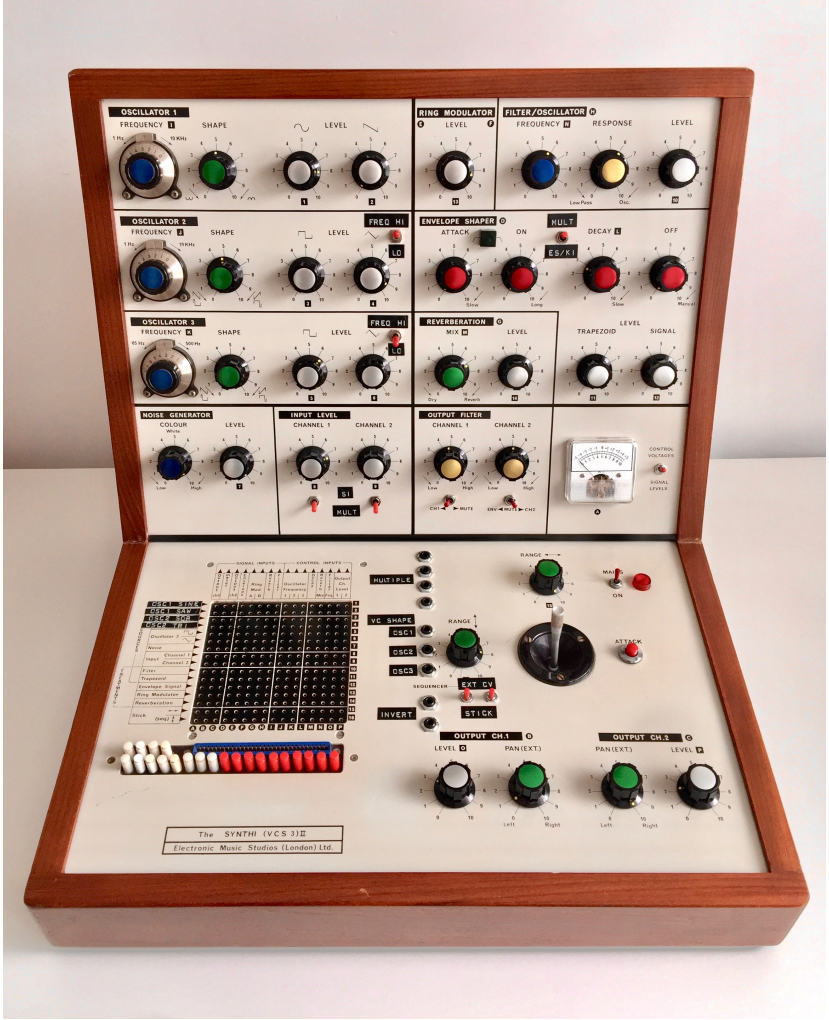
EMS VCS3 mkII

Serial number 1198, late 1972.

This VCS3 mkII was originally owned by the former owner of EMS from 1984-1995, composer Edward Williams. Sometime in the 1990s Brian Johnson, a colleague of Williams, acquired it from him. Brian and Edward worked and performed together using the EMS Soundbeam, with Brian's speciality being experimental video effects. You can read about their work here: http://www.muzines.co.uk/articles/the-old-school/162

I acquired this VCS3 from Brian in 2013. Brian told me a little about the history of this particular synthesiser, including that it was among the equipment used by Edward on the soundtrack to David Attenborough's Life on Earth documentary in the late 1970s.

> "It all makes for a woozy, wonderstruck album that, not unlike Attenborough himself, evokes the exotic and the awe-inducing with disarming subtlety and ineffably British understatement. No wonder Radiohead have lately been expressing their esteem for it.



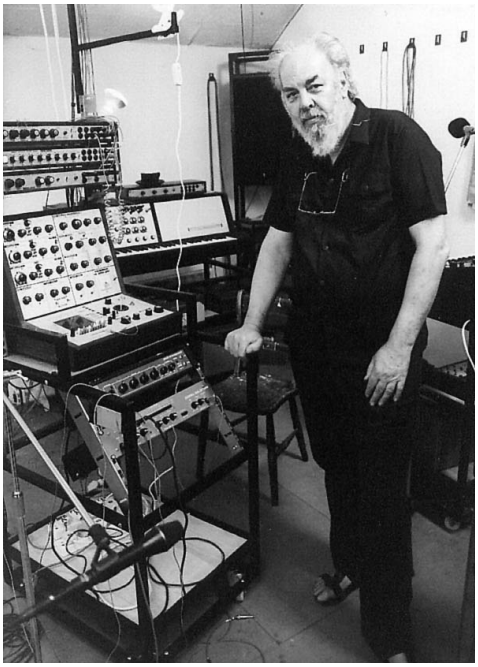
This VCS3 features prominently in the tracks "Slow Dance for Nudibranches" and "Oral Transport for the Young".

"By the time I was writing the score for Life On Earth, I was as influenced by the sounds of the VCS3 [an early British synthesiser] as I was by Vaughan Williams." https://www.theguardian.com/music/2009/sep/08/life-on-earth-soundtrack

Other owners of Edward Williams' VCS3s include Adrian Utley (Portishead). His can be seen on the video at https://youtu.be/YT0l-OsGpgA?t=339 where many of the same modifications can be observed. Will Gregory (Goldfrapp) also has another.

Brian Johnson had looked after the synth well. He had switched it on every few days to keep the electrolytic capacitors working, and I have continued to do this.

