

RAR-1 Room Acoustic Processor

User Manual

Ver:1.2



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Thanks for choosing Audimaxim

This product is the world's first, A–Solution to optimize spatial phase processing using high order FIR filter based on FPGA chip. Using advanced acoustic algorithms, acoustic field defects in rooms can be corrected accurately. It can effectively eliminate standing wave caused by low frequency, to restore the essence of true voice.

At the same time, it is a precise digital electronic frequency divider. Read the instructions carefully before using! If you have any questions, please contact your local distributor or login on our website: <u>www. audimaxim.com</u>, for help or contact our company's technicians, we will be glad to help you!





1.1. Packing list

Inside packing list :

- * RAP-1x1
- * AC Cable x 1
- * USB Disk x 1 (Built–in operation instructions and application software)



RAP-1x1



AC Cable x 1



USB Disk x 1



1.2. Pre-use preparation (Equipment to be prepared separately)

Before using , you need to add the following equipment :

* Routers and network cable

The machine needs to connect local area network and computer operation software to measure and optimize the process.



* Measure microphone, Microphone wire, Microphone rack

The recommended microphone is Earthworks M30. Please purchase it by yourself or contact local distributors.



Measure microphone





Microphone rack

* Computer

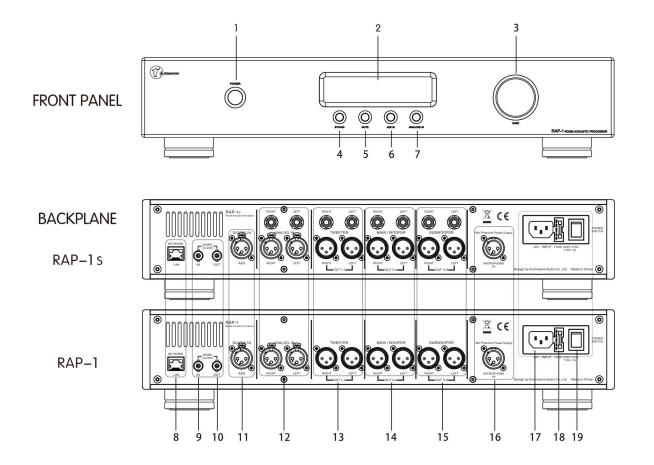
Operating system is above Window7 or Mac Os10.9.



Computer



1.3. Operational panel instruction



FRONT PANEL

- 1. ON / OFF
- 2. Display screen
- 3. Volume (Adjustable -60~0)
- 4. ON / BYPASS (Select switch before and after optimization)
- 5. Mute switch
- 6. AES digital input selection
- 7. Analog input selection

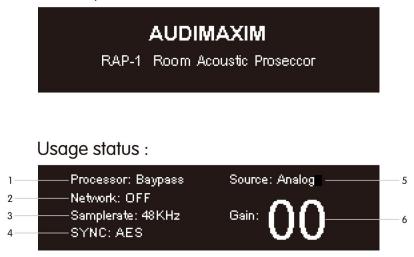
BACK PLANE

- 8. LAN : Network interface
- 9. Clock input
- 10. Clock output
- 11. AES digital input
- 12. Analog input
- 13. Analog output 1-2 : Tweeter output in frequency division mode
- 14. Analog output 3–4 : Default full–range output (Mid–range / Woofer output in frequency division mode)
- 15. Analog output 5-6 : Subwoofer output in frequency division mode
- 16. Measuring microphone input
- 17. AC power input
- 18. AC power fuse : 250V / 0.5A
- 19. Main power switch ON / OFF



1.4. Display screen description

Start-up self-check status :



Turn on the power switch, display screen enters self–check status. About 1 minute later, the display will be in use.

- 1. Optimize machine state : "ON" Optimized state, "Bypass" Pre-optimization state.
- 2. Network connection status : "ON" In connection, "OFF" Unconnected.
- 3. Digital synchronized clock sampling frequenc.
- 4. Synchronous clock source :

"Master 48K" Represents the synchrononization source with built-in clock.

"AES" Represents the clock of the AES input device as the synchronization source.

"Work Clock" Represents external digital clock as synchronization source.

- 5. Input signal source display.
- 6. Volume display : minimum volume "-60" , maximum volume "00".





