

# LIGHTNING WAVE

DESIGNED AND BUILT IN DUNEDIN, NEW ZEALAND

# OVERVIEW - LOOK TO THE CENTERFOLD FOR CONTROL DESCRIPTIONS

Thank you for purchasing a Lightning Wave pedal! It has been designed to create a unique digital interface to customise modulation without analog-to-digital conversion of your audio signal.

Traditionally the characteristics of an effects pedal's modulation pattern has been defined by the settings of control knobs like Depth, Rate or Shape.

Now it's possible to trace the shape of your own waveforms using the fader on a Lightning Wave pedal either with stepped sequences using the level, or real-time recording of the fader movement for smooth waveforms. This captures information like recording automation to a Digital Audio Workstation.

Five coloured preset banks have been included with a range of additional features that are explained in this guide.

If you still have any questions after reading, please get in touch.

EMAIL: LEE@LWAVE.NZ | PHONE: +64273008258

Designed and built in Dunedin, New Zealand by:

Lee Nicolson [LWAVE] | concept and hardware  
Jonny Arthur [80TAPE] | firmware development

Many thanks to friends and family xo

## STANDBY / ON MODE

Switch [C] toggles STANDBY and ON. When you first power the device you will see that the control dial [B] is blinking. Check the colour of the dial so you can see if it's in STANDBY or ON mode.

If it's WHITE then your signal is bypassed and the device is in STANDBY mode. If the dial is coloured, the effect is ON and the colour displayed represents the current memory bank.

On start-up this will be RED by default. Four additional banks are coloured GREEN, BLUE, YELLOW and MAGENTA. Pressing dial [B] repeatedly will cycle through the banks.

## WRITING PRESETS

There are two ways to create presets. Both capture the movement of the fader [A] but have a different procedure for creating either stepped or continuous waveforms.

Stepped waveforms are created by capturing a sequence of fader levels. Firstly check the effect is enabled by pressing switch [C], then select the bank you would like to overwrite by pressing the dial [B].

Once selected, the next step is to hold the tap switch [D] down for the entire duration you are selecting step levels.



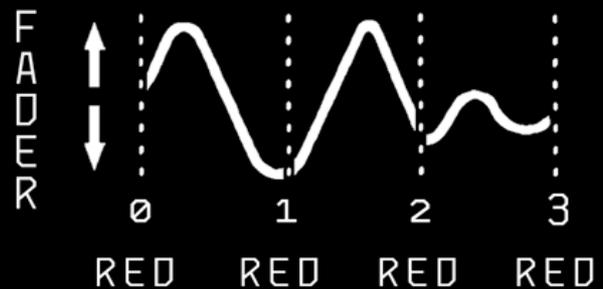
The control dial will first turn GREEN. If you release the tap switch at this point your recording will be cancelled without the existing preset being overwritten.

Before the first press of the dial, adjust the fader level to select the start position. By repeating this process you begin to assemble a sequence that can be anywhere from 1 to 255 steps long.

Releasing the tap switch completes the process and saves the sequence as a preset. You can take your time during the selection because the recording process waits between each press of the dial.

To record continuous waveforms, fader movement is captured in real-time.

Firstly enable the effect and select a bank, then begin by holding the control dial [B] down.



Before the recording starts you will see that there is a count-in period where the dial flashes WHITE to give a reference of the recording tempo.

Begin moving the fader on the first RED flash that follows GREEN and release the control dial at the end of the final beat you would like to capture.

The effect level is audible during preset editing so it can help to use a guitar loop or synth tone to hear the precise level being captured.

## BLANK PRESETS

When a preset is recorded as a single step or beat at the lowest fader position, it lets you control the the depth manually using either the fader or an expression pedal. While using an expression pedal the fader still can limit the total sweep range. E.g. if the fader is at 50% the expression will control the 0-50% range.

