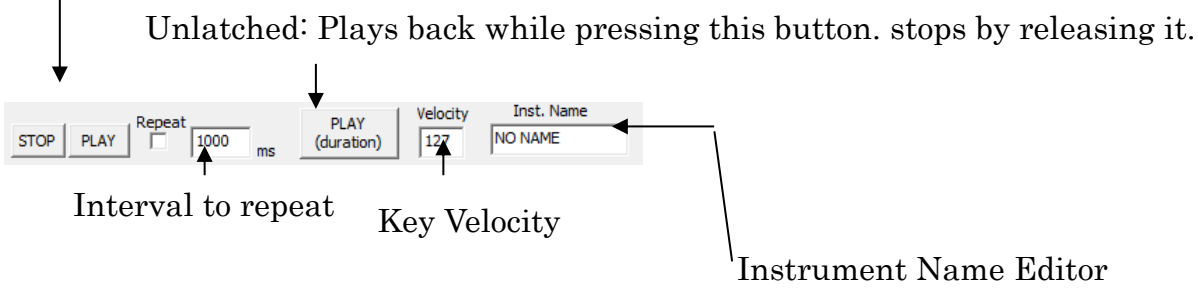


4.8 Play / Stop, and Instrument Name Editor

Play / Stop:
A convenient function to play the sound while editing to check and preview. Both latched and unlatched play back modes are provided.

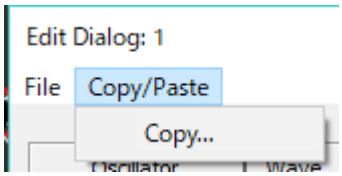
Instrument Name Editor:
Please note that this is the only place where you can edit the Instrument Name.

Latched: Plays back repeatedly until you press the Stop button.

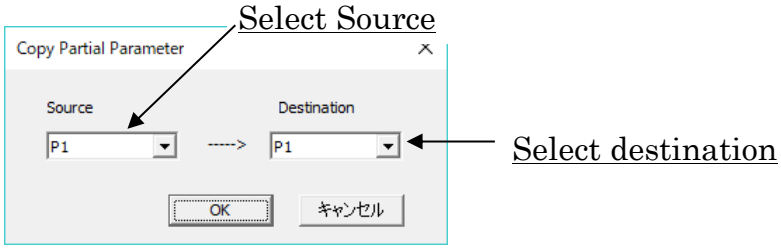


4.9 Copy and Paste

Allows copy and paste parameters between Partials within a same Instrument.



Copy / Paste Partials Dialog



5. Tips

5.1 How to control the RC-808 for Windows from your DAW

The standalone version of the RC-808 can still be controlled from your DAW
To have the RC-808 for Windows to be controlled from your fave DAW, set the "LoopBe Internal MIDI" to the output of the DAW's MIDI Track.

5.2 How to control the RC-808 for Mac from Apple Logic Pro X

a. Launch the Audio MIDI Setting in the Utility App folder.
   Open the MIDI Studio.
   Double Click the "IAC Driver".
   Check the "Device is online".
   Click the Remove button on the lower left – several times to clear the ports.
   Then click the Add button + to create IAC Bus 1.

b. On the RC-808, open the Settings -> Set the MIDI IN Device as "IAC Driver IAC Bus 1".
   It's alright to have OMNI ON, MIDI CH 10, but if necessary then change these as well.

c. Open the Preference of the Logic Pro X.
   Open the MIDI tab.
   The "IAC Driver IAC Bus 1" on the Input should have the check mark unchecked.
   All the other IAC drivers related ones should have the check mark unchecked.

d. Create a new External MIDI track on the Logic Pro X.
   Set the output port to "IAC Driver IAC Bus 1".
   Set the MIDI channel to 10, although OMNI ON should make this less important. .

Now the RC-808 can be used as an external sound module!

5.3 Assembling a new Drum Kit by collecting Instruments from existing multiple Drum Kits

You can assemble a new Drum Kit by picking up individual Instruments from multiple Drum Kits.
Maximum 16 Instruments can be collected and gathered to create a new Drum Kit.

