

- ★ Handclap simulation
- ★ Variable clap spacing
- ★ Built-in ambience
- ★ Modular construction
- ★ Optional stereo output

**PARTS COST GUIDE** with pre-sets **£11.50**

Two projects, featured in the last few months, which have proved to be very popular are the Synbal (February '83) and Syntom II (April 83). These units were designed to be built up into a modular system which could provide a complete range of electronic percussion.

This month we add another module, the Synclap, which, as the name suggests, allows convincing imitations of a handclap to be produced. The circuitry is designed to integrate with the rest of the percussion system and be triggered via pads, mic or switch.

## Handclapping

This instinctive sound must be one of the oldest in history and is used to punctuate many forms of music. The action is obvious! but the sound is fairly difficult to synthesise accurately.

When several people clap together the result is an ensemble of claps. This is because they do not bring their hands together exactly at the same instant. To

of four short claps, which are close enough together to sound as one. The band pass output is connected to VCA1 which is also controlled by an envelope, this time with only one long decay. By mixing this output with that of VCA2 a 'pseudo reverb' or ambience is created.

The optional panning network allows the circuit to be connected to a stereo percussion system and claps placed in the stereo field.

## Circuitry

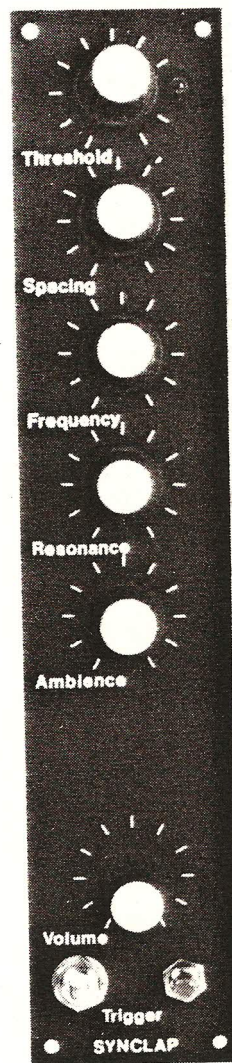
The complete circuit diagram for the project is shown in Figure 2.

Trigger signals, which can be from a piezo pickup, crystal mic, rhythm machine or computer are connected to R1. The input is differentiated by C1/R2 to produce a short spike, which sends the output of IC1a low when it reaches the threshold voltage on pin 5, set by RV1. This low level sets pin 4 of the SR flip-flop, IC2a & b, high. IC2c is configured as an oscillator which starts running when pin 2 is high. The oscillator clocks IC3, a binary counter, which resets the flip-flop on the fifth negative-going edge. This in turn stops the oscillator and resets the counter.

The four clock pulses are differentiated by C3/R7 which then charges C4, discharging via R8, R9 and opening the VCA, IC5c.

Counter output, Q2, goes high during two clock pulses thereby lighting the LED, D2, and charging C5 to produce the other

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via C11 to the 'clap' VCA and those from the band pass output via C9 to the 'ambience' VCA. RV5 is used to adjust the amount of 'ambience'. The VCAs are similar being based around IC5, a dual transconductance amplifier.

Outputs are mixed via the Volume control and sent either as a mono output: by omitting RV7 and the '100-up' components, and including R45; or as stereo by omitting R45 and including RV7 and the '100-up' components. The final stereo mixer, IC101, provides the right and left signals.

Power is supplied from a single rail, +12V, which is split, by IC1c, into a dual +/-6V supply.

## Options

The Synclap PCB has been designed to match the Synbal and Syntom II with the same dimensions, control spacing and input output connections. It also offers the same flexible options which have to be selected before construction can begin.

**Controls:** 1) rotary - The PCB can be  
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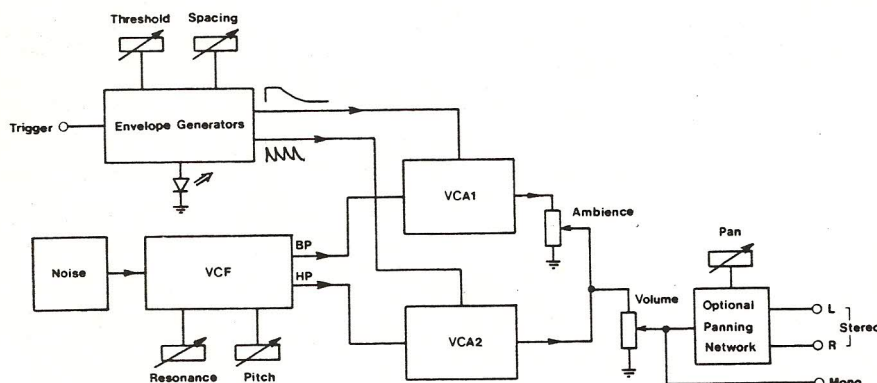