In March 2016 I decided to book the VCS3 in for a service with EMS. It was exhibiting some signs of its age, and being a little more unpredictable than it had been. Robin Wood checked the serial number and gave an estimate of its age, and confirmed that it had been owned by Edward Williams.



Edward Williams in his studio with a VCS3. Whilst not the VCS3 offered here, it exhibits many of the same modifications.

The VCS3 had a long (7 month) stay at EMS where it underwent a thorough service and testing, including the replacement of some components, including new wooden slats on the base. I collected it from EMS at the end of October 2016. The work undertaken is itemised in the attached service bill. Robin Wood also documented the instrument's modifications.

In January 2018 a 'crackling' sound was observed on oscillator 1. The synth was taken to EMS to be checked out, where a duff BC258 transistor on board C was located and replaced. It was tested by Robin and after cleaning the contacts of the Vernier dial OSC2 gave it a clean bill of health. *This VCS3 is in great shape.*

It was important to me to use EMS directly for the repair and maintenance of this VCS3; any components used are to the exact and original specifications, and thus avoiding any change to the character and authenticity of this instrument's sound. It was worth the long waiting times involved for the synthesiser to be serviced and repaired to ensure its pedigree and integrity - it has only ever been modified, repaired and serviced by EMS.

Modifications

This instrument has some exciting modifications by EMS as specified by Edward Williams. Please see the attached report by Robin Wood, EMS, for a full description. Note that he lists this unit as a VCS3 Mk1, which is a mistake on the report. A summary of the modifications is below:

- The matrix has been rewired to behave like a VCS3 mk1
- Hi/Lo switches on oscillators 2 & 3
- Envelope shaper source select switch (selects where the envelope gets its trigger from - either 8-way keyboard connector or external gate input)
- External gate input jack on rear of unit (supplied with special lead for use with MIDI/CV converter)
- Input channel SI/Mult switches (disconnects the link from 8 way keyboard socket - useful if keyboard and external audio inputs are connected as they can interact and crackle)
- Voltage controlled oscillator shape (3 x 3.5mm jack sockets with special patchpin leads - modulate osc shape, especially interesting for stereo effects)
- Dual patchable inverter (uses 3.5mm - patchpin lead to invert signals)
- Two extra input channels (fitted on back panel for CV or line level audio, joystick position to control levels!) with switch EXT CV / STICK.
- "Multiple" - four 3.5mm jack sockets wired to each other to act as a CV splitter when patching the mods together - control several things at once, for example.

In 2016 EMS made up the following new leads to work with the 3.5mm patch bay and matrix:

