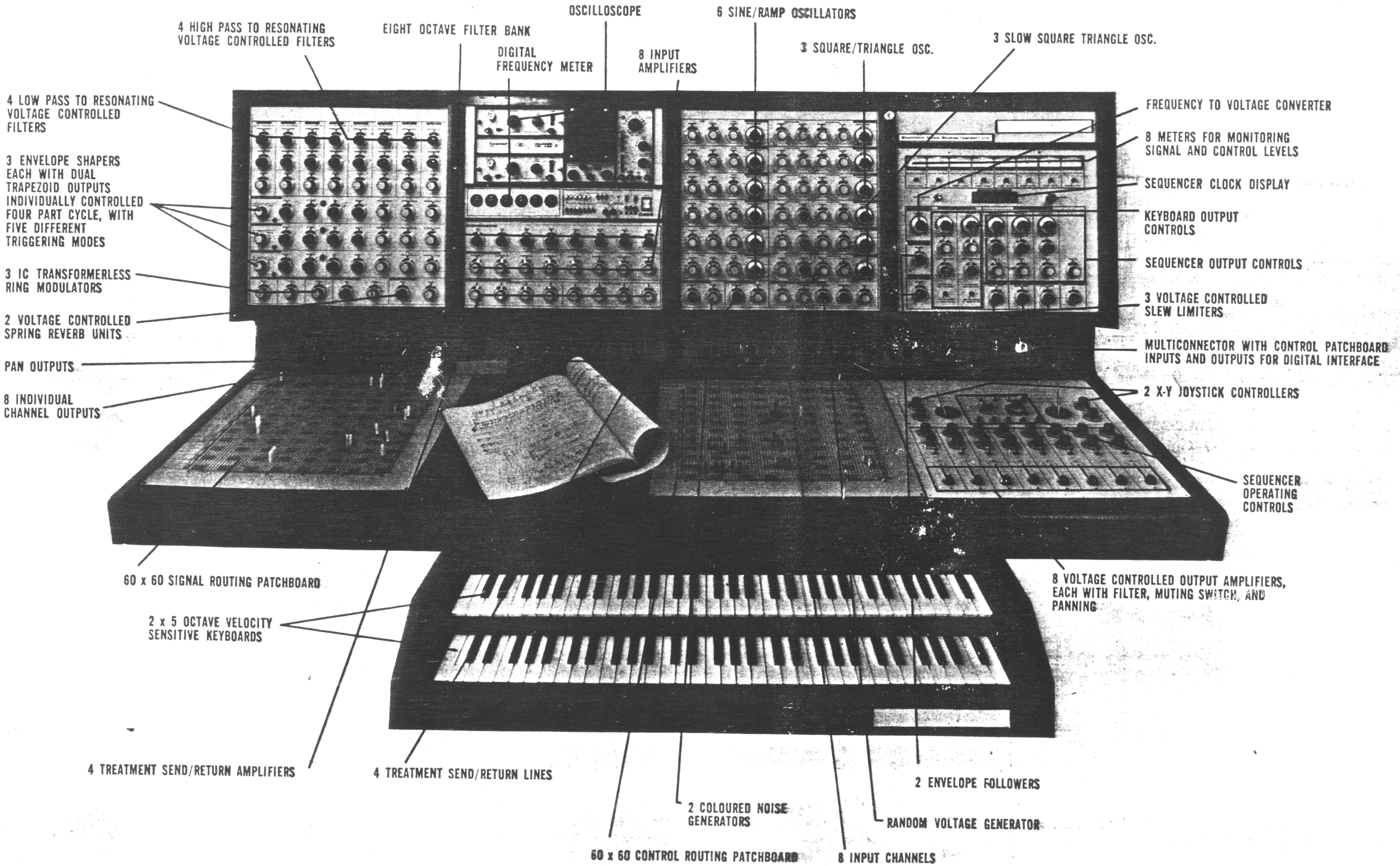
SYNTHI 100

EMS

Electronic Music Studios London Limited,
49 Deodar Road London SW15 2NU
Telephone 01-874 0042/874 2363 Telex 928327
New York: 408 East 78th Street NY 10021 Tel: 212 734 7344
Telex 42 40 33



SYNTHI 100

EMS
Electronic Music Studios London Limited,
49 Deodar Road London SW15 2NU
Telephone 01-874 0042/874 2363 Telex 928327
New York: 408 East 78th Street NY 10021 Tel: 212 734 7344
Telex 42 40 33

The SYNTHI 100 is the most formidable electronic music system ever devised. It has as its heart a digital sequencer, which is in fact a small special purpose computer, complete with analog-to-digital and digital-to-analog converters. This device enables the operator to load, in his own time, up to six independent tracks of control voltage data, plus attack and switching pulses, then hear it played back, forwards or in reverse, at any speed. All events can be individually examined by stopping the clock, and edited or erased. This sequencer is years ahead of its time.

