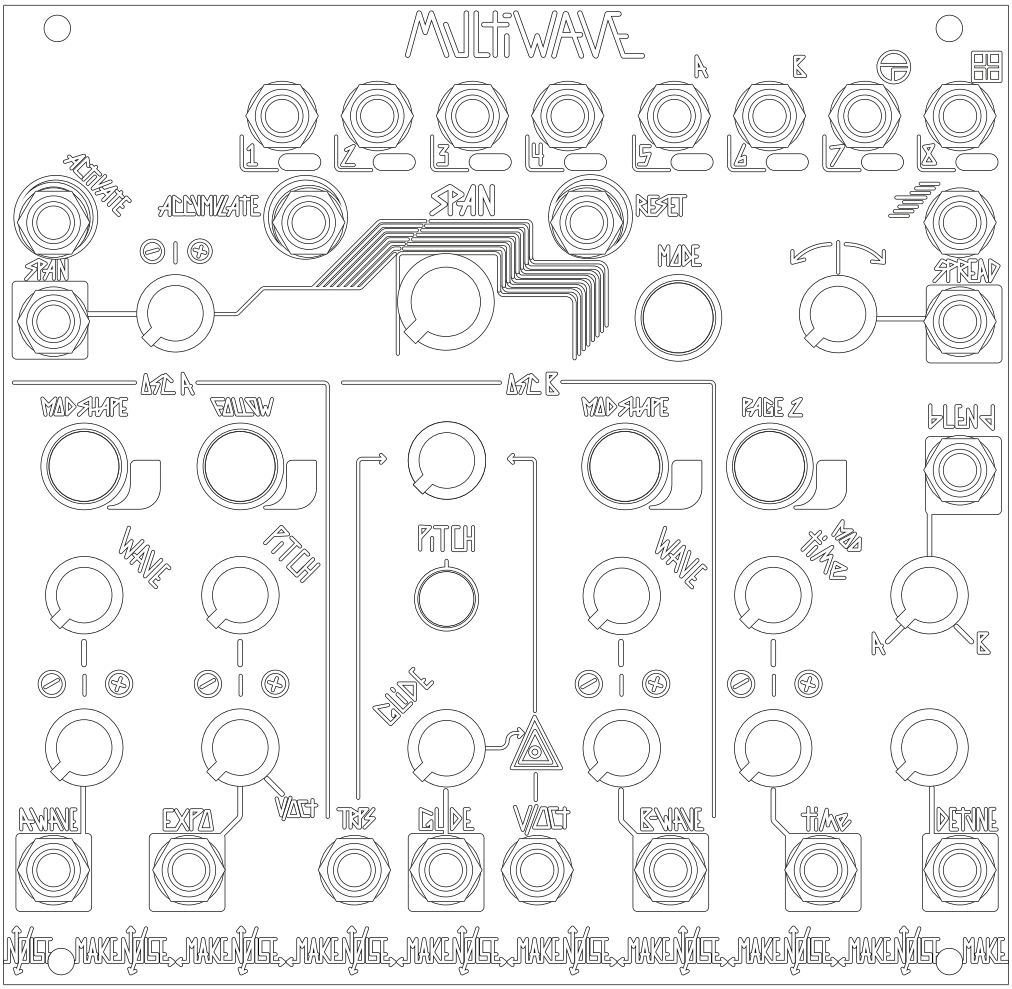
MULTIWAVE



MAKENOISE

TABLE OF CONTENTS

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes / modifications not approved by the Make Noise Co. could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

makenoisemusic.com
Make Noise Co., 414 Haywood Road, Asheville, NC 28806

LIMITED WARRANTY

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, removing knobs, changing faceplates, 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.

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, Return To Manufacturer Authorization, or any needs & comments.

http://www.makenoisemusic.com

About This Manual:

Written by Tony Rolando and Walker Farrell
Illustration and layout by Lewis Dahm

INSTALLATION

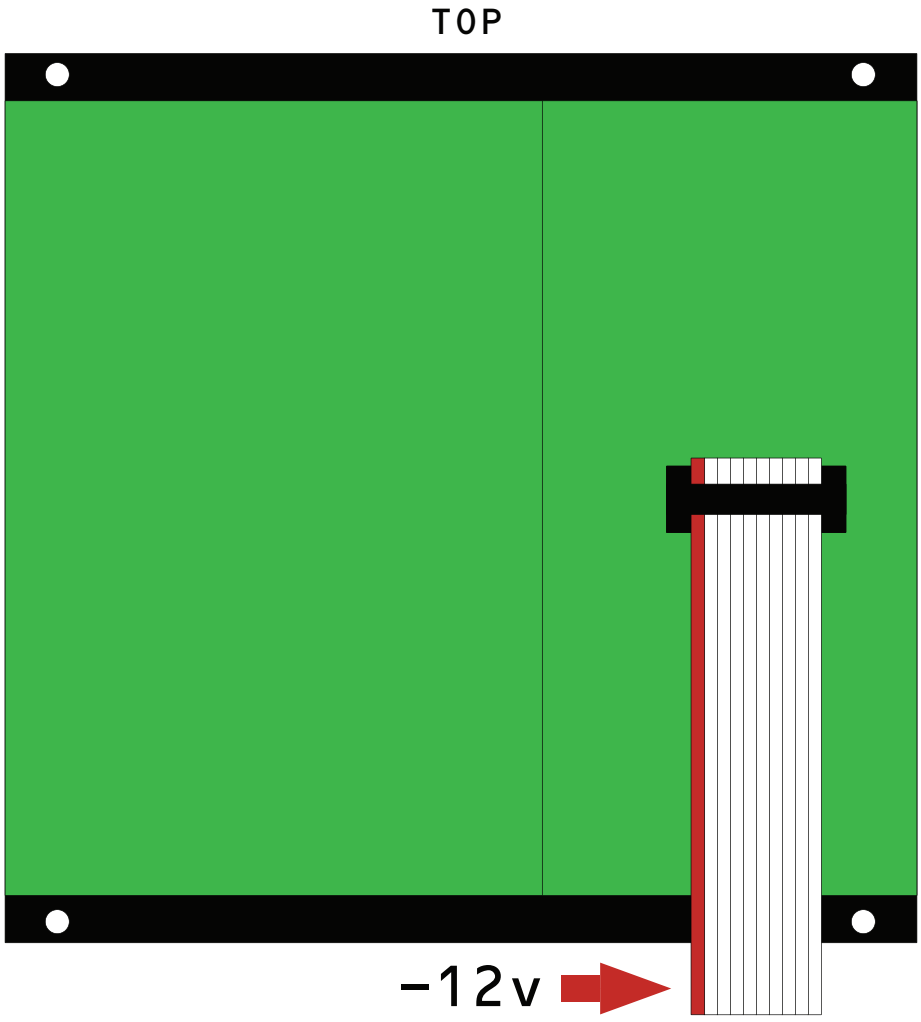
Electrocution hazard!

