The Syntom DRUM SYNTHESISER

Join Warren Cann in the drum revolution with this unique touch sensitive instrument costing only £10.90 in kit form

by Clive Button

The Syntom is a very effective drum synthesiser that can produce a variety of fixed and falling pitch effects, triggered either by tapping the unit itself, or by striking an existing drum to which the device is attached.

Four potentiometers give control over different characteristics of the sound, the Volume control being used to switch off the internal battery as well as determining the level of the signal sent to the external amplifier. The Decay pot. governs the time taken for the sound to die away after each strike, from less than 1/10 sec. to several seconds, giving a wide range of envelopes. The frequency of the note is variable over the entire audio range by means of the Pitch control, and the Sweep control introduces a voltage causing the pitch to fall as the amplitude decreases. These controls, when used in combination with each other enable the most popular drum synthesiser effects heard on commercial recordings to be obtained.

Circuit

The Circuit is in three main parts: the envelope generator, the Voltage Controlled Oscillator (VCO), and the Voltage Controlled Amplifier (VCA). IC1 forms the first stage of the envelope generator, detecting the signal produced by the crystal earpiece when the unit or the drum to which it is fitted is struck. The trigger signal charges C1 via D1, and the capacitor is then discharged slowly by RV1 and R3. This envelope voltage is buffered by IC2c and sent to the VCA. It is also fed (via RV2 — the Sweep potentiometer) to IC2d, the VCO control voltage summing amplifier where it is mixed with a voltage from the Pitch control, RV3.

The VCO consists of an integrator formed around IC2a, and a Schmitt trigger (IC2b) driving TR1. When the integrator voltage reaches the upper threshold of IC2b, TR1 is turned on shorting the non-inverting input of the integrator to earth, causing it to act in inverting mode. Hence the output voltage falls until the lower threshold is reached, IC2b changes state, turning off TR1, and the output of IC2a starts to rise, as it is once more in non-inverting mode. The resultant triangle wave is fed to the VCA section, which consists of a CA3080 transconductance amplifier, IC3. The gain of this amplifier is controlled by the output of the envelope generator, such that as the envelope voltage decays,

