csport

User's Manual

Active Crossover ACN400

Crossover network connection and operation methods differ depending on the manufacturer. Be sure to connect and operate them according to this user's manual.

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Thank you for purchasing our products.
We hope that this product will enhance your music and provide you with a richer musical life.

The Ultimate in Stereo Playback - Multi-Amplifier System
This crossover network is equipped with a newly developed MK filter and realizes a "transfer function G=1". Even at -12dB/Oct, there is no phase rotation, each channel speaker is naturally connected, and each sound is output in three-dimensional and precise detail.

5-year quality warranty

All products will be repaired free of charge for five years if they fail under normal use in accordance with the user's manual. (excluding consumables).

Product Contents

- Active crossover ACN400
- AC cord
- User's Manual

Please read this User's Manual carefully before using the product to ensure safe operation.

1. Safety Precautions

Warning

If the power cable is not handled properly, there is a danger of fire or electric shock.
• Do not use power cables other than attached.
• Do not touch the power plug with a wet hand.
• Do not place anything on the power cable.

Do not remove the top plate, bottom plate, and side cover.
• There is a risk of electric shock and serious injury because of the high voltage inside.

Stop using immediately in the following cases.
• If water or chemicals flow into the unit.
• If there are metal or flammable items inside.
• If it seems a malfunction or an abnormality.
• If there is odor or smoke.
Turn off the power, unplug the power cable, and contact your dealer or our Service Department.

Do not disassemble, repair, or modify the product in any way.
• If you need repair, please contact your dealer or our service department.

2. Precautions for use

Caution

Do not install the product in the following places
• Humid or dusty place
• Enclosed area
• Unstable place with vibration or inclination

When connecting the power cable, keep the following in mind.
• Plug the power cable securely into a robust electrical outlet.
• Make sure there are no unreasonable bends in the cable.

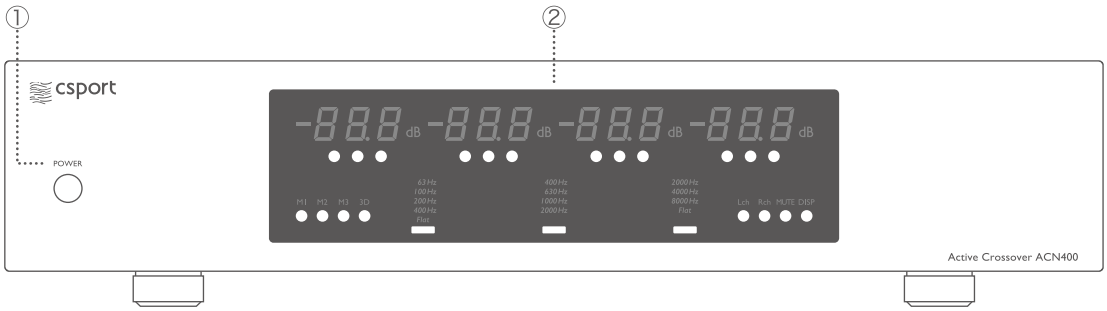
Connect the audio input/output cables securely without loosening them.

For daily cleaning, wipe with water and then wipe with a dry cloth.
• Do not use solvents such as thinner.

The input impedance of this unit is 3k Ω.
• Please use a equipment with an output impedance of 600 Ω or less.

3. Names of parts and their functions

Front



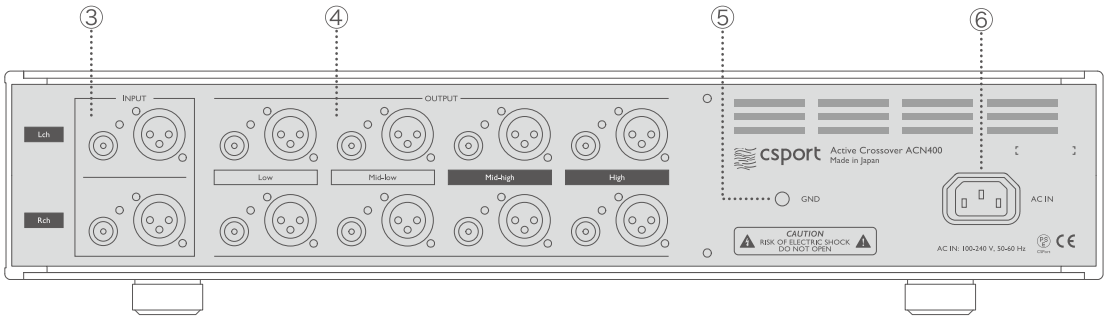
① Power button

Press the button to turn on the power and turn on the display. Press again to stop operation and turn off the display.

② Control panel

Displays the gain between input and output for each channel from left to right: low, mid-low, mid-high, and high.

Back



③ Audio input terminals

- Upper [Lch] Balanced input / Unbalanced input
- Lower [Rch] Balanced input / Unbalanced input

*Please use a equipment with an output impedance of 600 Ω or less for the first stage equipment.

④ Audio output terminals

- Upper [Lch] Balanced output / Unbalanced output
- Lower [Rch] Balanced output / Unbalanced output

*Please use a equipment with an input impedance of 1.5kΩ or more for the rear stage equipment.

The channels for each terminal are, from left to right: low, mid-low, mid-high, and high.

⑤ Ground terminal

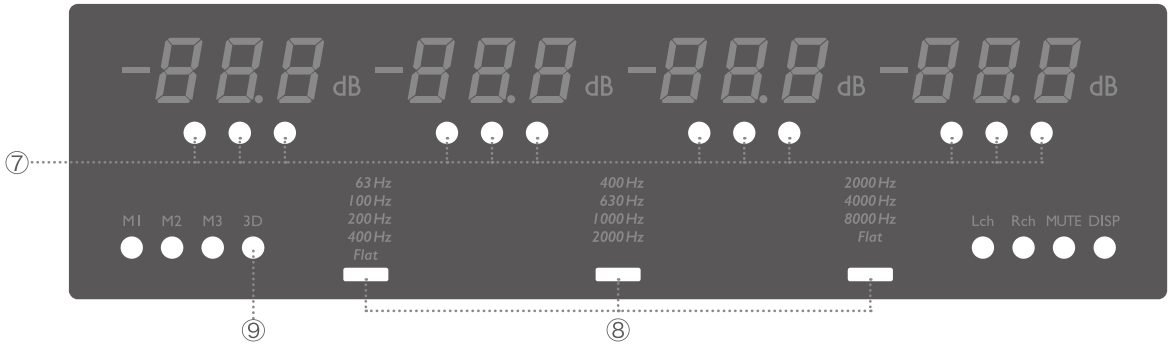
Used to connect to the ground of other equipment.

