

MMG



v2.4

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Make Noise warrants this product to be free of defects in materials or construction for a period of one year from the date of purchase (proof of purchase/invoice required).

Malfunction resulting from wrong power supply voltages, backwards or reversed eurorack bus board cable connection, abuse of the product or any other causes determined by Make Noise to be the fault of the user are not covered by this warranty, and normal service rates will apply.

During the warranty period, any defective products will be repaired or replaced, at the option of Make Noise, on a return-to-Make Noise basis with the customer paying the transit cost to Make Noise. Please contact technical@makenoisemusic.com for Return To Manufacturer Authorization.

Make Noise implies and accepts no responsibility for harm to person or apparatus caused through operation of this product.

Please contact technical@makenoisemusic.com with any questions, needs & comments, otherwise... go MAKE NOISE!

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THANK YOU

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Special thanx to Tadao Kikumoto and Don Buchla for their original and inspirational circuit designs.

Electrocution hazard!

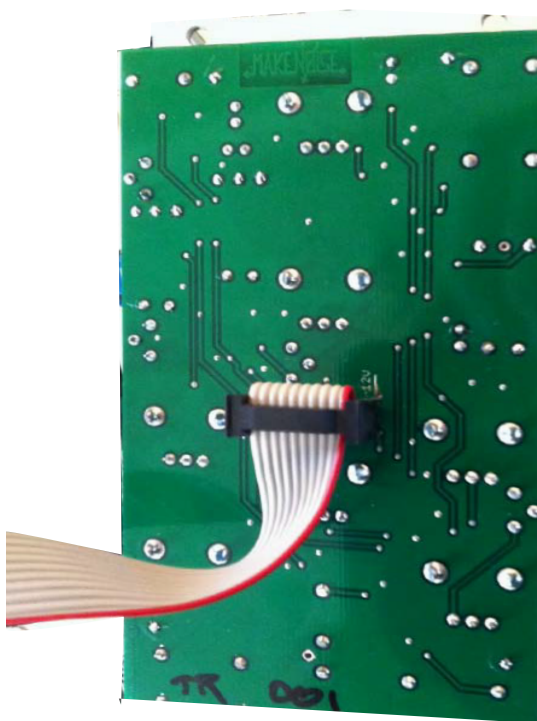
Always turn the Eurorack case off and unplug the power cord before plugging or un-plugging any Eurorack bus board connection cable.

Do not touch any electrical terminals when attaching any Eurorack bus board cable.

The Make Noise MMG is an electronic music module requiring 45mA of +12VDC and 40 mA of -12VDC regulated voltages and a properly formatted distribution receptacle to operate. It must be properly installed into a Eurorack format modular synthesizer system case.

Go to <http://www.makenoisemusic.com/> for examples of Eurorack Systems and Cases.

To install, find 12HP in your Eurorack synthesizer case, confirm proper installation of included eurorack bus board connector cable on backside of module (see picture below), plug the bus board connector cable into the Eurorack style bus board, minding the polarity so that the RED stripe on the cable is oriented to the NEGATIVE 12 Volt line on both the module and the bus board. On the Make Noise 6U or 3U Busboard, the negative 12 Volt line is indicated by the white stripe.



Please refer to your case manufacturers' specifications for location of the negative supply.

The MMG is a Vactrol-based, Voltage-Controlled Filter and Low Pass Gate, using our QMMG core. The MMG bridges the Far East and West Coast synthesis styles, allowing for highly-resonant acidic squelch and organic, percussive animations to be programmed simultaneously within a single module.

