

# **DS Audio**



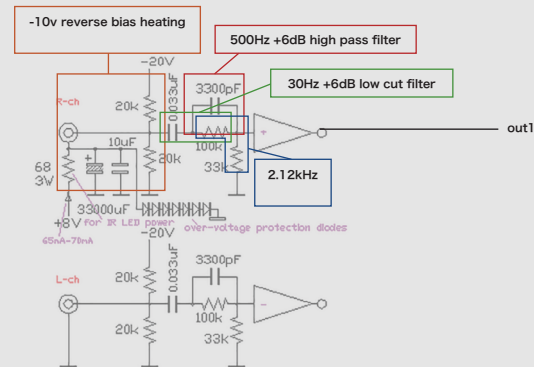
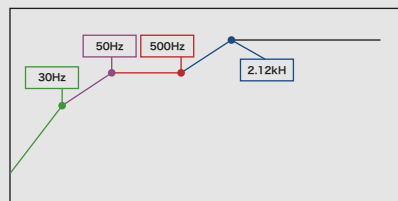
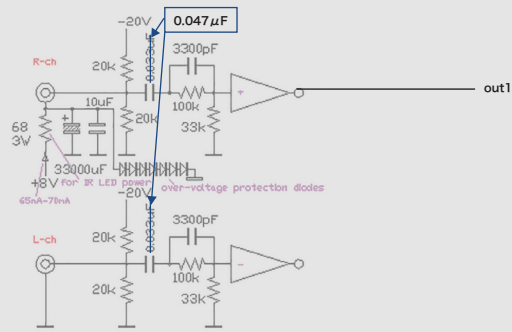
**Phono-Equalizer Circuit**

**Technical Information**

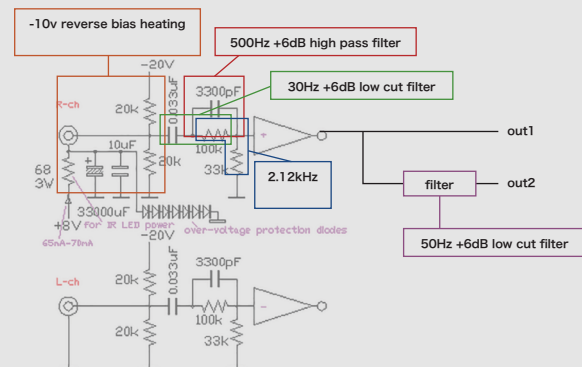
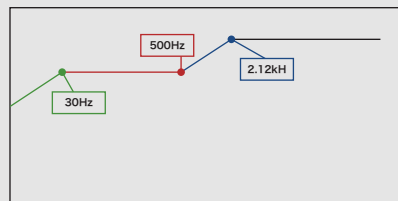
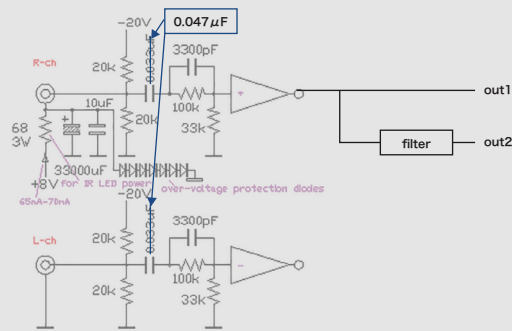
**ver1.01 2021.2.26**