1. Create a folder in beforehand, with its name being the new Drum Kit.
2. On the Main Panel, press the Instrument Name button of the Instrument you want to assign an Instrument. This will open the Edit Dialog.
3. Go File > Load, and search for the Instrument File (.prm) you want to use from the folders. Then load it.
4. Confirm the Inst Name on the Edit Dialog and the Instrument Name on the Instrument Number you want to use on the Main Panel is identical.
5. Likewise, load the other Instrument Files (.prm) to other Instruments on the Main Panel.
6. From the Main Panel, go Settings(S) -> "Inst# <-MIDI Note No" menu, and set the MIDI Note numbers of individual Instruments.
7. From the Main Panel, go File (F) -> Save Parameters (kit) and open the dialog to confirm the relation of the 16 Instrument Numbers and their MIDI Note numbers.
8. Check the check boxes of the Instruments you want to save.
9. Click the File button mentioned earlier, and open the Save File with Different Name dialog.
10. Select the folder you made at first.
11. Type in the new Drum Kit name to the File Name (N) field.
12. Click Save (S) button. return to the Save Parameter display to confirm the directory to be saved, and then press OK.

5.4 Editing an existing Drum Kit

If various Instrument files (.prm) are stored within a same Drum Kit folder, then multiple Drum Kits can be assembled from them and saved into the same folder.

1. Copy and paste the Instrument files you want to use, and Drum Kit files you want to edit, into a single folder.
2. From the Main Panel menu, go File (F) > Load Parameters (kit) to open the file explorer dialog.
3. Select the Drum Kit (.allprm) you want to edit, and click it to deploy it on the Main Panel.
4. Open the Edit Dialog of the Instrument with Instrument Number button.
5. Go File > Load, to select and load the Instrument file (.prm) you want to edit. Confirm the sound by triggering it with the Instrument Pad.
6. Change the Note Number of the Instrument if necessary.
7. From the Main Panel menu, go File (F) > Save Parameter (kit) and open the Save Parameter display.
8. Confirm the Instrument Name and Note Number.
9. Click the File button on the upper right, and open the "Save as" dialog.
10. Write the new file name to the File (N) if necessary, an click Save (S) button.
11. If the Inst File Name will be as is, then overwrite it.
12. Click the OK button in the Save Parameter.

6. MIDI

6.1 Instrument Level と Instruments Panning

Each of the RC-808 Instrument's Level and Panning can be adjusted from the red and white knobs on the Main Panel, as well as from a sequencer; either the one onboard or the external DAW via MIDI Control Change B n# H.
Also, above mentioned knobs will transmit each values via Control Change.

Panning

Instrument (Track) No.	Control No.	Pan
1	4BH (75)	Left 0 / Center 64 / Right 127
2	4AH (76)	
	74 + Track No	
16	5AH (90)	Left 0 / Center 64 / Right 127

Level

Instrument (Track) No.	Control No.	Level
1	5BH (91)	0 ----- 127
2	5CH (92)	0 ----- 127
	90 + Track No.	
16	74H (116)	0 ----- 127

6.2 MIDI Implementation Chart

Function		TX	RX	
Basic	Power On	x	1-16	
Channel	Assignable		1-16	
Mode	Power On	Mode 3	Mode 3	
	Message	x	x	
Note No		x	0-127	
		* * * * *	0-127	
Velocity	Note On	x	○	
	Note Off	x	x	
After Touch		x	x	
		x	x	
		x	x	
Control Change		○	○	Inst Pan Cntr 64/R 127
	75-90			
	90-95	○	○	Inst Level 0-127
Program Change		x	x	
Exclusive		x	x	
Common		x	x	
		x	x	
		x	x	
Realtime	: Clock	x	x	
		x	x	
		x	x	
		x	x	
		x	x	
		x	x	
		x	x	
		x	x	
Notes				

Mode 1: Omni On, Poly Mode 2: Omni On, Mono ○: Yes

Mode 3: Omni Off, Poly Mode 4: Omni Off, Mono ×: No

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