Figure 1. Block diagram of the Synclap.

generate this effect the circuit must create a few bursts of filtered noise in rapid succession. The block diagram of the Synclap is shown in Figure 1.

Noise is processed by the Voltage Controlled Filter (VCF), which has two outputs, high pass (HP) and band pass (BP). Both the Pitch (cut-off frequency) and Resonance (feedback) of the filter can be controlled. The high pass output is fed to a Voltage Controlled Amplifier (VCA2) which is controlled by a burst of four short envelopes each time the circuit is triggered. The spacing between the envelopes can be adjusted from 10-30mS. This produces an output from VCA2

envelope. C5 discharges via R11 and opens the VCA, IC5a.

White noise is produced by the reverse breakdown of Tr1. This signal is amplified by IC1b and connected to the state variable filter, based around IC1d and IC4.

The cut-off frequency of the filter is controlled by the current flowing into the two transconductance amplifiers IC4a & c. This is set by the voltage on RV3. The 'Q' or Resonance of the filter can be varied by RV4 which sums more of the band pass output into the filter producing a sharp peak, rolling off at -12dB/Octave.

Signals from the high pass output are fed

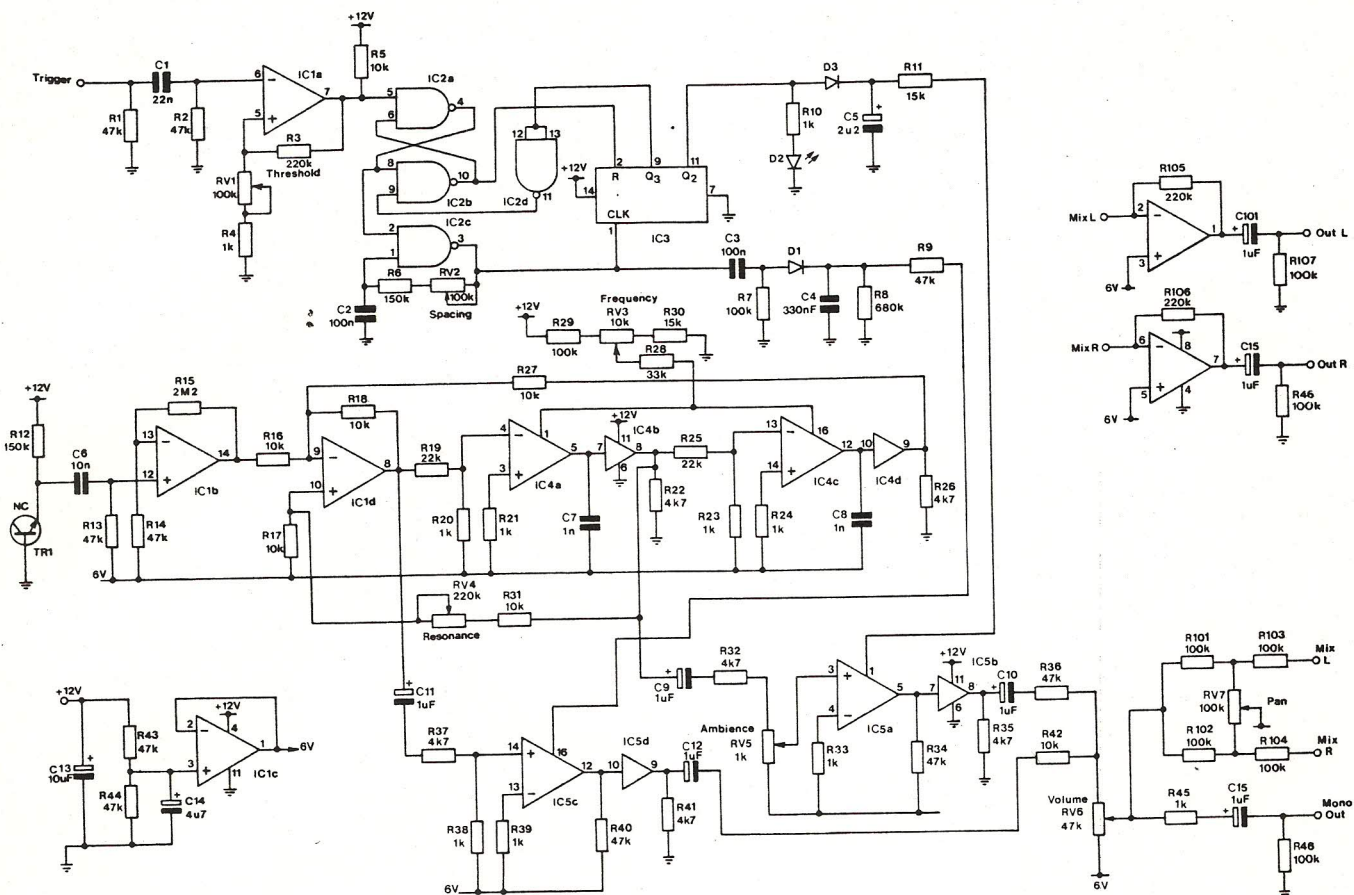


Figure 2. Circuit diagram of the Synclap.

mounted on a panel such as the one shown in the photo. All the pots, switch, LED and socket are hard-wired to the board. This allows the sound to be continuously variable.

