RE·LEAF Inc.

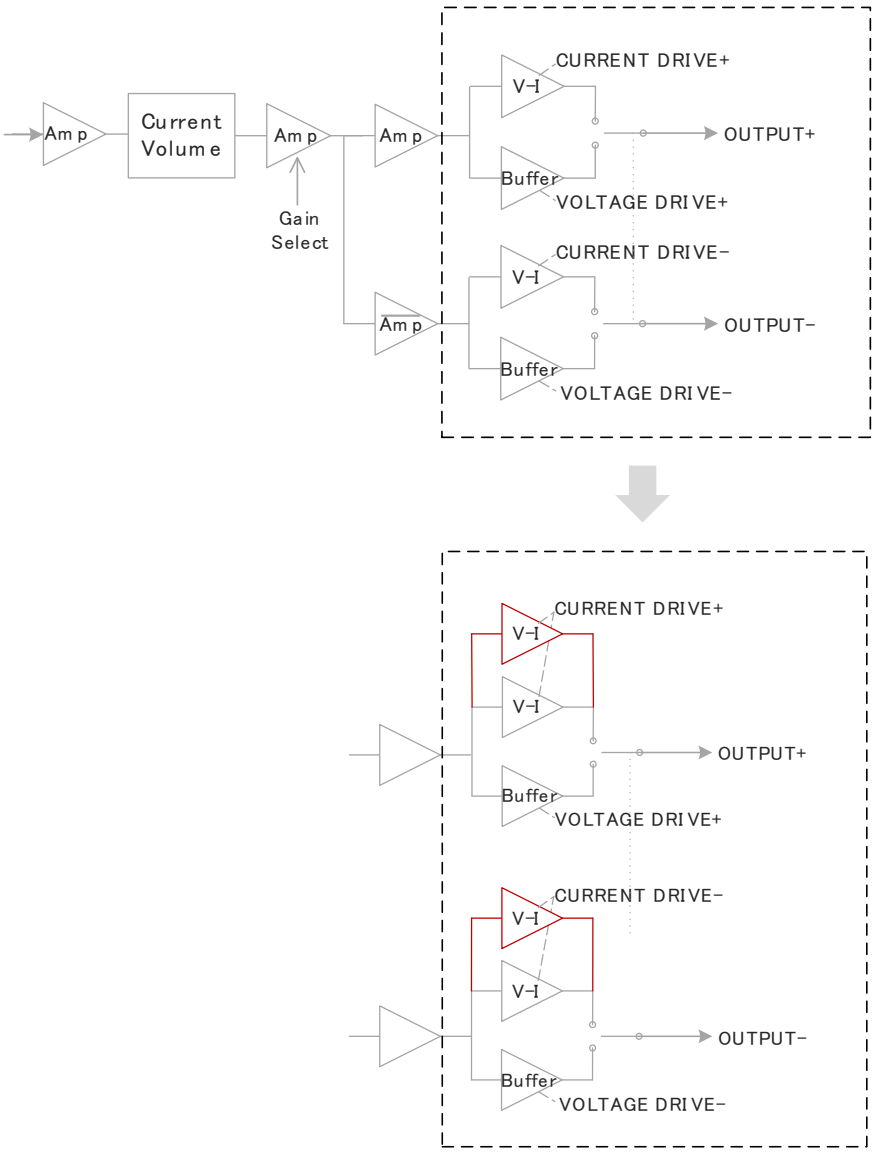
Headphone Amplifier

E3 hybrid dC

Customized Specification 『 dC (double Current drive) 』

- Parallelly connected Two V-I conversion amplifiers
  Current Drive doubles the maximum drive current
- Selectable” Current Drive” + “Voltage Drive” modes, the world's first hybrid configuration
- Minimize inductance by "Constant current type volume"
- "4-Ply stabilized power supply " to eliminate the influence of the sound quality by the capacitor, which does not use the capacitor at the last stage

Customized Specifications 『 dC (double Current drive) 』



Parallelly connected Two V-I conversion amplifiers
Current Drive doubles the maximum drive current

E3 hybrid dC

Price: TBD

Customized Specifications 『 dC (double Current drive) 』

・ Background

There were voices pointed out that lack of volume was found among customers in headphones that require comparatively driving power with conventional current drive.

