



# Monophonic MIDI Arpeggiator

User Guide

Revision 1.03

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# INTRODUCING ARPIE

ARPIE is a monophonic MIDI arpeggiator based around open-source software and hardware. The Arduino-based firmware enables simple code customisation and re-purposing by users. The hardware is designed for easy DIY assembly and customisation.

Despite its simple construction and appearance, ARPIE is full featured with various chord arpeggiation and tempo synchronisation features, together with features to enable ARPIE to be used creatively without an attached MIDI keyboard.

A distinctive feature of ARPIE is the minimal control surface. While this has only simple LEDs for visual feedback, it is simple to use once you get familiar with it.

This manual is designed to provide a handy guide to using supplied ARPIE firmware and standard hardware. However it is not the full set of documentation available.

For information on troubleshooting, building, customising etc., as well as firmware updates, source code and hardware files please see <https://github.com/hotchk155/arpie>

## QUICK START

I know you just want to get started... So connect up your MIDI keyboard to MIDI in, and a sound module to MIDI out. Switch on the ARPIE.. after a short delay (1-2 seconds) the 16 blue data display LEDs should light and the CLK LED should start blinking.

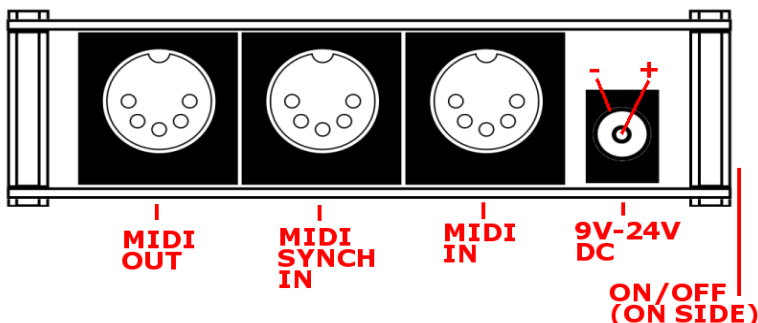
Hold down a chord on the MIDI keyboard. The RX LED should blink as notes are received, and the TX LED should blink rapidly as notes are sent. Press the HOLD button once, the HOLD LED should illuminate. Now when you play a chord, the Arpeggiator continues to play after you have released the keys.

If you don't have a keyboard handy, turn on HOLD, press INST and then press the small button below the right-most blue LED. This should start playing a C major chord arpeggio.

OK, now we've broken the tension lets move on :o)

# CONNECTIONS AND POWER

The rear panel of ARPIE is shown below:



The minimal requirements to make music with ARPIE are

- A synthesizer or other sound module connected to MIDI OUT
- A power source. This can be an internally mounted PP3 battery or a DC supply of between 9 and 24V connected to the rear 2.1mm, centre-positive socket. The socket automatically disconnects the battery when a plug is inserted.

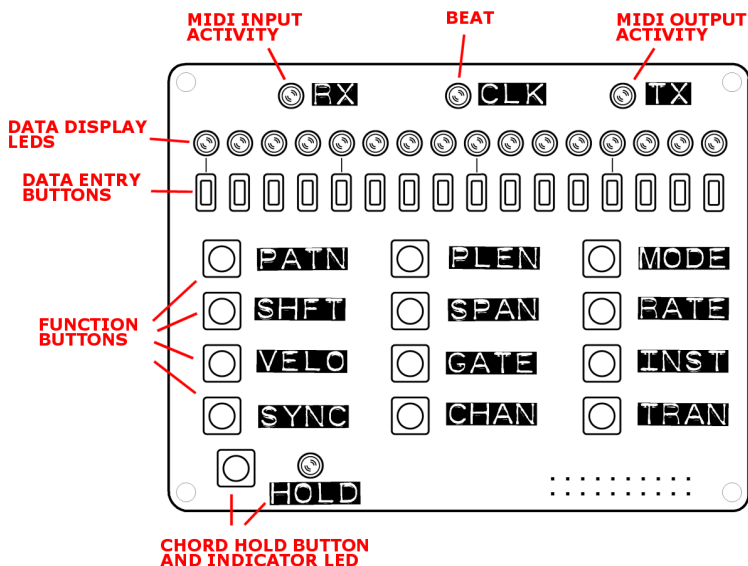
Additionally, you can connect a MIDI controller to MIDI IN. Typically a piano type keyboard is used to play chords which provide input for ARPIEs arpeggiation engine however ARPIE can also be initialised with random or fixed chords without an external keyboard.