⑥ AC input terminal

Used to connect AC power source. Be sure to use the supplied AC cord.

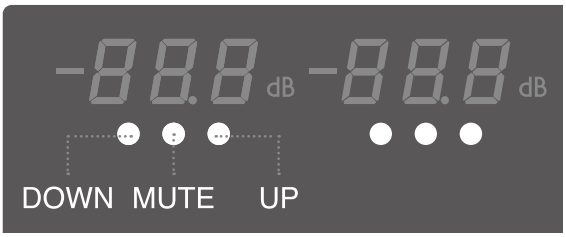
The safety ground of this unit is connected with the ground terminal of the AC cord. Please use an outlet with a ground wire connected. Failure to ground the unit may result in electric shock.

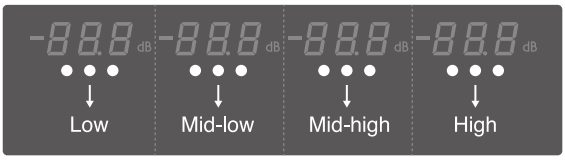
Control panel



⑦ Gain control buttons

Controls the gain of each channel.





• UP/DOWN button

Press the button once to increase or decrease the gain by one step, or press and hold the button to increase or decrease the gain continuously.

- 0 ～ -8 dB ・・・・・0.5 dB Step
- -8 ～ -13 dB ・・・・・1.0 dB Step
- -13 ～ -16 dB ・・・・・1.5 dB Step
- -16 ～ -30 dB ・・・・・2-6 dB Step

• MUTE button

Press the button to MUTE the channel, and press it again to cancel MUTE.

⑧ Crossover frequency setting button

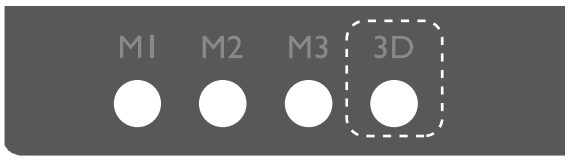
Switches the crossover frequency between each channel.Press the button to switch in ascending order. Lch and Rch are set at the same frequency.

Crossover frequency that can be set (Hz)

Low / Mid-low	63	100	200	400	FLAT
Mid-low / Mid-high	400	630	1000	2000	
Mid-high / High	2000	4000	8000	FLAT	

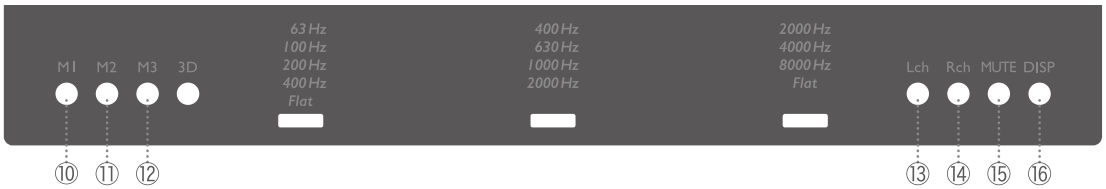
⑨ 3D output button

Lch low-frequency output can be combined with Lch and Rch for 3D output.At this time, the output level will be -4.5dB and the gain display will also drop by 4.5dB. Either increase the level of the rear stage equipment or decrease the output level by 4.5dB except for 3D.



Press the button to set the 3D output setting, and press it again to cancel.

Display



⑩ ⑪ ⑫ Memory write/recall buttons 1, 2, and 3
Up to three gain/crossover frequency settings and 3D ON/OFF settings can be stored. (Combination of both Lch and Rch)

• Memory write
Press and hold one of the 1 to 3 buttons to store the current setting.

• Memory recall
Pressing any button from 1 to 3 recalls the registered gain, crossover frequency, and 3D ON/OFF.

⑬ Lch setting button ⑭ Rch setting button
Switches to Lch and Rch setting and display.

⑮ All channel MUTE button
Press the button to MUTE all channels, and press it again to cancel MUTE.

> MUTE has two types: channel-by-channel MUTE and channel MUTE.

⑯ Display brightness adjustment button
The display brightness can be adjusted in 5 steps from maximum to off. When off, only this button lights dimly.

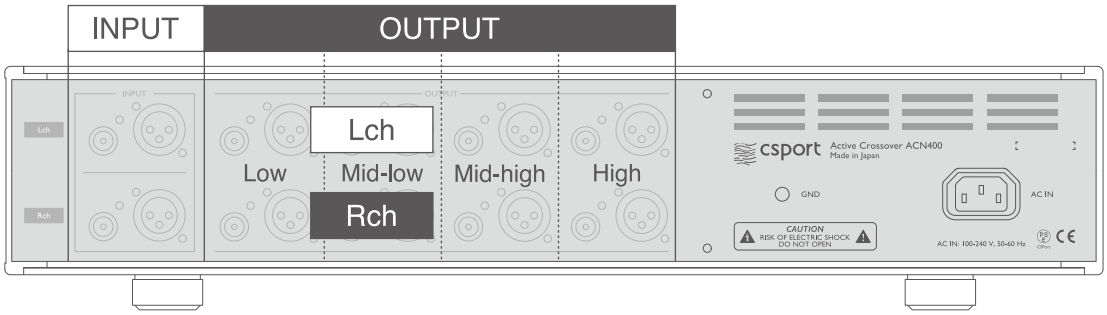
4. Installation and Connection

1. Connect the AC cord

• Plug the AC cord into the AC input terminal and connect it to an outlet.