・ Technical background

In one current drive circuit there was a limit to the maximum amount of current that the amplifier can drive with linear and low noise.

・ Newly developed technology

Enable stable drive by connecting current - driven amplifiers in parallel. Ensure maximum drive current that can be driven according to the number of parallel current drive circuits after sound verification and sound quality tuning.

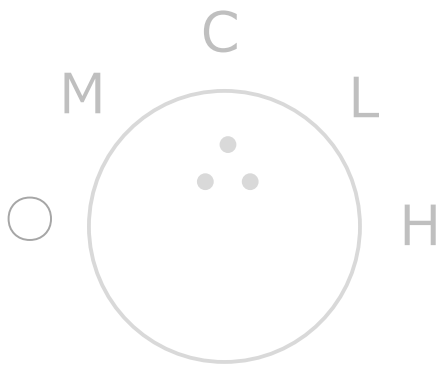
・ Characteristics of dC (double current drive)

Approximately 90 dB / mW of headphones, which required comparatively driving power, can also ensure enough volume.

※ Important Notices:

- In this dC, twice as much current flows at the same volume position, so for high efficiency headphones exceeding approximately 100 dB / mW, if the volume is narrowed down or the volume position is too low, set the GAIN switch on the back to 6 dB less It is recommended to set it to.
- This E3 hybrid dC version is a specification change only for the current drive mode, and there is no change from the original E3 hybrid in the voltage drive mode at all.
- Customers who point out lack of volume even after adding options will recommend Dual Mono UTC connection using two amplifiers equipped with this dC. Four times the current can be secured than the E3 hybrid original setting.
- Please be careful not to become a hearing impairment due to excessive volume.