Always turn the Eurorack case off and unplug the power cord before plugging or unplugging any Eurorack bus board connection cable. Do not touch any electrical terminals when attaching any Eurorack bus board cable.

The Make Noise MultiWAVE is an electronic music module requiring 230mA of +12VDC and 5mA of -12VDC regulated voltage 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 26HP in your Eurorack synthesizer case, confirm proper installation of 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 manufacturer's specification for location of the negative supply.

INTRODUCTION

MultiWAVE is an eight channel dual wavetable oscillator for the New Universal Synthesizer System or any Eurorack modular synthesizer. It uses a single set of controls and macro modulation functions to generate eight unique audio waveforms at eight independent channel outputs.

Each MultiWAVE channel contains two independent wavetable oscillators, Osc A and Osc B, each with its own wavetable loaded and variable relations in frequency, modulation, and wavetable position.

Many of MultiWAVE's parameters and inputs can be modulated independently across all eight channels in either of two ways: Spread, and Modulation Dissemination. These new modulation styles are used for the Osc A Wave Position, Osc B Wave Position, Mod Time, and Osc A Pitch parameters. (note the gold legending on the attenuverters for these parameters):

- The Spread control affects all channels to differing amounts based on the direction of the Spread parameter. It allows for weighted modulation of up to 40 destinations with a single control voltage. When Spread is modulated to the left of 12:00, channels further to the left are more affected by Spread. When Spread is set to the right of 12:00, channels further to the right are more affected by Spread. Individual parameters' Spread depth is set by their respective input attenuators.

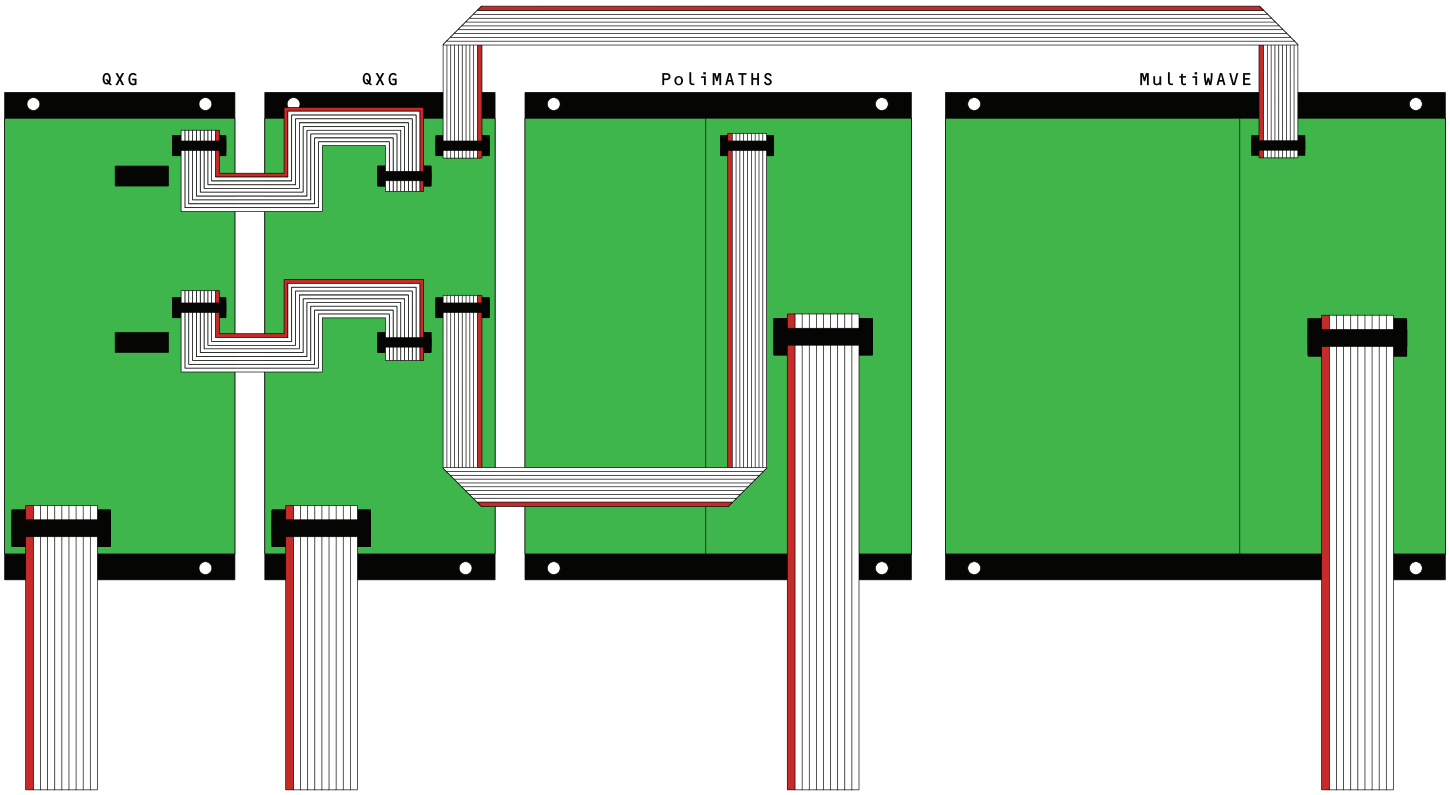
- Parameters with their CV inputs patched bypass Spread and are instead subject to Modulation Dissemination, where the CV input's current value is captured by the respective channel at activation. In other words, modulation patched to the controls with the gold legending is shared from one channel to the next as channels are activated. The depth of Modulation Dissemination is set per parameter by the input attenuators.

(The Osc B Pitch parameter's input is used for Modulation Dissemination, but is not subject to Spread. To Spread Pitch across the eight voices, use the Detune parameter instead.)