2. Connect the audio input/output cable

• With the main power off, connect the audio input/output cables to the terminals on the rear panel.
• Please refer to the following pages for the connection method and crossover frequency settings.
• Input equipment should be connected with an output impedance of 600 Ω or less, and output equipment with an input impedance of 1.5 kΩ or more.



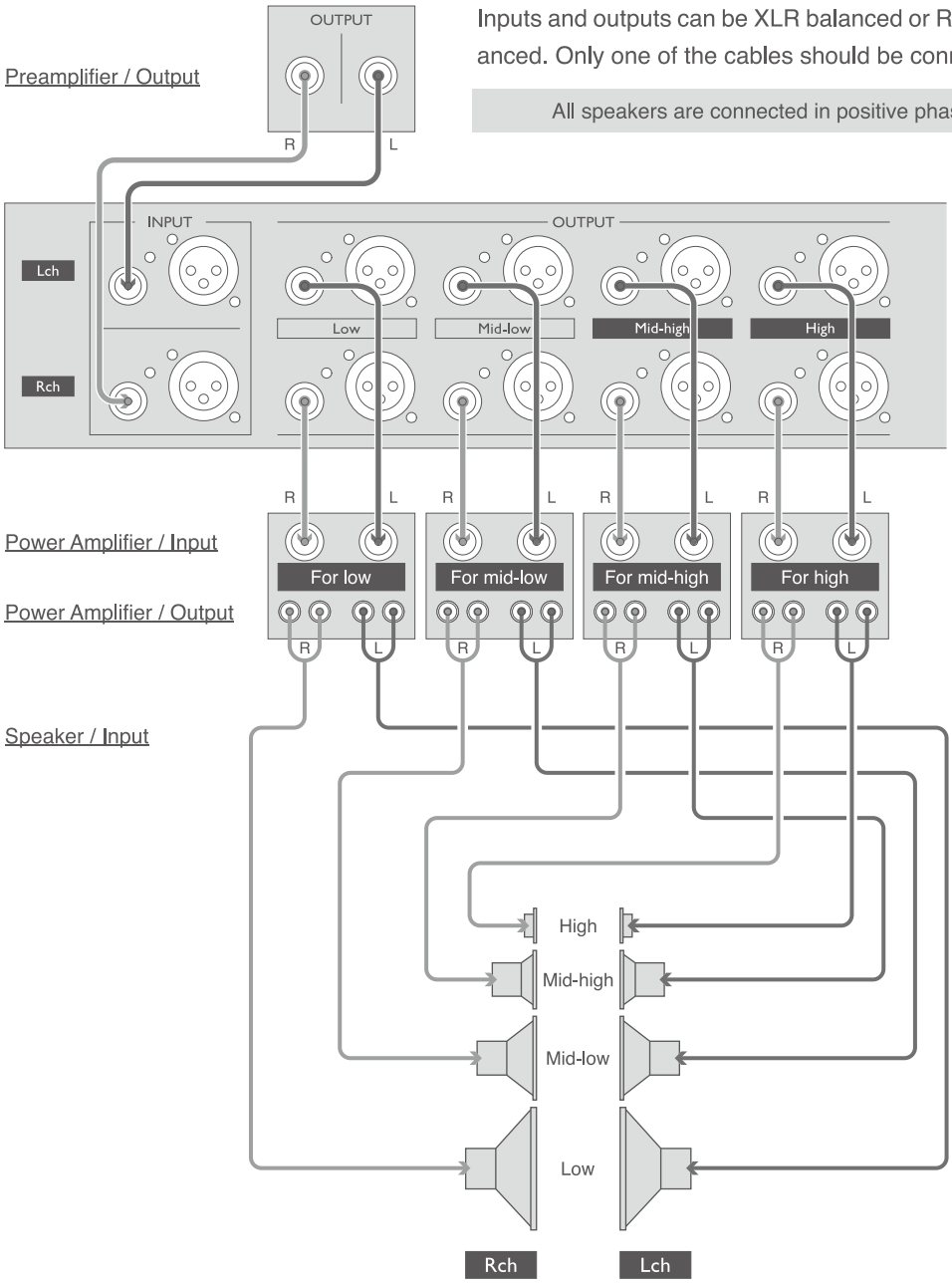
● About crossover frequency setting and connection method

The crossover frequency can be set from 4 to 2-way. An example of audio input/output cable connection is as follows.

4 Way

Divide into four ranges:
low, mid-low, mid-high, and high

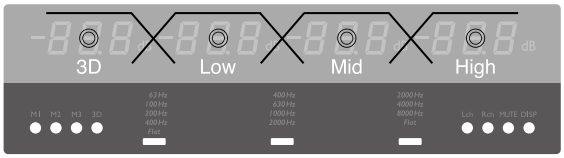
Control Panel Settings



3 Way + 3D

Divide into three ranges: low, mid, and high
Lch+Rch composite output (3D) on Lch low