- 3 x minijack-to-pin
- 2 x minijack-to-minijack

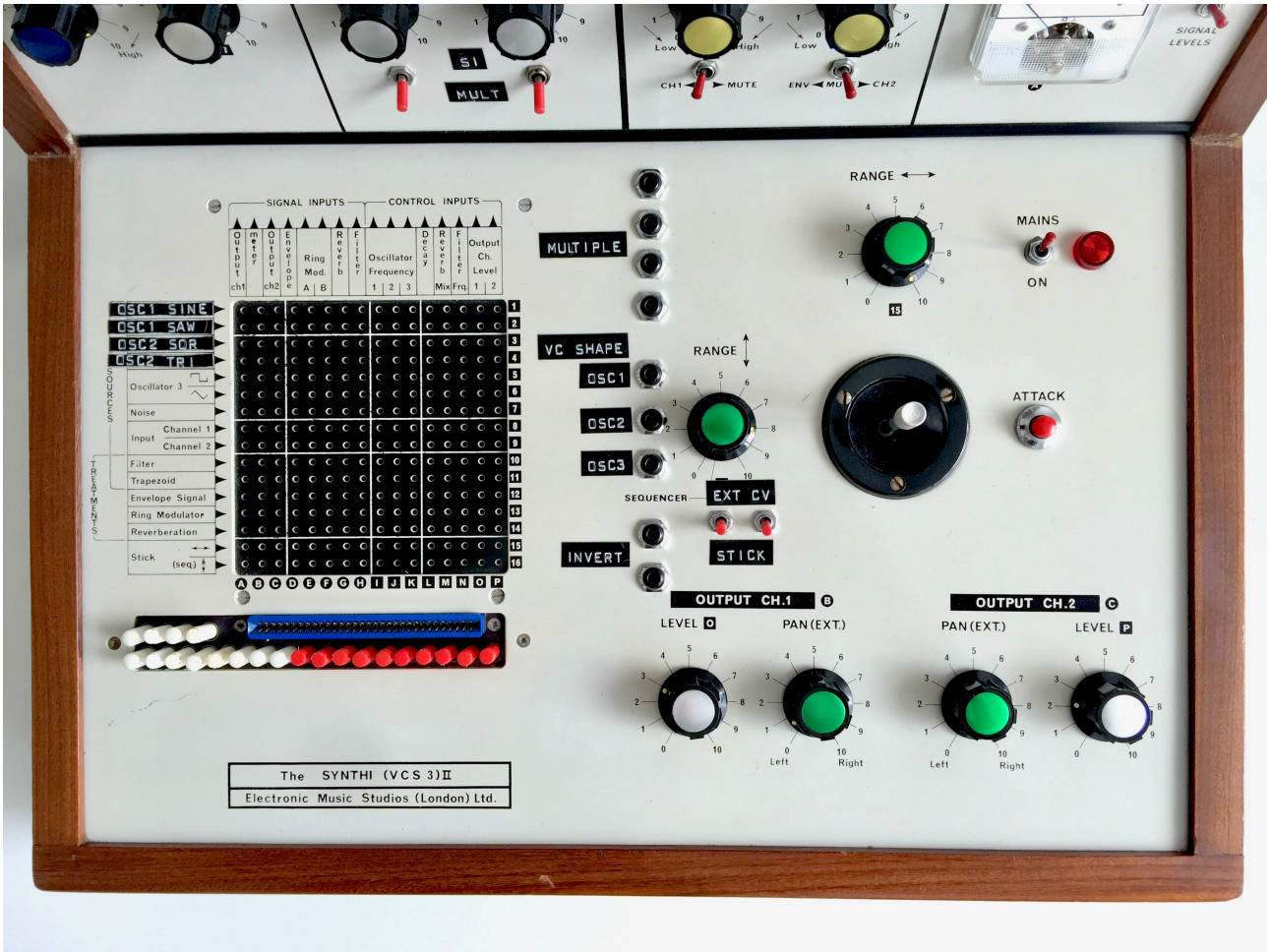
Electrical Supply

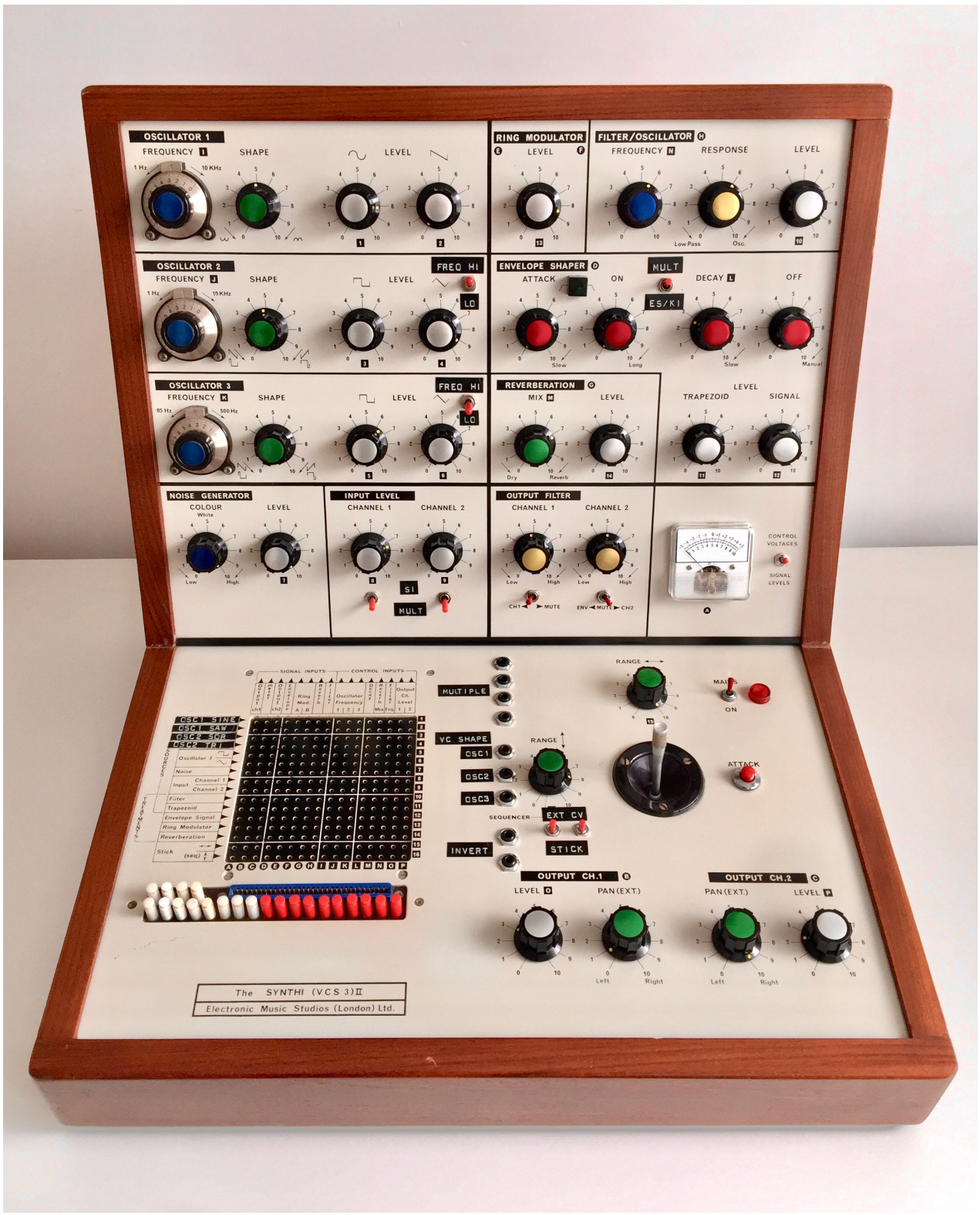
This VCS3 is supplied with a Bulgin mains lead with UK plug, and the instrument is set to 240V.

Cosmetic Condition

Great condition for its age. As shown in the following photos, there are a few minor bumps and scratches, but this instrument has been well looked after. It has also been cleaned internally during its recent service.