**Digital Stream Corporation**

## DS Audio Output1



## DS Audio Output2



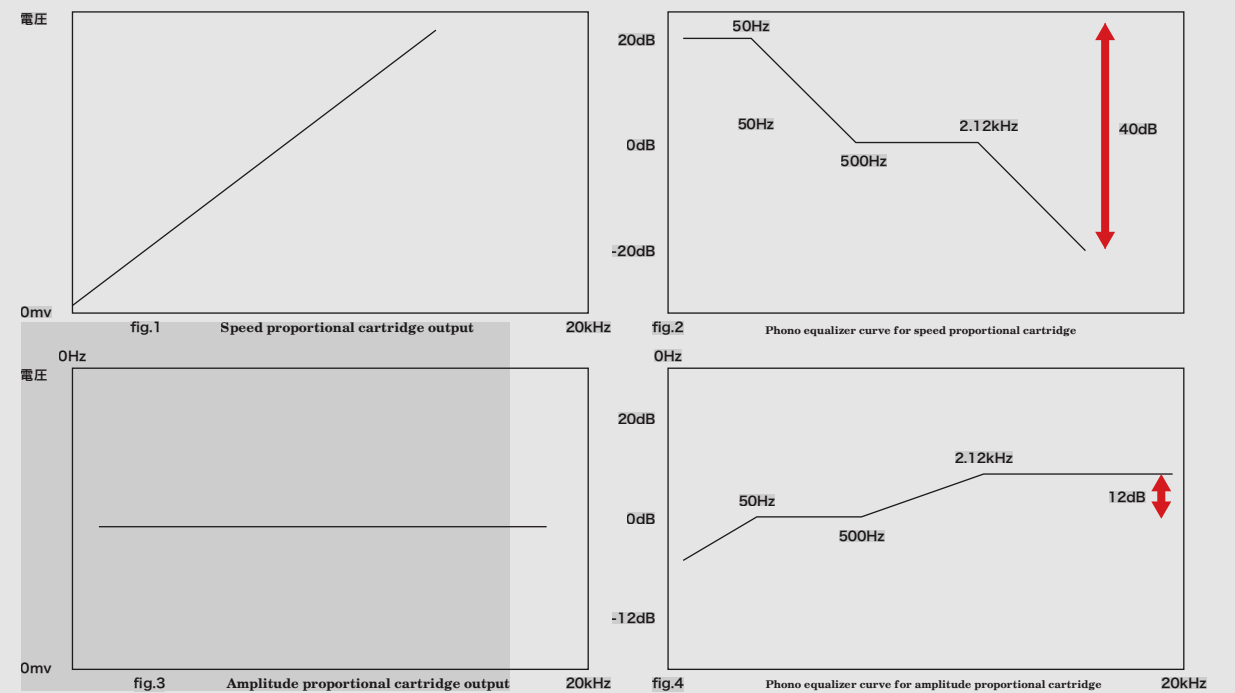
**Q Why is the phono equalizer circuit of the optical cartridge different from the phono equalizer circuit of MM / MC?**

**A** A: Since the MM / MC cartridge is a speed proportional type cartridge, the speed increases = the output increases as the frequency increases (fig 1)

In the phono equalizer, the output change of the speed proportional part must also be corrected for RIAA correction, so the phono equalizer curves for the speed proportional type require a large correction (fig 2)

On the other hand, the amplitude proportional type cartridge outputs in proportion to the magnitude of the record groove amplitude irrespective of the speed, so it outputs flat from high frequency to low frequency (fig 3)

Therefore, the RIAA phono equalizer curve required for amplitude proportional type consists of a very simple circuit compared with the speed proportional type phono equalizer curve (fig 4)



### Q How to supply voltage to the cartridge?

**A** Power is supplied to the cartridge using the ground line (blue and green lines) of the tone arm cable.

Specifically, power is supplied to the LED by applying +5 V to the cartridge 4 pin green terminal and using the blue terminal as the ground.

Since PD is driven with reverse bias, a reverse bias of -10 V is applied to the signal line.

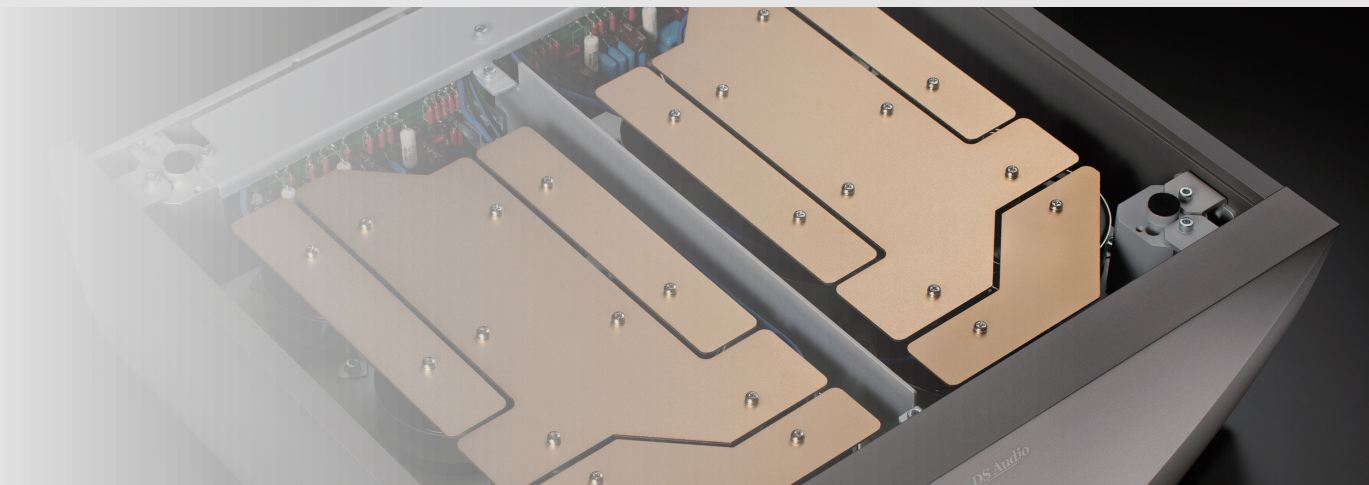
**Q** Why do we need a filter in the ultra-low range? Why are there two outputs?