## DEPTH CONTROL

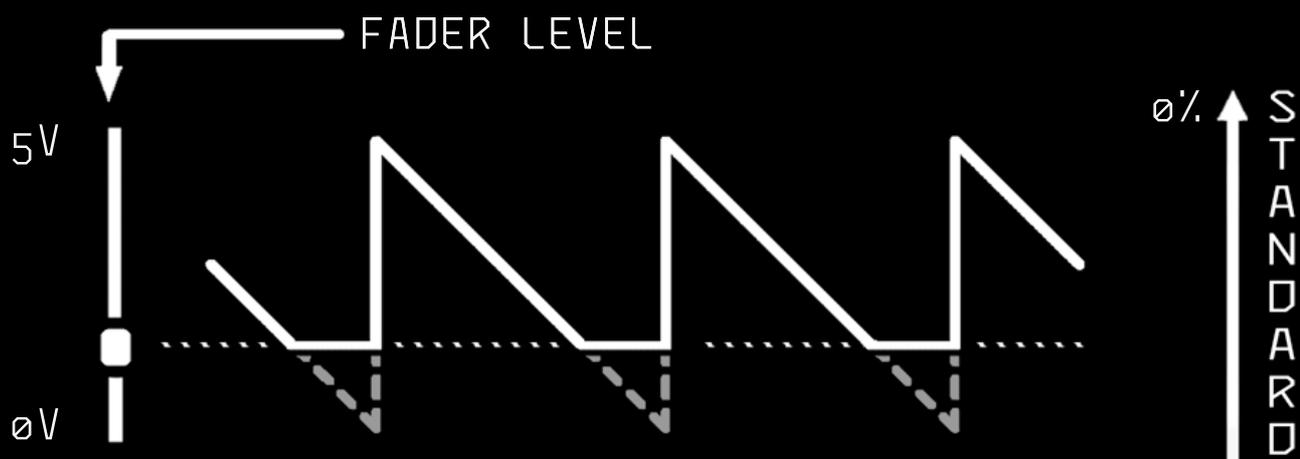
When the device is operating normally, the position of the fader sets the output range of the preset bank. The response range of moving the fader between 0% and 100% depth may not be the same for each bank depending on the range of the preset when it was created.

E.g. if the preset only reached a maximum depth of 75% during creation, then the fader at the 100% position during playback will be scaled so it only controls a maximum of 75% of the range.

## INVERSION SENSOR

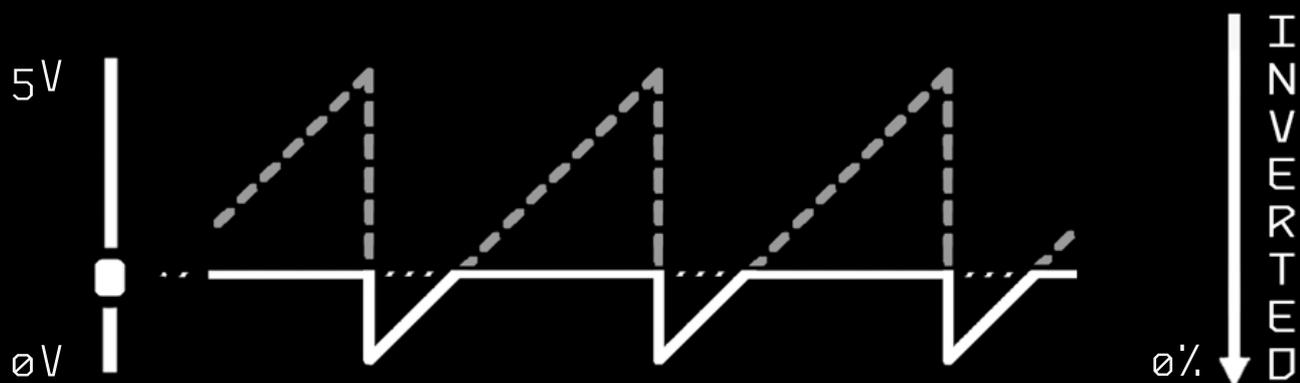
The wave can be inverted by pressing the touch sensor [3]. This is both a reversal of the fader direction and whether it controls the top or bottom range of the waveform. In other words, it acts as a mirror of both the wave preset and if the depth control raises the floor or lowers the ceiling.

When the pedal is powered up the standard setting of the fader is 100% depth while positioned at the lowest point. As the fader level is raised it limits the lower range of the waveform. At the highest point the CV output is limited to a 5V flat line.



When the touch sensor is pressed the preset wave is flipped and the depth control behaves in the opposite way. At the 0% position the CV output is limited to 0V.