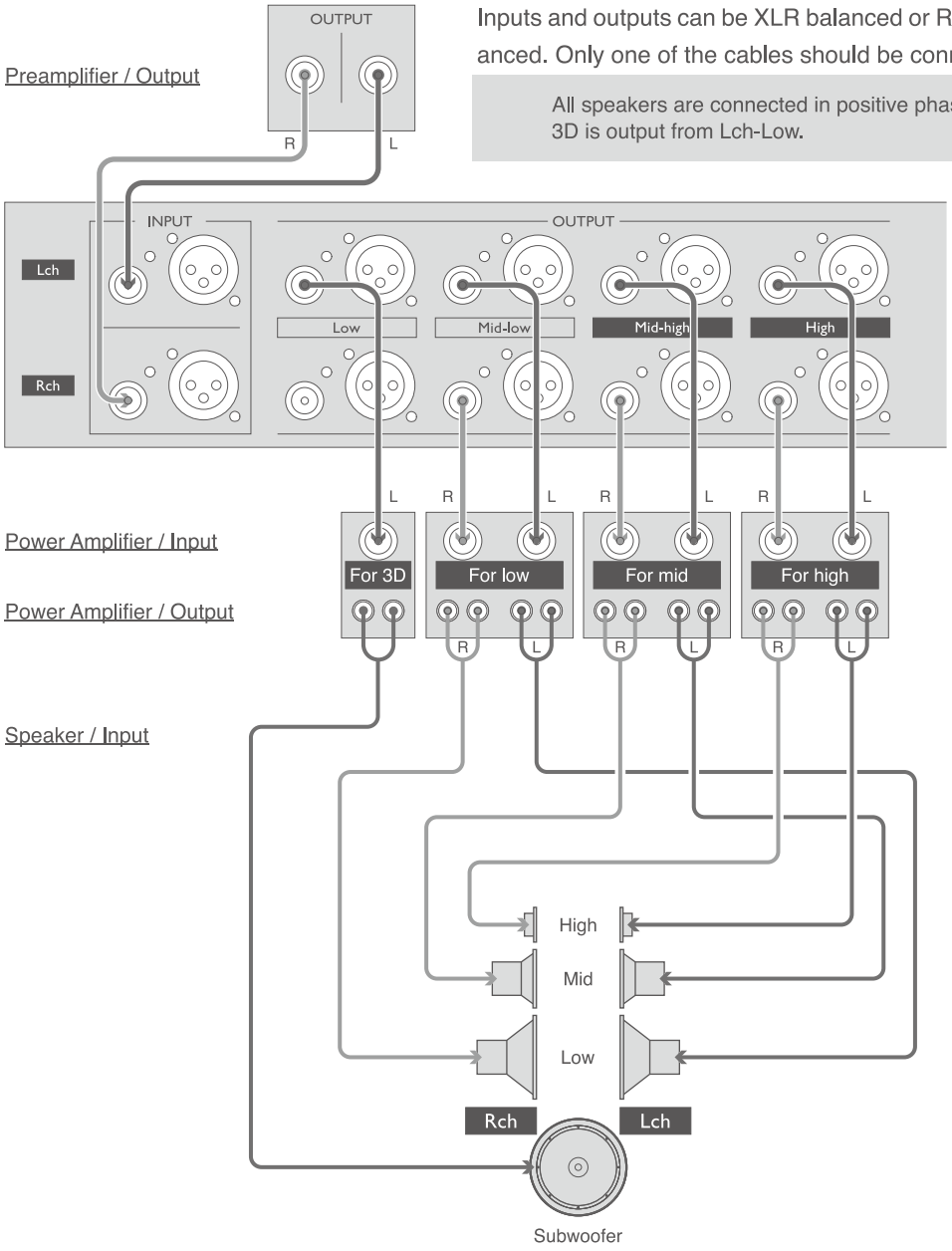
Control Panel Settings



3D freq. freq. freq.

Inputs and outputs can be XLR balanced or RCA unbalanced. Only one of the cables should be connected.

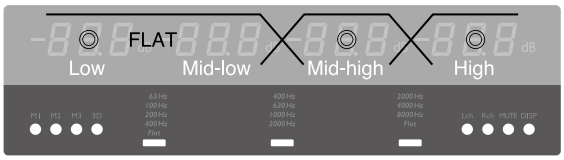
All speakers are connected in positive phase.
3D is output from Lch-Low.