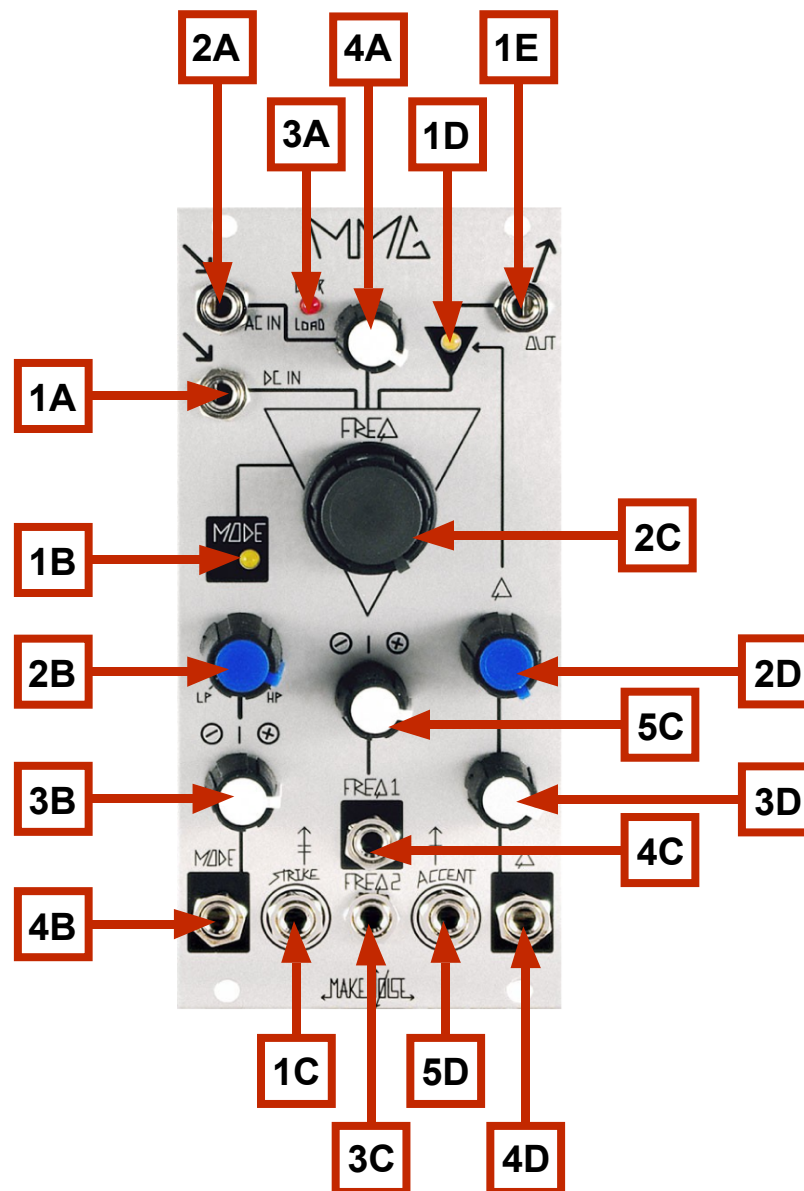
The AC coupled Input has an attenuator to adjust signal levels. An un-attenuated DC input is also offered, as this was the type of input utilized on the original QMMG. Together, these inputs allow for mixing audio signals or combining a control signal with an audio signal to yield asymmetrical behaviors in the circuits that follow.

The Mode circuitry allows for smooth Voltage Controlled sweeping between Low Pass and High Pass responses.

Voltage-Controlled Q Factor yields everything from smooth to aggressively-clipped Resonances, while an Automatic Gain Control circuit keeps signal levels under control at high resonance settings.

An Accent input is provided for programming XOX style punch and a Strike input allows for LPG style bongo plonks (René X and Y gates work well at these inputs).

The MMG is a 100% analog filter for musical applications and is not suitable for laboratory use. The MMG utilizes Vactrol-based gain cells where voltage control is required. Therefore the Mode, Frequency, and Q controls all have a unique response that is slower than the typical solid-state filter circuit.



MMG Panel Controls

INPUT

- 1A DC Input: Direct Coupled Input. Expects 10Vpp.
- 2A AC Input: AC coupled Input. Expects 10Vpp.
- 3A Over Load Indicator: Lights when inputs exceed ideal levels for circuit.
- 4A AC Input Drive: Sets input level for AC Input.

MODE

- 1B Mode Indicator: Lights as circuit sweeps from LP to HP modes.
- 2B Mode Panel Control: Uni-polar control for mode of filter. LP at 0% to HP at 100%
- 3B Mode CV Attenuverter: Bi-Polar attenuator for Mode CV input (4B).
- 4B Mode CV Input: Control signal input for Mode. Normalled to Frequency control signal. Set Mode CV attenuator (3B) to 50% to dis-able normalization. Range 8V.

Frequency

1C Strike Input: Briefly opens the filter circuit to 100%. Expects 8 to 10V Gate or clock.

2C Frequency panel control: Uni-polar control setting the Cut-off Frequency of filter.

3C Frequency CV Input 2: Unity gain control signal input for cut-off Frequency. No attenuation. Range 8V.

4C Frequency CV Input 1: Control signal input for cut-off Frequency. Range 8V.

5C Frequency CV Attenuverter: Bi-Polar attenuator for Freq CV Input 1 (4C).

Q Factor (Resonance)

1D Q Clip Indicator: Lights when feedback path for Q Factor is clipped.

2D Q Panel Control: Uni-polar control for level of resonance.

3D Q CV Attenuator: Uni-polar attenuator for Q CV Input (4D).

4D Q CV Input: Control signal input for Q. 8V range.

5D ACCENT Input: Briefly pushes entire filter circuit to 110%

Output

1E Signal Output: AC and DC Input signals, as processed by the MMG circuits, is output here.

