

Technical Note

“REAL-SOUND”
BRINGS THE BREATH OF PERFORMERS
JUST FRONT OF YOU



DESIGNER AUDIO

High End 9-12 May 2013



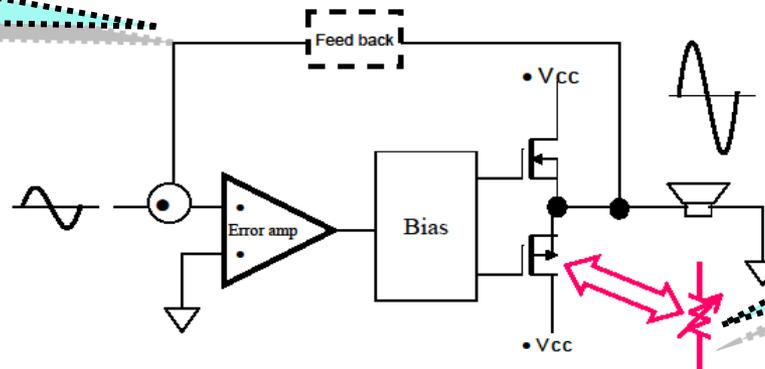
Our overview of Traditional High-End Audio

With the mainstream of the recent efforts in pursuit of audio quality based on the combination of a low-efficiency speakers and a semiconductor high-power amplifier, what is really possible is just a pursuit of a sound that expands on or behind the plane of speakers by emphasizing the feeling of elaborateness, wide range and positioning of a rather thin tone quality ?

Even if such a sound presents a high degree of perfection from the viewpoint of audio measurement, **does it really bring us the joy and excitement of music ?**

Traditional Semiconductor Amplifier

Negative feedback



Variable Resistor

Class AB amplifier uses linear regulating transistors to modulate output voltage. $\eta = 30\%$ at temp rise test condition.

- The traditional semiconductor power amp varies the power by supplying the base current to the power stage bipolar transistor or the gate load for the FET. However, as these power semi conductors acts like a variable resistor, the power loss in the power stage leads to useless energies including "Heat".
- Since the transfer function of a semiconductor is poor in linearity, the traditional amplifier inevitably needs to correct the static characteristic by performing negative feedback circuitry. But the negative feedback makes the amplifier stage vulnerable to the counteraction from the speakers, causing complicated phase delays inside the amplifier.

The Sound SPEC Targeted At “Real-Sound” brings the breaths of performers just front of you

How the joy of music would grow if the current mainstream speakers with wide range but low efficiency can reproduce higher-dimensional acoustic sound like the old vintage high-efficiency speakers.

In the development of “Real-Sound” amplifiers, we have tried to make it possible to reproduce a tone that is beautiful, rich and penetrating as if appealing directly to the human emotions, a real three dimensional field, and a musical sound full of dynamism !!

Changes and Evolution of Audio Amplifier

Tube amp

- Natural and rich tone
- Incapable of driving low-efficiency speakers
- Limited bandwidth
- History of 90 years