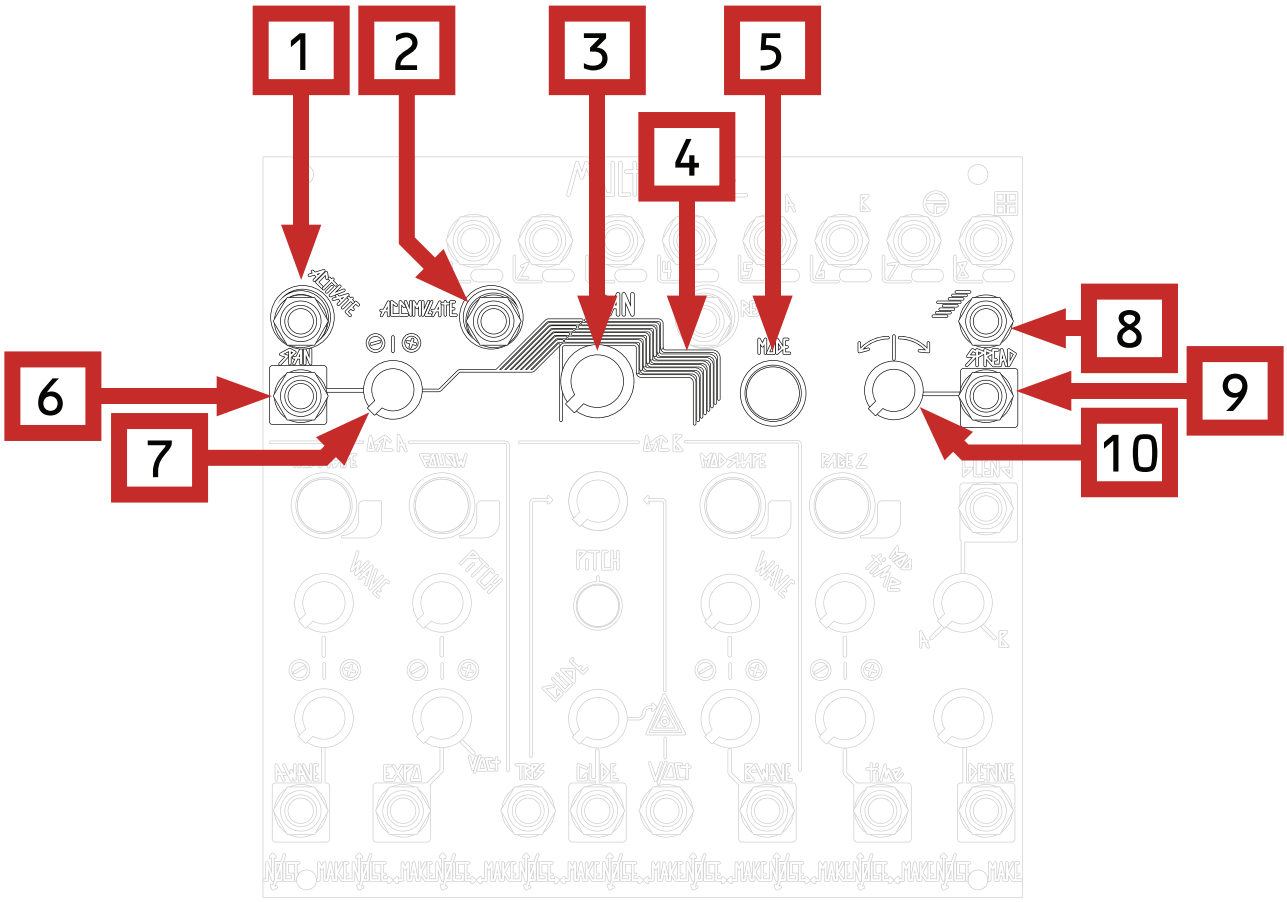
In conjunction with each other, these two modulation methods (Spread and Modulation Dissemination) allow for the aforementioned function parameters to be uniquely modulated across eight channels with only a single set of controls.

MultiWAVE channels are activated via Span and Activate controls which operate identically to those on PoliMATHS. Channels can be activated directly in variable, and even arbitrary patterns using any control voltage patched to Span, chronologically using Round Activation or simultaneously using Parallel Activation. When a channel is Activated it receives new values for Modulation Dissemination as well as generating Channel Index signals for use with other N.U.S.S. modules (for example to Activate analogous PoliMATHS channels simultaneously for a poliphonic voice patch).

MultiWAVE also includes an output header for creating pre-patched connections to the signal inputs of a pair of QXG modules. When a PoliMATHS is also pre-patched to the QXGs' control inputs, the collection of modules comprises the eight voice, dual wavetable core of the New Universal Synthesizer System.

