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/49 Advanced Noiseshaping Redither (ANR)

/49UV ANR with Apogee UV22 algorithm included

/49SBM ANR with Sony Super Bit Mapping (SBM) algorithm included

ANR, UV22, SBM Redithering

Various listening tests have shown that the optimum dithering process for a given piece of music depends on many parameters, such as the equipment used to record and process the music, the recording location, the type of music etc. Thus it seems a logical step to integrate various types of redithering algorithms in a single unit. This allows the mastering engineer to choose the best algorithm for any piece of music.

We integrated the three best known algorithms, namely the Apogee UV22, the Sony SBM (Super Bit Mapping) and our ANR (Advanced Noiseshaping Redither).

Data sheet

102/49 Advanced Noiseshaping Redither (ANR)

Description, Features

The ANR smoothly reduces the wordlength from up to 24 bits down to 16, 17, 18, 19, 20 or 12 bits without introducing any quantization distortions or noise modulation. The residual noise is shaped according to the human hearing curve, making the dither noise almost inaudible.

The output is programmable to put out either "digital zero" or normal dither noise whenever a few consecutive zero input samples are detected.

Operation

Before plugging in the module, three jumpers have to be set on the second PCB board of the module:

- The single one determines the power-up default. If installed in the lower position, the module will power up switched on, if installed in the upper position, the module will power up switched off.
- The seven jumper positions in a row are explained on the back of the frontpanel. Six of them determine the output wordlength. Set the proper output wordlength depending on what kind of equipment is connected to the 102 system's output interface, e.g. select 16 bits by inserting the jumper at the "16 bit" position if you connect a Sony 1630, etc.

The seventh jumper determines whether the output of the ANR will go to "black" (digital zeros on all bits) if the input is also on black. If the jumper is not installed the output will go to black. If it is installed, the output will show the dither noise even with zero input signal. You may wish to have digital black between takes, on the other hand switching to digital black in a strict sense means noise modulation. With the black feature on, the output goes to black only if the input is all 24 bits zero for at least 256 samples (approx. 5.8ms at 44.1kHz).

Application Examples

Reducing the output of a 20 bit A/D converter to fit the input of a 16 bit recorder.

Reducing the output of a 20 bit recorder to fit the input of a 16 bit recorder.

Reducing the output of a digital signal processing system to fit a 16 bit recorder.

Technical Data

Input Format: up to 24 bits internal format

Input Wordlength: up to 24 bits

Output Format: up to 24 bits internal format

Output Wordlength selectable: 16,17,18,19,20,12 bits or bypass, i.e. fully transparent for 24 bits

Sampling Frequency: 32 kHz .. > 50 kHz

The noiseshaping filter coefficients are switched depending on the sampling frequency. Correct noiseshaping is possible with sampling frequencies of 44.1kHz or 48kHz. All other sampling frequencies cause a shift of the noiseshaping curve on the frequency axis.

Processing precision: 32 bit floating point

Frontpanel elements: - on/off switch with LED

Power-up default: jumper selectable: on or off

Jumpers for: - power-up default

- output wordlength: 16, 17, 18, 19, 20, 12 Bits

- "black" jumper not installed: Output goes to digital zero with a digital zero input.

- "black" jumper installed: Always dither noise at output.

Width of module: 30 mm (1 1/5 inch)

Data sheet

102/49UV Advanced Noiseshaping Redither (ANR) with Apogee UV22 option Description, Features

The ANR smoothly reduces the wordlength from up to 24 bits down to 16, 17, 18, 19, 20 or 12 bits without introducing any quantization distortions or noise modulation. The residual noise is shaped according to the human hearing curve, making the dither noise almost inaudible.

The module can be switched to the Apogee UV22 algorithm, which is a non-noiseshaping dithering algorithm with a virtually white noise distribution over the whole audio bandwidth.

The output is programmable to put out either "digital zero" or normal dither noise whenever a few consecutive zero input samples are detected.

Operation

Before plugging in the module, four jumpers have to be set on the second PCB board of the module:

- The single one determines the power-up default. If installed in the lower position, the module will power up switched on, if installed in the upper position, the module will power up switched off.

- The seven jumper positions in a row are explained on the back of the frontpanel.