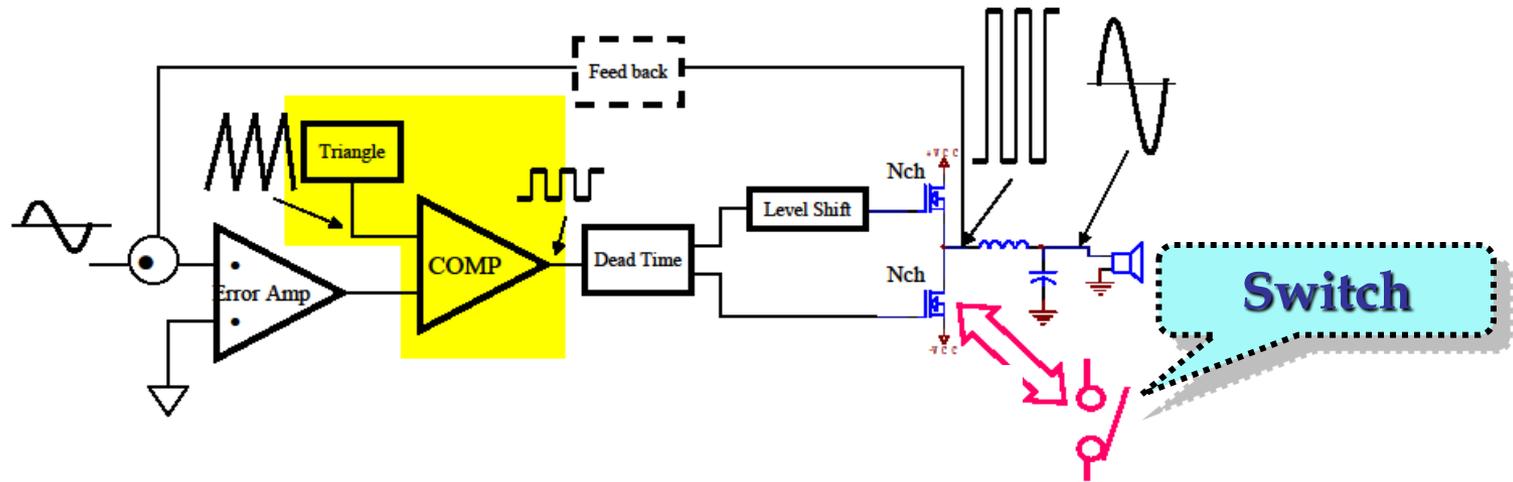
Semiconductor amp

- High power easily available
- Negative feedback with merits/demerits, limits
- Wasteful energy consumption
- Technology matured with history of half past century

Third-generation amp Class-D amp

With both an organic, penetrative force of tube amps and the driving power of semiconductor amps, the high sound quality and high efficiency of the Class-D amp makes it truly the amplifier of the third generation !!

How Class-D amplifier works



- **Class-D amplifier** uses MOSFET that is either only **ON** or **OFF** as switch.
- **PWM technique** is used to express analog audio signals with ON or OFF states in output devices.

Advantages of Class-D Amplifier

- The Class-D amp has almost triple higher efficiency and power saving compared to traditional semiconductor amps.
- The Class-D amp can easily bring out power in an instant. The change of the PWM switching timing can vary the out put power without delay factor and an excellent reproduction of music.
- The Class-D amp transfers energies in two directions. The counter-electromotive forces from the speakers are regenerated to the power supply so that speaker drive faithful to the original signal is possible.
- The Class-D amp has excellent linearity.

“Real-Sound” Class-D Amplifier

- The performance of a Class-D amp depends on “ how it can implement highly accurate PWM switching”. For this purpose, we adopted products of **Inter Rectifier**. in USA, including the Direct FET, as final power stage a product typically manifesting IR’s power control device develop capability and a **high-voltage withstanding driver IC with excellent time axis control** enabling the clean switching based on the latest MOS FET technology.
- Finding almost intuitively the future of audio in these IR solutions, we decided to bet on the possibility of full use of the excellent devices.