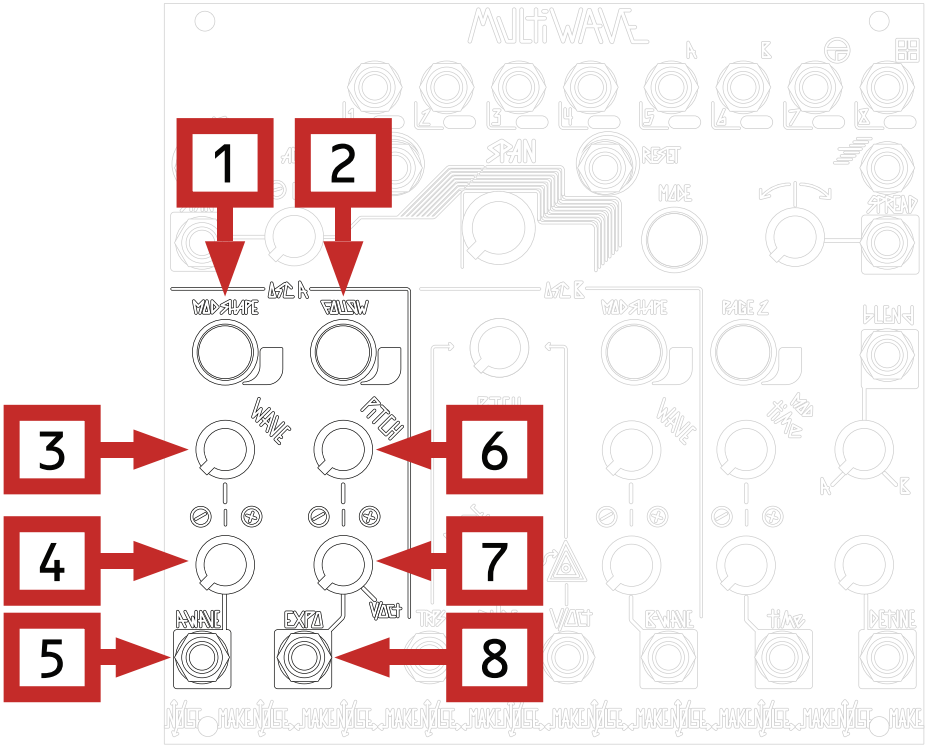

QXG
QXG
PoliMATHS
MultiWAVE

PANEL CONTROLS



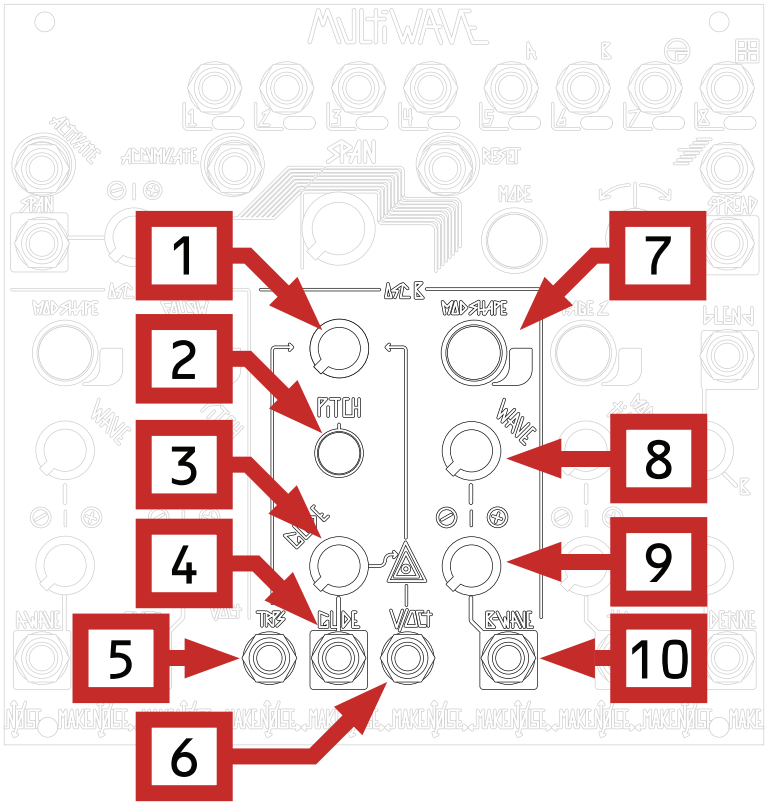
1. **Activate Input:** Gate input. At rising edge, Channels Activate according to Span control as determined by current Span Mode.
2. **Accumulate Input:** Gate input. When patched, all Activation messages will be held by the target Channel(s) until gate is received at Accumulate. Channels display Orange to indicate they are being held.
3. **Span:** Sets the Channel Span for Activation according to current Span Mode. In Channel Index mode, Channel is Activated upon selection if Activate input is unpatched. Set to 12:00 with Span CV Input attenuverter clockwise in Channel Index mode to translate Channel Index messages from other N.U.S.S. modules.
4. **Span Activity Window:** Displays current Span mode as selected by Mode Button. White=Channel Index; Yellow=Round; Blue=Parallel. Lights Bright White in Channel Index when set up to receive Channel Index messages from other N.U.S.S. modules.
5. **Mode Button and Activity Window:** Selects Span Mode, indicated by Span Activity Window.
6. **Span CV Input:** Control Voltage input for Span parameter. Modulate with any control signal, or patch Channel Index output from other N.U.S.S. module.
7. **Span CV Input attenuverter:** Bipolar input attenuator for Span CV Input. Set clockwise with Span panel control set to 12:00 in Channel Index mode to translate Channel Index messages from other N.U.S.S. modules.
8. **Channel Index Ouput:** Sends a Control Voltage indicating currently Activated channel. Patch to Span input on other N.U.S.S. modules.
9. **Spread CV Input:** Control Voltage input for Spread parameter.
10. **Spread Combo Pot:** Bipolar panel control for Spread parameter. Sets direction and amount of modulation sent to unpatched Spreadable parameters according to the settings of their input attenuverters. When Spread CV Input is patched, operates as bipolar attenuator.

PANEL CONTROLS



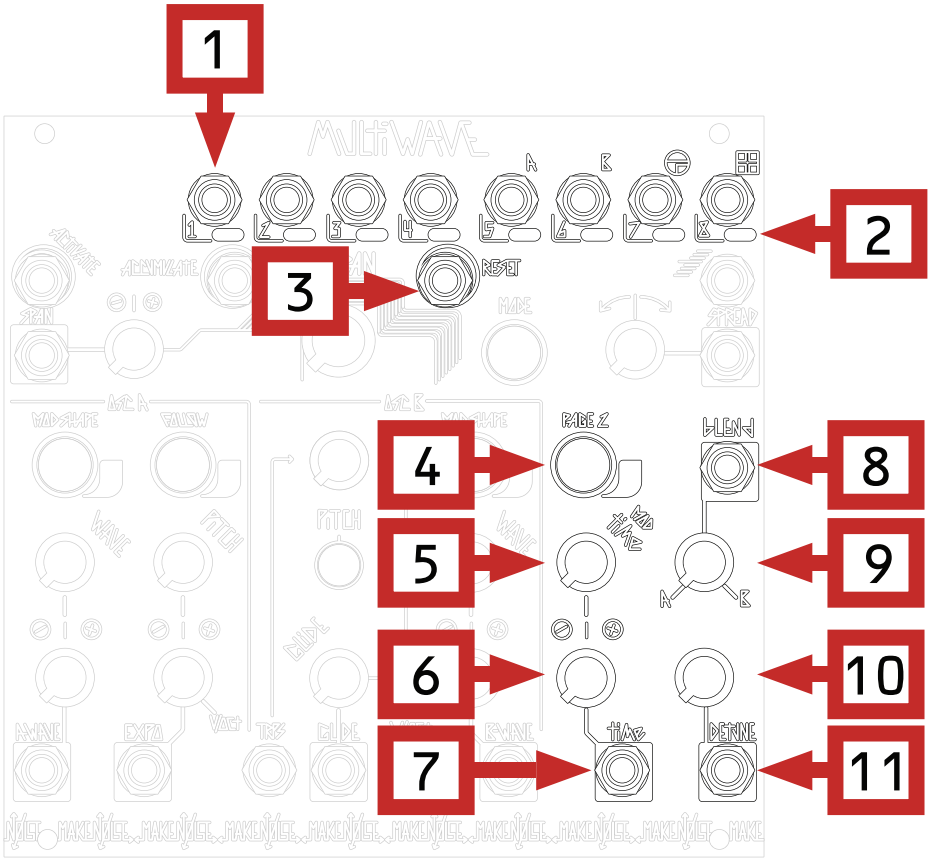
1. **Mod Shape Button and Activity Window:** Selects and denotes Mod Shape for Osc A.
2. **Follow Button and Activity Window:** Selects and denotes Follow Mode.
3. **Wave Panel Control:** Sets wave position in currently loaded wavetable. Spreadable parameter.
4. **Wave Attenuverter:** Bi-polar input attenuavor for Wave Position Modulation Dissemination or Spread amount.
5. **A-Wave CV Input:** Control voltage input for A-Wave. Patching this input disconnects A-Wave from Spread and uses CV input for Modulation Dissemination instead.
6. **Pitch Panel Control:** Sets starting Pitch for Osc A according to the selected Follow mode.
7. **Pitch Attenuverter:** Bi-polar input attenuavor for Pitch Modulation Dissemination or Spread amount. When Follow is off, set fully clockwise for 1v/oct response.
8. **Pitch Exponential Input:** Control voltage input for Pitch. Patching this input disconnects A-Wave from Spread and uses CV input for Modulation Dissemination instead. Tracks 1v/oct when Follow is Off and Pitch Attenuverter is set fully clockwise.