2) *Vertical Pre-sets* - The pre-sets can be mounted vertically. Boards can then be slotted into a case with the left-hand edges at the front allowing occasional adjustments to be made.

3) *Horizontal Pre-sets* - The pre-sets can be mounted horizontally as shown in the component overlay. This allows adjustments to be made to a board mounted horizontally in an enclosure.

4) *Combinations* - Obviously any combination of controls could be used. The most commonly used, such as Spacing and Pitch, could be rotary and the rest pre-set.

**Outputs.** 1) *Mono* - If mono outputs are required then RV7 and components numbered 100 upwards are omitted. Resistor R45 should be inserted and Out R/Mono used as signal output.

2) *Stereo* - For stereo use R45 should be omitted with RV7 and the 100-up components inserted. Outputs are taken from Out L and Out R.

3) *Modular Stereo* - To allow a modular stereo system to be built up the virtual earth busses of the final mixer are available. Only one of the system boards need contain the final mixer IC101. The rest only have R101 to 104 and the Pan pot inserted. All of the Mix R and Mix L outputs are connected together and the final output taken from the board with IC101 inserted.

Construction is fairly straightforward and components should be assembled in the following order: Veropins, links, resistors, capacitors, diodes, transistor and IC sockets (if required). Controls and LED can then be mounted with ICs inserted last.