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REAL-SOUND AMPLIFIER

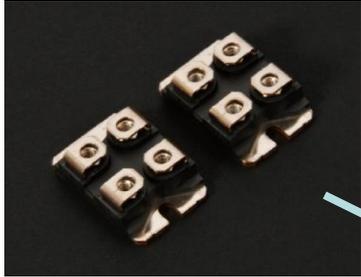
RSA-F3EX



**True richness of music is found only in
“Real-Sound”**

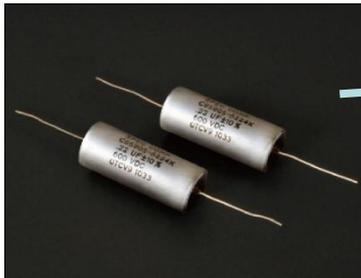
Inside of RSA-F3EX

Power supply



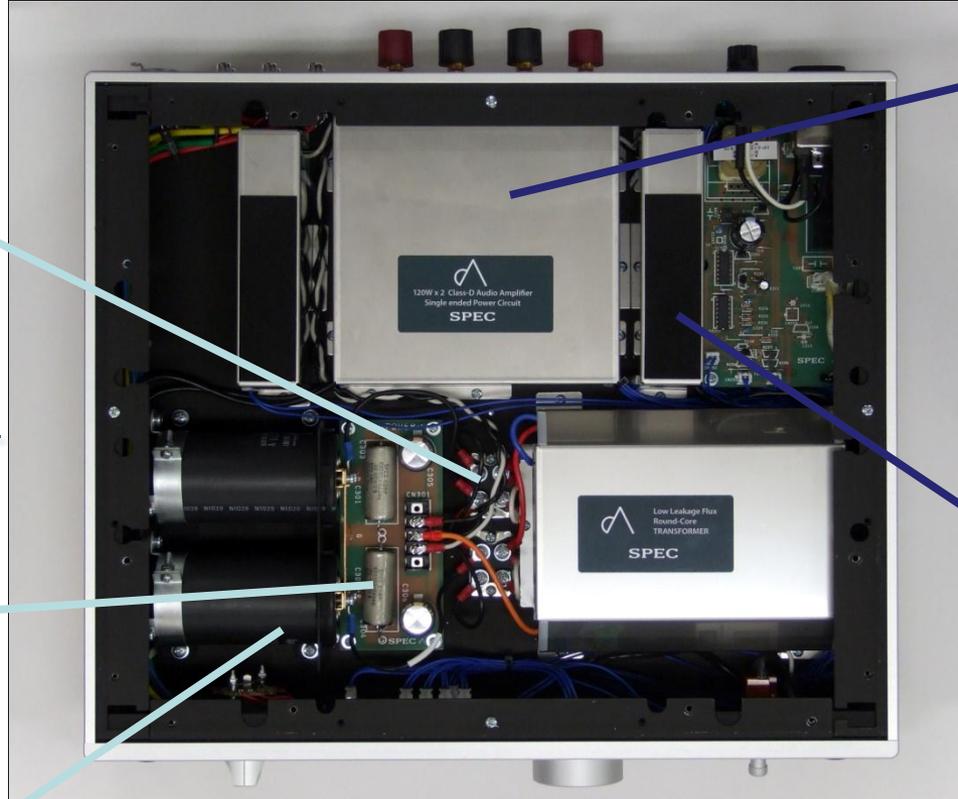
Rectifier

Ultrafast Soft-recovery diodes

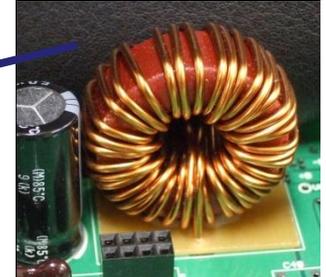


Capacitor

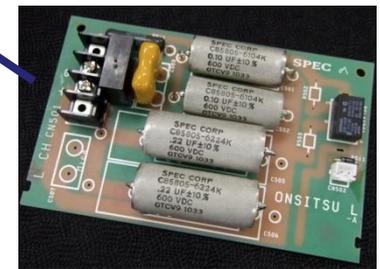
Custom electrolytic capacitor
& Hermetic seal oil filled capacitor



Low-pass filter



Inductor



Capacitor

Hermetic seal oil filled capacitor
& Mica capacitor

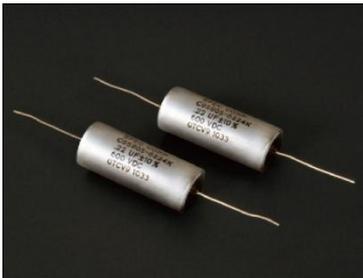
High quality “Real-Sound” is supported by excellent performance power supply with **classical analog design**

Rectifier



A newly developed withstand high voltage “ **Ultrafast Soft-recovery**” diodes for professional use ensures clean and powerful sound across the entire range.