Power Switch
& Mode Selector



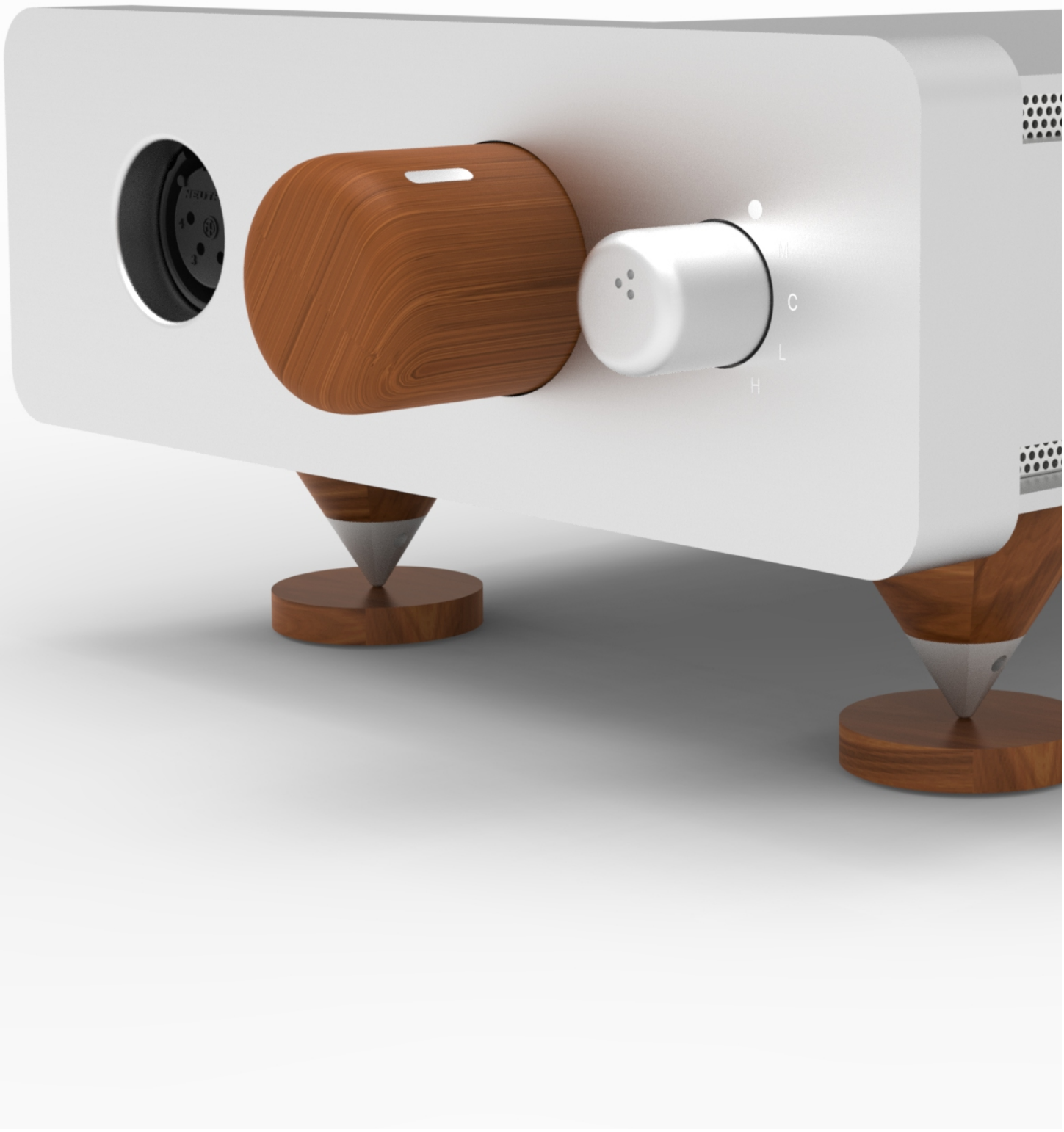
○ : Power OFF

M : Power ON
Mute Mode

C : Current Drive Mode

L : Voltage Drive Mode
Low Gain

H : Voltage Drive Mode
High Gain


C
L
H

*Optional Accessories sold separately

Technology ①

[Current Drive]

・ Current Drive is the ideal drive format based on the headphone movement rule.
・ About 99.99% of headphones available on the market employ [voltage] drive.
・ A Copernicus revolution from conventional voltage drive, the return format.
・ World's first Current Drive signal amplification circuit is newly developed.
・ Current Drive realizes ultimate high resolution sound and unsurpassed drive power for playback with both a feeling of transparency and counter position.
・ Newly developed Current Drive eliminates the need for a conventional impedance reliant gain switch for each headphone.

・ General system for sound conversion

Headphones and speakers can be thought of as monitors. The movement of a motor (force) compresses air and converts the movement to sound. The power comes from Fleming's left hand rule. In other words, force (sound level) is expressed as the product of current I and magnetic field B (F=I・B). Because voltage is not a parameter in this equation, current can be said to be the main actor in drive power energy.

・Problems with Conventional [Voltage Drive]

Most headphones employ voltage drive in which the audio signal is connected to headphones by voltage. The headphone load resistance is converted to current in accordance with Ohm's law, possibly resulting in following types of problems.

1. Difference in headphone load resistance (0.01Ω 100Ω) leads to in gain differential
    - A change in load resistance even at the same voltage results in a change in current
      = Change in force (sound level)
      = Same value as change in amplifier gain
    - For example 30Ω and 300Ω relatively high load headphones employing the same voltage have a 10:1 difference in current
      =10 times difference in gain (if the difference in voltage is not corrected, they will not be the same)
    - Because volume exceeds adjustable range, a gain switch is indispensable

2. Impacted by connection cable
    - Resistance from the connection cable is part of the amplifier load
    - The headphone load is connected in series, drive voltage is split with cable resistance
        - Some of the energy is consumed by the connection cable
    - Connection cable has a capacity component and an impedance component
    - Energy consumed by the connection cable is not fixed with respect to the frequency
      = Impact on sound quality in principle
      (can be said that sound distortion is guaranteed)

3. Headphone resistance is not fixed with respect to frequency

・Ideally, resistance would be fixed with respect to frequency

・Due to impedance, there is additional resistance for high range sounds

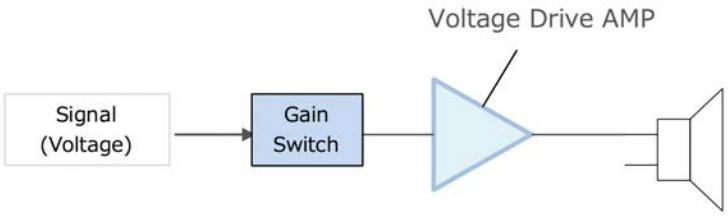
= Reduced current for high range causes distortion of high range characteristics