PANEL CONTROLS



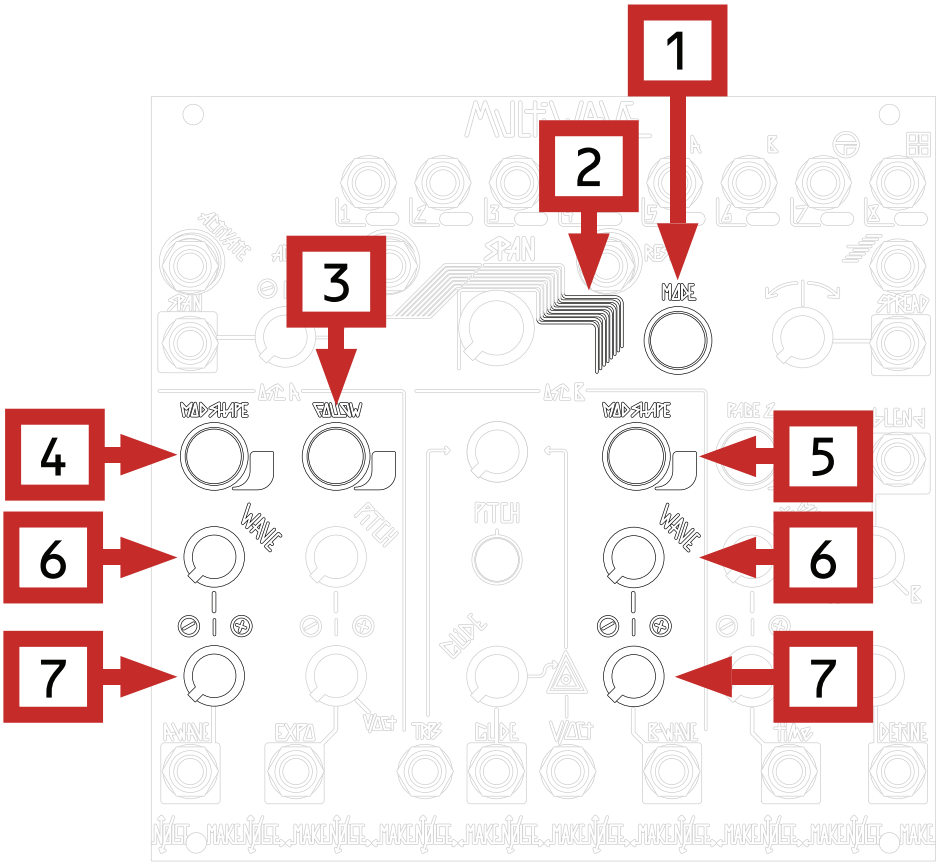
1. **Pitch Panel Control:** Sets starting Pitch for Osc B.
2. **Pitch Fine Tune Control:** Fine control of starting Pitch for Osc B.
3. **Glide Panel Control:** Sets Glide time at 1v/oct input.
4. **Glide CV Input:** Control voltage input for Glide.
5. **TRPS. Transpose input:** Live input that affects all eight channels. Tracks 1v/oct.
6. **V/Oct Input:** Modulation Dissemination input for Osc B Pitch. Tracks 1v/oct.
7. **Mod Shape Button and Activity Window:** Selects and denotes Mod Shape for Osc B.
8. **Wave Panel Control:** Sets wave position in currently loaded wavetable. Spreadable parameter.
9. **Wave Attenuverter:** Bi-polar input attenuavor for Wave Position Modulation Dissemination or Spread amount.
10. **B-Wave CV Input:** Control voltage input for B-Wave. Patching this input disconnects B-Wave from Spread and uses CV input for Modulation Dissemination instead.

PANEL CONTROLS



1. **Channel 1-8 Outputs:** Modular level waveform outputs for individual MultiWave channels. Alternatively can carry various submixes on outputs 5-8 (detailed by gold legending on panel) when Summing is turned on on Page 2.
2. **Channel 1-8 Activity LED's:** Display of Channel activity including current amplitude, Spread amount, and Accumulations.
3. **Reset Input:** Gate input. At gate high, resets MultiWAVE depending on current Span Mode.
   Channel Index Mode: Re-Activates selected Channel.
   Round Mode: Next Activation will be on Channel 1.
   Parallel Mode: Resets all clock dividers so that next Activation Activates all Channels.
4. **Page 2 Button and Activity Window:** Press button to enter Page 2. Activity Window lights White to indicate Page 2 is active.
5. **Mod Time Panel Control:** Sets Mod Time. Spreadable parameter.
6. **Mod Time Attenuverter:** Bi-polar input attenuavor for Mod Time Modulation Dissemination or Spread amount.
7. **Mod Time CV Input:** Control voltage input for Mod Time. Patching this input disconnects Mod Time from Spread and uses CV input for Modulation Dissemination instead.
8. **Blend CV Input:** Control voltage input for Blend. Live input.
9. **Blend Panel Control:** Sets Blend between Osc A and Osc B.
10. **Detune Panel Control:** Detunes the eight channels of Osc B. In tune at counterclockwise. Harmonic oscillator at full clockwise.
11. **Detune CV Input:** Control voltage input for Detune. Live input.

PANEL CONTROLS



PAGE 2 FUNCTIONS

1. **Mode Button:** Turns output mixing on/off.
2. **Span LED:** Lights GREEN to indicate output mixing is ON, RED to indicate OFF.
3. **Follow Button:** Enables/disables Quantization.
4. **Osc A Mod Shape Button:** Selects Mod region.
5. **Osc B Mod Shape Button:** Selects Multimod Activation Behavior.
   OFF: *Multi-Mod Shapes are free running and not affected by Activations.*
   MAGENTA: *Activation Reset. A channels' Multi-Mod shape resets upon Activation.*
   CYAN: *Activation One-Shot. The shape is read through once upon Activation and then stops. For the two random Multimod shapes, the behavior is slightly different.*
6. **Wave control:** Table selection.
7. **Wave Attenuverter:** Bank selection.

THE MULTIWAVE VOICE STRUCTURE

MultiWAVE contains eight channels or voices, each consisting of two wavetable oscillators, Osc A and Osc B.