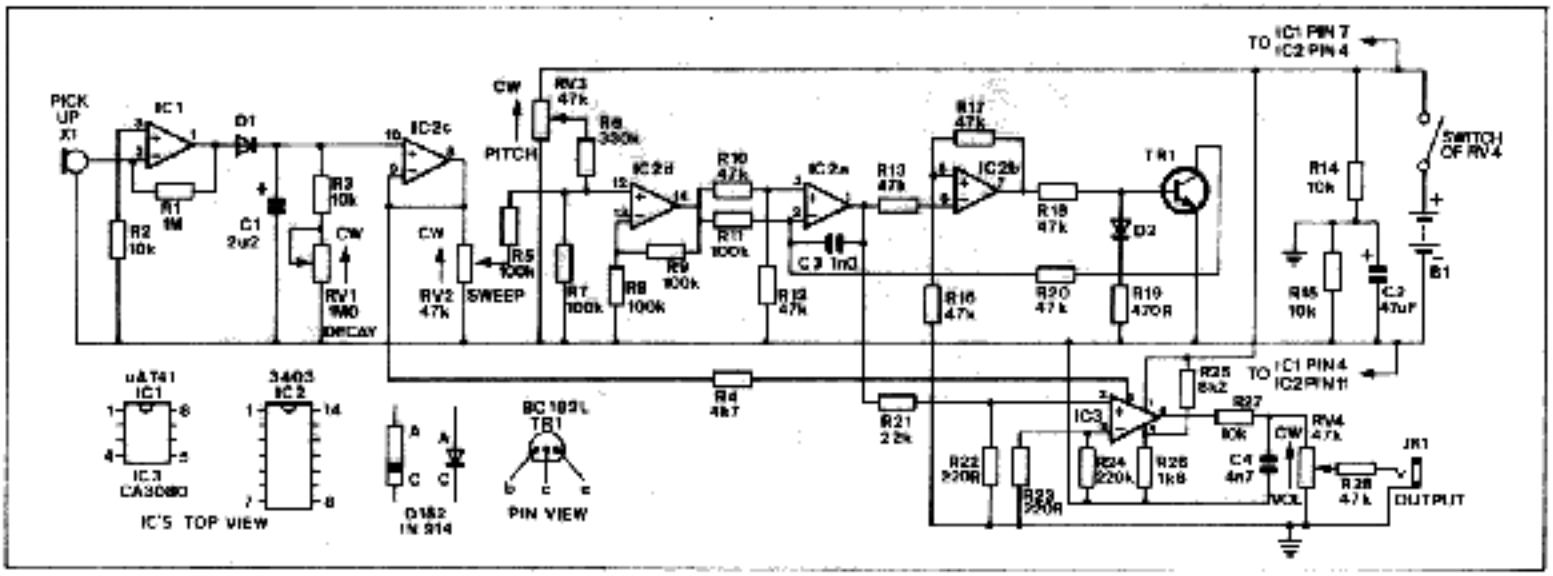


Figure 1. The circuit diagram of the Syntom.

the triangle wave is increasingly attenuated until it is reduced to a very low, inaudible level. The output of the CA3080 is fed to RV4, the Volume pot, and then on to the jack socket.

A dual supply is derived from the single 9V battery by a potential divider formed by R14 and R15, providing a 0V supply which is stabilised by C2.

Constructional Details

All resistors, capacitors and semiconductors except R28 are mounted on the printed circuit board in that order, taking care as always with the orientation of electrolytic capacitors, IC's, diodes, and the transistor. If the suggested case is used, veropins for connection of the pots, jack, battery and earpiece must be mounted from the component side since this side faces away from them and there is no room for the wires to pass around the edge of the board. Otherwise they fit from the track side, or can be left out altogether, the wires being soldered directly to the tracks.

The potentiometers are mounted on the front side (which is the side opposite the removable side if using the case suggested in the parts list), after their spindles have been sawn to a length suiting the knobs. The jack socket is best mounted on the back, where the lead to the external amplifier will be out of the way during use, but take care here since the board, battery and earpiece all fit near the back of the case. The connections to the off-board components can now be made, and the PCB fitted in the special slots on the inside of the case (with the track side facing towards the pots). Note that R28 is connected directly from the wiper of RV4 to the signal terminal of the jack socket.

For use with an existing drum, the Syntom is attached to the drum by a securing bolt and a bracket made from 25mm aluminium channel section which is fixed to the case by two bolts with washers. A simple hexagonal-head bolt could be used, but the handwheel bolt specified in the parts list is much easier to use, and lends a professional appearance to the finished unit. One side of the bracket must be drilled and threaded to accommodate the bolt, and it is a good idea to stick a small piece of rubber on the inner face of the opposite side to prevent scratching of the drum rim. The final constructional stage is to fit the knobs, connect the battery using a PP3 connector, and screw on the back of the case. A piece of foam glued to the inside of the back will hold the battery against the potentio-

PARTS LIST

Resistors - all ¼W 5% carbon film unless specified

R1	2M2		(M2M2)
R2,3,14, 15,27	10K	6 off	(M10K)
R4	4K7		(M4K7)
R5,7,8, 9,11	100k	5 off	(M100K)
R6	330k		(M330K)
R10,12, 13,16, 18,20			
R28	47k	8 off	(M47K)
R19	470R		(M470R)
R21	22k		(M22K)
R22,23	220k	2 off	(M220K)
R24	220k		(M220K)
R25	8k2		(M8K2)
R26	1k5		(M1K5)
RV1	1M0 log. pot.		(FW28F)
RV2,3	47k log. Pot.	2 off	(FW24B)
SW1	47k log. pot with switch		(FW55V)

Capacitors

C1	2u2 63V axial electrolytic		(FB15R)
C2	47u 10V axial electrolytic		(FB33R)
C3	1n0 Mylar Film		(WW45R)
C4	4u7 Mylar Film		(WW17T)

Semiconductors

IC1	uA741, 8-pin DIL		(QL22Y)
IC2	3403		(QH91F)
IC3	CA3080, 8-pin DIL		(YH55N)
TR1	BC182L		(QB50K)
D1,2	1N914	2 off	(QL71N)