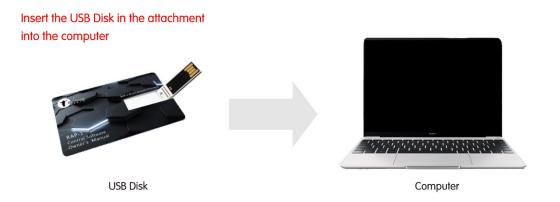
RAP-1 Control Software



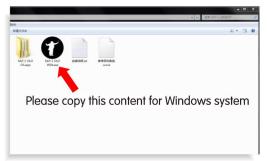


2.1. Installation of operating software

1. Take out the USB flash disk in the package and plug it into the USB port of the computer.



1. 2. Open the USB Disk content and download the operating software to the computer.



USB Disk content display window for Windows 7 system

Operating software dose not need to install program, it can be copied directly to the computer.

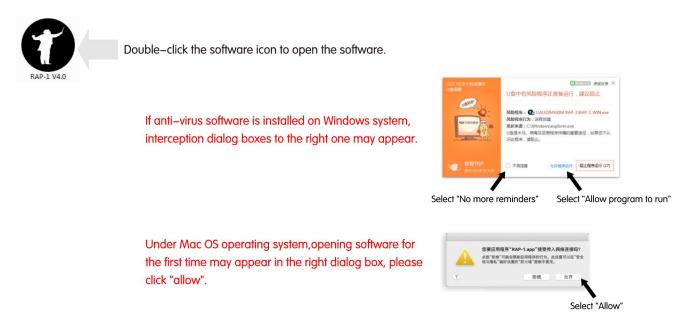
USB Disk content display Window for Mac OS system



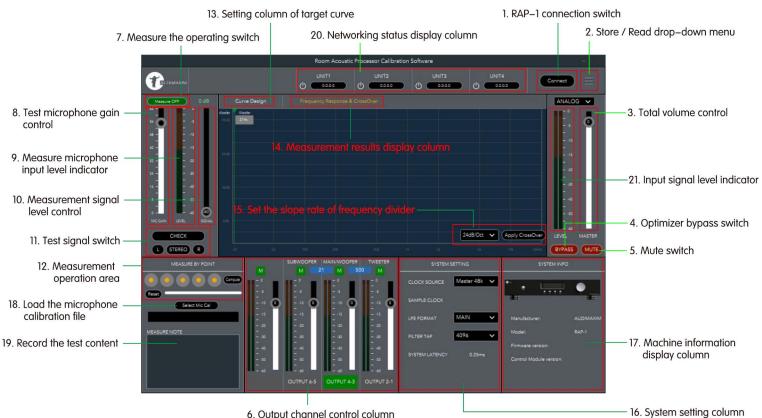


2.2. Operating software window description

Double-click the software icon to open the software



Function description of operating software departments:



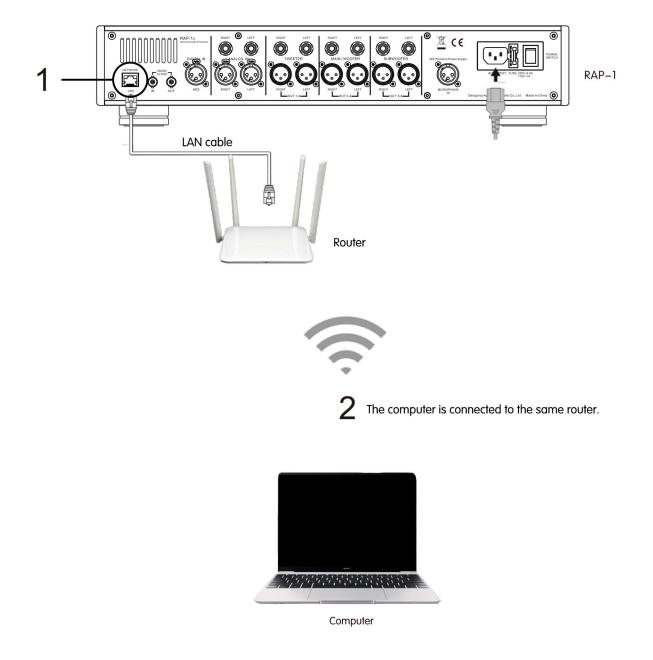
6. Output channel control column



2.3. Connecting operation software with RAP-1

How to connect RAP-1 with computer ?

- 1. Insert the "LAN" port on the back of the machine with CAT5 or CAT6 network cable, and connect the other port of the network cable to the router "LAN".
- 2. The computer equipped with operational software should be connected with the same router via WI–FI.

