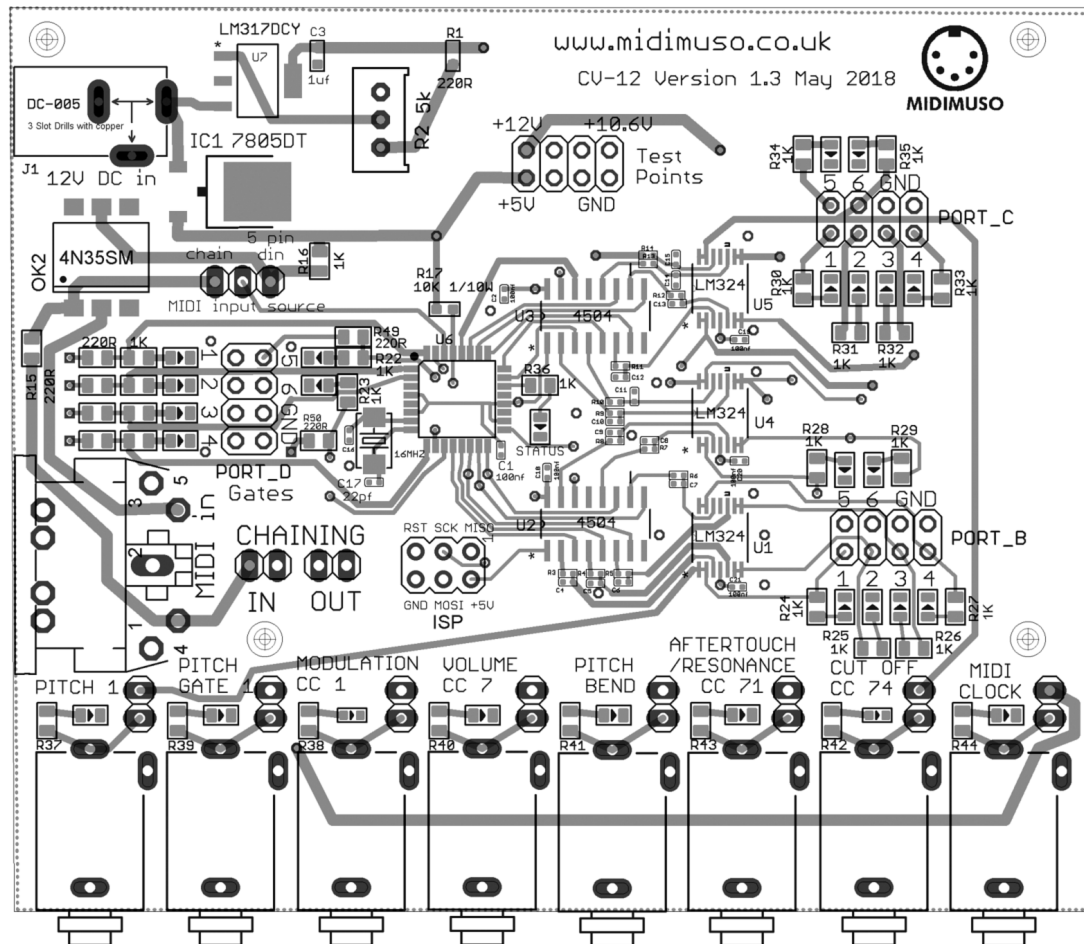




Midimuso CV-12 Octex



Features:

Converts MIDI into control voltages

8 on-board, patchable output sockets

Allows 1V / 0.5V / 1.2 V per octave conventions.

11 modes which offer a balance of pitch / velocity voltages / control voltages / gates.

Monophonic / polyphonic modes (up to 6 note poly per board)

Chainable: boards can be connected together to produce more outputs.

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Overview:

Based around the **Midimuso CV-12** pre-programmed microcontroller IC which reads MIDI and has 3 8 pin ports producing 18 separate voltage outputs for:

Note Gates (5V for “note on” or 0V for “note off”) and corresponding...

Pitch-Voltages (0V to 10V)

One note per MIDI channel (max 6 Notes simultaneously per board) or 4 note Poly Mode.

Control-Voltages (maximum **12** outputs per board, all 0V to +10V)

Pitch-Bend (0V to 10V continuous, 5V centred, available in all modes)

Aftertouch (Channel Pressure) 0V to 10V available in all modes – appears on same output as Resonance (CC71)

Auxiliary Gates (maximum 11 per board) 5V for “note on” or 0V for “note off” events on MIDI channel 16)

Midi Clock (0V to 5V. Pulse length = 1ms, (available in all modes except Mode 6)
Produces 24 pulses per quarter note e.g. 48 pulses / second @ 120 B.P.M.