3 Way -1

Divide into three ranges: low, mid, and high

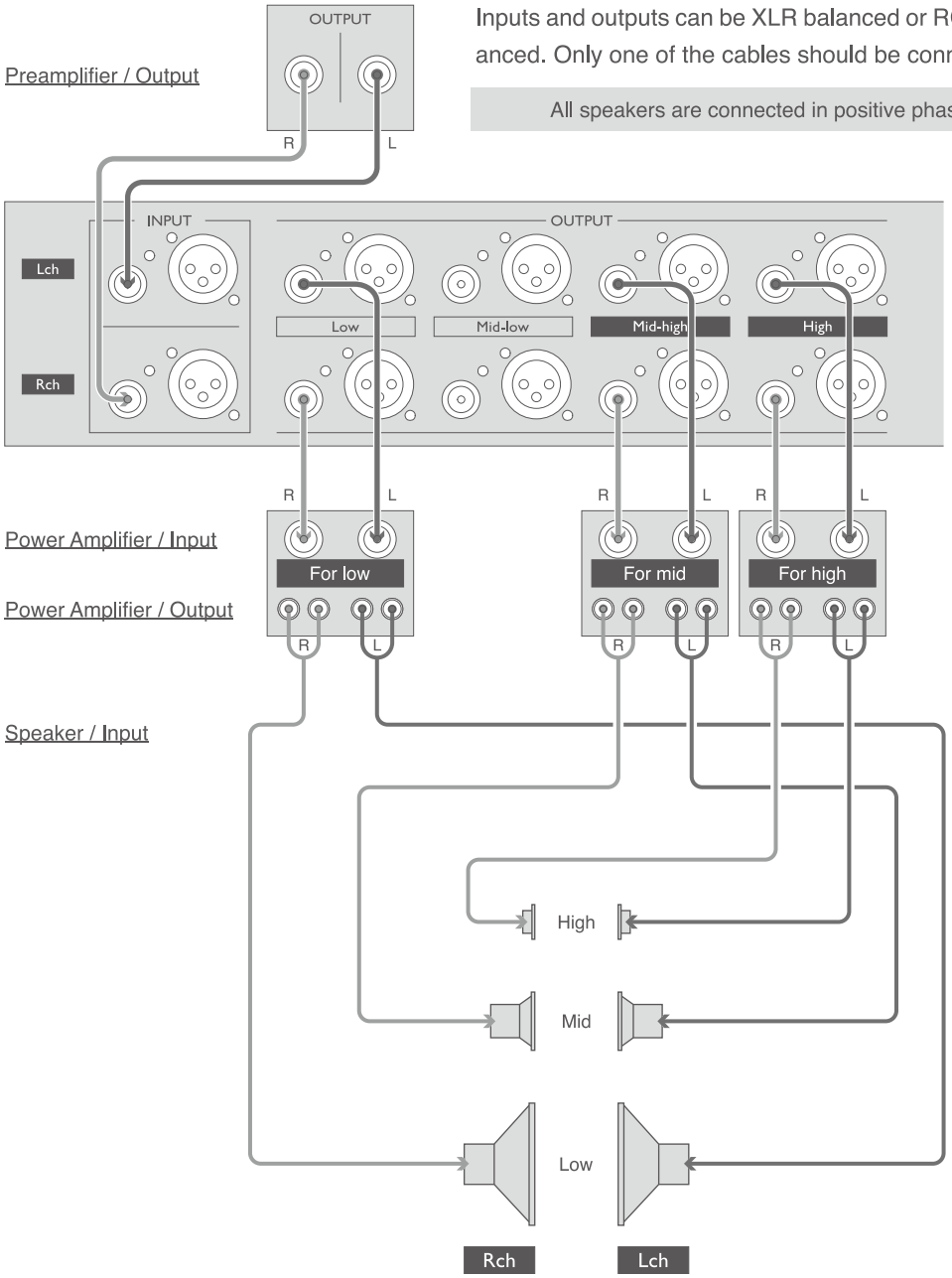
Control Panel Settings



Flat freq. freq.

Inputs and outputs can be XLR balanced or RCA unbalanced. Only one of the cables should be connected.

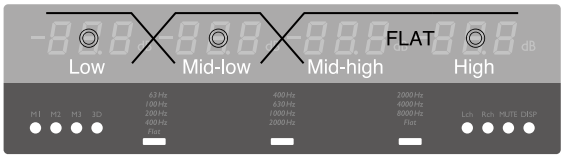
All speakers are connected in positive phase.



3 Way -2

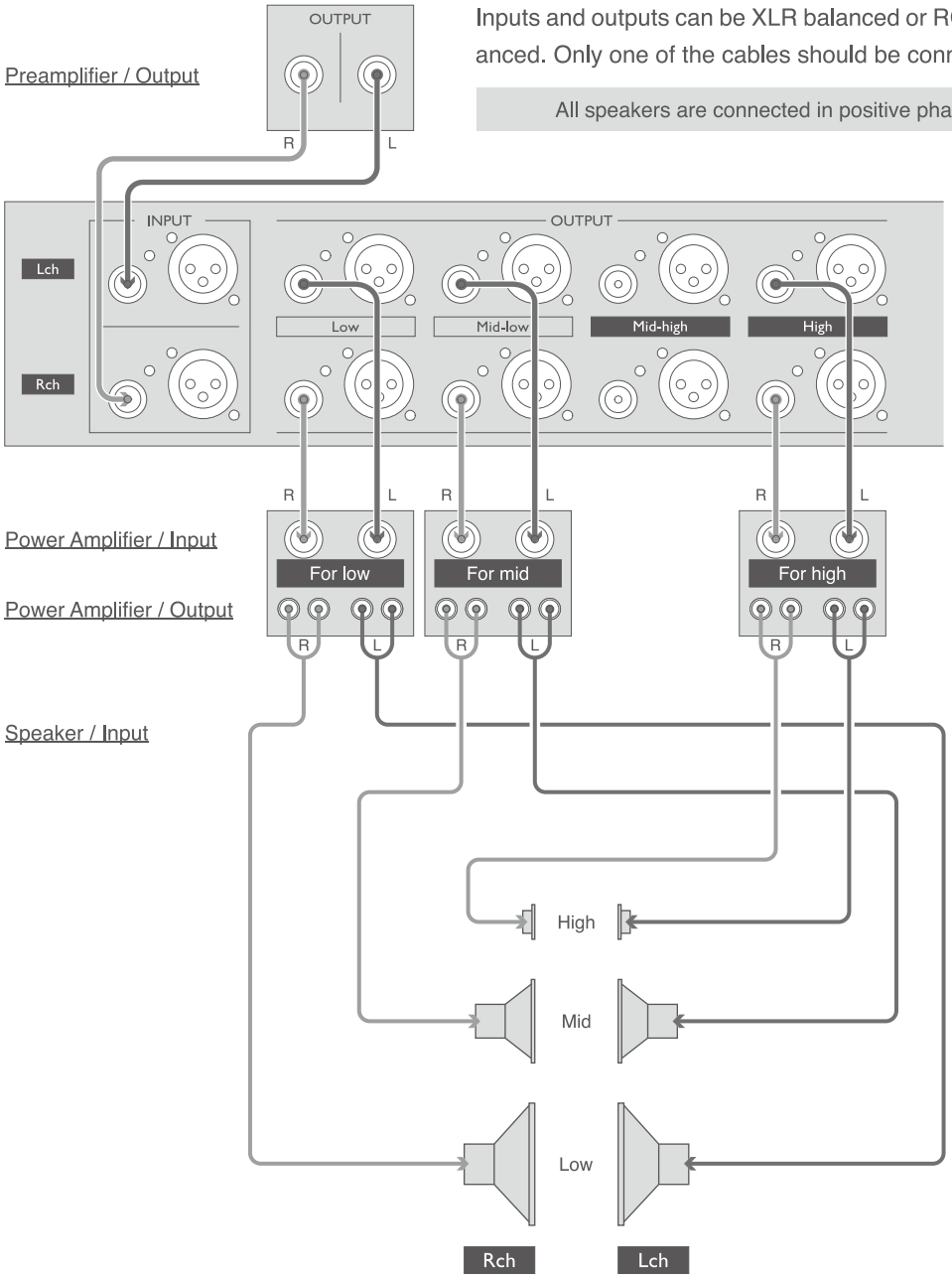
Divide into three ranges: low, mid, and high

Control Panel Settings



Inputs and outputs can be XLR balanced or RCA unbalanced. Only one of the cables should be connected.

All speakers are connected in positive phase.