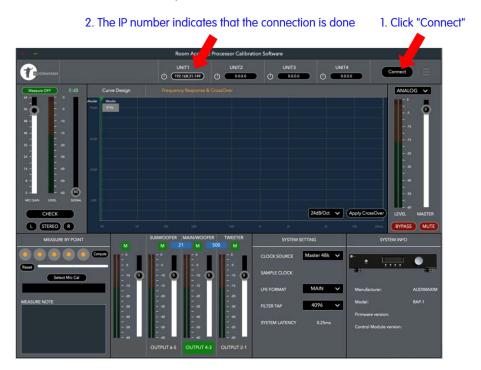


^{*} Simply connect to the computer when measuring and optimizing the operation, general use can be done without connection.



2.3. Connecting operation software with RAP-1

RAP–1 connects routers and turns on power, start up about a minute and then go into service, you can start networking with it. Ensure that computers and RAP–1 are on the same network, Click "Connect" and the upper "UNIT 1" field of the software displays the IP address, representing that the connection has been completed.



At most 4 RAP–1 can be connected at the same time. If multiple RAP–1 are connected in the same network, clicking "Connect" will result in multiple IP addresses, each IP address represents a RAP–1. Double–click the "UNIT*" it can be named by itself for easy identification.



- * If you click on "Connct", there is no IP address, please wait for one minute and try again. If it is still unsuccessful, you need to check following possible conditions :
 - 1. Is the router on and working properly?
 - 2. RAP-1 normally connected to the router "LAN" port ?
 - 3. Is the network cable connection poorly contacted ?
 - 4. Is the computer connected to the same router?
 - 5. Dose the firewall inside the computer prevent the software from networking?







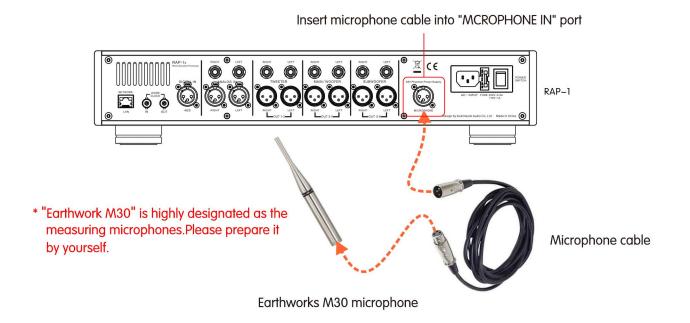
Measurement & Optimization





3.1. Measuring the connection and placement of microphones

Connect the microphone :



Microphone placement :

Put the microphone in the best listening position, pick up the microphone and head up, the microphone is level with ear.

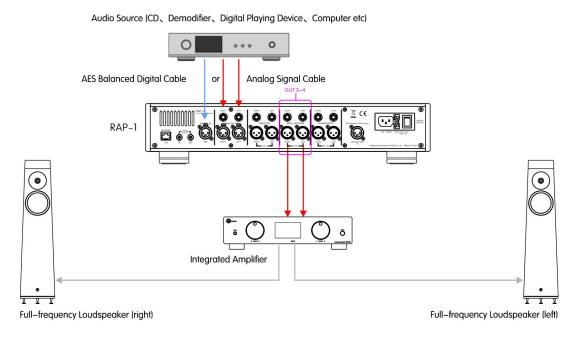




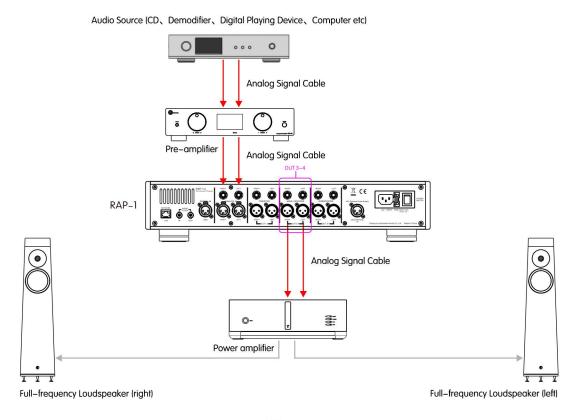
3.2. Measurement and optimization of full-frequency speaker system

Connection of full frequency speaker system

If you are using an Integrated amplifier, please connect as follows :



If you are using split Pre-amplifier+Post-amplifier, please connect as follows :





3.2. Measurement and optimization of full-frequency speaker system

* Please make sure that the RAP-1 is in self-check state before the amplifier is turned on. Or else, there may be some impulsive sound.