Check that the invert sensor is not enabled during recording by switching to standby and ensuring that the fader LEDs are not on.



The I/O JACK is configured by using switches on the circuit board. It can be set to mono for AUDIO, SYNC or CV. Or it can be set to stereo for dual settings with an insert cable.

The top plate has a TOUCH SENSOR to invert the wave and depth control. If enabled the fader is illuminated during standby.

The top-left jack is the signal OUTPUT. When the effect is on standby this signal is true bypass.

By default the top of the FADER is 0% depth during playback mode. The bottom is 100% depth but when a recording is started, the fader changes into the main input control for the waveform being created.

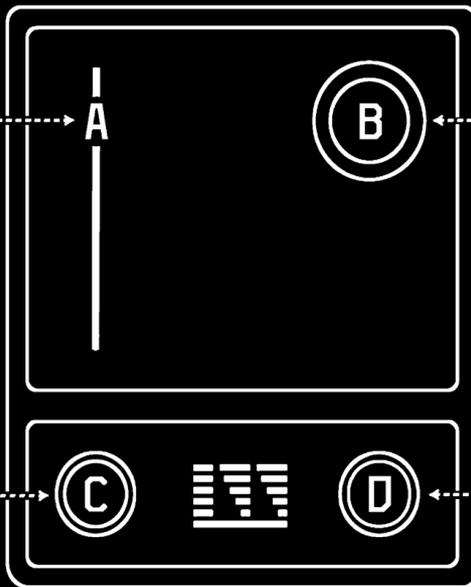
Look at the LEDs within the fader to visualise your wave pattern.

The BYPASS SWITCH allows the audio signal to pass through the pedal unaltered. Standby mode can be identified by the dial flashing WHITE.



[1] [2] [3] [4]

INPUT mono or optional stereo [DOOM pedal only].



The CONTROL DIAL performs several functions by turning or using short or long button presses.

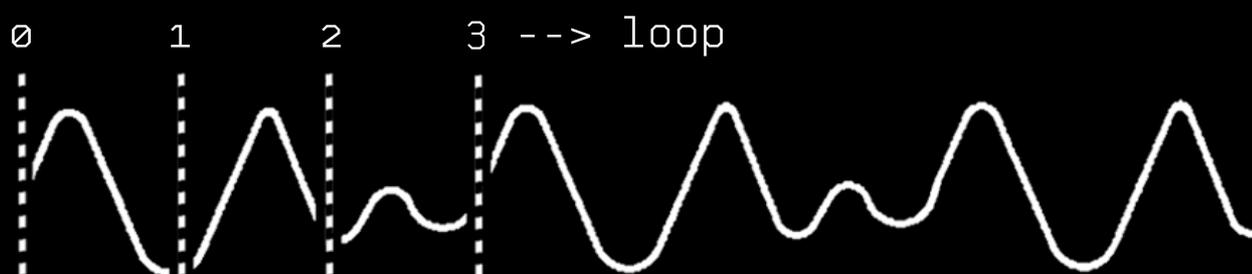
Tempo, modes, current state and the selected memory bank are all displayed using the LED indicator on top.

Multiple short presses of this switch update the TAP TEMPO speed. A long press [over 0.5 seconds] initiates the changing of modes, sub-divisions, and preset recordings.

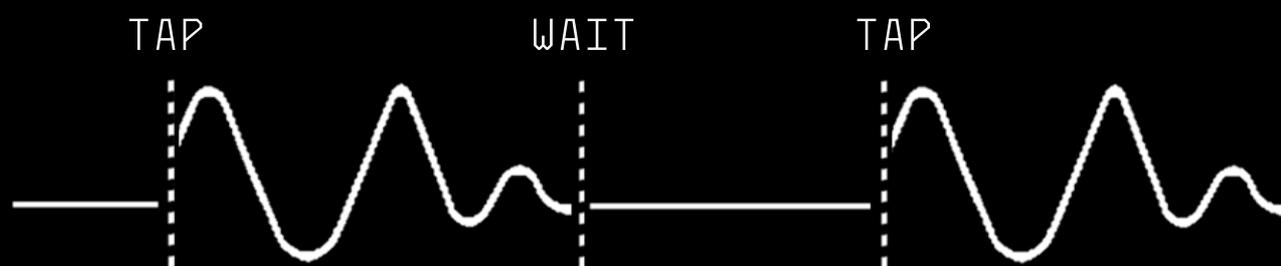
# CHANGING MODES

While the effect is ON, hold down the tap switch [D] and when the control dial turns GREEN, rotate the dial LEFT or RIGHT. You will see the colour change between GREEN, RED and BLUE. Releasing the tap switch selects the playback mode.