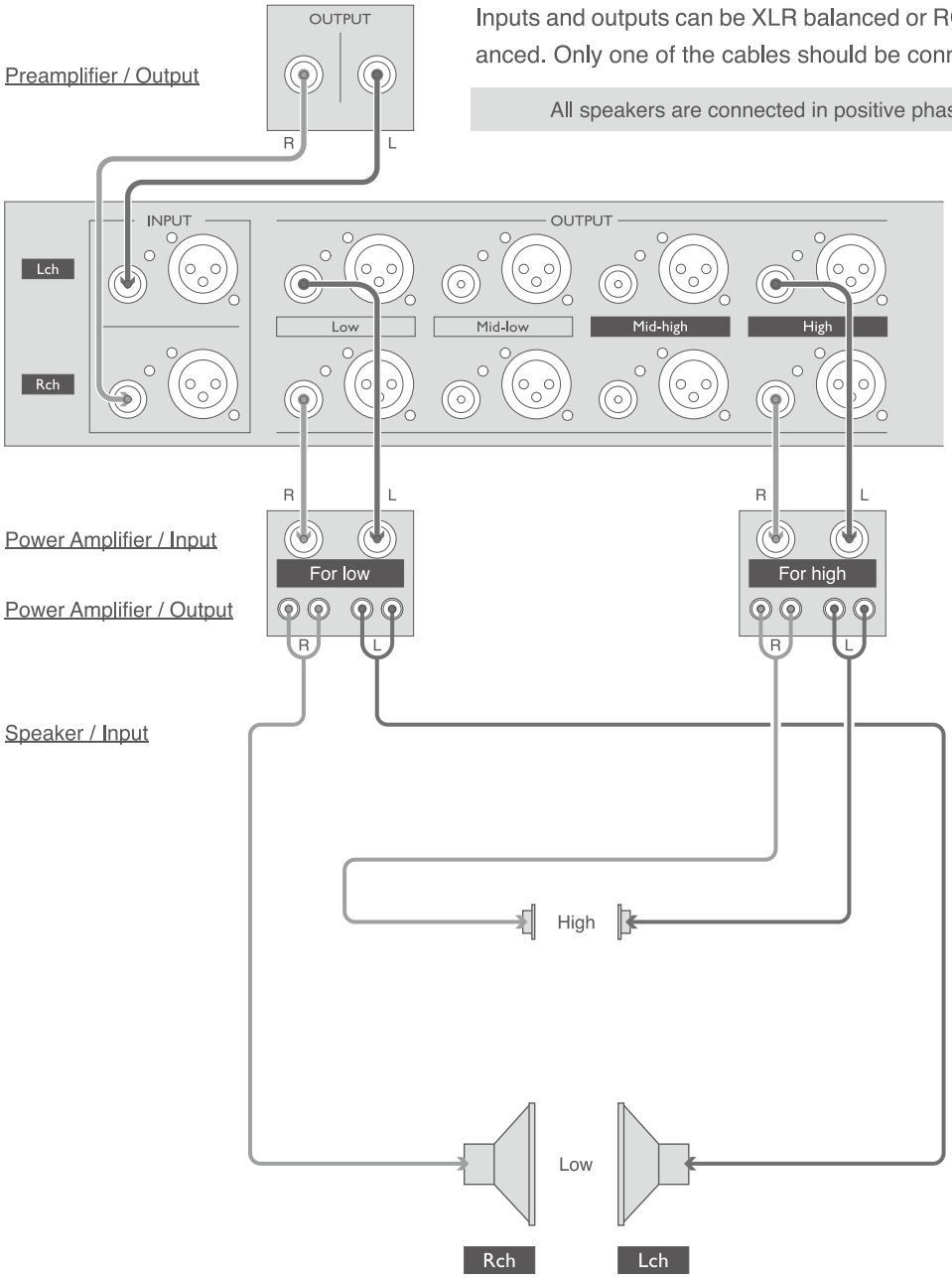
2 Way

Divide into two ranges: low and high

Control Panel Settings

Inputs and outputs can be XLR balanced or RCA unbalanced. Only one of the cables should be connected.

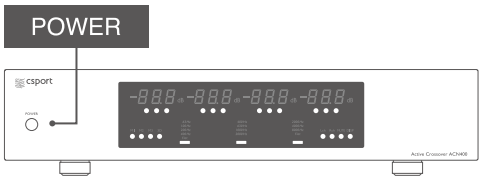
All speakers are connected in positive phase.



5. How to use

1. Turn on the power

• Press the power button to start using. At this time, the display will light up.

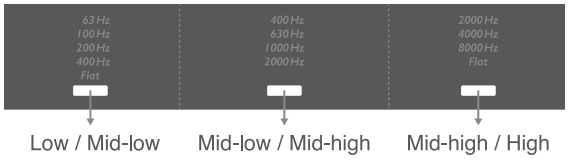


2. Set with buttons on the front

• Use the buttons on the front to set the crossover frequency between each channel and the gain of each channel. At this time, press the Rch and Lch buttons before setting each.

Set the crossover frequency

• Set the bandwidth that the speaker system will receive.(Lch and Rch are set at the same frequency) At this time, make sure that the speaker characteristics are linear up to 1 octave below and above the crossover frequency.

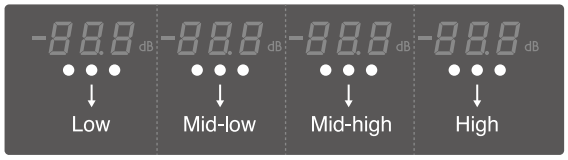


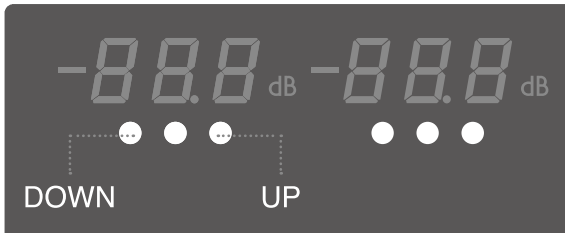
Set the gain

• Adjust the gain difference for the rear stage equipment and efficiency difference for the speaker.

• Use a microphone and level meter to adjust the overall level, and finally, determine the level by actually listening to the sound.

MUTE all channels except the one to be set, and adjust the level for each channel. After that, release MUTE on all channels and adjust the overall level.