OSCILLATOR 1
FREQUENCY
SHAPE
LEVEL
RING MODULATOR
LEVEL
FILTER/OSCILLATOR
FREQUENCY
RESPONSE
LEVEL
Low Pass
Osc.
OSCILLATOR 2
FREQUENCY
SHAPE
LEVEL
FREQ HI
LO
ENVELOPE SHAPER
ATTACK
ON
MULT
ES/KI
DECAY
OFF
Slow
Long
Slow
Manual
OSCILLATOR 3
FREQUENCY
SHAPE
LEVEL
FREQ HI
LO
REVERBERATION
MIX
LEVEL
Dry
Reverb
LEVEL
TRAPEZOID
SIGNAL
NOISE GENERATOR
COLOUR
White
LEVEL
Low
High
INPUT LEVEL
CHANNEL 1
CHANNEL 2
SI
MULT
OUTPUT FILTER
CHANNEL 1
CHANNEL 2
Low
High
Low
High
CH1
MUTE
ENV
MUTE
CH2
CONTROL VOLTAGES
SIGNAL LEVELS


SIGNAL INPUTS
CONTROL INPUTS
Output ch1
meter
Output ch2
Envelope
Ring Mod. A B
Reverb
Filter
Oscillator Frequency 1 2 3
Decay
Reverb Mix
Filter Frq.
Output Ch. Level 1 2
OSC1 SINE
OSC1 SAW
OSC2 SQR
OSC2 TRI
SOURCES
Oscillator 3
Noise
Input
Channel 1
Channel 2
Filter
Trapezoid
Envelope Signal
Ring Modulator
Reverberation
Stick
(seq.)
TREATMENTS
MULTIPLE
VC SHAPE
OSC1
OSC2
OSC3
SEQUENCER
EXT CV
INVERT
STICK
RANGE
MAINS
ON
ATTACK
OUTPUT CH.1
LEVEL
PAN (EXT.)
Left
Right
OUTPUT CH.2
PAN (EXT.)
LEVEL
Left
Right
The SYNTHI (VCS 3)II
Electronic Music Studios (London) Ltd.


OSCILLATOR 1
FREQUENCY
SHAPE
LEVEL
RING MODULATOR
LEVEL
FILTER/OSCILLATOR
FREQUENCY
RESPONSE
LEVEL
Low Pass
Osc.
OSCILLATOR 2
FREQUENCY
SHAPE
LEVEL
FREQ HI
LO
ENVELOPE SHAPER
ATTACK
ON
MULT
ES/KI
DECAY
OFF
Slow
Long
Slow
Manual
OSCILLATOR 3
FREQUENCY
SHAPE
LEVEL
FREQ HI
LO
REVERBERATION
MIX
LEVEL
Dry
Reverb
LEVEL
TRAPEZOID
SIGNAL
NOISE GENERATOR
COLOUR
White
LEVEL
Low
High
INPUT LEVEL
CHANNEL 1
CHANNEL 2
S1
MULT
OUTPUT FILTER
CHANNEL 1
CHANNEL 2
Low
High
Low
High
CH1
MUTE
ENV
MUTE
CH2
CONTROL VOLTAGES
SIGNAL LEVELS
SIGNAL INPUTS
CONTROL INPUTS
Ring Mod.
Oscillator Frequency
Output Ch. Level
Mix
Freq.
OSC1 SINE
OSC1 SAW
OSC2 SQR
OSC2 TRI
Oscillator 3
Noise
Input
Channel 1
Channel 2
Filter
Trapezoid
Envelope Signal
Ring Modulator
Reverberation
Stick
(seq)
MULTIPLE
VC SHAPE
OSC1
OSC2
OSC3
RANGE
SEQUENCER
EXT CV
STICK
INVERT
RANGE
MAINS
ON
ATTACK
OUTPUT CH.1
LEVEL
PAN (EXT.)
Left
Right
OUTPUT CH.2
PAN (EXT.)
LEVEL
Left
Right
The SYNTHI (VCS 3)II
Electronic Music Studios (London) Ltd.