The channels are Activated via the Activate and Span controls, and modulated via CV, with Spread and Modulation Dissemination allowing for differing parameter values across the eight channels.

Osc A and Osc B each read waveshapes from 8 banks of 8 wavetables. 6 of the 8 banks were specially developed by Make Noise. The remaining banks are a curated collection of historical wavetables. All 8 banks are user-definable should you want to load custom wavetables. Each oscillator loads its own wavetable and has its own voltage controllable wave position within its loaded wavetable.

Osc A can be sequenced independently of Osc B, or Follow the pitch of Osc B in any of several modes including Linear Detune, Octaves, and harmonic Intervals. It may alternatively be set to Free and used for drone, or sequenced independently via its own Pitch parameter. (Setting the associated Pitch CV Attenuator Full CW will achieve a 1V/ Octave response.)

The Multi Modulation reads through the wavetables starting from the channel's unique wave position (taking into account Modulation Dissemination or Spread) at a rate set by the Mod Time parameter with Osc A and Osc B each having a unique Shape parameter.

Transpose, Glide, and Detune are also available for further control of Pitch.

Transpose is a 1v/oct input that affects all eight channels of Osc B simultaneously on all eight channels and is always actively read in real-time (cannot be sent to individual channels via Modulation Dissemination). Osc A will be transposed based on the Follow setting.

Glide adds portamento, with adjustable rate, to the 1v/oct input upon each new Activation. (Note that if a voice is Activated with the same V/Oct value as its previous activation, then there will be no Glide as it is not changing pitch.)

Detune changes the pitch of all eight voices to create chorusing or the type of pleasing drifting effects associated with classic analog polysynths. At its highest values, Detune spreads the pitch of the eight voices all the way out into the harmonic series for use as a "harmonic oscillator."

By default, each channel's output contains a mix of the Osc A and Osc B as set by the voltage controllable Blend parameter. An alternate output scheme is available upon entering Page 2.

ACTIVATING MULTIWAVE

Whenever a MultiWAVE channel is Activated, that channel's Spreadable parameters and 1v/oct input all update to reflect the current values at any patched CV inputs. If it is Activated in tandem with a PoliMaths in a QXG chain (by patching one module's Channel Index output to the other's Span input with the destination module set to Channel Index mode), then the resulting channel output will also be gated at the QXG by the respective PoliMaths channel, resulting in the creation of a traditional poliphonic note event.

MultiWAVE features three unique Activation modes, selected by the Mode button. The selected mode determines the functions of the Activation input and Span parameter.

Channel Index (Mode Activity Window WHITE)

In this mode the SPAN control is used to manually or CV select between the eight channels. Whenever a channel is selected by Span (indicated by White cursor illumination on the channel output activity window) it will be Activated. Turn the panel control for intuitive "strumming," or send a sequence to Activate channels in whatever order you prefer.

Span at 12:00 selects no channel, with values to the left selecting channels 8 through 1, and values to the right selecting channels 1 through 8.

When the Activate input is patched, the selected channel will only Activate upon reception of a trigger or gate at the Activate or Reset input. In this case, channels will NOT Activate immediately upon channel selection, thus allowing Span Activations to be "masked" by a gate stream. (Also note that with Span at 12:00, no channel is selected and thus no channel will be Activated.)

This is also the mode used for one New Universal Synthesizer module to communicate with another (for example, MultiWAVE with PoliMATHS). Patch the Channel Index Out from the leading module to the Span CV In on the following module. Set the following module to Channel Index mode, and set its panel controls for Span CV Attenuator to Full CW and Span Panel control to 12:00. In this condition the SPAN Activity window will show a more Bright White. (To start with this patch, nothing should be patched to Activate, Accumulate, or Reset).

Round (Mode Activity Window YELLOW)

In this mode each successive trigger at the Activation input Activates a new channel, moving to the right or left by the number of channels set by the Span control. For example when Span is set to 1 (indicated by White cursor at Ch1), the simplest Round pattern is created as all eight channels are Activated sequentially one at a time. When Span is set to 2, every second channel is Activated. At 3, every third channel, etc. Different patterns are created depending on the setting of Span and the channel that was last Activated when a new Span is selected. If a gate is sent to the Reset input, the next Activation will start again at Channel 1, allowing for patterns of any length to be created.

Span may be set either to the right or left of 12:00, with lefthand values causing motion to the right.

Parallel (Mode Activity Window CYAN)

In this mode each channel Activates at a clock division of a clock received at the Activate input. The divisions are set by the Span control, with values nearest to 12:00 generating the lowest divisions (all channels /1), with the spread of divisions increasing as the Span control moves further to the left (Channel 1 having the largest divisions) or right (Channel 8 having the largest divisions). The current set of divisions is indicated by the White cursor position via Span control. Using CV, the range of the knob can be exceed for very large integer divisions. If a gate is sent to the Reset input, all channels' clock division counters will reset.

Shift Register Span Mode (Magenta)

This mode is used to pass modulation dissemination from one channel to the next.

The Activation input Activates all channels simultaneously. The channel selected by Span is the Shift Register input.

On each new Activation, data in the shift register (Modulation Dissemination values) is passed to the adjacent channel(s).

For example, if Span is set clockwise to Channel 4, then with each new Activation the values in Channel 4 are passed to Channel 5, the values in Channel 5 to Channel 6, Channel 6 to Channel 7, and 7 to 8.

Channels prior to the Span setting are not a part of the shift register, and will continue to hold their previous values.

When setting Span counterclockwise (to the left of 12:00), the shift register will move left from the channel selection instead of right.

The Reset input clears all Mod Dissem values in the shift register region (Reset also does not affect channels outside the region as set by Span).

Sequencing MultiWAVE in the Shift Register mode is a great way to create cascading arpeggios etc.

Using different Span regions is an easy way to hold some channels static while continuing to sequence others.

Accumulation

When the Accumulate input is patched, Activations are accumulated and delayed until this input receives a trigger or gate, at which point channels that had received an Activation message since the last Accumulation trigger will all Activate simultaneously. Channels that are currently Accumulated (but not yet Activated) light ORANGE.

OSC B

Pitch
Pitch of Osc B. Sum of the Coarse panel control, Fine panel control, Transpose input, and 1v/oct input (via Modulation Dissemination and plus Glide).

Wave Position (Spreadable parameter)
Starting Wavetable position to create base timbre for Osc B Oscillator. By default, internal modulation starts from this position and continues to the end of the table at the rate set by the Mod Time control. Alter this behavior with the Mod Region setting (see Page 2).

Mod Shape (Button) and Mod Time (Spreadable parameter)
The Mod Shape button selects the shape that will be used to read through the currently selected wavetable for timbre modulation. Read starts from Wave position and goes through to end of table, with amplitude scaled for travel distance. Associated activity window shows shape by both color and brightness.