Optionally a MIDI clock source can be connected to MIDI SYNCH IN. For example you might want ARPIE to synchronise as a slave to a drum machine which can output a MIDI beat clock.

ARPIE can also slave to a MIDI beat clock on MIDI IN, though often the note controller and master clock sources will often be separate devices, which is where the external synch input is useful.

The main power switch is on the side of the device, close to the DC socket. Slide the switch toward the back of the unit to switch on power. The power LED (close to the switch) lights when power is on.

# THE CONTROL SURFACE



The top row contains three activity LEDs:

- The **RX** LED flickers when MIDI information is received via the input port
- The **CLK** LED - flickers at the start of each beat
- Then **TX** LED flickers when MIDI information being sent via the output port

The function of the Data Display LEDs and Data Entry Buttons depends on which of the function buttons was last pressed. Each function assigns specific meanings to each of the LEDs and Data Entry buttons. If no buttons are pressed for a few seconds the display function returns to Pattern Mode (PATN)

# HOLD BUTTON

The **HOLD** button toggles the chord hold function on and off. An indicator LED beside the HOLD button shows when the chord hold function is in effect. This function means that a chord you press on a controller keyboard will continue to play after you release the keys.

Pressing and holding the **HOLD** button for about 3 seconds enables **MIDI input lock**. This prevents the arpeggiator engine from responding to any inbound notes and it is useful when you have multiple ARPPIEs in a chain and may want to control one while the others continue to play. In MIDI input lock mode the HOLD button blinks rapidly. Press the HOLD button again to exit from this mode.

The HOLD feature has some more subtle effects regarding sequencing and step timing, which are listed later.

## PATN - PATTERN EDIT

In this mode the sixteen data display LEDs show a pattern of "note" (LED on) or "rest" (LED off). You can toggle an LED on and off by pressing the data button below the LED.

This pattern of notes and rests allows a rhythmic structure to be applied to the currently playing arpeggio. Arpeggiated notes are muted when they coincide with a rest in the pattern.

PATN is the default function, and the one to which ARPIE returns when you don't press anything for a while. You can return to this mode immediately by pressing PATN at any time.

## PLEN - PATTERN LENGTH

Press the PLEN button to view and change the length of the rhythmic pattern (from 1-16 steps). The current pattern length is indicated with a brighter LED and can be changed by pressing a data button.

The pattern restarts when it reaches the point defined by PLEN. This can be different from the length of the arpeggio sequence, allowing some interesting effects as the rhythmic pattern of notes and moves across the arpeggio sequence.

# TYPE - ARPEGGIO TYPE



This mode allows you to select the basic way in which the Arp sequence is built from a chord. It also contains some buttons which can be used to initialise a pattern

## ARP ORDER

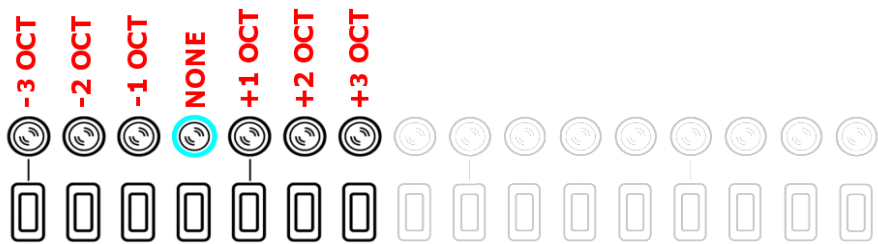
- **UP** - notes of the chord are sorted into ascending order
- **DOWN** - notes of the chord are sorted into descending order
- **UP-DOWN** - notes of the chord are sorted into ascending, then descending order. If the sequence spans multiple octaves, all octaves are spanned on the way "up" before returning "down". The highest note is not repeated.
- **RANDOM** - notes placed into a random order.
- **KEYBOARD** - notes of the chord are not reordered, so will be in the order they were received by MIDI.