The operation mode is as follows :

Step 1: Selecting machine and setting frequency division mode

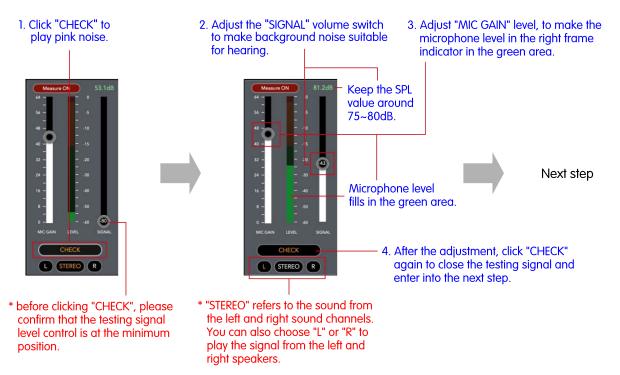


* In "MAIN" full-frequency mode, "OUTPUT 4-3" is the default output channel, and other output channels are not available.

1. Click "Connect " and find RAP -1 within LAN.

* Each "Earthworks M30" measuring microphone

Step 2: Setting measuring signal level and microphone gain





3.2. Measurement and optimization of full-frequency speaker system

Step 3: Confirm that the microphone has been placed in place, and start frequency sweeping measurement

Click the first measurement circle, and the left and right speakers will send frequency sweeping signals respectively. The green progress bar of the measurement circle will rotate clockwise. Click the measurement circle again, and the frequency sweep will start again. You can repeat the measurement many times, and the status display column shows the final measurement result.

- 1. Click the first measuring circle to start frequency sweeping measurement.
- * During the testing, please be quite in case that the result will be affected. Each testing circle represents a testing position. At most 5 plcaes can be choosen as the testing positions. The result tested by the last time will be shown in the state column.



2. Click "Compute" to compute for optimization.

Step 4: Optimize the operation

After the completion of single or multi-point frequency sweep, the optimization operation can be carried out. Click "Compute" to start, and the progress column shows the progress, the progress column is complete, the operation is finished, and the optimization of the left and right tracks appears in the status bar.

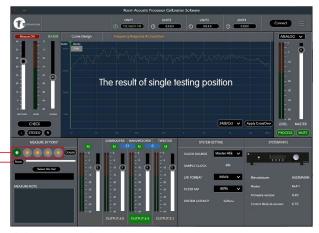
* during the optimization operation, all operation keys on the software interface should not be clicked until the operation comes to an end.

3. Click "Measure OFF" to exit the measurement state.

Step 5: Optimize and save the results

Click "Measure OFF" to exit the measurement state, then click the drop–down menu in the upper right corner, and select "Save Parameter File" to save the optimization results.

After optimization, click "BYPASS" to switch to compare the sound effects before and after optimization. If necessary, go to the next "setting of target curve".



Click "Reset" and all testing results will be deleted.







Click "BYPASS" and compare the sounds before and after correction.



3.3. Setting of target curve

The default optimization curve is flat, and if you don't like flat sound features, you can set the optimization curve as you like. The methods are as follows :

Step 1: Set the optimization scope

The optimization of the system default is 20 to 24 KHz range, but if your speaker system does not have so wide frequency response range, for example, small diameter woofer unit, if the scope of low frequency optimization is too low, play some larger low–frequency dynamic music, low–frequency might produce larger distortion, even may cause damage to woofer, therefore, you need to choose the right range according to the actual situation of your horn optimization range (especially the bass).

* If your system has sufficient frequency response range and power, skip this step and go straight to the next step to set the target curve.



Step 2: Design the target curve

The dot on the target curve is the control point. Select a point with the mouse, hold down the left button to drag up and down to set the shape of the curve, and double-click the left button on any part of the line to add a control point. Double left click on the control point to delete the target point, you can add or delete the target point when needed. After setting the target curve, click "APPLY CURVE DESIGN" and the system will carry out optimization calculation again according to the new target curve. The bottom left progress bar will display the optimization progress, and the optimization is completed after the progress bar is full.

* You can modify the target curve repeatedly, remember to click "APPLY CURVE DESIGN" and wait for the optimization to be completed.



Double click the left mouse and the existing control point can be deleted.

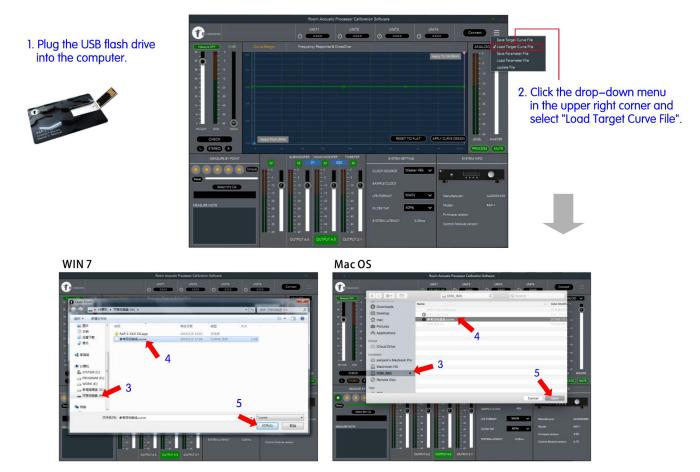
The control point can be added at any places on the green line if you double click the left mouse button.