Off = No
(You may also jump directly to Off by long pressing the Mod Shape button.)
Red = Ramp / Forward Read
Green = Saw / Backward Read
Blue = Triangle / Ping Pong Read
(Forward read from starting position to end followed by reverse read from end to starting position.)
Purple = Sine / Wow and Flutter Ping-Pong Read
(Reads like Triangle but slows down near beginning and end)
Pink = Staircase Read
(Reads like Ramp but instead of continuous Read, jumps to 32 discrete "steps" which allows for stepped wavetable scanning.)
Orange = Stepped Random / Random Access Read
Yellow = Smooth Random Read

The Mod Time parameter sets the rate of this modulation, which can be different per voice via Spread or Modulation Dissemination.

Glide
Sets glide amount between old and new pitch value upon reception of change in 1v/oct signal upon channel Activation. Note that if a voice is Activated with the same V/Oct value as its previous activation, then there will be no Glide as it is not changing pitch.

Transpose
Real-time input for global transposition of Osc B Pitch across all eight voices (not subject to modulation dissemination). Tracks 1v/oct.

PAGE 2

As you might imagine, you may press the Page 2 button to enter Page 2, which allows access to global functions.

Wavetable Selection
While in Page 2, each Osc uses its respective Wave control to select Table while Wave Attenuverter selects Bank. If the current position of the Wave control is different from the previously selected wavetable, then the current position will appear as a white cursor and the currently selected table will appear as a brighter version of the bank's color. In this way you can check which table is loaded without loading another one. After navigating the cursor to the current table it will become live for selection of a new table.

There are eight banks, each a different color, displayed at channel outputs with currently selected table shown by the Cursor in White:

RED - CLASSIC SHAPES
BLUE - MAKE NOISE
GREEN - WARP AND FOLD
PURPLE - ADDITIVE
PINK - SYNC
ORANGE - ORGANS
YELLOW - VOCAL
CYAN - FM

On Page 2, Wavetable Selection is previewed. Once Page 2 is exited, the selected table is loaded, which takes 2 seconds.

The tables in these banks may be replaced with user-defined tables by connecting the MultiWAVE to a computer using the USB jack.

Output Mixing
On Page 2, Mode Button turns output mixing on/ off. SPAN window lights GREEN to indicate Mixing is ON, or RED to indicate Mixing is OFF.

Output mixing allows for easier use outside the QXG/PoliMaths chain. Outputs are as follows:

```
1-4: individual channel outputs
5: mono mix of all eight channels, Osc A only
6: mono mix of all eight channels, Osc B only
7: odd channels only
8: even channels only
```

When output mixing is OFF, each channel appears at its own output.

Multimod

On Page 2, Osc B Mod Shape button chooses Multimod Activation behavior.

OFF: Multi-Mod Shapes are free running and not affected by Activations.

MAGENTA: Activation Reset. A channels' Multi-Mod shape resets upon Activation.

CYAN: Activation One-Shot. The shape is read through once upon Activation and then stops.

Mod Region

On Page 2, Osc A Mod Shape button selects Mod Region (the region of the wavetable that will be modulated by Mod Shapes).

OFF: Default. Modulates from Wave position to end of table.

PURPLE: Modulates from beginning of table to Wave position.

Quantization

On Page 2, Follow button enables Quantization.

OFF: No Quantization.

YELLOW: 12-TET quantization enabled. Affects Pitch, Transpose and V/Oct. Also affects Osc A Expo control in Free and Detune modes (including when channels are Spread). The oscillators are also locked to A=440 when this is on and the fine tune is at noon.

OSC A

Pitch (Spreadable parameter)
Pitch of the Osc A. Behavior depends on the setting of the Pitch Follow button (see below).

Pitch Follow (Button)
Sets Follow behavior. Press and hold this to reset to OFF mode.

OFF: Free. Makes Osc A Pitch independent (and tracks v/oct when Pitch attenuverter set CW).

Pink: Expo Detune. Makes Pitch add +/- one octave to Osc B Osc's pitch.

Magenta: Linear Detune. Pitch offsets from Osc B's pitch by a consistent Hz amount.

Cyan: Octaves. Locks Osc A to octaves up or down from Osc B's pitch.

Green: Integer Multiply. Locks Osc A to integer ratios of Osc B Osc's pitch (useful for guaranteed in-tune tracking relative to Osc B, or for sub-oscillator effects etc.)

Wave Position (Spreadable parameter)
Wavetable position to create base timbre for Osc A Oscillator.

Mod Shape (Button)
Selects the read shape for Osc A wavetable (same selection as on Osc B) Press and hold this to reset to OFF mode.

Global Parameters (affect both Osc A and Osc B)

Blend
Sets output mix between Osc A and Osc B.

Detune
Global detune across all eight voices. Set low for beating/chorusing or high for "harmonic oscillator" effects.

Mod Time (Spreadable parameter)
The Mod Time parameter sets the rate of read modulation, which can be different per voice via Spread or Modulation Dissemination.

TIPS & TRICKS

- When using “Harmonic Oscillator” (Detune full CW), it will often make more sense to sequence Transpose instead of 1v/oct.

- The effects of the Detune control are more apparent when voices overlap--this can be a good reason to use the Accumulate input and Activate voices simultaneously.

- In Multimod Activation One-Shot Mode, the Yellow and Orange Multimod shapes act differently.
  - **YELLOW:** TIME sets an adjustable slew rate.
  - **ORANGE:** TIME does nothing.

APPENDIX A: INCLUDED WAVETABLES

CLASSIC SHAPES	MAKE NOISE	WARP AND FOLD	ADDITIVE
1_tri_saw	1_maths_curve_tri	1_warp_sine	1_additive_saw
2_tri_square	2_0coast_ot	2_pw_sine	2_additive_saw_formant
3_tri_saw_square_pwm	3_0coast_mult_even	3_fold_sine	3_additive_square
4_square_pwm	4_0coast_mult_full	4_mirrored_sine	4_additive_square_formant
5_sine_square_saw	5_xpo_modulate	5_wrap_sine	5_additive_saw_hp
6_saw_ramp_combo	6_strega_tone	6_horizontal_fold_sine	6_additive_harm_lp
7_super_saw_index	7_mod_demix_intervals	7_horizontal_fold_saw	7_additive_harm_hp
8_sine_dc_clip	8_mod_demix_packets	8_0coast_mult_odd	8_additive_harm_sweep
SYNC	**KEYS**	**VOWEL**	**FM**
1_flip_sync_sine	1_organ_odds	1_vow_u_a	1_fm_index_1
2_sync_sine	2_organ_harm	2_vow_o_i	2_fm_index_2
3_dpo_sync_sine	3_organ_harm_clip	3_vow_a_i	3_fm_index_3
4_sync_saw	4_organ_simmer	4_vowel_multi	4_fm_index_4
5_dpo_sync_saw	5_organ_full	5_vowel_multi_rounded	5_fm_index_5
6_sync_square	6_fm_bell	6_vintage_vox_1	6_fm_index_6
7_dpo_sync_square	7_fm_epiano	7_vintage_vox_2	7_fm_index_7
8_sto_sync	8_fm_pluck	8_vintage_vox_3	8_fm_index_8

APPENDIX B:
LOADING CUSTOM WAVETABLES

To access the MultiWAVE folder structure for reorganizing wavetables, or loading custom tables, connect MultiWAVE to a computer via USB-C cable (the USB-C jack is on the bottom left behind the panel), and power on the system while holding the MODE button.