Re-trigger Mode Pitch gate(s) are repeated for overlapping notes

Continuous Controllers

Modulation (all modes)	Release
Volume (all modes)	Attack
Expression (all modes)	Delay
Resonance (all modes)	Chorus
Cut Off (all modes)	Phaser
	Foot Control

Modes Table

On arrival, the board is set to MODE 1A, re-trigger is on.

	PCB port	0A	0B	1A	1B	MODE	2A	2B	4A	4B	6	1 x poly 4PV	4x mono 4MV
	B1	4 foot cti	A Gate 6	Pitch 1	Pitch 1	Pitch 1	Pitch 1	Pitch 1	Pitch 1	Pitch 1	Pitch 1	Pitch P	Pitch 1
	B2	95 phaser	A Gate 7	95 phaser	A Gate 5	Pitch 2	Pitch 2	Pitch 2	Pitch 2	Pitch 2	Pitch 2	Pitch P	Pitch 2
	B3	93 chorus	A Gate 8	93 chorus	A Gate 6	93 chorus	A Gate 4	Pitch 3	Pitch 3	Pitch 3	Pitch 3	Pitch P	Pitch 3
	B4	94 delay	A Gate 9	94 delay	A Gate 7	94 delay	A Gate 5	Pitch 4	Pitch 4	Pitch 4	Pitch 4	Pitch P	Pitch 4
	B5	73 attack	A Gate 10	73 attack	A Gate 8	73 attack	A Gate 6	73 attack	A Gate 2	Pitch 5	Velocity P	Velocity 1	Velocity 1
	B6	72 release	A Gate 11	72 release	A Gate 9	72 release	A Gate 7	72 release	A Gate 3	Pitch 6	Velocity P	Velocity 2	Velocity 2
	C1	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend	Ptch bend
	C2	1 mod	1 mod	1 mod	1 mod	1 mod	1 mod	1 mod	1 mod	1 mod	1 mod	1 mod	1 mod
	C3	7 vol	7 vol	7 vol	7 vol	7 vol	7 vol	7 vol	7 vol	7 vol	7 vol	Velocity P	Velocity 3
	C4	11 expr	11 expr	11 expr	11 expr	11 expr	11 expr	11 expr	11 expr	11 expr	11 expr	Velocity P	Velocity 4
	C5	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft	71 res/aft
	C6	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off	74 cut off
	D1	A Gate 1	A Gate 1	P Gate 1	P Gate 1	P Gate 1	P Gate 1	P Gate 1	P Gate 1	P Gate 1	P Gate 1	Gate P	P Gate 1
	D2	A Gate 2	A Gate 2	A Gate 1	A Gate 1	P Gate 2	P Gate 2	P Gate 2	P Gate 2	P Gate 2	P Gate 2	Gate P	P Gate 2
	D3	A Gate 3	A Gate 3	A Gate 2	A Gate 2	A Gate 1	A Gate 1	P Gate 3	P Gate 3	P Gate 3	P Gate 3	Gate P	P Gate 3
	D4	A Gate 4	A Gate 4	A Gate 3	A Gate 3	A Gate 2	A Gate 2	P Gate 4	P Gate 4	P Gate 4	P Gate 4	Gate P	P Gate 4
	D5	A Gate 5	A Gate 5	A Gate 4	A Gate 4	A Gate 3	A Gate 3	A Gate 1	A Gate 1	P Gate 5	A Gate 1	A Gate 1	A Gate 1
	D6	CT	CT	CT	CT	CT	CT	CT	CT	P Gate 6	CT	CT	CT
	Prog Change	7	8	0	1	2	3	4	5	6	9	10	10
MIDI	Pitch			1	1	1-2	1-2	1-4	1-4	1-6	1	1-4	1-4
Channels	Control	1	1	1	1	1	1	1	1	1	1	1	1
	Aux Gate	16	16	16	16	16	16	16	16	-	16	16	16
Overflow	Pitch			2	2	3-4	3-4	5-8	5-8	7-12	1	5-8	5-8
to	Control	2	2	2	2	2	2	2	2	2	2	2	2
Next Board	Aux Gate	16	16	16	16	16	16	16	16	-	16	16	16

The bottom 6 rows indicate which MIDI channels the outputs respond to.

Mode 4PV receives notes on MIDI channel 1 and allocates them to an available output automatically. Chaining allows unlimited polyphony with delay between boards being around 1 millisecond.

CT = MIDI Clock. Pulse length = 1ms. Produces 24 pulses per quarter note e.g. 48 pulses / second @ 120 B.P.M.