- Click "RESET TO FLAT DESIGN" and the curve will be flat again.
- 2. Click "APPLY CURVE DESIGN" to apply the results.

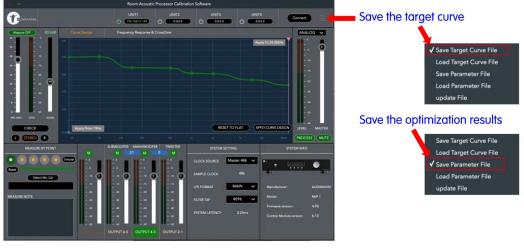


3.3. Setting of target curve

In order to facilitate the novice to find the feeling quickly, we put a "reference target curve" in the system USB flash drive. You can directly read it and then modify it to your taste. The operation method is as follows :



After opening, take the target curve below as reference, you can modify it according to the listening sense. Select "Save Target Curve File" from the drop-down menu in the upper right corner to Save the target curve. You can save a variety of curves for next test. Once the optimization is completed, you can save the entire optimization result. Next time the boot system will default to the last use of the state, you do not need to connect to the computer to use. * You can save multiple optimization results using different target curves for easy comparison.

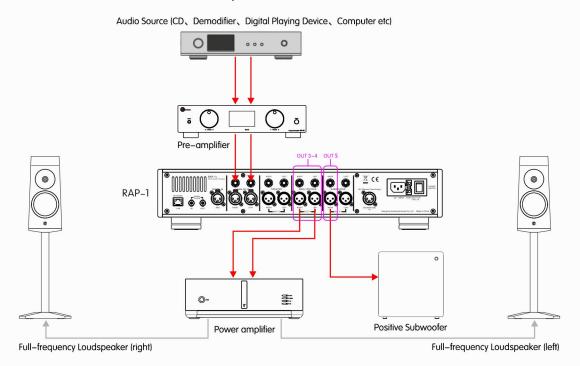




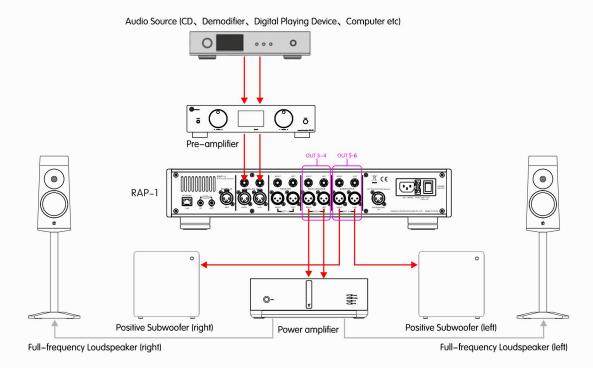
3.4. Measurement and optimization of full frequency+SUB ultra-low sound system

Full frequency+SUB ultra-low tone system connection

One (MONO) active ultra-low speaker connection method :



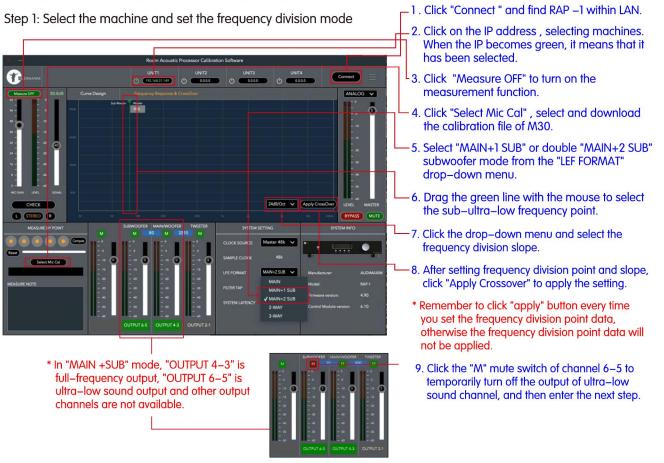
Two (STEREO) active ultra-low speaker connection method :