MultiWAVE will appear as an external drive called MULTIWAVE.

The folders are as follows:

```
1-red
2-blue
3-green
4-purple
5-pink
6-orange
7-yellow
8-cyan
```

Wavetables are stored in WAV format and are compatible with the WaveEdit software by Synthesis Technology.

Filenames must begin with a number from 1 to 8 to designate the slot they will appear in. For example here are the factory contents of the “1-red” bank:

```
1_tri_to_saw.wav
2_tri_to_square.wav
3_tri_saw_square_pwm.wav
4_square_pwm.wav
5_sine_to_square_to_saw.wav
6_saw_ramp_combo.wav
7_super_saw_index.wav
8_sine_dc_clip.wav
```

Once you have placed the files of your choosing, eject the drive from the computer. Then press the MODE button to allow the MultiWAVE to boot up as normal, after which the wavetables will be selectable on Page 2.

APPENDIX C:
USING MIDI WITH THE MULTIWAVE

With the MultiWAVE MIDI Inlet, or when installed in the New Universal Skiff System, the USB-C input can be used for Activation of MultiWAVE channels via MIDI signals from a USB MIDI host (such as a computer running a DAW or MIDI sequencer).

Using USB-MIDI or leaving a USB cable plugged directly into the MultiWAVE's on-board USB jack for an extended period of time (for FW update or wavetable management) outside the New Universal Skiff System, or without the MultiWAVE MIDI Inlet, is not supported. The skiff panel and MIDI inlet provides the required physical and electronic stability to the USB port.

The MultiWAVE must be running version 4.1.6 or higher in order to receive MIDI messages. Go to https://www.makenoisemusic.com/firmware/ to download the latest version.

New MultiWAVE button functions with MIDI update:

1. Long press the MODE button in normal operation to cause a MIDI panic. The MODE led will light red while the button is held. Since MultiWAVE does not respond to Note-Off messages, "stuck notes" are not a problem, but this function is useful for resetting all the channels' pitches, as MIDI note values are otherwise held per channel until a new value is received.
2. On Page 2, long press the MODE button to enable/disable MPE functionality. During the long press, the SPAN window lights BLUE to indicate MPE is ON, or OFF to indicate MPE is OFF.

MIDI Operation with MPE OFF

MIDI Channel 1

MultiWAVE responds to messages received on MIDI channel 1 the same way it does to Activation gates and 1v/oct signals, utilizing the Span Modes to Activate channels at the designated pitch.

Using Round mode with Span set to 1 and sending MIDI notes on Channel 1 creates simple "Round Robin" poliphony and is the simplest way to play MultiWAVE with a keyboard (patch Channel Index to PoliMATHS' Span input as normal to create the standard voice structure).

Modulation dissemination at the 1v/oct input is summed with Channel 1 MIDI notes, resulting in transposition.

The ChI output generates signals based on Activated channels.

Glide, MultiMod reset, and Accumulate all operate just as they do from patching Activations.

MIDI Channels 2-9

The next eight MIDI channels each Activate a specific channel of MultiMod. These Activations are independent of the Span mode, bypassing the N.U.S.S. “front end.” These MIDI channels are useful for targeted poliphonic sequencing of MultiWAVE.

When using these MIDI channels, Modulation dissemination at the 1v/oct input is summed with MIDI notes, resulting in transposition.

The Ch1 output generates signals based on Activated channels.

Glide and MultiMod reset are not triggered by Activations from these MIDI channels. Also, Activations from these MIDI channels are not affected by Accumulate.

MIDI Channel 10

Midi messages received on MIDI Channel 10 cause global Transposition on MultiWAVE. Like the Transpose input, this bypasses the “front end” and causes an immediate change in pitch on all MultiWAVE channels. Note: As with the physical Transpose input, MIDI Transposition messages do not cause any activity at the CHi output, or any resets of the internal multimod bus.

MIDI Operation with MPE ON

When MPE is turned on (long-press MODE button on Page 2 to turn Span window BLUE), MIDI messages are interpreted differently. The DAW or controller should be set to send MPE in Low Mode or “Lower Zone” with Channel 9 as the top channel. This mode distributes note events across MIDI Channels 2 thru 9 with per-channel pitch bend for special controller effects and alternate tunings. Channels 10 and above do not operate in this mode. Use this mode only if you have an MPE-cabable controller or DAW.

Technical Details
- Channel 1 becomes the MPE master channel rather than the Span-Midi channel.
- Pitch bend on channel 1 (MPE master) is still ±2 semitones.
- Pitch bend on ch 2-9 (MPE Members) becomes ±48 semitones.
- Channel 10-16 are disabled. (Transpose mode on Ch10 is disabled)

Other MIDI Messages

MultiWAVE can also receive Pitch Bend and CC messages. These operate differently depending on whether MPE is turned on.

- **Pitch bend:**
  - Global (Ch1, Ch10, MPE master): ±2 semitone range.
  - Per Channel (Ch2 - Ch9): ±2 semitones in normal mode, ±48 semitones in MPE mode
- **Global CCs:**
  - These are global only (Ch1, Ch10, MPE master)
  - These all sum with the pot position
  - CC2 (Breath Controller) → Spread
  - CC4 (Foot Controller) → Detune
  - CC5 (Portamento Time) → Glide
  - CC8 (Balance) → Blend
- **Per Channels CCs:**
  - Global (Ch1, Ch10, MPE master): Sets the same value on all channels.
  - Per channel (Ch2 - Ch9): Both normal and MPE modes. Sets a value per channel.
  - These all sum with the pot position
  - CC16 (General Purpose 1) → Osc A Wave
  - CC17 (General Purpose 2) → Osc A Expo
  - CC18 (General Purpose 3) → Osc B Wave
  - CC19 (General Purpose 4) → Multimod Time