## PATTERN SETUP

- **RANDOM** - The rhythmic pattern (PATN mode) is randomised and its length (PLEN) is set to a random number.
- **CLEAR** - Pattern is cleared (all rests) and set to 16 step length.
- **PATTERN FILL** - Pattern is filled (all notes on) and set to 16 step length.

# SHIFT - OCTAVE SHIFT

Transposes the arpeggiated sequence by whole octaves.



The default “no shift” position is indicated by a slightly brighter LED.

# SPAN - OCTAVE SPAN

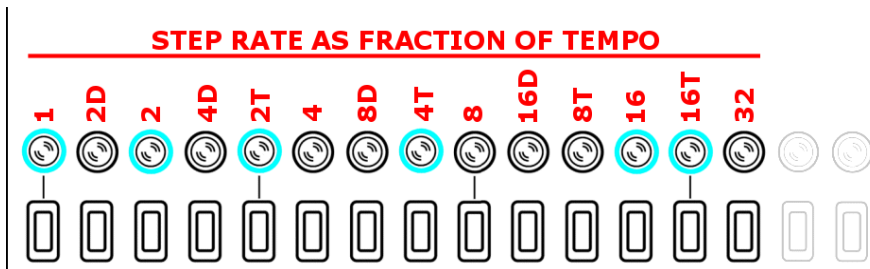
Determine the number of octaves the arpeggiated sequence will be extended over.





# RATE - STEP LENGTH

Determines the length of notes in the arpeggiated sequence, as a fraction of a beat (It does not alter the tempo/BPM)



The above labels can be interpreted as follows:

## NOTE TIME DIVISION

- **1** – full note
- **2** – half note
- **4** – quarter note (1 beat)
- **8** – eighth note
- **16** – sixteenth note
- **32** – thirty-second note

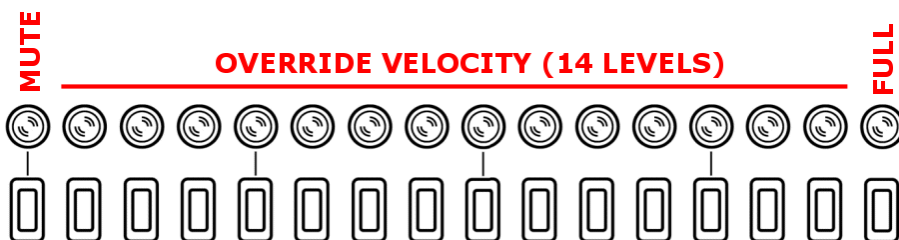
## SUFFIX

- **D** – dotted time (one and a half times normal note duration)
- **T** – triplet time (two thirds normal note duration)

Whole time divisions (Without suffix) are shown on the display with brighter LEDs to assist interpreting the display.

# VELO - VELOCITY

Controls the MIDI velocity of the notes output by the sequencer.

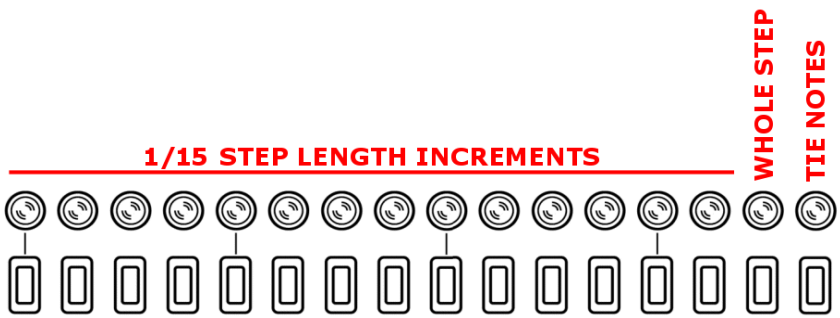


There are two velocity modes and you can toggle between them by pressing and holding the VELO button.