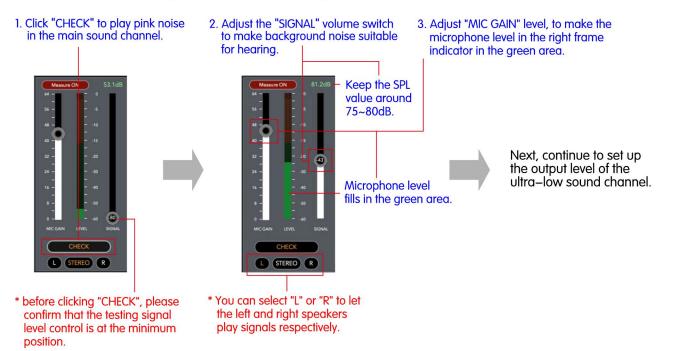


3.4. Measurement and optimization of full frequency+SUB ultra-low sound system

The optimization steps of the full frequency+SUB ultra–low sound system are as follows :



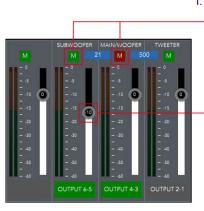
Step 2: Set the measured signal level and microphone gain





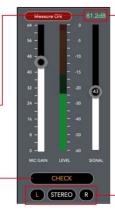
3.4. Measurement and optimization of full frequency+SUB ultra-low sound system

Step 3: Adjust the signal level of matched OUTPUT 6-5 ultra-low sound channel



1. Turn on the mute switch of 4–3 full–frequency channel to mute the full–frequency channel, cancel the mute mode of 6–5 channel, and let the ultra–low sound play the powder noise signal.

- 2. Adjust the level push of 6–5 ultra–low sound channel to ______ keep the output volume SPL value of ultra–low sound consistent with the value of 4–3 main channel.
- 3. After the adjustment, click "CHECK" to close the signal test.
- 4. Cancel the mute mode of 4–3 main channel and enter into the next step.



Keep the SPL value around 75~80dB.

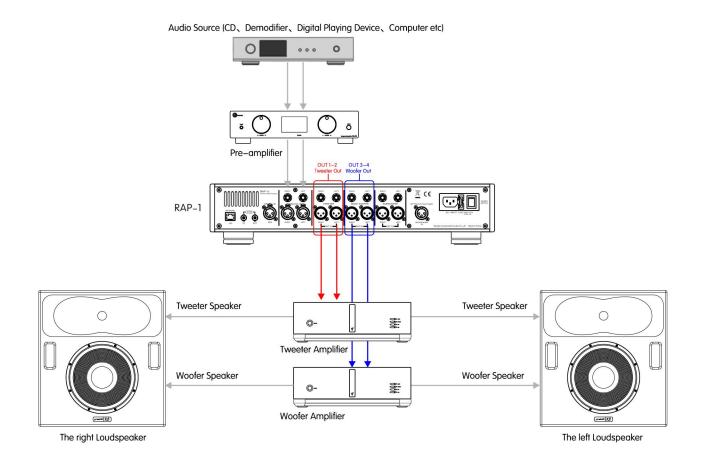
Under the double ultra-low sound mode, you can select "L" or "R" to see whether the output levels of the two ultralow sounds are consistent. If there is any deviation, the balance can be adjusted by the volume knob of the active ultra-low sound.



- Step 4: Make sure the microphone is in place and start sweeping measurement P-12 Step 3
- Step 5: Optimize the operation P-12 Step 4
- Step 6: Optimize and save the results P-12 Step 5



3.5. Measurement and optimization of 2–way electronic frequency speaker system System connection of 2–way electronic frequency speaker system



* Precautions for electronic frequency division :