Miscellaneous

X1	Crystal earpiece		(LB25C)
JK1	Mono jack socket (open type)		(HF91Y)
	Clear MR8		(LH21X)
	Handwheel bolt		(YL23A)
	M4 6mm bolts		(RF33J)
	Printed circuit board		(GA05F)
	PP3 connector		(HF28F)
B1*	PP3 battery		
	Ribbon cable (10 way)	1m	(XR95C)
	1mm Veropins		(FL23A)
	Knobs	4 off	(YB40Y)
	Blue knob cap		(QY01B)
	Green knob cap		(QY02C)
	Grey knob cap		(QY03D)
	Red knob cap		(QY04E)
	Front Panel		(RH90R)

Note: A complete kit (LW86F) of parts listed is available from Maplin Electronic Supplies Ltd, price just £10.90 inc VAT & P&P. The kit does not include batteries.

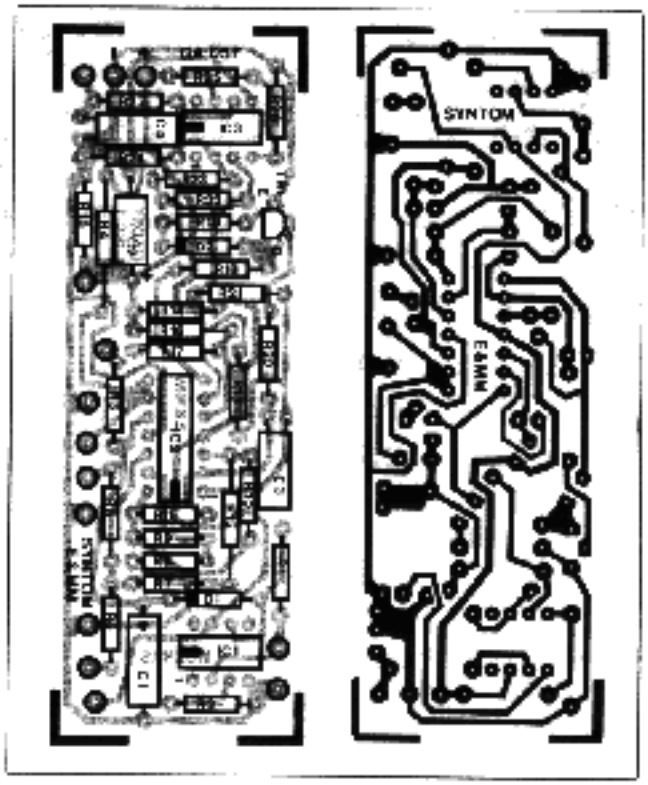
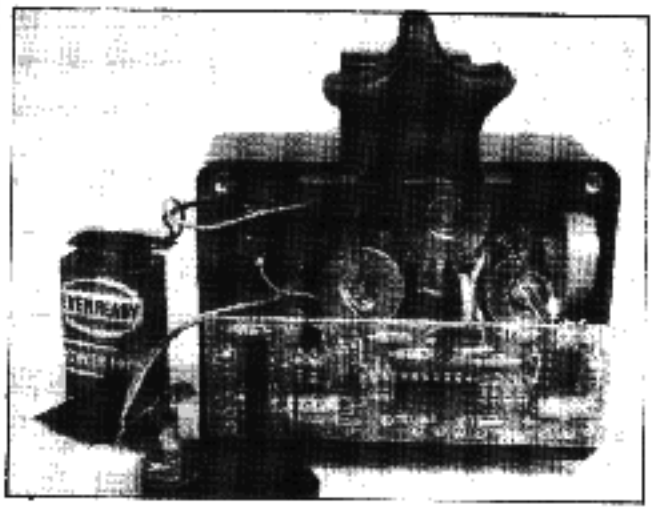


Figure 2. The Syntom PCB.