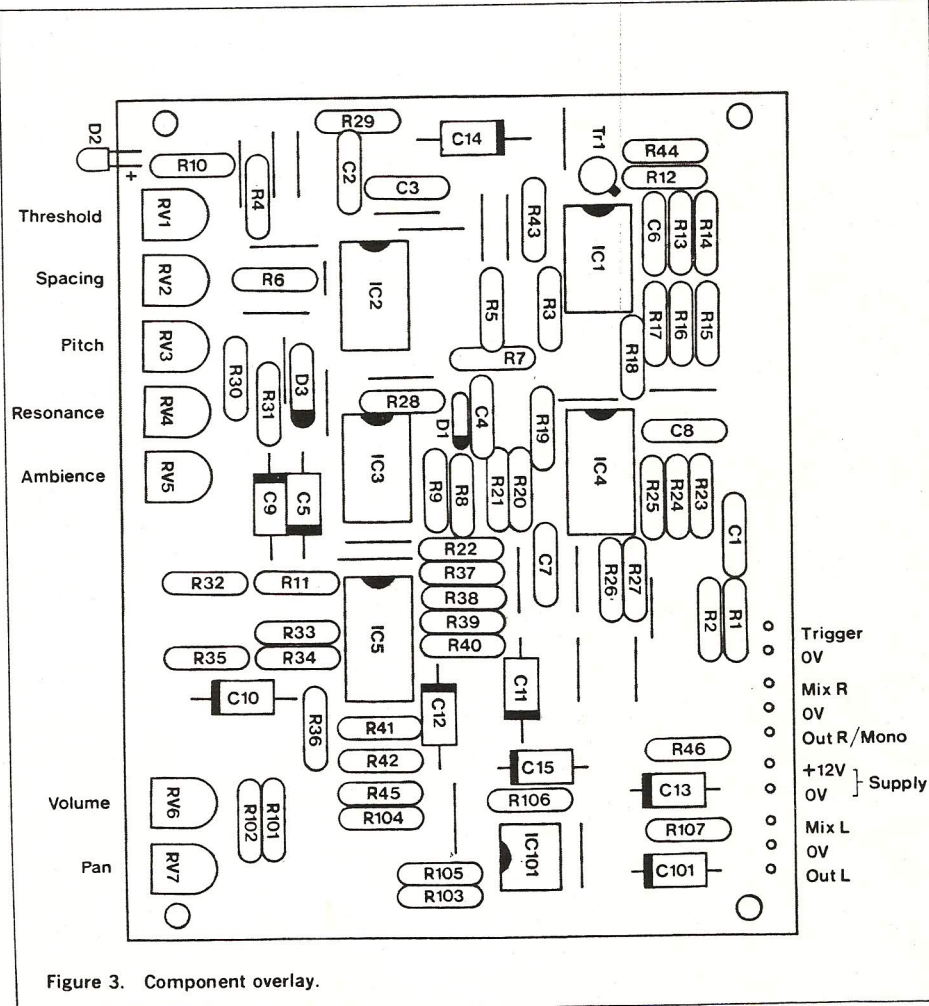
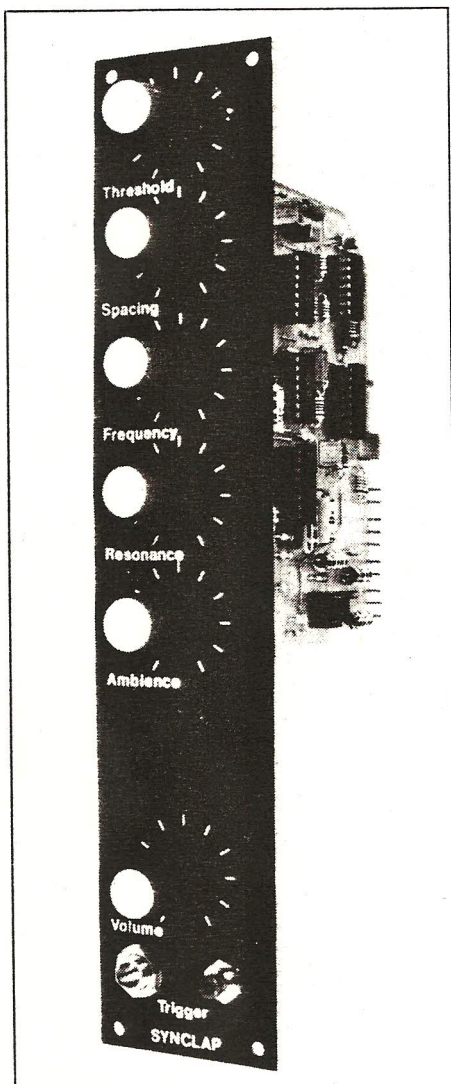
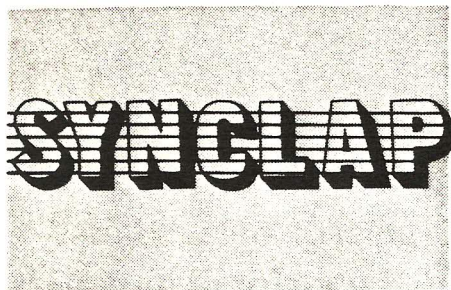


Figure 3. Component overlay.



PCB mounted to a modular panel.

## Using the Synclap

Trigger signals can be from a variety of sources: crystal mic, piezo pickup, rhythm unit such as the Amdek described in March 83, or even a computer port. A switch could be connected across the trigger input and 12V for manual operation if required.