The SYNTHI 100 is easy to set up (two pin matrixes, each 60 x 60 way), and the large amount of varied hardware at the disposal of the user means that in the assembly of complex sounds compromises are unnecessary. There are features like output level controls on all signal producing devices to facilitate accurate balancing, and phase locking on all oscillators for additive as well as subtractive 'filter synthesis'. A frequency-to-voltage converter and envelope followers provide control voltages from signals, slew limiters will integrate stepped voltages, and nine filters, eight of them voltage controlled, make possible amazingly subtle timbre manipulation.

The SYNTHI 100 is designed to match your other studio equipment, using eight voltage controlled line output channels, eight line input channels, as well as four send and return lines for treatments outside the synthesiser. This astounding machine can also be operated entirely automatically by a computer, and EMS will be pleased to quote for a suitable processor and our own specially designed interface. This opens up the whole field of sound synthesis to new levels of precision control.

The SYNTHI 100 is already in use by many studios, including the BBC, Radio Belgrade and the University of Wales. Recent great improvements in manufacturing techniques have enabled us to make a very large price reduction without in any way compromising the specification.

ABRIDGED SPECIFICATION

NB: All devices have output level controls, but to save space this is not mentioned in the following descriptions of each item.

TWELVE OSCILLATORS:
Six Sine and Ramp Audio Generators
Frequency Range: 1Hz-10KHz (manual — greater when v-controlled).
Voltage Control: 0.5V/Octave.
Sine shaper for even harmonic control.
Synchronising input.

Three Square and Triangular Audio Generators
As above but shaping on both outputs, giving square — rectangular — pulse, and rising ramp — triangle — falling ramp.
Synchronising input.

Three Low Frequency Square and Triangular Generators
Frequency Range: 0.025Hz (40"/cycle) — 500Hz (greater with vc).
Voltage Control: 0.5V/Octave.
Shape Variation: as above.
Synchronising input.

TWO NOISE GENERATORS:
Built in filter giving dark through white to light.

DUAL OUTPUT RANDOM VOLTAGE GENERATOR:
Distribution of Chances: Rectangular.
Amplitude Variance: 2x ±0-2.5V max (5V excursion).
Mean Time between Selections: 10mS to 10S.
Time Variance: Equal periods to 100:1 variance.

THREE ENVELOPE SHAPERS WITH DUAL TRAPEZOID OUTPUTS:
Four section trapezoid cycle: Delay, Attack, On, Decay
V-Controllable time (each section): 2mS-20S.
Five Triggering Modes: Signal Threshold, Hold On, Single Shot, Free Run, Gated Free Run.
Voltage Outputs: As well as modulating an audio signal, each shaper can produce two different control voltages.

FOUR LOW PASS TO RESONATING FILTERS:
Frequency Range: 5Hz-20KHz.
Voltage Control: 0.5V/Octave.
Maximum Q: 20.
Cut-off Rate: 12dB/Octave for first octave, then 18dB/8ve.

FOUR HIGH PASS TO RESONATING FILTERS:
As foregoing but complementary characteristic.

OCTAVE FILTER BANK:
Eight fixed narrow bandpass filters one octave apart between 62.5Hz and 8 KHz, with separate amplitude controls.

TWO SPRING REVERBERATION UNITS:
Reverberation-to-direct ratio is voltage controllable.

THREE SLEW LIMITERS:
Voltage Controllable Slew Rate: 1mS - 10S.

THREE IC TRANSFORMERLESS RING MODULATORS:
Input Rejection: 60dB.

ONE 256 EVENT, 6 SIMULTANEOUS PARAMETER DIGITAL SEQUENCER:
Storage Capacity: 10,750 bits.
For details see separate **SEQUENCER 256 leaflet.**

EIGHT VOLTAGE CONTROLLED OUTPUT AMPLIFIERS:
Each with slide fader, output panning, variable first order low to high pass filter, output disconnect switch, and meter switchable to read AC or DC level.
Voltage Control: 0.5V/Octave.

TWO X-Y JOYSTICK CONTROLLERS:
Two manually controlled outputs from each stick.
Range of each output: ±2VDC.

TWO FIVE-OCTAVE PITCH AND DYNAMICALLY-PROPORTIONAL KEYBOARDS:
Each keyboard delivers three outputs, pitch, dynamic and envelope trigger.
Pitch Voltage: 0.5V/Octave (need not, of course, control pitch).
Dynamic Voltage: ±1.5V depending on key velocity.

TWO 60 x 60 PIN MATRIX PATCHBOARDS:
One for Signals, one for Controls, with interconnections for dual purpose functions. 7,200 pin locations in all.