・Mechanical resonance causes sharp increases in resistance at some frequencies

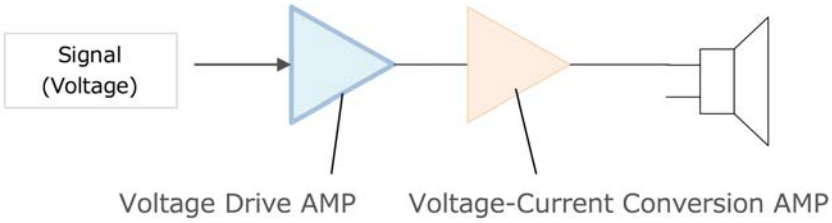
= Additional resistance near Resonance point, current drops

・Behavior at response points not interrelated to music signal

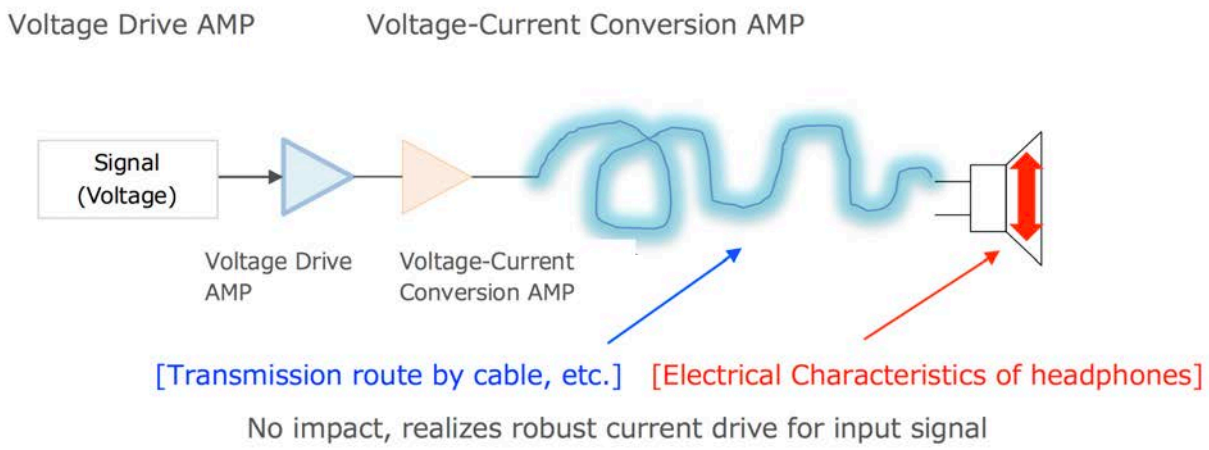
= Difficult to call that accurate sound reproduction, this is a problem for headphones



・In the case of E3 hybrid Current Drive mode [Current Drive]



If a voltage to current conversion circuit is added behind the Voltage amplification AMP, it is becomes possible to flow current corresponding to the voltage. This circuit functions as a current drive AMP, not contributing to problems outlined in 1-3 above (without regard to headphone resistance or connection cable characteristics) ensuring that the current corresponding to the voltage value specified by the design flows through to the headphones. Accordingly, the need to furnish a gain switch is eliminated.

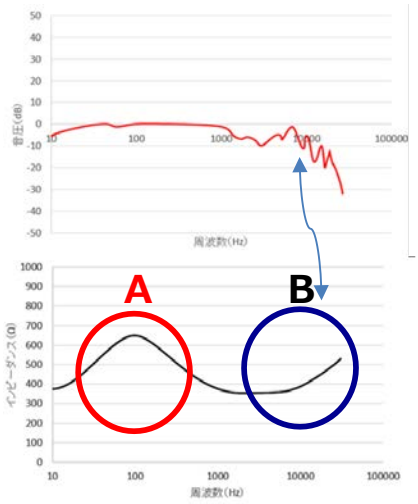


[Frequency characteristics of headphone reproduction and influence on sound quality]