By default on power-up you are in AUTO/GREEN mode i.e. a repeating loop of your preset. The tempo speed is adjusted with the tap switch or the control dial.

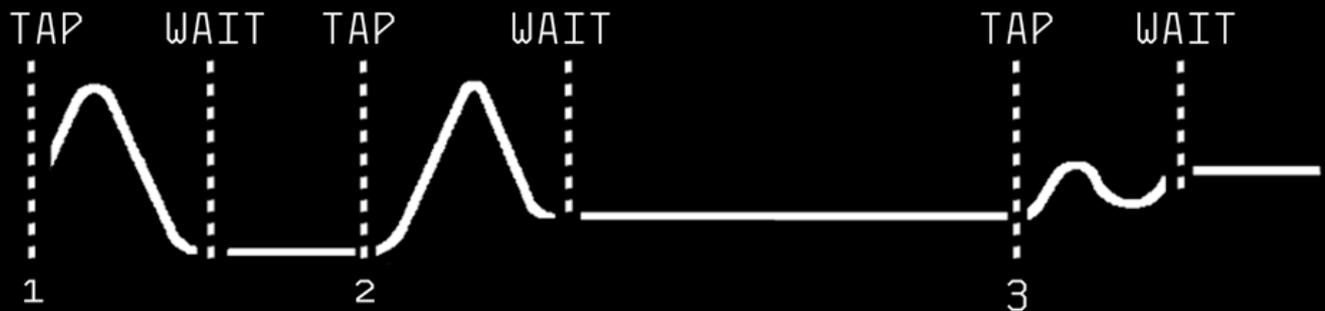


MANUAL/RED mode plays the whole preset ONCE per tap of the tempo switch. In between it waits on either the level of the START or END of the wave, selected with the internal DIP switch 10.



In the example above you can see that the mode is waiting at the end level of the waveform with a small jump at the start when it is triggered.

STEP-TRIG/BLUE mode is similar to RED mode except that it moves per step and waits between taps. E.g. if the preset is 3 beats long it will take 3 taps of the tap switch to step through the progression.



Because the tap switch is utilised as a trigger input, the transition between end-levels can be sped up or slowed down by turning the control dial. This may take some experimentation to figure out. If the tempo is very slow you will find the response speed is quite different to when it's at the maximum. Smooth waves at the highest speed will sound similar to sequenced square wave presets.

## TAP TEMPO | SUB-DIVISIONS

In AUTO mode, switch [D] is configured as a tap tempo input. With multiple short button presses it averages and updates the main tempo speed.

By changing the sub-division setting it's possible to transform the master speed in relation to the received tap or sync tempo.

To change the sub-division setting, the effect needs to be in standby mode. By continuously holding switch [D] you will see the control dial flash between RED and WHITE. To interpret this you only need to count the WHITE flashes, E.g.

RED | WHITE | WHITE | WHITE | WHITE | WHITE | RED

This is a sub-division setting of 1/5 which means that if the tempo input is 60bpm this will translate to 300bpm. Releasing the tap switch will save your sub-division preference to memory.

The sub-division setting can be between 1/1 - 1/8.

The length of a preset is also related to how the preset responds to the tap tempo switch.