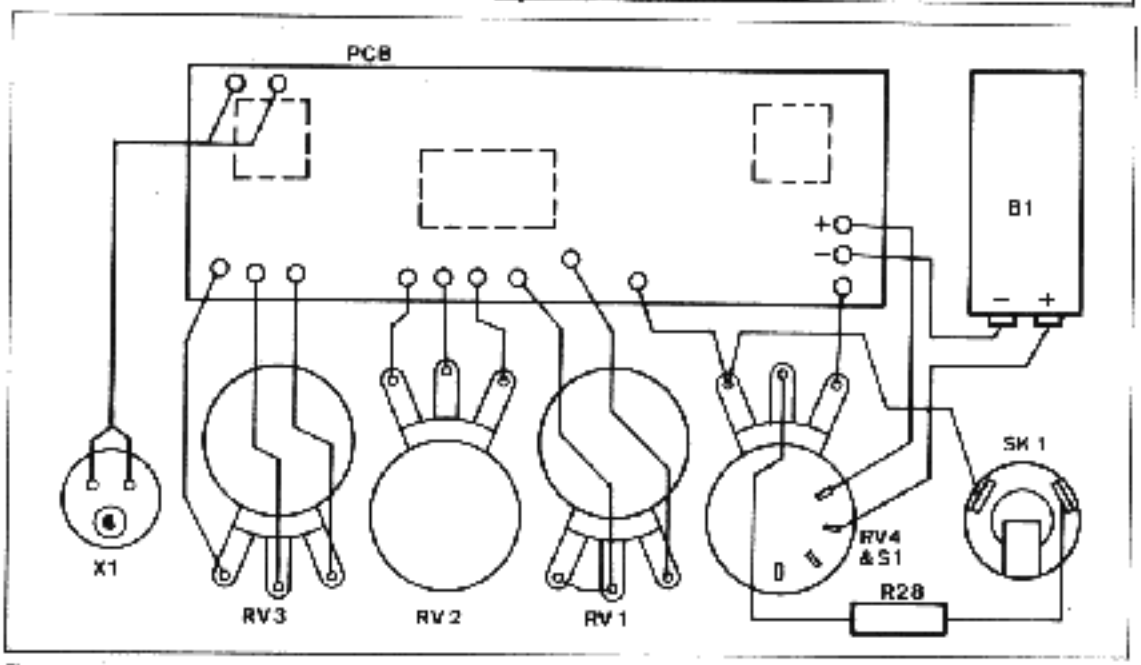
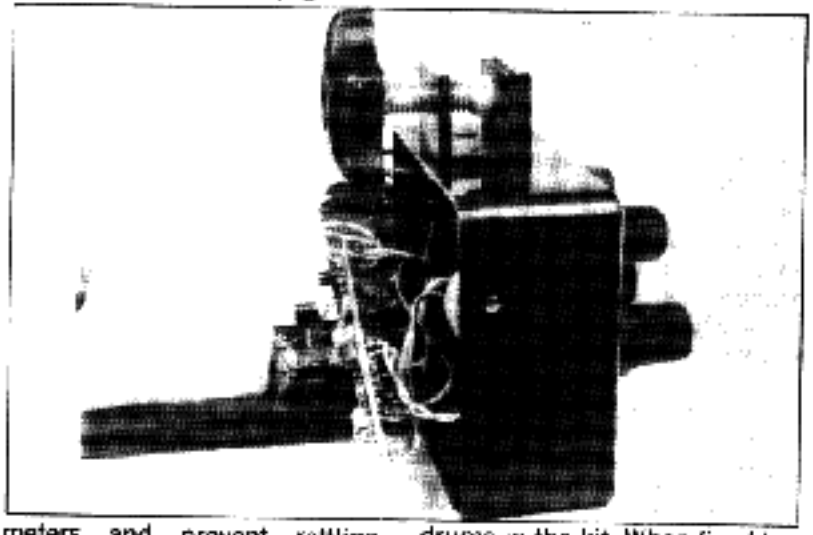


Figure 3. PCB wiring, with the board viewed from the track side.

Continued on page 29

Syntom continued from page 29.



meters and prevent rattling, which could cause unwanted triggering of the unit.

Testing & Use

Connect the drum synthesiser to an external amplifier, and with all controls at midway position, firmly tap the case. A medium duration falling pitch effect should be heard, and experimentation with the controls will soon reveal the whole range of sounds available. The sensitivity of the unit has been fixed to respond to a direct hit or a hit on the drum to which it is fixed but not to external sounds and vibrations, including those from other drums in the kit. When fixed to a drum, the Syntom can be set off by just hitting the drum rim with the stick, or caused to sound along with the drum if the skin is hit. Since the sound varies with stick impact, particularly interesting effects can be produced by, for example, using a sharply falling pitch with an envelope of similar length to the natural drum sound, and playing single hits and rolls of differing impact force on the drum skin.