- **As played** plays each arpeggiated note using the velocity of the note as it was played in the chord on the input device. This mode can be identified by the right-most LED being on and all the others off. In this mode the data entry buttons have no function.
- **Adjustable velocity mode** allows you to override the velocity of all arpeggiated notes to one of 16 levels (including muted and full velocity) as indicated below

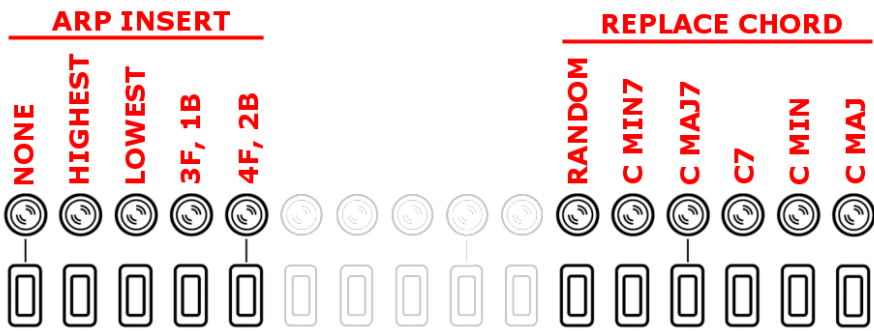
# GATE - NOTE LENGTH

Controls the gate length of the notes output by the sequencer - as proportion of the current note length. The highest setting means that one note is "tied" to the next (The note is not stopped until the next note is started, with the MIDI note off message being sent after the next MIDI note on)



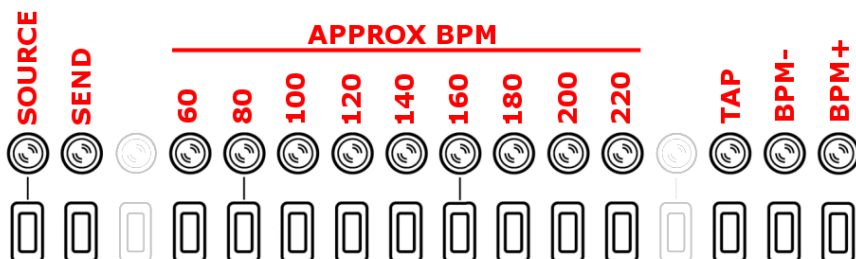
# INST - NOTE INSERTION

Extends the length of the arp sequence by repeating notes from the chord according to specific modes as defined below. This screen also has some options for inserting chords without a keyboard for demo purposes. The "Hold" switch must be enabled for this to work.



# SYNC - MIDI SYNCH

This screen controls the arp MIDI SYNCH mode and internal metronome (BPM). When ARPIE is running on its internal clock, the data display LED's indicate the approximate BPM. Pressing one of the nine BPM buttons sets the tempo to a specific value.



The **SOURCE** button controls the SYNCH clock source:

- **ON** – Internal clock source
- **OFF** – External clock source via the MIDI IN or SYNCH IN sockets

The **SEND** button controls whether ARPIE sends a MIDI beat clock to the MIDI OUT port. This button can also be used to start/stop and synchronise MIDI slave devices. More later in the manual

- **ON** – Send MIDI synch messages out of MIDI OUT port
- **OFF** – Don't send MIDI synch messages

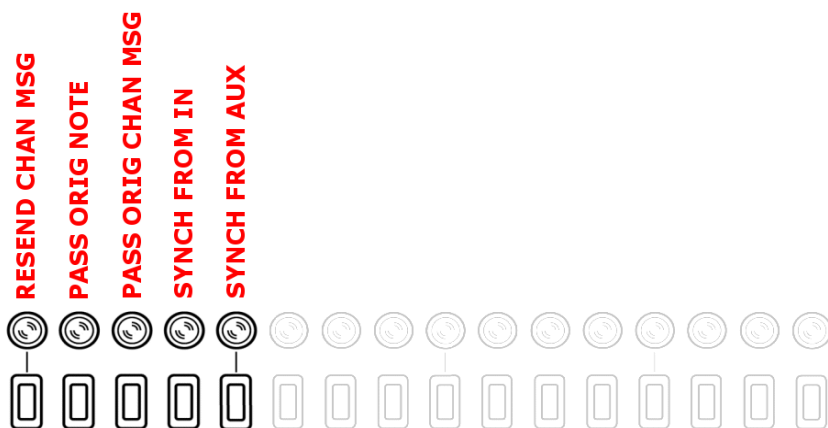
The **BPM+** and **BPM-** buttons can be used to adjust the BPM by steps of 1.

Pressing the **TAP** button two or more times allows you to set the tempo interactively.