E.g. if you have a 4 beat preset and you use a 1/5 sub-division setting to divide the 60bpm tap speed into the equivalent of 300bpm:

4 beat loop @ 60bpm = 15 times per minute

4 beat loop @ 300bpm = 75 times per minute

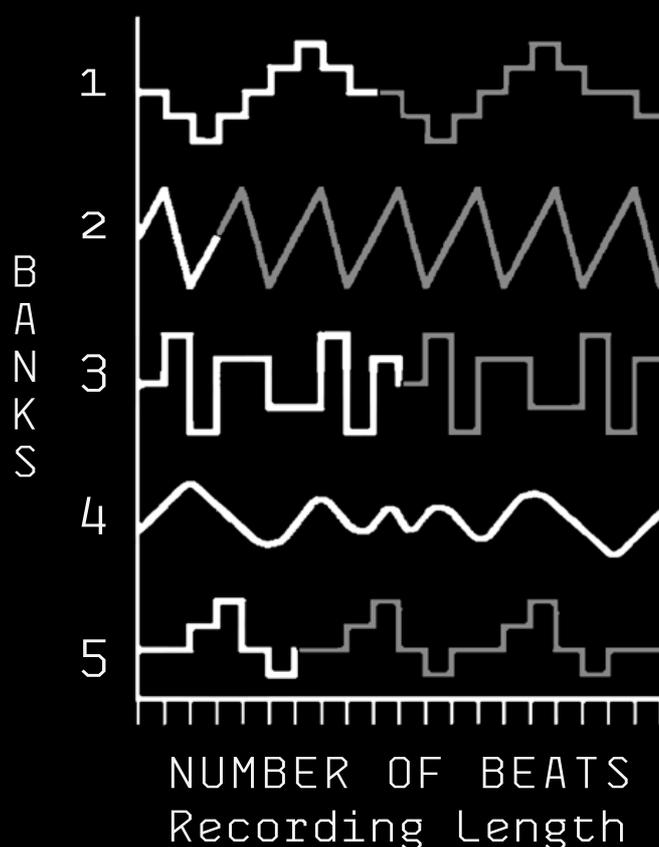
If the preset is longer the loop speed is slower.

20 beat loop @ 60bpm = 3 times per minute

20 beat loop @ 300bpm = 15 times per minute

A longer preset has more information to play though and takes a higher bpm to loop at the same rate but will retain a better resolution at slow end of the tempo range.

Each bank can have a different length making it possible to create a variation of responses across your presets.



# I/O CONFIG | MODE SWITCHES

If you open the enclosure you will see a number of small switches, as described over the page.

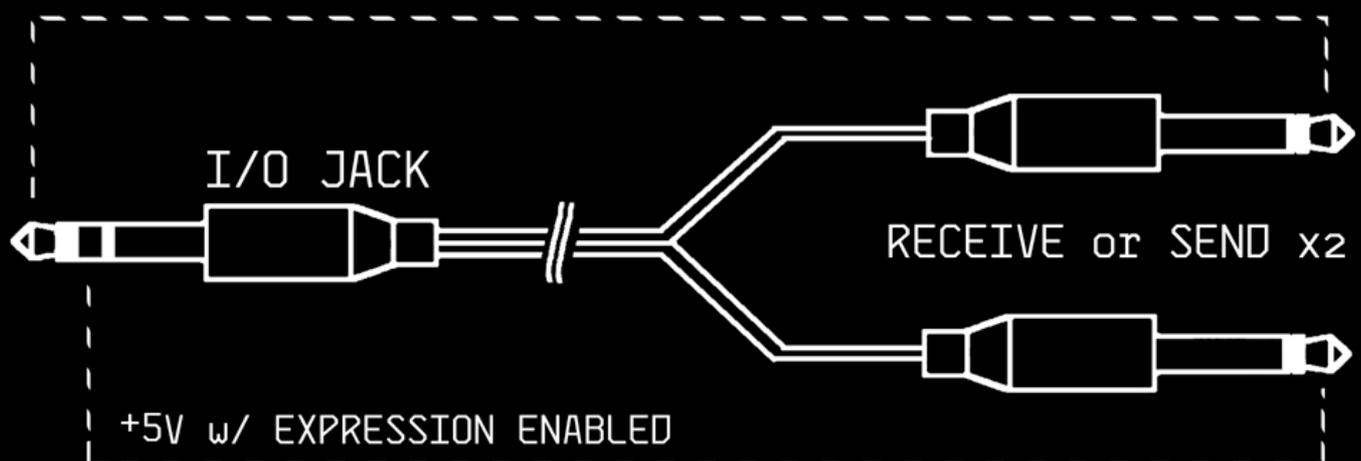
They primarily select the signals that you want to send or receive via the I/O jack [2].