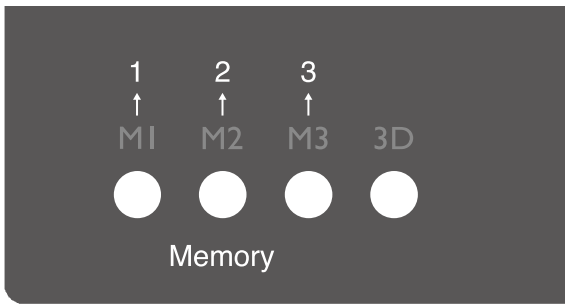
• To memorize the settings, use the Memory write/recall buttons to store them.

Memory Write

• Press and hold one of the 1 to 3 buttons to store the current setting, and the LED will blink.

Memory recall

• Press any button from 1 to 3 to recall the stored gain and crossover frequencies.



Construction of a multi-amplifier system

Multi-amplifier system

• With a single speaker, it is difficult to reproduce high-end sound in the full bandwidth from bass to treble due to distortion caused by split vibration and mixed modulation by the Doppler effect. Therefore, a multi-speaker system is configured and the frequencies are divided by LC network. However, the LC network would spoil the characteristics of the speakers. The reason is that the LC network is in series with the speaker, which adversely affects the damping factor, and the crossover point moves as the impedance of the speaker changes with frequency.

• This brings us to the ultimate method, the multi-amplifier system.

Determine the number of channels and speakers to be used

• First, determine the number of speakers and amplifiers to be used; even a 2-way system will sound different compared to an LC network. The LC network has a greater effect on the low frequency range, so one option is to use a 4-way with the top two connected by an LC network and driven by three amplifiers.

Determine the crossover frequency and speakers to be used

• Select the speakers to be used and determine the frequency range of each speaker. At this time, make sure that the speaker characteristics are linear up to 1 octave below and above the crossover frequency.

• If a low frequency output is connected to a high frequency speaker by mistake, the voice coil may burn out, so it is recommended to use a capacitor to cut it off.

• The impedance of a speaker fluctuates greatly depending on the frequency, so there is a method to make the impedance constant by inserting an LCR in parallel.

Select the amplifier to be used

• To match the character of the sound, all use the same amplifier. Or, since the frequency components of musical sounds are mostly in the low frequency range, an amplifier with a higher output may be selected for the low frequency range.

Adjustment of time alignment

• This unit is an analog type and does not have a time alignment function. Adjust the position of each speaker back and forth. In adjusting the diaphragm position, the position of the sound source differs slightly depending on the speaker, so make adjustments while listening to the sound.

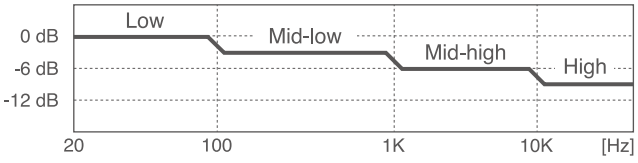
• In the case of a horn system, if the tweeter is aligned with the diaphragm position, it will be considerably further back and obstructed in front. Therefore, the tweeter is moved forward an integer multiple of the cross wave-length.

Meaning of transfer function G=1

For filters above -12dB/Oct, phase rotation occurs. The waveforms of the input and output are different, and the waveform of the composite output is different. For an amplifier with G=1, the waveforms of the input and output are the same and there is no phase difference. Therefore, by simply adjusting the time alignment, the low to high frequencies are naturally connected, making each note three-dimensional and clear. Even with a -12dB/Oct filter, there is no need to switch the + and - of the mid-range speakers.

Adjustment of level

• Use a microphone and level meter to adjust the overall level, and finally, determine the level by actually listening. The final sound pressure characteristics of the listening room should be set so that Low is 6 to 10 dB higher than High, as shown in the figure, to obtain rich bass.



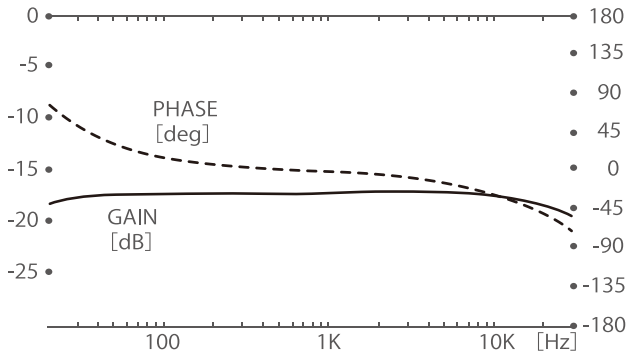
6. Product Specifications

Model	ACN400
Type	CR type (MK filter) crossover network
Input/Output Terminal	Balanced, Unbalanced
Max. Input Voltage	3.0 V (Balanced, Unbalanced)
Max. Output Voltage	3.0 V (Balanced, Unbalanced)
Input Impedance (100 Hz ～ 10k Hz)	3k Ω (1k Hz)
Output Impedance (100 Hz ～ 10k Hz)	300 Ω (1k Hz)
THD	0.1 %/1k Hz or less (at 0.3 V output)
Frequency Response	20 Hz to 20 kHz +0 -2 dB (4ch composite bandwidth)
Gain	0 dB
Crossover Frequencies	Setting by pushbutton Low/Mid-low range ••• 63, 100, 200, 400, FLAT Mid-low/Mid-high range ••• 400, 630, 1000, 2000 Mid-high/High range ••• 2000, 4000, 8000, FLAT
Slope Characteristics	-12 dB/Oct fixed
Signal to Noise Ratio	80 dB (Output 1.0V, IHF-A corrected)
Crosstalk	70 dB (Output 1.0V, IHF-A corrected)
Level Adjustment	+0 dB ～ -8 dB: 0.5 dB step -8 dB ～ -13 dB: 1.0 dB step -13 dB ～ -16 dB: 1.5 dB step -16 dB ～ -30 dB: 2-6 dB step
3D Output	Possible (Lch-Low, Subwoofer + 3Way)
Phase Setting	Not possible
Memory Write/Recall	3 memories
Mute Function	Possible (Per channel and all channels)
Display Adjustment	5 levels including lights out
Power Supply	AC100/117/220/240 V, 50/60 Hz
Power Consumption	60 W
Dimensions	470W×90H×350D mm
Weight	16.0 kg
Finishing	Anodic oxide coating