The lower 3 rows show how a second board will respond.

Changing Modes

Mode change is enabled by sending MIDI program change 99.

Then the desired Mode can be sent as MIDI program change

e.g. Mode 1A = program change "0".

There are MIDI files on the midimuso website to make this easier to do.

There is also an online tool to make program changes much easier.

<https://midimuso.co.uk/tools/>

(works in Chrome, Edge, Opera, Android Webview and Samsung Internet browsers)

Program # MODE

=====

0	1A (default)
1	1B
2	2A
3	2B
4	4A
5	4B
6	6
7	0A
8	0B
9	4PV
10	4MV

Example

Hex Decimal

0xC1	193	Program Change
0x63	99	Enables Mode Change (until board is powered down)
0xC1	193	Program Change
0x05	0	0 = mode 1A

Retrigger

Retriggering is where a gate is switched off and quickly back on when a new note arrives. It's useful in mono modes where you may be playing quickly and you want the envelope generator to be gated again for any overlapping key strokes.

In polyphonic mode, retrigger only occurs when all available channels have been used up (e.g. holding down 4 keys in a one board set up) and another key is pressed.

Switching retrigger off results in a legato style of play.

Program change 99 = allow mode changes, followed by:

Program change 101 = retrigger **on**

or

Program change 100 = retrigger **off**

e.g.

Hex Decimal

0xC1	193	Program Change
0x63	99	Enables Mode Change (until board is powered down)
0xC1	193	Program Change
0x64	101	101 = retrigger on

You don't have to reset the board after a Mode change and the board will remember it is in the new mode even after power off.

The mode can be changed again at any time.

Aftertouch

Channel pressure or “aftertouch” is featured on higher-end keyboards and allows pressing the key(s) down whilst holding a note (or chord) to alter a characteristic such as volume or vibrato.

The signal appears at pin 27 or port C5 on the PCB – the same pin as used for resonance so you should decide on aftertouch or resonance – sending both will produce odd results.

Overflow and Polyphony

In mode 4PV, a single board will allow 4 notes simultaneously.

If a 5th note is sent, it will steal from the oldest note currently playing.

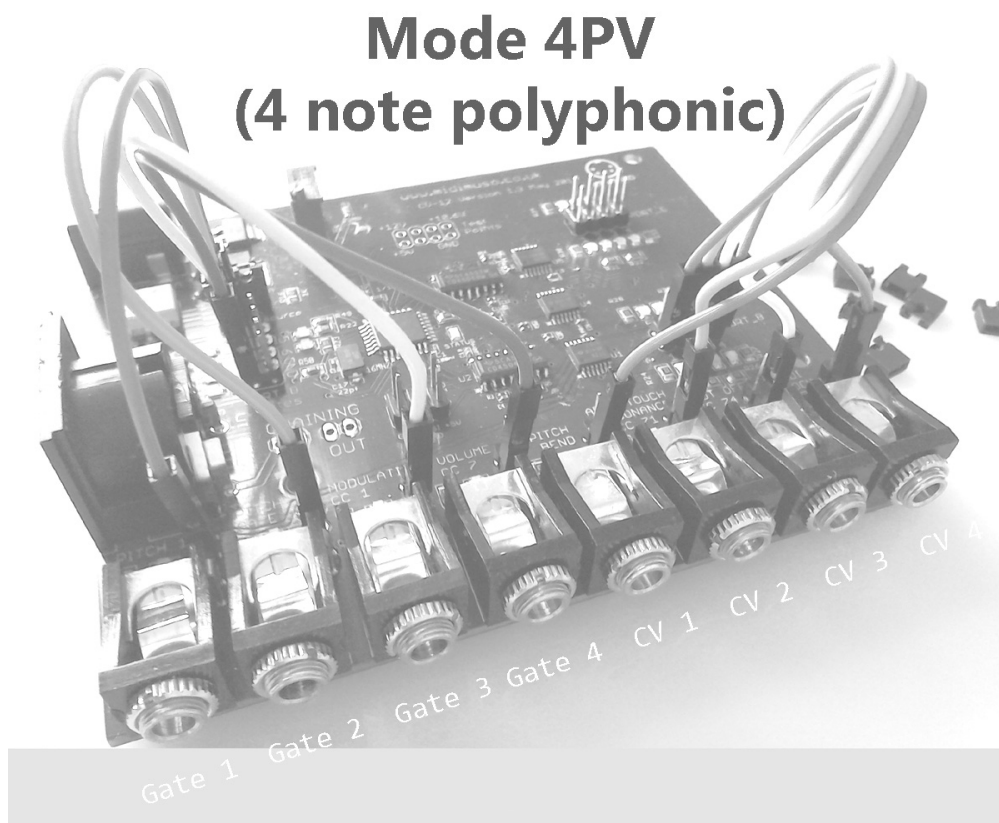
If it is chained, it will pass the 5th note on to the next board which will output if it can.