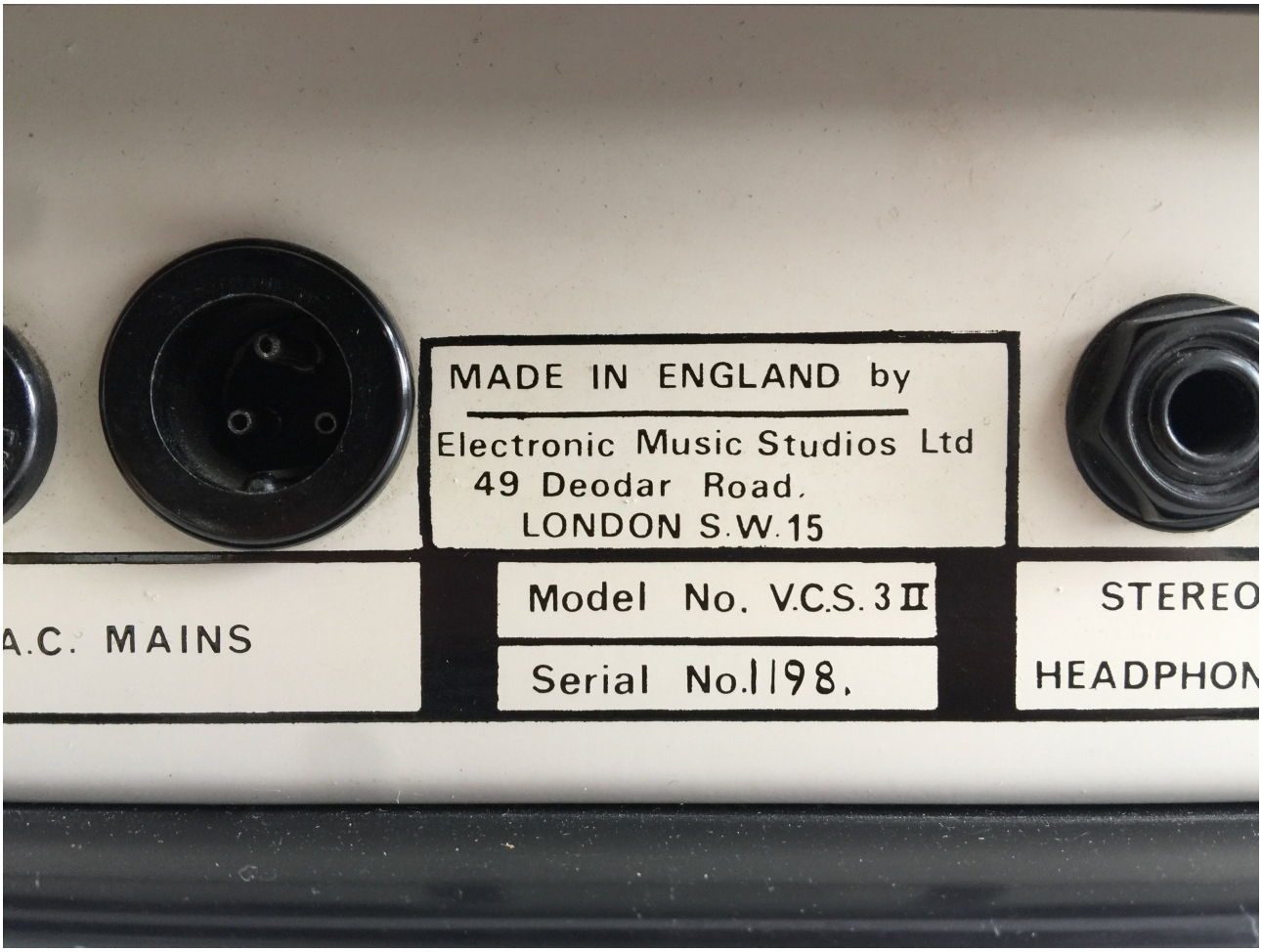

OSCILLATOR 1
FREQUENCY
SHAPE
LEVEL
RING MODULATOR
FILTER/OSCILLATOR
OSCILLATOR 2
ENVELOPE SHAPES
OSCILLATOR 3
REVERBERATION
NOISE GENERATOR
COLOUR
INPUT LEVEL
CHANNEL 1
CHANNEL 2
OUTPUT FILTER
THE SYNTHI VCS3 LTD