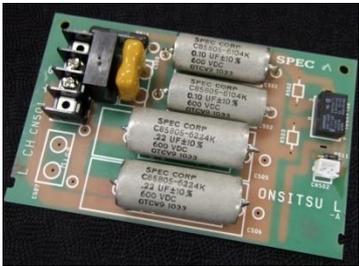
Capacitor



The main custom **electrolytic capacitor** and high voltage **oil filled capacitor** for best signal-use in parallel achieve smooth and beautiful sound over upper and middle range to the ultra-low range.

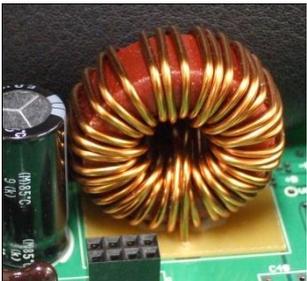
Low-pass filter at the final stage of the amplifier determines the sound quality

Capacitor



Excellent sound quality custom made oil filled capacitor by **Arizona capacitors, Inc.** and valued mica capacitor employed achieves the artistic “ **Real-Sound** ” of RSA-F3EX, M3EX.

Inductor



Special made inductor selected only by hearing allows the low-distortion and like an open air sound through the entire range.

Wooden base-chassis and insulators realize rich & acoustic instrument-like sound of **RSA-F3EX**



Insulators

The three insulators combine pure real maple from Hokkaido, Japan and hickory moderates the vibrancy of the spruce base-chassis and cut off the vibration from outside help provide nice musicality.

Base-chassis

A solid laminated panel of European spruce from Austria is used for the base-chassis produces a rich & warm pleasant sound.

SPEC

“Real-Sound Phono Equalizer” REQ-S1EX



- A phono equalizer with extremely simple circuit configuration making full use of the latent ability of latest operational amps close to the ideal amplifier.

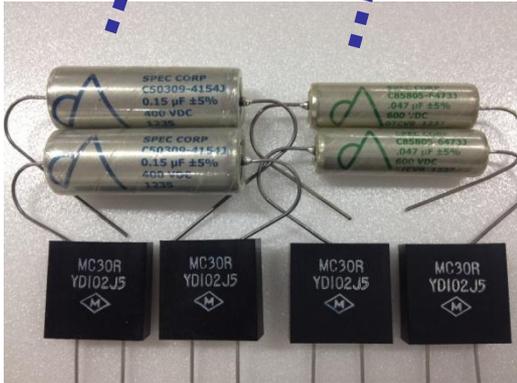
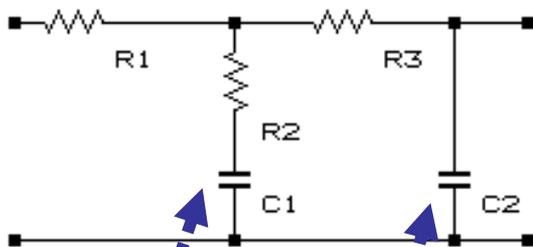
- Most important portion of the high gain amplifier circuitry like as phono EQ , the initial stage receiving the output from a cartridge incorporates separate operational amps, most suitable for MC and MM cartridges for seeking highest sound quality of each types.

- An ultra low-noise, high-gain “bipolar-input operational amp” is used for MC cartridges with low-voltage, low-impedance outputs, while a high input impedance and high-performance audio circuitry “FET-input operational amp” is used for MM cartridges with high-voltage, high impedance outputs.

SPEC

“CR Equalizer” in Pursuit of “Real Sound” Faithful Reproduction of Rich Information Contained in Analog Vinyl LPs

CR equalizer circuit



- Thanks to the latest ultra low-noise, high-gain operational amps, we could adopt “**CR equalizer**”, it has basically a minimum number of exclusively passive devices and excellent phase characteristics.
- Because of its simple circuit configuration, the sound quality capability of each part used in the CR devices determines the final sound quality of the phono equalizer.
- **REQ-S1EX** employs two kinds of **highest quality “oil filled capacitors”** custom-made by **Arizona Capacitors, Inc.** featuring different tonal character and **“mica capacitors”** with **ultimate sound quality.**
- They contribute to the straight, highly transparent, information-rich sound quality of the “**Real-Sound phono equalizer**”.