BPM defaults to 120 when ARPIE is switched on.

The internally generated BPM is approximate (but good enough for most stuff). However, an external clock source is recommended if a precise BPM is needed.

# SYNC - GLOBAL OPTIONS



Press and hold SYNC to access the Global Options screen.

The global options are

- Resend received non-note channel messages (e.g. Pitch bend, mod wheel) received in ARPIEs input channel, mapped to ARPIEs output channel
- Pass note message received on ARPIEs input channel to output without changing the channel
- Pass received non-note channel messages (e.g. Pitch bend, mod wheel) received in ARPIEs input channel, to output without changing the channel number of the message.
- Allow ARPIE to receive MIDI synch messages from the MIDI IN port
- Allow ARPIE to receive MIDI synch messages from the aux MIDI SYNCH port

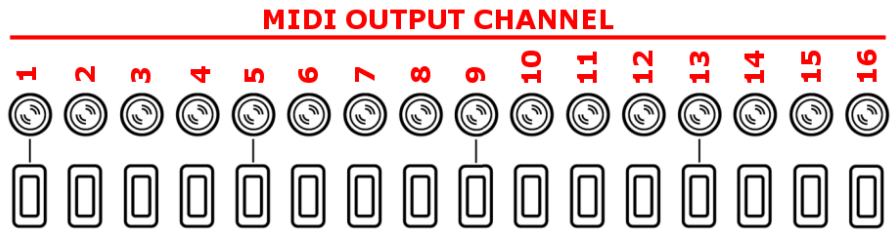
The following table shows the effect of the Global Options

MIDI notes from controller keyboard are received on the MIDI IN socket	<b>Pass Original Note</b> global setting is ON		Notes are sent to MIDI OUT on the <b>original channel</b> on which they are received
	ARPIEs <b>MIDI input channel</b> is set to OMNI or matches the controller's send channel	<b>MIDI Note Lockout</b> is OFF (Hold light is not flashing)	Input notes are sent to arpeggiator engine and arpeggiated notes are sent to ARPIEs assigned output channel
Non-note channel messages (pitchbend, mod wheel etc.) from	<b>Pass Original Channel Message</b> global setting is ON		Messages are sent to MIDI OUT on the <b>original channel</b> on which they are received
	<b>Resend Channel Message</b> global setting is ON		Messages are sent to MIDI OUT on ARPIEs <b>assigned output channel</b>
MIDI Synch message are received on the MIDI IN socket	<b>Synch from IN</b> option is enabled	<b>Synch Source</b> option is EXTERNAL	MIDI synch from the IN socket drives the arpeggiator engine and is sent to MIDI OUT (if SEND option is ON)
MIDI Synch message are received on the MIDI SYNCH socket	<b>Synch from AUX</b> option is enabled	<b>Synch Source</b> option is EXTERNAL	MIDI synch from the auxiliary SYNCH socket drives the arpeggiator engine and is sent to MIDI OUT (if SEND option is ON)

**Note:** MIDI thru is handed in ARPIEs firmware (there is no hardware thru) which can cause latency if the arpeggiator engine is busy - and possibly even dropped messages in situations of very high thru volume.

# CHAN - MIDI CHANNEL

When pressed, selects and displays the MIDI channel for output

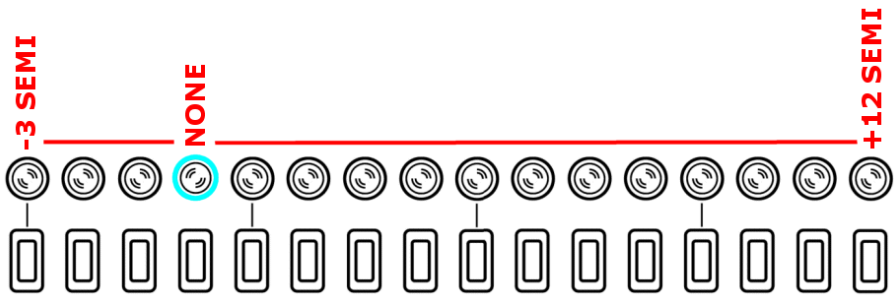


If the CHAN button is pressed and held for a couple of seconds, you can **Select The MIDI Input Channel**. By default ARPIE will accept input from any MIDI channel (OMNI mode) but you can also select a specific channel, which affects MIDI Thru behaviour (see below)

OMNI mode is indicated by all the Data Display LEDs showing brightly. Pressing any single button will select an individual input channel. Pressing the same button again will restore OMNI mode.