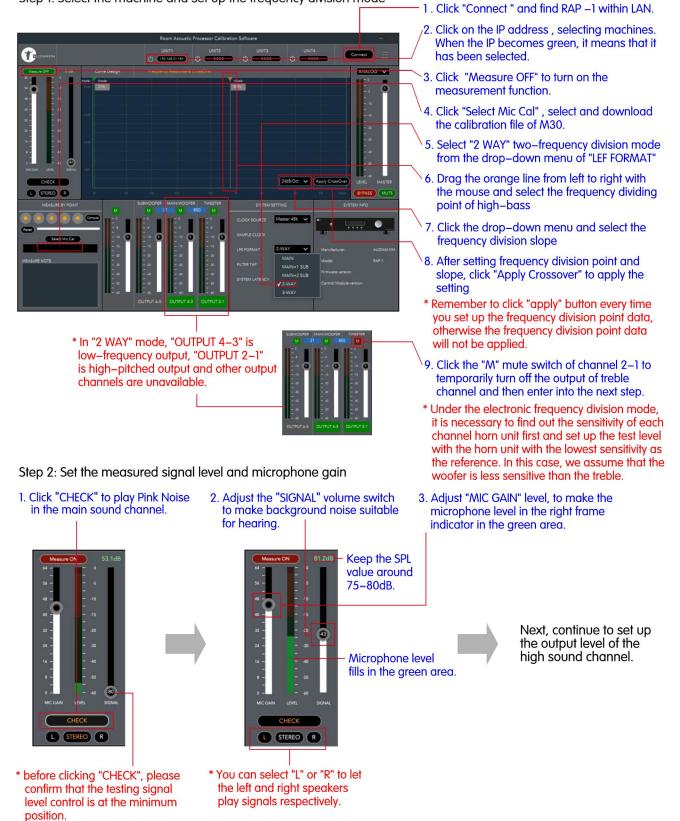
Due to the low power of the tweeter, special attention should be paid to the protection of the tweeter during electronic frequency division :

- 1. It is suggested to connect high-pass filter capacitor in series at the input end of the treble unit for protection to reduce the impact of burst low-frequency signals on the treble unit.
- 2. In order to avoid burning out the tweeter unit due to the current shock generated when switching on and off, please pay attention to the correct switching sequence :
 - (1) When starting up, first connect the power of front–end equipment, wait for all front–end equipment to enter the normal working state, and finally turn on the power amplifier power.
 - 2 When switching off, turn off the power amplifier first, and then turn off other front–end equipment.



3.5. Measurement and optimization of 2-way electronic frequency speaker system

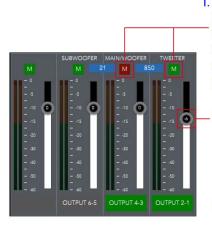
Measurement and optimization steps of 2–way electronic frequency speaker system Step 1: Select the machine and set up the frequency division mode





3.5. Measurement and optimization of 2-way electronic frequency speaker system

Step 3: Adjust the signal level of the matched "OUTPUT 2-1" treble channel

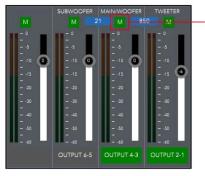


1. Turn on the mute switch of the 4-3 bass channel, turn off the sound of the bass channel, and then cancel the mute mode of the 2–1 channel, so that the high-pitched voice plays the powder noise signal.

- 2. Adjust the level push of the 2-1 treble channel to keep the output volume SPL value of the treble consistent with that of the bass channel.
- 3. After the adjustment, click "CHECK" to close the test signal.
- 4. Cancel the mute mode of 4-3 bass channel and enter into the next step.



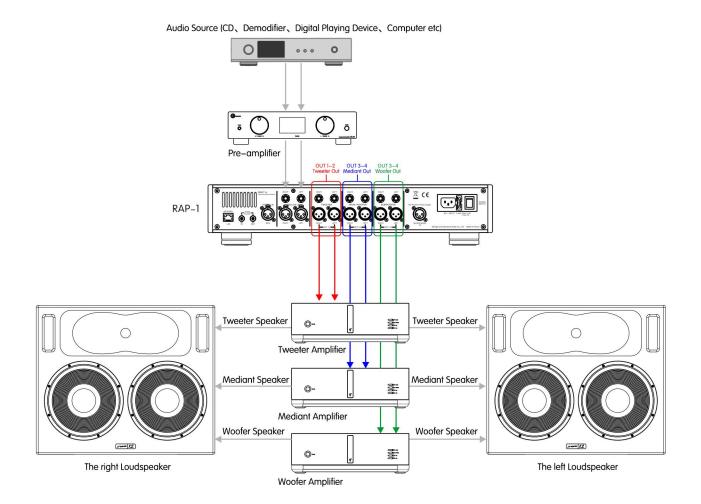
You can select "L" or "R" to let the left and right speakers play signals respectively.



- Step 4: Make sure the microphone is in place and start sweeping measurement P-12 Step 3
- Step 5: Optimize the operation P-12 Step 4
- Step 6: Optimize and save the results P-12 Step 5



3.6. Measurement and optimization of 3–way electronic frequency speaker system System connection of 3–way electronic frequency speaker system



* Precautions for electronic frequency division :

Due to the low power of the tweeter, special attention should be paid to the protection of the tweeter during electronic frequency division :

- 1. It is suggested to connect high-pass filter capacitor in series at the input end of the treble unit for protection to reduce the impact of burst low-frequency signals on the treble unit.
- 2. In order to avoid burning out the tweeter unit due to the current shock generated when switching on and off, please pay attention to the correct switching sequence :
 - (1) When starting up, first connect the power of front–end equipment, wait for all front–end equipment to enter the normal working state, and finally turn on the power amplifier power.
 - 2 When switching off, turn off the power amplifier first, and then turn off other front–end equipment.