If it can't, it will pass on (if further chained), or note-steal from its own oldest note.

Patching Sockets

On arrival, the sockets are jumpered and output the gates and CVs labelled on the board.

You can re-assign what a socket does by removing the jumper and attaching a dupont cable from the port pin (ports B, C and D) to the socket pin nearest to the socket.



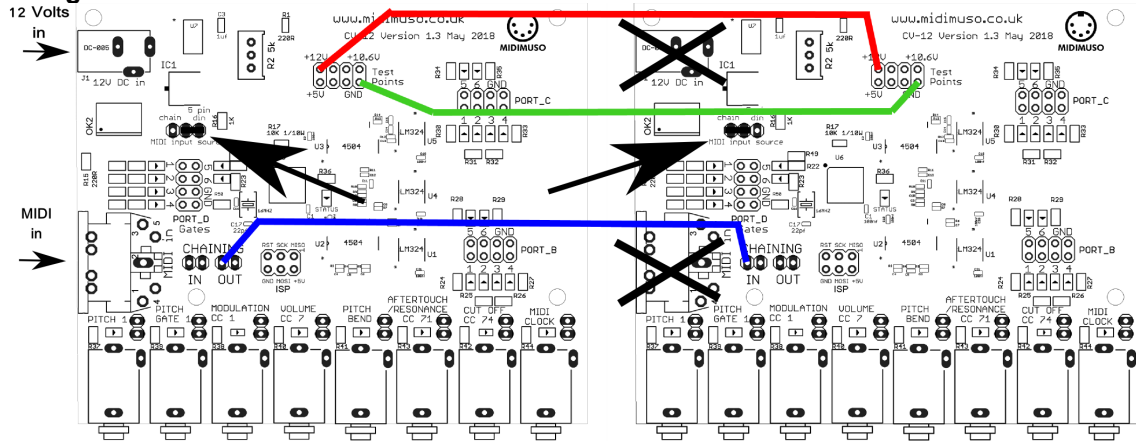
Here, 8 jumper cables have been used to provide 4 pitch Cvs and 4 gates.

The board was put into mode 4PV by playing the midi file from the site:
see the link to the .zip file at the bottom of the page
<http://midimuso.co.uk/index.php/cv-12/>

Chaining

Chaining 2 boards gives 8 note polyphony in Mode 4PV

Chaining CV-12 boards



How Chaining works:

Chained boards are directly connected via chain in and chain out and jumper JP1 should connect centre and adjacent, left pin i.e. “chained” on the chained PCBs.

All boards **MUST** be **powered up** at the **same time** to allow handshaking.

The lowest rows of the modes table show the following information:

Note on and off:

In mode 1A: notes sent over MIDI channel 1 will appear at the 1st board
notes sent over MIDI channel 2 will appear at the 2nd board
notes sent over MIDI channel 3 will appear at the 3rd board etc.

In mode 2A: notes sent over MIDI channels 1 & 2 will appear at the 1st board
notes sent over MIDI channels 3 & 4 will appear at the 2nd board
notes sent over MIDI channels 5 & 6 will appear at the 3rd board etc.

In mode 4A: notes sent over MIDI channels 1, 2, 3 & 4 will appear at the 1st board
notes sent over MIDI channels 5, 6, 7 & 8 will appear at the 2nd board
notes sent over MIDI channels 9, 10, 11 & 12 will appear at the 3rd board etc.

In mode 6: notes sent over MIDI channels 1, 2, 3, 4, 5 & 6 will appear at the 1st board
notes sent over MIDI channels 7, 8, 9, 10, 11 & 12 will appear at the 2nd board etc.

In mode 4PV: the first 4 notes held down and sent over MIDI channel 1 will appear at the 1st board
the next 4 notes held down and sent over MIDI channel 1 will appear at the 2nd board
the next 4 notes held down and sent over MIDI channel 1 will appear at the 3rd board etc.
There's a 1 millisecond delay between boards so 32 note polyphony is practical (total 8 mSec delay)

Continuous Controllers, Pitch bend and Channel Aftertouch

appear at board #1 for MIDI channel 1, board #2 for MIDI channel #2 etc.

Aux gates are always sent on **MIDI Channel 16** and, if the 1st board runs out of available gates, it sends the overflow to the next board etc.