Five of them determine the output wordlength. Set the proper output wordlength depending on what kind of equipment is connected to the 102 system's output interface, e.g. select 16 bits by inserting the jumper at the "16 bit" position if you connect a Sony 1630, etc.

The sixth jumper determines the power-up default for the algorithm. With no jumper installed, the ANR algorithm comes up after power-up (on-LED not blinking). With the jumper installed, the UV22 algorithm is selected after power-up (on-LED blinking).

The seventh jumper determines whether the output of the module will go to "black" (digital zeros on all bits) if the input is also on black. If the jumper is not installed the output will go to black. If it is installed, the output will show the dither noise even with zero input signal. You may wish to have digital black between takes, on the other hand switching to digital black in a strict sense means noise modulation. With the black feature on, the output goes to black only if the input is all 24 bits zero for at least 256 samples (approx. 5.8ms at 44.1kHz).

The on/off switch on the frontpanel works as follows: Just pressing briefly toggles between on and off state. When the module is on, pressing the switch for a few seconds causes the dither mode to toggle, i.e. if the LED is blinking the UV22 algorithm is selected and if the LED is steadily on, the ANR is selected. If the module is off, the dither mode can't be changed.

Application Examples

Reducing the output of a 20 bit A/D converter to fit the input of a 16 bit recorder.

Reducing the output of a 20 bit recorder to fit the input of a 16 bit recorder.

Reducing the output of a digital signal processing system to fit a 16 bit recorder.

Technical Data

Input Format: up to 24 bits internal format

Input Wordlength: up to 24 bits

Output Format: up to 24 bits internal format

Output Wordlength selectable: 16,17,18,19,20 bits or bypass, i.e. fully transparent for 24 bits

Sampling Frequency: 32 kHz .. > 50 kHz

The noiseshaping filter coefficients are switched depending on the sampling frequency. Correct noiseshaping is possible with sampling frequencies of 44.1kHz or 48kHz. All other sampling frequencies cause a shift of the noiseshaping curve on the frequency axis.

Processing precision: 32 bit floating point

Frontpanel elements: - on/off switch with LED

Power-up default: jumper selectable: on or off

Jumpers for: - power-up default on or off

- output wordlength: 16,17,18,19,20,12 bits or bypass, i.e. fully transparent for 24 bits

- "ANR" jumper not installed: ANR algorithm selected after power-up.

- "ANR" jumper installed: UV22 algorithm selected after power-up.

- "black" jumper not installed: Output goes to digital zero with a digital zero input.

- "black" jumper installed: Always dither noise at output.

Width of module: 30 mm (1 1/5 inch)

Addendum to the /49UV Advanced Noiseshaping Redither with UV22 data sheet

"Auto" mode for the /49UV module

The special version of the /49UV module with the auto on / off feature works as follows:

"auto" mode off (jumper "auto" installed):

In this mode the module works as before except for the zero in zero out feature ("black" jumper), which is not supported anymore. I.e. the dither noise is always present at the output, independent of the input signal.

The single jumper determines the on/off power-up default. If installed in the lower position, the module will power up switched on, if installed in the upper position, the module will power up switched off.

The seven jumper positions in a row are explained on the back of the frontpanel. Five of them determine the output wordlength. Set the proper output wordlength depending on what kind of equipment is connected to the 102 system's output interface, e.g. select 16 bits by inserting the jumper at the "16 bit" position if you connect a Sony 1630, etc.

The sixth jumper determines the type of dither algorithm selected after power-up.

If the jumper is not installed, the ANR is selected after power up, if the jumper is installed, the UV22 is selected.

The seventh jumper is the "auto" jumper as mentioned above.

The switch on the frontpanel switches the dither on and off. In addition the algorithm can be selected (UV22 or ANR) by pressing down the switch for a few seconds. This works only if the dither has been "on" (LED lit) before. If the LED changes its behaviour, then the algorithm has changed, i.e. blinking LED = UV22, steady LED = ANR.

"auto" mode on (jumper "auto" **not** installed):

In this mode the module switches itself on and off depending on the selected output wordlength and the input wordlength. If the input wordlength is greater than the output wordlength, the module switches on (LED lit), else it switches off. This mode implies that for zero input signal there is always also a zero output signal, i.e. the zero in zero out feature ("black" jumper), is not required anymore.

The single jumper which determined the on/off power-up default in the non auto mode is not active anymore. The module is always on, except when the conditions as described above are met.