Since the drum synthesiser is battery powered, it should be turned off when not in use to conserve power, though a single PP3 will still provide for up to 60 hours of continuous playing.

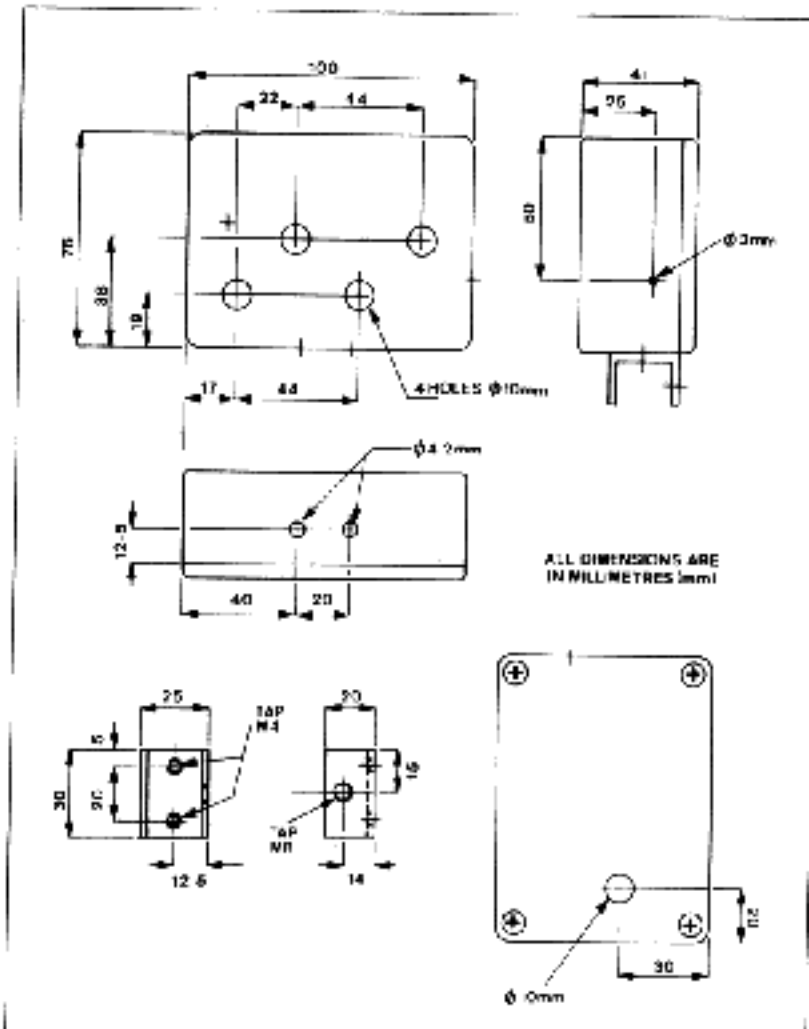


Figure 4 Case and bracket construction.

Since it's impossible to read the parts list for the Syntom circuit, here it is....

PARTS LIST
~~~~~~~~~~

Resistors - all 1% 0.4W metal film unless specified.

R1	:	1M0
R2,3,14,15,27	:	10k
R4	:	4k7
R5,7,8,9,11	:	100k
R6	:	330k
R10,12,13,16, 17,18,20,28	:	47k
R19	:	470R
R21	:	22k
R22,23	:	220R
R24	:	220k
R25	:	8k2
R26	:	1k8
RV1	:	1M0 log. pot
RV2,3	:	47k log. pot
RV4	:	47k log. pot with switch

Capacitors

C1	:	2u2 63v axial electrolytic
C2	:	47u 10v axial electrolytic
C3	:	1n0 Mylar film
C4	:	4n7 Mylar film

Semiconductors

IC1	:	uA741, 8 pin DIL
IC2	:	3403
IC3	:	CA3080, 8 pin DIL
TR1	:	BC182L
D1,2	:	1N914
~~~~~~~~~~

Miscellaneous

X1	:	Crystal earpiece
JK1	:	Mono jack socket
		Case MB2
		Handwheel bolt
		M4 6mm bolts
		Printed circuit board
		PP3 connector
B1	:	PP3 Battery
		Ribbon cable (10 way) 1m
		1mm veropins
		knobs 4 off
		knob caps
		Front panel