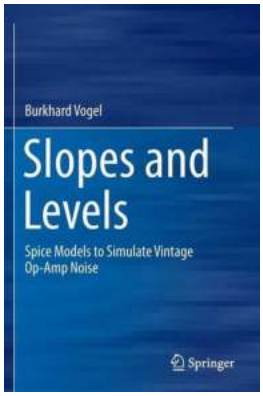
Spice Models To Simulate Vintage Op Amp Noise

The era of vintage audio equipment holds a special place in the hearts of audiophiles and music enthusiasts. The warmth and character produced by these classic devices are highly sought after, yet rarely replicated in modern equipment. One key aspect that contributes to the distinctive sound of vintage audio gear is the noise generated by the operational amplifier (op amp) integrated circuits.

While noise is generally considered undesirable in audio equipment, the noise characteristics of vintage op amps have become an integral part of their charm and appeal. These op amps, particularly those found in vintage audio devices, possess unique noise patterns that add a certain character to the audio signal. Recreating this noise in modern equipment can be a challenging task, but with the help of spice models, it is possible to simulate vintage op amp noise accurately.



Slopes and Levels: Spice Models to Simulate Vintage Op-Amp Noise by Burkhard Vogel (Kindle Edition)

★★★★★ 5 out of 5

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Spice (Simulation Program with Integrated Circuit Emphasis) is a powerful tool used in electronics engineering to simulate and analyze the behavior of various electronic circuits. By utilizing spice models that accurately represent the noise characteristics of vintage op amps, engineers and audiophiles can simulate the vintage sound accurately and design new equipment that mimics the characteristics of the classic devices.

The Importance of Op Amp Noise Simulation

Op amp noise simulation is crucial for several reasons. Firstly, it allows engineers to understand the impact of noise on the overall audio quality of a circuit. By accurately simulating vintage op amp noise, circuit designers can make informed decisions during the design process to optimize audio performance.

Secondly, accurate op amp noise simulation enables the recreation of the nostalgic, warm audio quality associated with vintage gear. Music and audio enthusiasts seeking the classic sound can now incorporate this vintage charm into their modern setups or use the knowledge gained from noise simulations to apply similar characteristics in digital audio processing.

Obtaining Spice Models

Spice models that accurately represent the noise characteristics of vintage op amps are essential for achieving realistic simulations. Fortunately, various sources provide spice models for popular vintage op amps, allowing engineers and hobbyists to recreate the distinct sound.

One common source of spice models is the manufacturer's website. Many well-known manufacturers of op amps provide spice models on their websites to support their products' simulation. These spice models often include accurate

representations of the op amp noise, allowing users to simulate the vintage sound effectively.

Additionally, electronics forums and communities are a valuable resource for obtaining spice models. Entering discussions and sharing knowledge with fellow enthusiasts can lead to the discovery of specialized spice models that accurately capture the noise characteristics of vintage op amps.

Simulating Vintage Op Amp Noise Using Spice

Once you have obtained the necessary spice models, simulating vintage op amp noise becomes an exciting task. Follow these steps to get started:

1. **Choose a Spice simulation software:** Select a spice simulation software that suits your needs. Popular options include LTspice, PSpice, and Tina-TI, among others. Ensure that the software supports the use of spice models.
2. **Import the spice model:** Import the spice model provided by the manufacturer or found in online forums into your chosen spice simulation software. This step ensures that your simulation accurately represents the vintage op amp noise.
3. **Create the circuit:** Design the circuit you wish to simulate, incorporating the vintage op amp and other relevant components. The simulation software allows you to connect the components and set various parameters according to your requirements.
4. **Run the simulation:** Start the simulation and observe the output. The software will provide detailed information about the noise characteristics of the vintage op amp under various conditions. Analyze the results and make adjustments to achieve the desired sound quality.

5. **Optimize the circuit:** Experiment with different combinations of components and values to further refine the simulation. Fine-tuning the circuit can enhance the vintage op amp noise and create a more accurate representation of the classic sound.

Simulating vintage op amp noise using spice models opens up endless possibilities for audio enthusiasts. It allows for the recreation of the iconic vintage sound and provides insights into the unique characteristics of classic audio equipment.

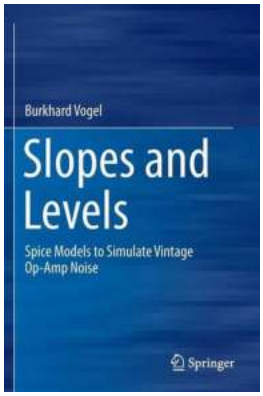
Incorporating Vintage Op Amp Noise in Modern Designs

With the ability to accurately simulate vintage op amp noise, engineers can now incorporate the distinctive sound into new designs and bring the nostalgic audio quality to modern equipment. By carefully selecting the appropriate spice model and optimizing the circuit, it is possible to capture the essence of vintage op amps while taking advantage of the advancements in modern technology.