There are many different types of filters. The most commonly used filters in synthesizers are Low Pass, High Pass and Band Pass. In musical terms, a filter removes harmonic content from the signal making it sound different. A Low Pass filter lets frequencies below the cut-off frequency pass through while all others are weakened by attenuation. The result is a duller sound as the cut-off frequency is lowered, and brighter as the cut-off frequency is raised. A High-Pass filter lets frequencies higher than the cut-off frequency pass through while all others are weakened. This results in the sound becoming thinner as the Cut-Off Frequency is increased, and fuller as the Cut-off is lowered. Although these changes start to occur at the cut-off frequency, it is not a severe operation! There is a transition from amplification to complete attenuation of the frequency beyond the cut-off point. This transition is called a "Slope." The Slope represents the steepness of the frequency response curve at the filter's cut-off frequency. In the case of filters for musical synthesis applications, slopes of 12 and 24db/Octave are most common. For reference, the classic Moog filter is 24db/ Octave.

In synthesizer filters there is typically a feedback path that allows the Q-Factor of the circuit to be adjusted. Increasing the gain of this feedback path results in ringing oscillations at the cut-off frequency known as Resonance. Resonance is what makes a synthesizer filter growl!

The Low Pass Gate is a specialized type of synthesizer filter developed by Don Buchla where the amplitude of the signal is not only frequency dependent, but also under voltage control. It is in essence a Voltage Controlled Filter and Amplifier, a VCFA. Traditionally the Low Pass Gate has had a very mild filter slope of 6db/Octave. This mild filtering combined with the use of a Vactrol based gain cell that turns off completely allows for the control of both amplitude and frequency domains simultaneously.

The MMG has both Low Pass and High Pass filter circuits. There is a normalization between the Frequency control signal and the Mode CV input that allows for a quasi-band-pass behavior to be programmed as well (with nothing patched to MODE CV Input, set Mode to LP, and Mode CV Attenuverter to full CW).

Like most synthesizer filters the MMG has Resonance that is controlled by the Q-Factor circuit. The MMG Q control is capable of being more aggressive than the typical resonance control and will distort at higher settings. The MMG implements the same Vactrol based gain cell used in the original Low Pass Gate circuits, and thus there is a range of operation where the amplitude is both frequency dependent and under voltage control. However, the MMG has a steeper filter slope of 12db/Octave, so it does not sound the same as the typical Low Pass Gate, such as the Make Noise Optimix.

The MMG is no more complicated than other synthesizer filters; however, it does have some features that are less typical.

The Input Stage: there are two inputs which allows for mixing two signals at the input of the MMG. One input is marked AC Input and the other is marked DC Input. These names reflect how the signal is coupled into the circuit. AC Input is AC coupled, which is the standard way to inject an audio signal into a filter. AC coupling into a filter conserves bandwidth and prevents asymmetrical clipping of the signal. The DC Input is direct coupled into the circuit. This is not a common way to couple a signal into an audio filter since it allows for loss of bandwidth and asymmetrical clipping. We have included the DC Input because it allows for processing control signals with the MMG as well as programming asymmetrical clipping. Patch an LFO to DC Input and your audio signal to the AC Input. Set the AC Input Attenuator to taste. Set the Mode to LP and observe the behavior of the circuit as you turn up the Freq and Q panel controls.

The MMG Q Factor circuit is highly dependent upon the input signal levels. For this reason, we have included the AC Input Drive control and Over Load indication LED. When this LED lights, you have exceeded the ideal input signal levels for operating the MMG. Do not fear though, you cannot damage anything by over loading the circuit! The ideals were designed to be exceeded! When over loaded, there are some distortions that occur and the strength of the resonance is lessened; it might be just the sound you are seeking.

The Mode control

There are two modes of operation on the MMG, Low Pass, and High Pass. Unlike the original QMMG, these modes are not switched, but rather they are swept. As you turn the Mode panel control, you are changing the circuit topology from LP to HP!

The Mode CV Input has a Bi-Polar attenuverter associated with it. Attenuverters allow for adding or subtracting a control voltage from the Mode Panel control setting. Keep in mind there is a normalization between the Frequency control signal and the Mode CV input that allows for a quasi-band-pass behavior to be programmed (with nothing patched to Mode CV Input, set Mode to LP, and Mode CV Attenuator to full CW). To eliminate this behavior, set the Mode CV attenuator to 50% or patch a dummy cable into the Mode CV Input.

The Cut-Off FREQUENCY is not unlike most analog Voltage Controlled Filters. With Mode set to LP, increasing the cut-off frequency is like opening the up the sound, making it brighter. With Mode set to HP increasing the Cut-Off frequency is like shaving away the sound, making it thinner.