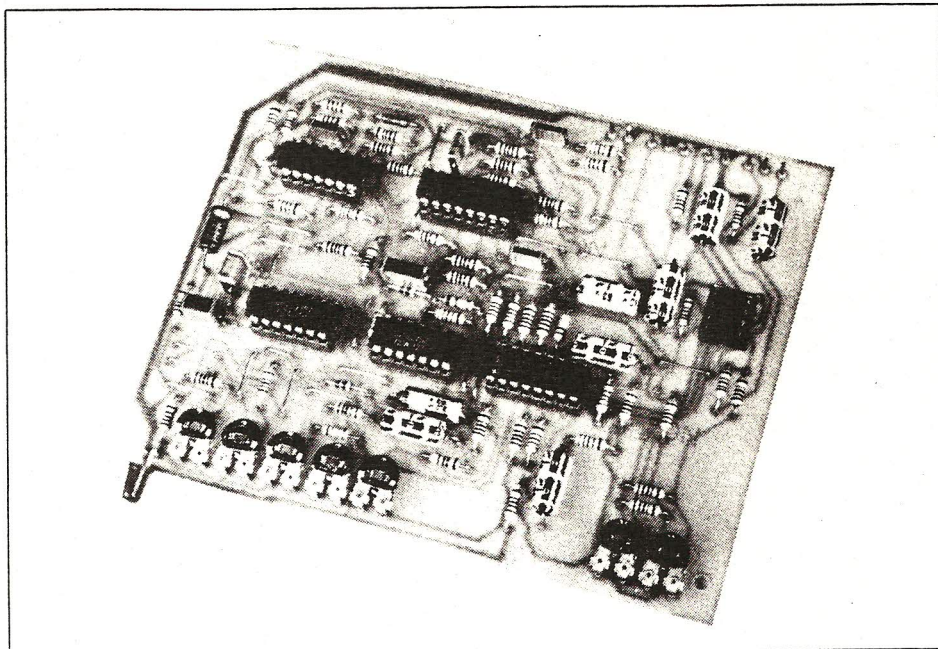
Since only one type of sound is produced no sound settings are given, however, the controls and their use are listed below:

- 1) **Threshold:** adjusts the trigger level to allow a wide range of input signals.
- 2) **Spacing:** varies the space between the four claps.
- 3) **Pitch:** alters the frequency of the filter and thus imitates changing hand size.
- 4) **Resonance:** makes the filter more 'peaky' and gives a more 'cupped' sound to the clap.
- 5) **Ambience:** adds a faint background signal imitating the effect of reverb.

Additional reverb or chorus could be used to thicken the sound but the built-in Ambience is quite convincing.

Power can be supplied by the circuit shown in the April 83 issue or by an equivalent 12V source. Get Clapping!

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The completed Synclap PCB.

## SYNCLAP PARTS LIST

Resistors — all 1/4W, 5% carbon film

R1,2,9,13,14,34,36,40,43,44	47k ✓	10 off
R3,105,106	220k ✓	3 off
R4,10,20,21,23,24,33,38,39,45	1k ✓	10 off
R5,16,17,18,27,31,42	10k ✓	7 off
R6,12	150k ✓	2 off
R7,29,46,101,102,103,104,107	100k ✓	8 off
R8	680k ✓	
R11,30	15k ✓	2 off
R15	2M2 ✓	
R19,25	22k ✓	2 off
R22,26,32,35,37,41	4k7 ✓	6 off
R28	33k ✓	

Potentiometers (Rotary or Pre-set)

RV1,2,7	100k lin	3 off
RV3	10k lin	
RV4	220k lin	
RV5	1k lin	
RV6	47k log (Rotary) or lin (Pre-set)	

Capacitors

C1	22nF polycarbonate	
C2,3	100nF polycarbonate	2 off
C4	330nF polycarbonate	
C5	2u2 63V axial electrolytic	
C6	10nF polycarbonate	2 off
C7,8	1nF polycarbonate	
C9,10,11,12,15,101	1uF 63V axial electrolytic	6 off
C13	10uF 25V	
C14	4u7 63V	

Semiconductors

D1,3	1N4148	2 off
D2	LED	
Tr1	BC108B	
IC1	UA3403 or LM324 ✓	
IC2	4093 ✓	
IC3	4024 ✓	
IC4,5	LM13600	2 off
IC6	1458 or 4558	

Miscellaneous

Veropins	
16 pin DIL socket	2 off
14 pin DIL socket	3 off
8 pin DIL socket	
PCB	

The PCB for the Synclap is available from E&MM, 282 London Road, Westcliff-on-Sea, Essex SSO 7JG at £3.25 inc. VAT and p&p. Please order as Synclap PCB.