**A** Since the optical cartridge is an amplitude proportional type cartridge, it will play back to DC (0 Hz) if nothing is done.

If you play up to the DC range, the warp of the record and the resonance of the tone arm will be played back as it is, and there is a possibility that the woofer will be destroyed.

The speed-proportional MM / MC cartridge does not output much in the ultra-low range (because the coil works as a filter), so there is no problem, but in the case of the amplitude-proportional cartridge, it is necessary to remove the ultra-low range with a filter.

For that reason, OUTPUT 1 has a filter of 6 db / oct from 30 Hz, and OUTPUT 2 50 hz to 6 db / oct + 30 Hz to 12 db / oct



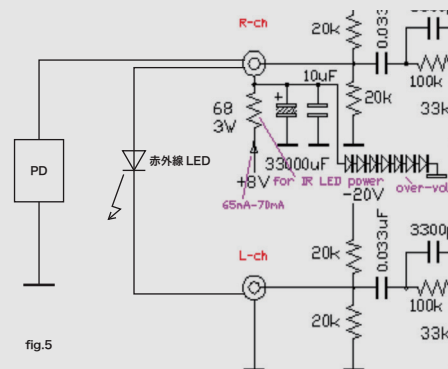
## Q Protection diode (indispensable)

A Infrared LED for cartridge driving and light receiving PD are connected as shown in fig.5.

If there is no protection diode, the inrush current enters at the moment of connecting the cartridge, causing the LED to glow at a light intensity higher than expected. PD may be damaged beyond the input allowable light quantity of PD due to its sudden light quantity.

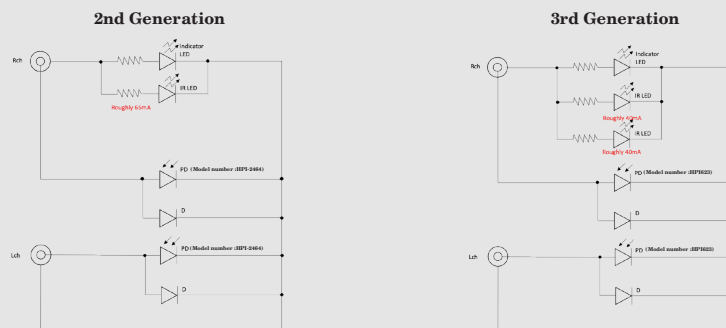
In order to prevent such a breakdown, the protection diode is put in the circuit, and the voltage on the R-ch cold side is always kept at 5 V.

Therefore, please be sure to use protection diodes.



## Q About the circuit of the cartridge

A The connections inside the cartridge are as follows. The second generation cartridges (DS Master1, DS-W2, DS002, DS-E1) use one infrared LED for detection. The 3rd generation cartridge (Grand Master) uses two infrared LEDs for detection.



## Q Questions about equalizer circuits and product support

A If the manufacturer is considering commercializing an equalizer for optical cartridges, please contact us and we will support you with questions about the circuit, design confirmation, etc. (No license fee or inspection fee is required.)

However, we are very sorry, but due to the limited human resources of our company, we do not accept individual questions about the circuit contents from our customers.

If a cartridge fails using a product other than the DS Audio equalizer (or the DS Audio certified equalizer posted on the DS Audio website), it is not covered by the warranty.

## Q About DS Audio product certification

A If you are a manufacturer and want to commercialize an equalizer that incorporates an optical cartridge circuit, please contact us by email at [support@ds-audio.biz] and send us an actual sample and circuit diagram.

We will check the product and if there is no problem, we will officially post it on the DS Audio homepage as equipment compatible with optical cartridges.

\* Not all products requested for publication can be posted.