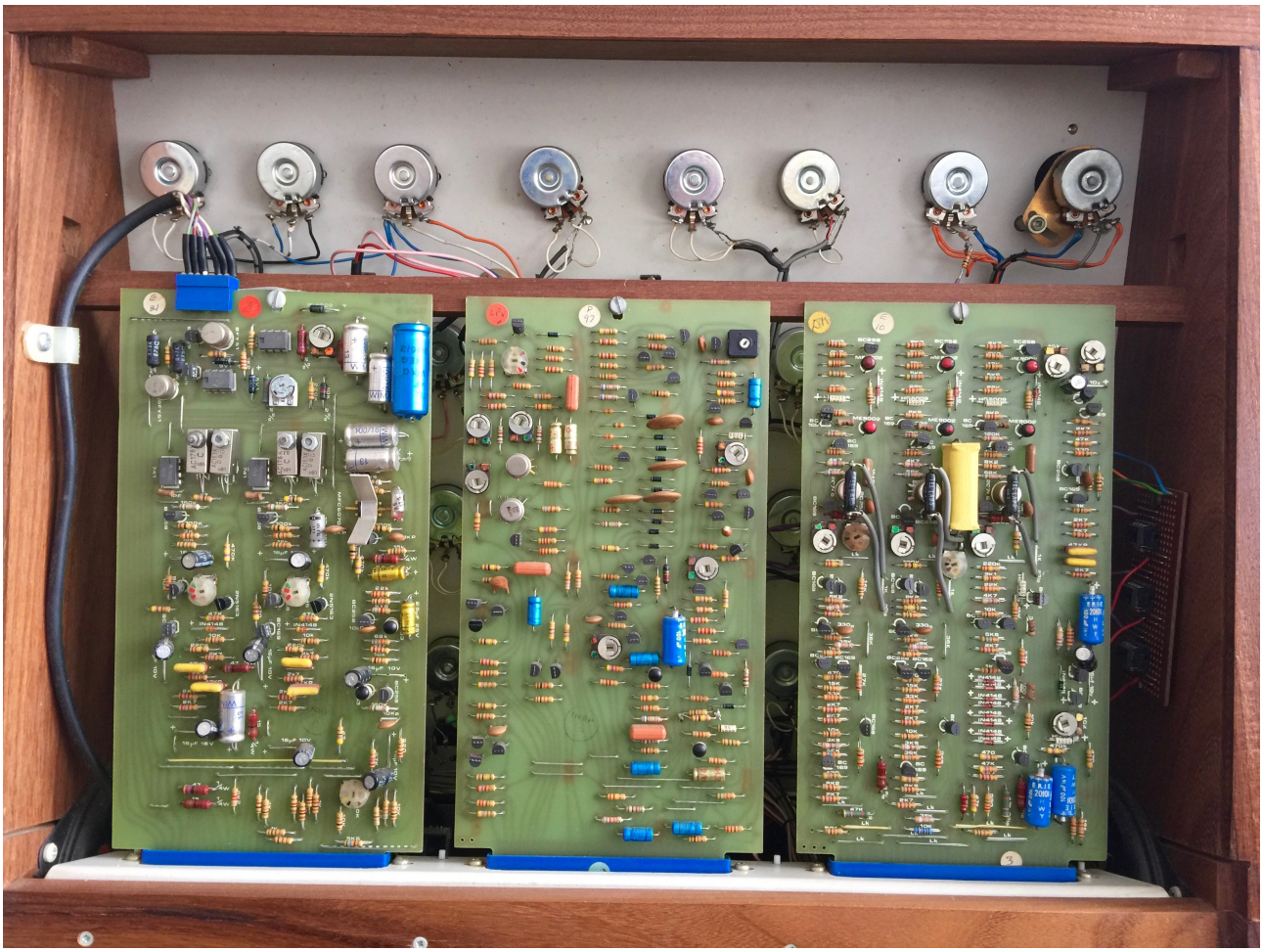

RING MODULATOR
FILTER/OSCILLATOR
FREQUENCY
RESPONSE
LEVEL
ENVELOPE SHAPES
ATTACK
DECAY
OFF
REVERBERATION
TRAPEZOID
SIGNAL
INPUT LEVEL
OUTPUT FILTER
CONTROL VOLTAGES
SIGNAL LEVELS

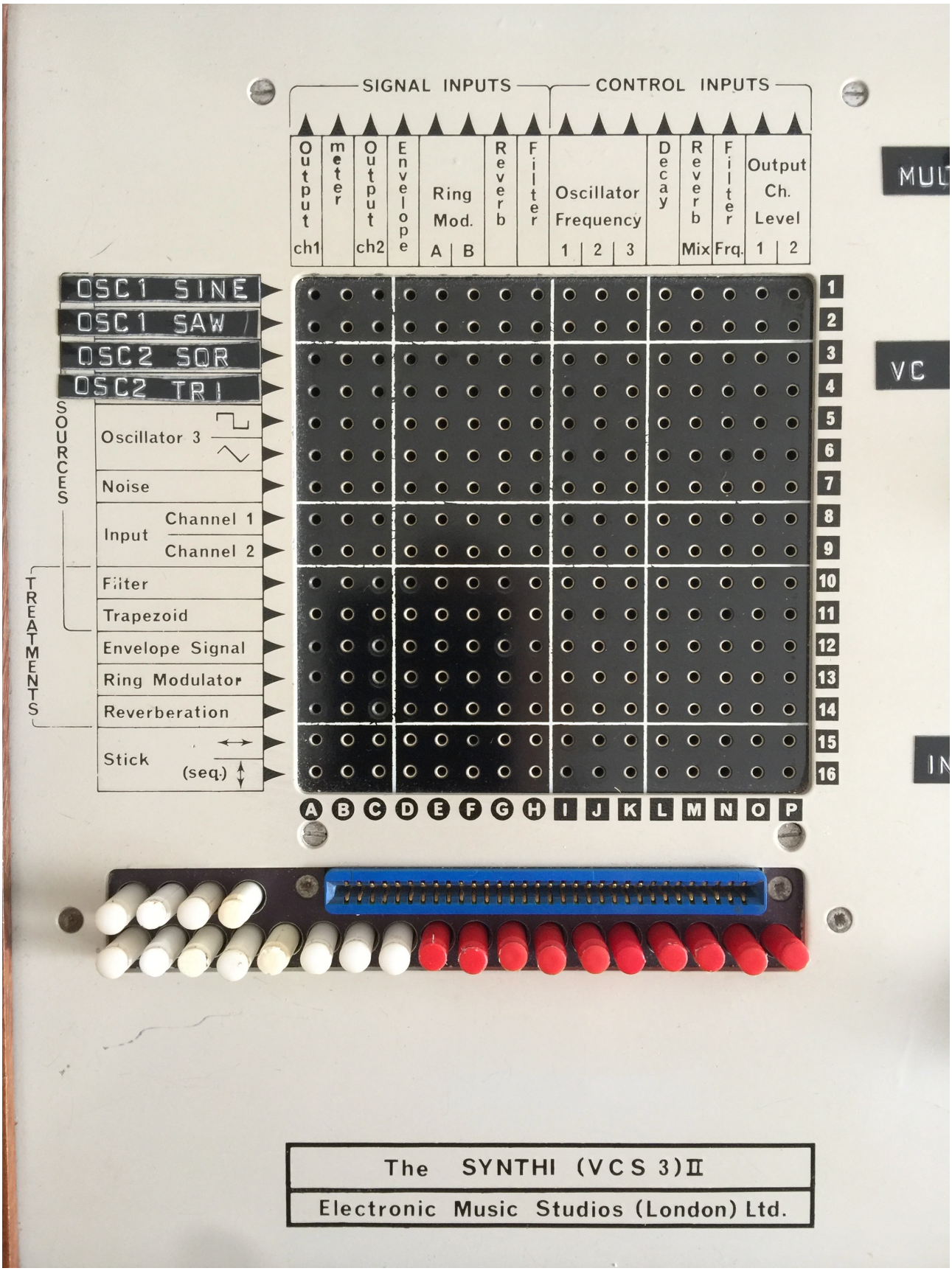

A.C. MAINS
MADE IN ENGLAND by
Electronic Music Studios Ltd
49 Deodar Road
LONDON S.W.15
Model No. VCS 3B
Serial No.1198
STEREO
HEADPHONES
SCOPE
Right
Left
SIGNAL OUTPUTS
Ch. 2
Ch. 1
CONTROL OUTPUTS
KEYBOARD
Ch. 2
Ch. 1
HI LEVEL INPUTS
Ch. 2
Ch. 1
MIC 600Ω