・Voltage drive characteristics of general headphones

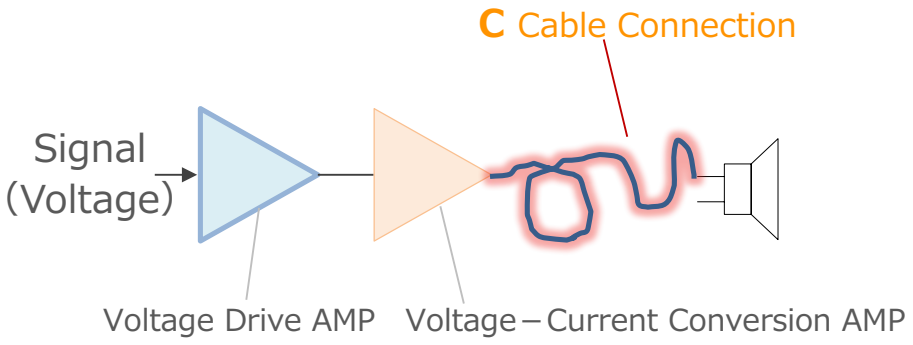
Sound pressure

Impedance



A: Influence of resonance: In the case of voltage driving, the linearity of the input voltage is neglected and the driving current is reduced so that a strong resonance phenomenon is avoided, but in either drive system the correlation with the input signal is reduced.

B: Influence of inductance: It is miscellaneous in voltage driving and clear reproduction in current driving.



C: Influence of cable: With current drive, accurate current can be passed through the voice coil without being affected by the inductance and capacitance of the transmission path. For this reason there is no coloring and you can not select a cable. In voltage drive, it acts as a part of the load impedance under the influence of the transmission characteristics, so you can enjoy the change in the sound quality with the cable.

Vertical setting stand “Wood Stand for E3 hybrid / E3 hybrid dC“

*Optional Accessories sold separately

Vertical Stand for E1, E3 hybrid, E3 hybrid dC “Spike Stand Single”

*Optional Accessaries sold separately

Specifications

Product Name	Headphone Amplifier
Model Number	E3 hybrid dC
Terminals	Analog input: XLR 3pin 2ch balanced input & RCA 2ch unbalanced input by selector switch
Outputs	Headphone output: XLR 4pin balanced output Standard jack shared combo type
Headphone Output	Current Drive Mode : 70mA (Max) Impedance to 600Ω Voltage Drive Mode : 200mA max, 3.2 max (Condition: 80Ω by Unbalance or 160Ω by Balance at High Gain Voltage Drive Mode)
Power Supply Voltage	DC + 15V
Current Consumption	Standard 1.0A (130mA in stand by mode)
Dimensions	Approx. 162mm(W) × 205mm(D) × 57mm(H), weighs about 2.5Kg
Accessories	AC Adapter (DC15V, 3A〜) Stereo jack converter (mini jack → standard jack) Foot Owner's manual Warranty certificate
Made in	Japan

(Note *1) Current drive has a tendency to resonate on high vibration headphones, which may cause sound to break up. Max currency is originally set at Current Drive Mode and unexpected bigger input signal will be controlled within max currency automatically, which my cause noise sounds.
(Note *2) Various sorts of headphone efficiency, impedance exists, depends upon headphone models and manufactures in the market. Mechanical and electrical characteristics are not always expressed by numbers or specification, which are variously diverse. Accordingly, this amplifier model does not always guarantee satisfying every headphone sound playback by both Current Drive and Voltage Drive mode.
(Note *3) Depending on gain setting and drive mode of the input amplifier section, depending on the size of the input signal and the volume position, exceeding the rating of the headphones will cause headphone malfunction, so please use after comprehension.
(Note *4) Accessories are out of warranty, but we will exchange for initial defects.

※ The posted image on this material is an image diagram. In actual products, detailed specifications, color tone etc. may be different.
※ Please note that specifications, appearance, finishing etc. may be changed without prior notice for product improvement.

Made in Japan by RE・LEAF Inc.

RE・LEAF Inc.
http://www.releaf.co.jp/
audio@releaf.co.jp