The MMG has two CV inputs for Cut-off Frequency control. Freq 1 has a Bi-Polar Attenuator associated with it. This allows for adding or subtracting a control voltage from the Freq Panel control setting. Freq 2 has no attenuator and is a unity gain control signal input. This means it is directly applied to the Cut-off Frequency setting. Freq 2 is a good input to use when you have a control signal that does not require further processing, such a programmed sequence or a signal that is being processed by a channel of MATHS.

The Q-Factor control

This is where the amount of resonance is programmed in the filter. Almost all music synthesizer filters have a control for resonance or Q-Factor (aka Q). The MMG offers voltage control over this behavior. The first half the Q range generates clean resonances, not unlike what is heard from many analog filters. After 12:00, you will notice the Q-Clip Indicator lighting (this is the Pink LED) and the sound of the resonance becomes more and more aggressive and harmonically rich. At some settings, the resonances over take the Input Signal in amplitude! In fact, the Q-Factor circuit allows the filter circuit to resonate to the point of oscillation in some cases. This is where the AC Input Drive control becomes handy. The MMG Q-Factor circuit is directly impacted by the Input Signal levels. By adjusting the AC Input Drive control, you are able to control the possible strength of the Q-Factor circuit. If you want really strong resonance, try setting the AC Input Drive lower. If you want the input signal to be stronger, set the AC Input drive higher. Keep in mind that because the lowest range of the Freq control performs like a VCA and attenuates the signal, there is a loss of energy at Freq settings below 10:00 and the resonance will recede quickly at these settings as well.

The STRIKE

This input is only found on one other filter, the Make Noise Optomix (it is also found on the Make Noise DPO, but that is not a filter).

The Vactrol based gain cells utilized in the MMG have a moderately fast attack time and a slower decay time, meaning the circuit turns on quickly, but takes a while to shut off, yielding a smooth natural decay to almost any signal processed. The Strike Input is a Gate input for striking or plucking the Vactrol. This means that when a Gate signal is received at this input, the Vactrol based gain cell is opened up to 100% for a brief amount of time and then allowed to close on its own. Thus, allowing the circuit to impart its magically slow response time upon the amplitude of the signal being processed.

The Strike input is useful for percussively animating a sound, since the fast turn on and slow turn off is reminiscent of a percussion instrument like a bongo, tom-tom or other drums.

The ACCENT

This is another, less common parameter to be found on a filter. The MMG Accent circuit resembles that of a certain Japanese made bass synthesizer that was packaged in a silver box. The Accent circuit in that silver box failed miserably at achieving the intended goal of naturalism in computer controlled music composition. Still, the Accent circuit became widely used in some styles of electronic music, such as Acid and Techno. Within these music styles, artists used Accent to create hard hitting notes that punched through the mix.

The OUTPUT Stage

There is one output on the MMG. There is one thing about that single output stage that is not typical though and that is the inclusion of an Automatic Gain Control circuit. This AGC circuit is not found on the original QMMG. The AGC scales the amplitude of the output signal as the resonance is increased. When set to high resonance levels, the amplitude of the output signal from the MMG (and the QMMG) filter core almost doubles. The AGC circuit following the Filter core prevents this massive increase in amplitude.

- To achieve classic Low Pass Gate sounds, use a complex audio signal source such as a Frequency Modulated Sine wave and apply Gate or Clock signal to Strike Input. Set Freq to Full CCW (0%).
- At lowest cut-off frequencies the High-Pass filter setting will seem to pass the signal with no change. Conversely, at highest cut-off frequencies the Low Pass filter setting will seem to pass the signal with little change. This is typical behavior for most filters.
- An un-modulated Sine or Triangle wave as audio signal source will result in the filter circuit behaving like a VCA. Since there is almost no harmonic content in the signal to be filtered only the fundamental frequency of the Sine wave is audibly processed and the fundamental is the Sine.
- Use DC Input to achieve original QMMG signal path.
- Don't forget to set the Mode CV Attenuverter according to your desires when even when nothing is patched to Mode CV Input, since the Freq control signal is normalled to the Mode CV Input.
- Use the AC Input Drive to adjust the character of the both the input signal and the resonance.

Patch Ideas:**Cicadas:**

Patch audio source to AC Input. Adjust level control until just below where the Overload LED lights. Patch LFO or other slow CV to DC Input. Note: Overload LED lighting in time with LFO. Adjust Q fully CW (100%). Because the overload circuit cancels out resonance, the sound morphs between saturation and heavy resonance. Adjust Cutoff, Mode, and Q to taste.

Constant Power:

With no cable in the Mode CV Input, adjust Mode panel control (blue knob) full CW (100%) and input attenuator full CCW (-100%). This causes the mode to be High-Pass at low Cutoff frequencies, morphing toward Low-Pass at high cutoff frequencies, ensuring some portion of a full-spectrum signal is always present at the output regardless of cutoff.