A.C. MAINS
MADE IN ENGLAND by
Electronic Music Studios Ltd
49 Deodar Road
LONDON S.W.15
Model No. VCS 3B
STEREO
SCOPE
Right
Left
Ch. 2
Ch. 1
KEYBOARD
Ch. 2
Ch. 1
Ch. 2


ext gate input
stick horiz input
stick vert input
MADE IN ENGLAND by
Electronic Music Studios Ltd
49 Deodar Road
LONDON S.W.15
Model No. V.C.S.3 II
Serial No.1198.
A.C. MAINS
STEREO
HEADPHONES
SCOPE
Right
Left
SIGNAL OUTPUTS
Ch. 2
Ch. 1
CONTROL OUTPUTS
KEYBOARD
Ch. 2
Ch. 1
HI. LEVEL INPUTS
Ch. 2
Ch. 1
MIC. 600Ω


MADE IN ENGLAND by
Electronic Music Studios Ltd
49 Deodar Road,
LONDON S.W.15
A.C. MAINS
Model No. V.C.S.3 II
Serial No.1198.
STEREO
HEADPHON




SIGNAL INPUTS
CONTROL INPUTS
Output ch1
meter
Output ch2
Envelope
Ring Mod. A B
Reverb
Filter
Oscillator Frequency 1 2 3
Decay
Reverb Mix
Filter Frq.
Output Ch. Level 1 2
OSC1 SINE
OSC1 SAW
OSC2 SQR
OSC2 TRI
SOURCES
Oscillator 3
Noise
Input
Channel 1
Channel 2
TREATMENTS
Filter
Trapezoid
Envelope Signal
Ring Modulator
Reverberation
Stick
(seq.)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A B C D E F G H I J K L M N O P
MUL
VC
IN
The SYNTHI (VCS 3)II
Electronic Music Studios (London) Ltd.


MULTIPLE
VC SHAPE
OSC1
OSC2
OSC3
RANGE
SEQUENCER
EXT CV
STICK
INVERT
OUTPUT CH.1
LEVEL
PAN (EXT.)
Output
Ch.
Level
1 2
O P

VCS3 Mk1 Serial No.1198 (ex-Edward Williams)

NOTES ON USE OF HI-LO OSCILLATOR MODIFICATIONS

An extra switch is fitted in the Oscillator 2 and Oscillator 3 section on the upper panel. Freq Hi/Lo.

With the switch in the 'up' position the Oscillator performs in the high frequency range. Switch down creates a low frequency oscillator, although the high end still reaches well into the audio range.

Note that positions of the shape controls are offset when using this modification. The centre positions on Osc2 in 'Hi' range and Osc3 in 'Lo' range are calibrated to be symmetrical but become offset when switching to the other range.

ENVELOPE SHAPER SOURCE SELECT SWITCH - MULT/ES-K1

This switch selects where the envelope trigger gets its trigger from. In the MULT position the trigger come from the 8-way keyboard connector on the rear panel. In the ES/KI position the trigger comes from the 'ext gate input' jack on the back panel.

INPUT CHANNEL SI/MULT SWITCHES

These two switches are for disconnecting the link from 8-way keyboard socket to the two input channels.

In normal operation if a keyboard is connected at the same time as an external audio input using the same input channel the two will interact. When the keyboard is played its CV outputs will cause pops and crackles on the audio input.

By setting this switch to SI (Signal Input) the connection to the 8-way socket is interrupted. In the MULT position both the 8-way socket and the signal input are connected.

VOLTAGE CONTROLLED OSCILLATOR SHAPE (VC SHAPE OSC1, OSC2 and OSC3)

Three 3.5mm jack sockets labelled VC SHAPE OSC1, OSC2 and OSC3 are mounted to the right of the matrix, and special patchpin-to-3.5mm jack patch-cords are supplied to route modulation direct from the matrix.

It is only necessary to place the pin in the horizontal row corresponding with the device chosen as the modulation source. Vertical column position makes no difference so best choose a location where the cord will not obstruct pin-patching.

Try a slow sweep from Oscillator 3 triangle output as an obvious choice for the source of control, but the trapezoid, sequencer, joystick or any other control source can just as easily be employed.

DUAL PATCHABLE INVERTER

Two 3.5 mm sockets next to the matrix labelled INVERT are provided. Using the special pin-to-3.5 mm jack cables provided, patching either of these inverters to any matrix location will give an invert function at that location. There are two separate inverters.

Try this out by listening to two oscillators under control from a third slow controlling oscillator. (B1, B3, I6, J6) Use the inverter pin at the J6 location to create a contrary motion of the oscillators.

TWO EXTRA INPUT CHANNELS

Two jacksockets are fitted on the back panel - labelled 'stick horiz input' and 'stick vert input'. These can be used as either CV or line level audio inputs. The signals/CVs are routed to row 15 or 16 on the matrix (Horizontal or Vertical joystick) and are turned on by using the switches labelled 'EXT CV'and 'STICK' beside the joystick.

When switched to Ext CV the joystick range control functions as an input level control. The amount of gain available is approximately the same as the normal hi-level input.

Note that the joystick function is lost when the extra Input Channel is switched on.

MULTIPLE

These four jack sockets are simply wired together to each other. This functions as a signal or CV 'splitter'.