In mode 1A: notes C4 (60) to Eb4 (63) will appear at the 1st board
notes E4 (64) to G4 (67) will appear at the 2nd board etc.

In mode 0B: notes C4 (60) to Bb4 (70) will appear at the 1st board
notes B4 (71) to Ab5 (81) will appear at the 2nd board etc.

Program changes are passed on to every board.

CT (Midi clock) is not passed on.

Calibration for Pitch Voltages. (the board arrives calibrated to 1V / octave)

Volts / Octave Moog scheme:			Output		
MIDI key	Value (hex)	Value (decimal)	1V / oct	1.2V / oct	0.5V / oct
A0	15	21	0.00	0.00	0.00
A1	21	33	1.00	1.20	0.50
A2	2D	45	2.00	2.40	1.00
A3	39	57	3.00	3.60	1.50
C4	3C	60	3.25	3.90	1.625
A4	45	69	4.00	4.80	2.00
A5	51	81	5.00	6.00	2.50
A6	5D	93	6.00	7.20	3.00
A7	69	105	7.00	8.40	3.50
A8	75	117	8.00	9.60	4.00

There is disagreement about MIDI key number standards. We used a free MIDI tool called MIDI Ox to display values from the controller keyboard.

<http://www.midiox.com>

Accuracy

Analogue voltages are produced by “bit spray” PWM at a refresh rate of 62 kHz per channel with a 1st order low-pass filter for smoothing. PWM accuracy is dependent on clock jitter. In practice, accuracy is around 1/30 semitone i.e. around 12 bits – good enough for pitch control.

Specifications:

Power supply voltage: 12 volts DC. Max 18V, +ve centre pin (2.1mm)

Power supply current: 500 mA minimum (per board when chaining)

Pitch resolution ~ 0.03 semitone

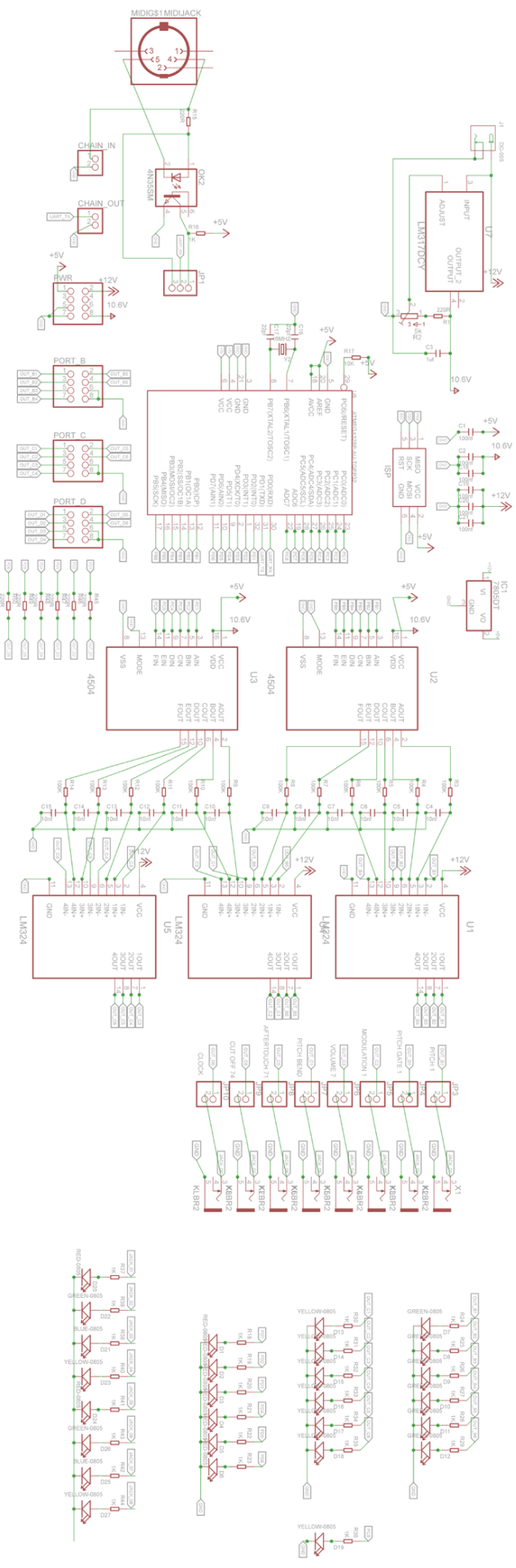
Analogue outputs: 0 – 10 Volts, Gate outputs: 0 – 5 Volts

Contact

email: info@midimuso.co.uk

Acknowledgements

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