Moreover, the knowledge gained from simulating vintage op amp noise can be applied in digital audio processing. Audio software and plugins can utilize the characteristics of vintage op amps to emulate the classic sound, providing users with the ability to add that warm and nostalgic touch to their recordings and music productions.

Spice models offer a powerful solution for simulating vintage op amp noise accurately. By obtaining the necessary spice models and using simulation software, engineers and audio enthusiasts can recreate the nostalgic audio quality associated with classic equipment. The ability to simulate vintage op amp noise opens up new creative possibilities, allowing for the incorporation of the distinctive sound in modern designs and digital audio processing. Embrace the

charm of vintage op amps and explore their unique noise characteristics through spice models, elevating your audio experience to a new level.



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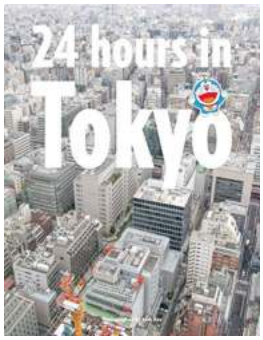
This book features an extensive index and all Mathcad worksheets.

Vinyl is back, tubes/valves are back, on the high-end field SMD-free analog amplification surpasses digitalized chains, and top microphone manufacturers still set on good old op-amps or on fully discrete BJT, FET, and/or tube-driven amplifiers. There is only one problem that is not satisfyingly well solved by the manufacturers: It is the noise production of the active components and the useful reflection in simulation tools, in tables or graphs of the datasheets/data books.

Nowadays, mostly surrounded by many digital helping tools, it makes sense using them—also by analog aficionados. It saves cost and time simulating first before spending money. Presented in this book the software tool LTSpice which is the free software solution from Linear Technology (today Analog Devices) that could also be used by full analog lovers to simulate the noise production of their amplifier design. All we need is the right creation approach to develop simulation models for the active components. Inter alia this is already done for tubes and

BJTs in the 2nd editions of my “How to Gain Gain” and “Balanced Phono-Amps” books. For op-amps, the missing approaches are presented in the book on hand.

It cannot be denied that mathematical software like Mathcad is extremely helpful to find the right equations for graphically presented noise curves which we can find in the literature. Nevertheless, it also works well with other types of math software to fulfill the parameter needs of the here presented modeling approaches for the input referred voltage and current noise of—not only—excellent sounding vintage op-amps, applicable in the audio range from 1 Hz to 100 kHz.



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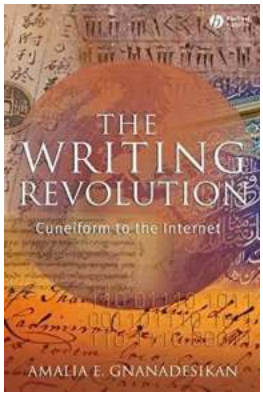

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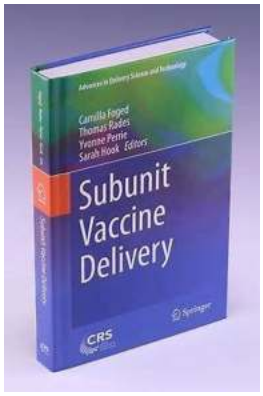

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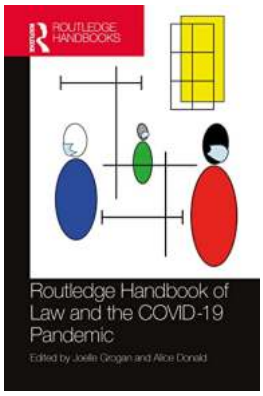

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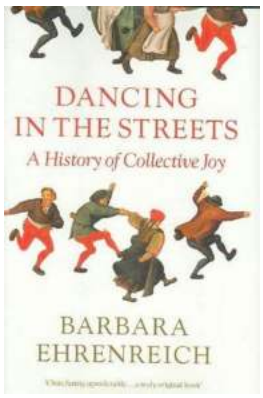

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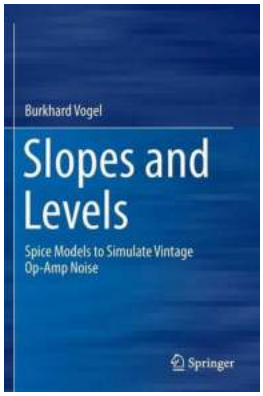

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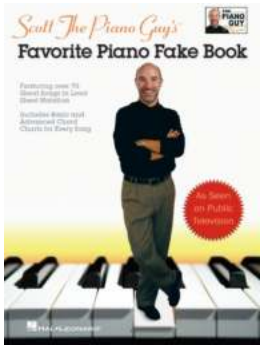

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