It's possible to assign the single TRS jack to be utilised for a range of single or dual functions. Either use a mono or stereo plug respectively.

## HOW TO USE AN INSERT CABLE

Lightning Wave pedals feature a multi-purpose I/O jack. This can be used with both a mono and stereo plug. If all on-board switches connecting to the ring are off then you can use a standard mono patch cable to send or receive a signal.

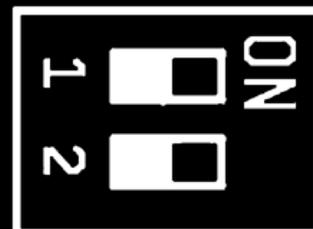
If a second channel is enabled then an insert cable can be used to break-out the stereo plug for functions like connecting an expression pedal or sending and receiving  $0V$  to  $+5V$  CV.



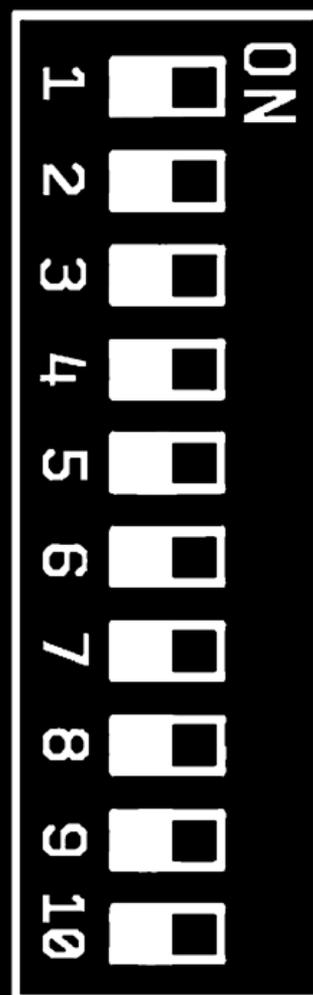
Some LW designs are stereo. This switch is used to run stereo audio into [1]/[4] using an insert cable or to utilise the I/O jack [2] as a secondary mono effect output/input.



This switch gives the option to send a clean buffered bypass signal OR output the TIP signal from the main switch. Only one switch from these top 3 can be selected at the same time.



[1] selects the CV to be sent from the TIP while [2] sends CV from the RING. Both can be enabled at the same time via the stereo plug of a stereo insert cable to split the signal.



To receive the trigger or tempo pulse from an external device, [3] assigns the TIP and [4] assigns the RING. Using only one frees the opposite for parallel CV output. [5] toggles the pulse mode from high to low.

To send a tempo pulse [6] assigns the tip and [7] toggles the pulse mode.

[8] assigns the TRS/TS to expression and CV input. [9] toggles depth/speed.

[10] decides if the wait level is from the preset start[off] or end[on] in manual mode.

# FAQs

## WHAT'S THE WARRANTY ON MY EFFECTS PEDAL?

Lightning Wave effects have a lifetime warranty on defects related to manufacturing or faulty components. Being based in New Zealand it's not practical to cover rough treatment unless you can pay freight, but we're still happy to assist your local technician via email and supply any parts needed at cost plus shipping. In the event of stomp switch failures, we can post a user-replaceable module instead of sending the whole pedal.

## HOW DO I SYNC TO SYNTHS LIKE THE VOLCA BEATS?

The BPM inputs and outputs of the Volca synths are compatible with V-trig signals by default. Using the SYNC-IN or OUT functions you can route to the I/O jack tip. An insert cable can enable the combination of two functions via the TRS, such as timing via the tip and C.V. output via the ring. This is an easy way to sync a Volca to something like an analog filter.

## MY PEDAL IS BEHAVING STRANGELY. WHAT DO I DO?

Check you are using a DC 9V PSU that can supply 100mA. If the supply is OK, switch off all the internal switches that assign the RING and TIP connections to the I/O plug. When multiple signals are assigned to the same I/O channel this can result in minor malfunctions like the SYNC output being routed to the expression input. If this doesn't solve the issue please email [lee@lwave.nz](mailto:lee@lwave.nz) with a description of the problem and a photograph of the inside switch settings.