For example let's say you wanted to have a simultaneous control of both Osc2 shape and Osc3 shape from the same source. You would connect two of the short jack-to-jack links, one each from VC Shape Osc2 and VC Shape Osc3 sockets to two of the four MULTI sockets. Then you would use a pin-to-minijack cable to go from the matrix (the source of the control) to a third MULTI jack socket.

USING THE EMS SYNTHI A, AKS AND VCS3 WITH A MIDI TO CV CONVERTER

Although the EMS synthesizers were designed well before the advent of MIDI and lack actual CV and Gate input and output sockets it is quite simple to use them with a MIDI to CV system.

CONNECTING THE CV INPUTS

All Synthis have two HI-LEVEL INPUT CHANNELS which can function as line level signal inputs OR Control Voltage (CV) Inputs. This means that two channels of CV information can be connected simultaneously and patched to control any function on the matrix - not just pitch.

The only complication in connecting CVs to these inputs is that due to the high initial gain of the input amplifiers it is necessary to **include a 100K resistor in line (in series) with the incoming CV**. Failure to do so will

result in the input amplifier of the Synthi 'clipping' so that normal tuning will be impossible. Notes above the middle of the keyboard may fail to make any difference to pitch.

Take the CV output from a MIDI-to-CV converter (or other analogue synthesizer) with a special cable and connect it to one of the Synthi's Hi-level input jacks. Patch the CV from this input channel to control the Synthi oscillator(s).

Obtaining the correct tuning spread can be difficult at first. Play an octave into the MIDI/CV converter - preferably make a two note sequence which loops. Then listen to the INTERVAL between the two notes as you increase the Synthi input channel level setting. As you adjust the input level both the low and high notes will be moving, but just focus on whether the INTERVAL is increasing and if it is more or less than an octave.

Once it is an octave leave the input level alone (unless you decide to patch the CV to an extra oscillator, which will require another retuning exercise as described). Once the correct tuning spread is set up you can simply adjust the oscillator frequency dial for the correct musical pitch.

CONNECTING THE EXTERNAL GATE INPUT

The Gate input on the original Synthi is only accessible on Pin 5 of the 8-way KEYBOARD socket. This VCS3 has been fitted with a buffered gate input which is accessible via an extra jack socket (labelled 'Ext Gate Input'). A positive-going pulse of 5V here will trigger the envelope shaper.

Connections to this Gate Input should be made with a normal jack lead, and not the special 100K resistor lead described above

RW - October 2016

INVOICE

INVOICE TO

Penzance,
Cornwall

DELIVER TO:

Tel:
Email:

CARRIAGE PER
For collection

TO
ELECTRONIC MUSIC STUDIOS

Trendeal Vean Barn
Ladock
Truro
Cornwall TR2 4NW
Tel: 01726-883265

No.4637

VAT No: 527 0690 47 (Prop: R.Wood)

DELIVERY DATE:
27th October 2016

ORDER No.	DATE OF ORDER	OUR REF.	INVOICE DATE
prepaid	02.04.16	RW	27th October 2016

QUANTITY	DESCRIPTION	UNIT PRICE	V.A.T. RATE	V.A.T. AMOUNT	TOTAL PRICE
	Service/repairs to VCS3 Mk1 Ser No.1198				
	1) Check all pots and clean/replace where necessary. Retest Replaced: Osc1 shape,Osc1 saw,Osc2 shape,Osc2 sqr,Osc2 tri, Osc3 tri,Env level,Trapezoid,OP Filt1,OP Filt2,Filt response, Filt frequency,Filt level,Rev level,Horiz range. 3.5 hours @ £84.00 + 14 @ 4.50				£151.50
	2) Matrix misaligned in panel - fouling pins. 0.5 hour				£12.00
	3) Osc2 vernier v stiff. Dismantled/serviced. 1 hour				£24.00
	4) Input Ch2 not working. Duff Q56 replaced. 0.5 hour + £0.30				£12.30
	5) Joystick v stiff. Dismantled/serviced. 1 hour				£24.00
	6) Output Channel control v abrupt. Replaced both pots and FETS 1 hour + £9.00 parts				£33.00
	7) Make up and fit slats to base. 1.5 hour + £2.50				£38.50
	8) Patch leads missing. Supply 3 x Minijack-to-pin @ £12.00 each Supply 2 x Minijack-to-Minijack @ £6.50 each				£49.00
	9) Miscellaneous items:				
	Correct Input Ch switch wiring		0.25		
	Replecd PSU -9V preset		0.25 +	£1.50	
	Replaced Env bleed preset/100pF		0.50 +	£0.50	
	Supply one missing patch pin			£8.50	
	Osc3 Hi/lo mod resistor missing		0.25		
	Label B/P jacks to identify		0.25		
			1.50 hour + £10.50		£46.50
	10) Clean all knobs and panels. 2 hours				£48.00
	10) Realignment and final test				£36.00
					£474.80
				+ VAT	£94.96
				TOTAL:	£569.76

Bank details (for transfer in GBP/pounds sterling:

Natwest,
Sort code:
Account number:
Account names: EMS
Swift code:
IBAN:

PAID WITH THANKS - BANK TRANSFER RECEIVED 25/10/16

£569.76

TERMS: PRO FORMA. C.O.D. NETT CASH 7 DAYS. 30-DAY ACCOUNT.

NON DELIVERY: E.M.S. must be informed within 14 days from Invoice date or no claims can be entertained.

DAMAGE: E.M.S. must be informed within 7 days of receipt of goods and the goods must not be tampered with prior to our inspection or no claims can be entertained.