The seven jumper positions in a row are explained on the back of the frontpanel. Five of them determine the output wordlength. Set the proper output wordlength depending on what kind of equipment is connected to the 102 system's output interface, e.g. select 16 bits by inserting the jumper at the "16 bit" position if you connect a Sony 1630, etc.

The sixth jumper determines the type of dither algorithm selected after power-up.

If the jumper is not installed, the ANR is selected after power up, if the jumper is installed, the UV22 is selected.

The seventh jumper is the "auto" jumper as mentioned above.

The switch on the frontpanel also works differently to the non auto mode. It is not possible to switch the dither on and off anymore, but the algorithm (UV22 or ANR) can be selected by pressing down the switch for a few seconds. This works only if the dither has been "on" (LED lit) before. If the LED changes its behaviour, then the algorithm has changed, i.e. blinking LED = UV22, steady LED = ANR.

Data sheet

102/49SBM Advanced Noiseshaping Redither (ANR) with Sony SBM option

Description, Features

The ANR smoothly reduces the wordlength from up to 24 bits down to 16, 17, 18, 19, 20 or 12 bits without introducing any quantization distortions or noise modulation. The residual noise is shaped according to the human hearing curve, making the dither noise almost inaudible.

The module can be switched to the Sony SBM algorithm.

The output is programmable to put out either "digital zero" or normal dither noise whenever a few consecutive zero input samples are detected.

Operation

Before plugging in the module, four jumpers have to be set on the second PCB board of the module:

- The single one determines the power-up default. If installed in the lower position, the module will power up switched on, if installed in the upper position, the module will power up switched off.
- The seven jumper positions in a row are explained on the back of the frontpanel.

Five of them determine the output wordlength. Set the proper output wordlength depending on what kind of equipment is connected to the 102 system's output interface, e.g. select 16 bits by inserting the jumper at the "16 bit" position if you connect a Sony 1630, etc.

The sixth jumper determines the power-up default for the algorithm. With no jumper installed, the ANR algorithm comes up after power-up (on-LED not blinking). With the jumper installed, the SBM algorithm is selected after power-up (on-LED blinking).

The seventh jumper determines whether the output of the module will go to "black" (digital zeros on all bits) if the input is also on black. If the jumper is not installed the output will go to black. If it is installed, the output will show the dither noise even with zero input signal. You may wish to have digital black between takes, on the other hand switching to digital black in a strict sense means noise modulation. With the black feature on, the output goes to black only if the input is all 24 bits zero for at least 256 samples (approx. 5.8ms at 44.1kHz).

The on/off switch on the frontpanel works as follows: Just pressing briefly toggles between on and off state. When the module is on, pressing the switch for a few seconds causes the dither mode to toggle, i.e. if the LED is blinking the SBM algorithm is selected and if the LED is steadily on, the ANR is selected. If the module is off, the dither mode can't be changed.

Application Examples

Reducing the output of a 20 bit A/D converter to fit the input of a 16 bit recorder.

Reducing the output of a 20 bit recorder to fit the input of a 16 bit recorder.

Reducing the output of a digital signal processing system to fit a 16 bit recorder.

Technical Data

Input Format: up to 24 bits internal format

Input Wordlength: up to 24 bits

Output Format: up to 24 bits internal format

Output Wordlength selectable: 16,17,18,19,20 bits or bypass, i.e. fully transparent for 24 bits

Sampling Frequency: 32 kHz .. > 50 kHz

The noiseshaping filter coefficients are switched depending on the sampling frequency. Correct noiseshaping is possible with sampling frequencies of 44.1kHz or 48kHz. All other sampling frequencies cause a shift of the noiseshaping curve on the frequency axis.

Processing precision: 32 bit floating point

Frontpanel elements: - on/off switch with LED

Power-up default: jumper selectable: on or off

Jumpers for: - power-up default on or off

- output wordlength: 16,17,18,19,20,12 bits or bypass, i.e. fully transparent for 24 bits

- "ANR" jumper not installed: ANR algorithm selected after power-up.

- "ANR" jumper installed: SBM algorithm selected after power-up.

- "black" jumper not installed: Output goes to digital zero with a digital zero input.

- "black" jumper installed: Always dither noise at output.

Width of module: 30 mm (1 1/5 inch)