Next, continue to set up the output level of the others channel.

3.6. Measurement and optimization of 3-way electronic frequency speaker system

Measurement and optimization steps of 3–way electronic frequency speaker system : Step 1: Select the machine and set up the frequency division mode



75~80dB.

Microphone level fills in the green area.

 Messure ON
 S3.1dB

 44
 0

 55

 48

 40

 40

 24

 24

 0

 0

* before clicking "CHECK", please confirm that the testing signal level control is at the minimum position. * You can select "L" or "R" to let the left and right speakers play signals respectively.

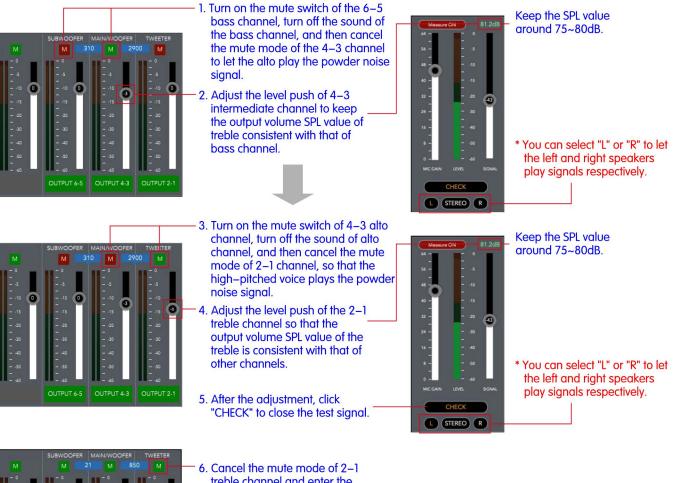
L STEREO R

-22-



3.6. Measurement and optimization of 3-way electronic frequency speaker system

Step 3: Adjust the signal level of the matched OUTPUT 2-1 treble channel





treble channel and enter the next step.

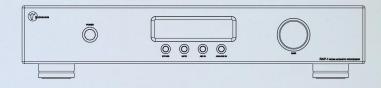
Step 4: Make sure the microphone is in place and start sweeping measurement. P-12 Step 3

Step 5: Optimize the operation. P-12 Step 4

Step 6: Optimize and save the results. P-12 Step 5







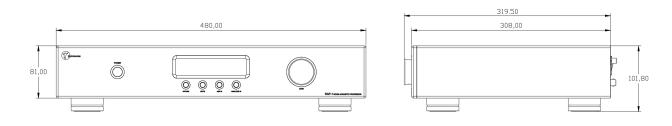


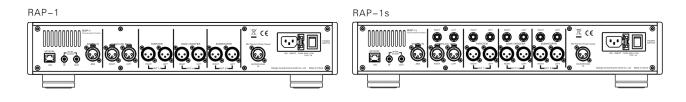




4. Specifications

Model	RAP-1	RAP-1se
Digital input	AES/EBU × 1@75 OHM	AES/EBU × 1@75 OHM
Work Clock Input	1 × BNC@75 OHM 3Vpp on BNC 32–192K	1 × BNC@75 OHM 3Vpp on BNC 32–192K
Work Clock Output	1 × BNC@75 OHM 3Vpp on BNC 32–192K	1 × BNC@75 OHM 3Vpp on BNC 32–192K
Analog Input	XLR × 2	XLR \times 2 , RCA \times 2
Analog Output	XLR × 6	XLR \times 6 , RCA \times 6
Frequency	10–30000Hz ± 0.3dB	10-30000Hz ± 0.3dB
Dynamic range	24bit>120dB	24bit>120dB
Singal noise	>110dB	>110dB
Sample Rate	44.1 , 48 , 96 , 176.4 , 192KHz	44.1 , 48 , 96 , 176.4 , 192KHz
AC Power	220V/110V , Max 25W	220V/110V , Max 25W
Dimensions	101.8(H) × 480(W) × 319.5(D)mm	101.8(H) × 480(W) × 319.5(D)mm
Shipping dimensions	232(H) × 656(W) × 490(D)mm	232(H) × 656(W) × 490(D)mm
Net weight	9.4Kg/each	9.7Kg/each
Shipping weight	13Kg/CTN	13.9Kg/CTN







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