# TRAN - NOTE TRANSPOSE

Transpose the MIDI output. Buttons represent -3, -2, -1, 0, +1, +2 through to +12 semitones. The default (no shift) position is indicated with a brighter LED.



# MORE ABOUT HOLD

Here is everything you wanted to know about the hold button. And some more.

HOLD is <b>OFF</b>	One or more keys are pressed and held	Arpeggiation starts from beginning of pattern and plays immediately. Beat time is reset
	One or more keys are released from a chord but at least one key remains held	Arpeggio is rebuilt but position in pattern and timing of next beat are unaffected
	One or more additional keys are pressed while a chord is held	
	Final key is released	Arpeggiation stops
	HOLD pressed while keys are held	HOLD is ON using the current chord. Pattern position and next beat time are unaffected
HOLD is <b>ON</b>	One or more keys are initially pressed	Arpeggiation starts from beginning of pattern. Next beat timing is unaffected so the first step plays according to the current beat time
	Some keys are released from the chord	No effect. The released keys remain in the arpeggio
	Additional keys are pressed while at least one key of the chord remains held	Arpeggio is rebuilt but position in pattern and timing of next beat are unaffected
	All keys are released	No effect
	One or more keys pressed after releasing all keys of the previous chord	Arpeggio is replaced but position in pattern and timing of next beat are unaffected



	HOLD pressed while keys remain held	All notes removed from the arpeggio except any that are still physically pressed on keyboard. HOLD is OFF
	HOLD pressed while no keys are held	Arpeggiation stops. HOLD is OFF
HOLD is <b>FLASHING</b>	MIDI Input Lock is enabled. Incoming MIDI notes are not passed to the arpeggiator engine	

# MORE ABOUT SYNCH

SOURCE	SEND	
INTERNAL  (LED is <b>ON</b> )	<b>OFF</b>	<b>STANDALONE</b> <ul style="list-style-type: none"><li>• Running on internal beat clock</li><li>• Internal beat clock is not sent to MIDI output</li><li>• Incoming synch messages are ignored</li></ul>
	<b>ON</b>	<b>MASTER</b> <ul style="list-style-type: none"><li>• Running on internal beat clock</li><li>• Incoming synch messages are ignored</li><li>• Internal beat clock is sent to MIDI output</li><li>• When SEND goes from OFF-ON the beat clock is restarted and MIDI restart message is sent to downstream devices</li><li>• When SEND goes from ON-OFF the beat clock is stopped and a MIDI stop message is sent to downstream devices</li></ul>
EXTERNAL  (LED is <b>OFF</b> )	<b>OFF</b>	<b>SLAVE</b> <ul style="list-style-type: none"><li>• Requires external synch</li><li>• Both MIDI IN and SYNCH IN are active (but only one should be used to receive synch messages at any time)</li><li>• Incoming synch messages are not passed to output</li></ul>
	<b>ON</b>	<b>SLAVE + THRU</b> <ul style="list-style-type: none"><li>• Requires external synch</li><li>• Both MIDI IN and SYNCH IN can be received (but only one should be used to receive synch messages at any time)</li><li>• Incoming synch messages are not passed to output</li></ul>

# STORED SETTINGS

ARPIE stores the following settings in EEPROM, which means that they are remembered when the device is switched off, and used as defaults next time it is switched on

Setting	Default
Synch SOURCE setting	INTERNAL
Synch SEND setting	OFF
MIDI input channel (or OMNI) setting	OMNI
MIDI output channel setting	Channel 1
Resend Channel Message Global Option	ON
Pass Original MIDI Note Global Option	OFF
Pass Original Channel Message Global Option	OFF
Synch From MIDI IN Global Option	ON
Synch From Aux MIDI SYNCH Input Global Option	ON

These setting can be restored to default by pressing the HOLD button when ARPIE boots up, then while the firmware version is displayed press and release MODE. When HOLD is released all the LEDs should flash brightly indicating the settings have been reset