7. Characteristics Data

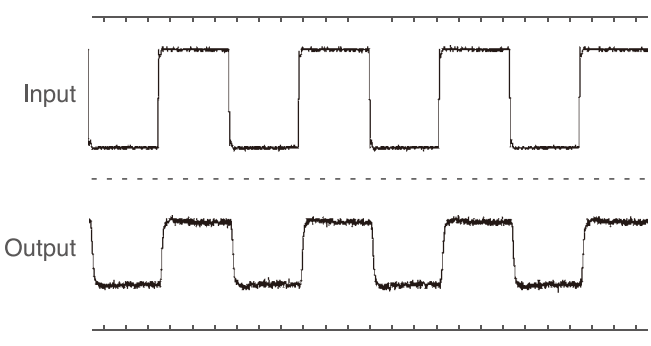
Composite outputs

Phase (dotted line) and Gain (solid line)



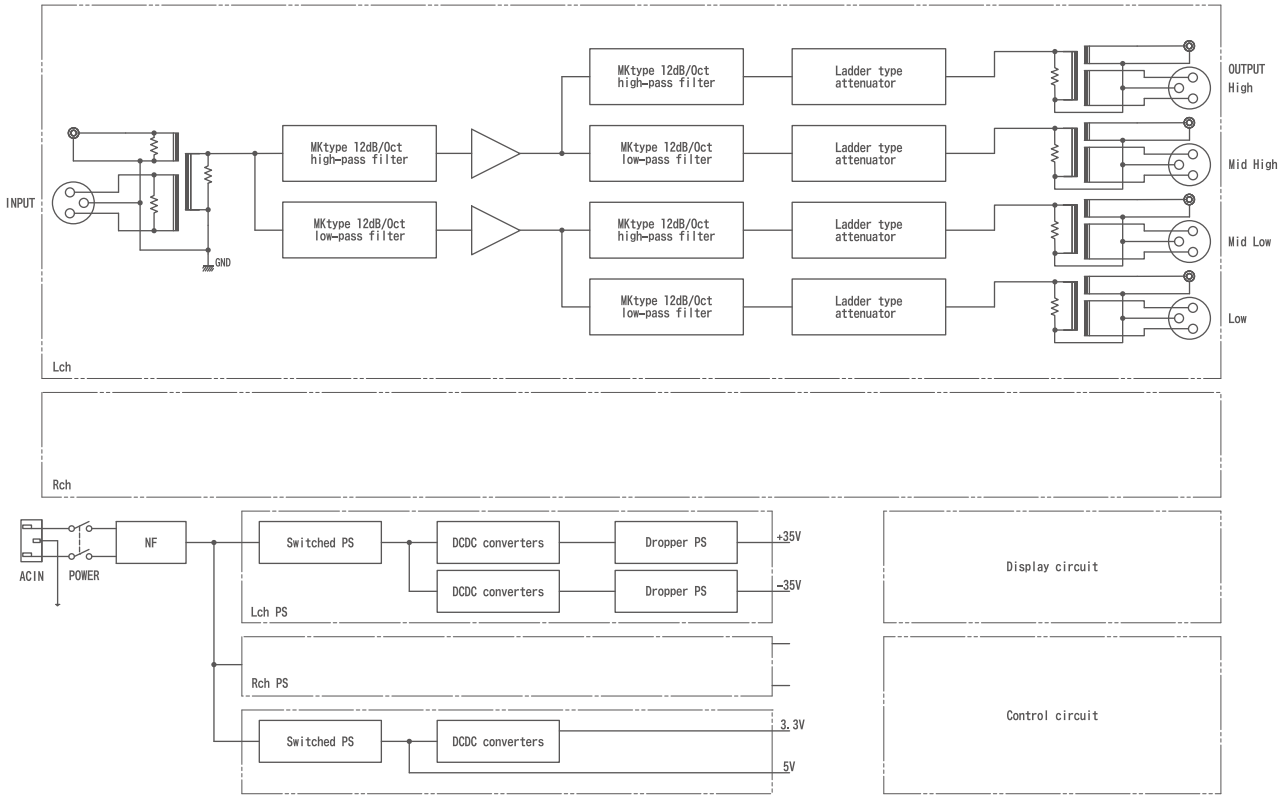
Square wave input and output

4 kHz square wave input (top) and output (bottom)



Phase changes in the low and high frequency range are due to the input and output transformers.

8. Block Diagram



9. Troubleshooting

Check the following when you think it may be a malfunction. If the problem persists even after these measures are taken, or if the problem is not listed, contact your dealer or our service department.

ACN400 not turning on

• Check that the power cable is plugged in.

No sound, low volume

1) Check that the overall MUTE and the MUTE for each channel are turned on and off.
2) Check that the audio input cable is properly connected.
3) Check that the audio output terminals are properly connected.
4) Check that the audio output cable is properly connected to the power amplifier and speakers.

10. After-sales Service

5-year quality warranty

All products will be repaired free of charge for five years if they fail under normal use in accordance with the user's manual. (excluding consumables). Please note that even within the warranty period, repair may be charged depending on the circumstances of the failure.

After expiration of warranty period

If repair is possible, the product will be repaired for a fee upon request. Repair parts will be available for 8 years after the end of production. If the product has been in use for a considerable period of time, please contact our service department in advance.

Others

The following failures will be repaired for a fee. Please note that you will be responsible for the actual cost of parts, technical fees, shipping, and travel expenses.

• If the failure is caused by improper use or usage that does not follow the user's manual.

• If the failure is caused by a device other than our product you purchased.

• If the failure is damaged by fire, earthquake, flood, lightning, rodent damage, salt damage, other pollution, or abnormal voltage.

• The product has been repaired by someone other than us.

Please note that we are unable to repair any product that has been altered.

We do not warrant any incidental damage resulting from product failure.

Second User Registration

Customers who have acquired our products as used products can take over the remaining warranty period as a second user. If you have acquired a used product, please register from the "Support" section of our website.

Contact Us

If you have any questions about the product, please contact your dealer or our service department. When requesting repair, please inform us of the serial number attached to the back of the unit and the status of the failure.

Please keep the packing materials as they will be needed for transportation of the repair.

csport

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