EIGHT AC/DC INPUT AMPLIFIERS:
Maximum Line Input: 1.8VAC (rms) or ±2.5VDC.

FREQUENCY-TO-VOLTAGE CONVERTER
Pitch Voltage: 1V/Octave.

TWO ENVELOPE FOLLOWERS:
Amplitude Voltage: 1VAC (rms)/6dB.

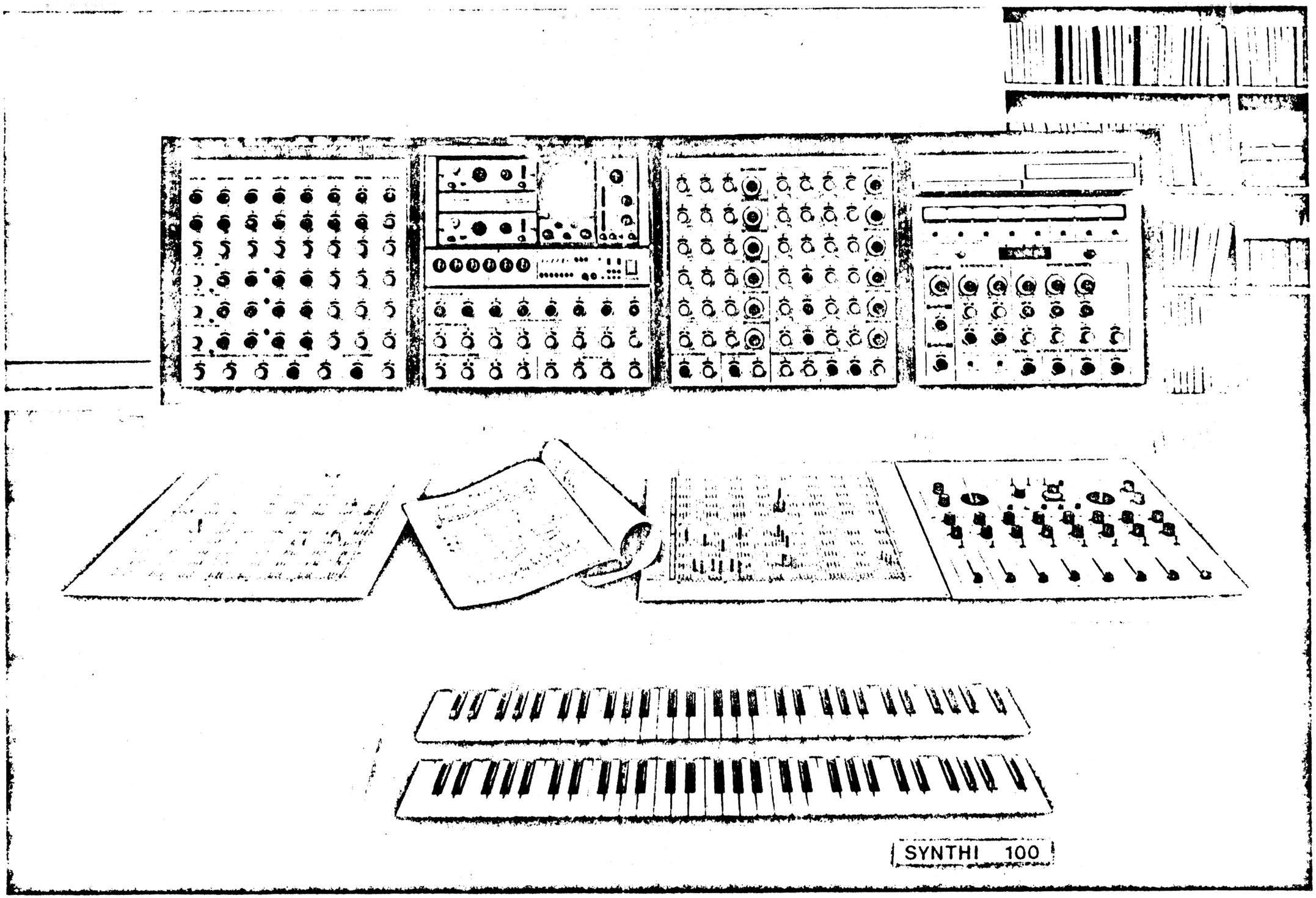
DOUBLE BEAM OSCILLOSCOPE:
DIGITAL FREQUENCY METER/TIMER/COUNTER.
High quality specifications from other manufacturers. Latest models fitted.

FOUR EXTERNAL TREATMENT SEND AND RETURN LINES:
For interfacing with other studio equipment.

MULTIWAY PLUG FOR EXTERNAL CONNECTION OF CONTROLS
All control patch connections are available at these sockets, making possible e.g. connection to a computer. All line connections are to Cannon sockets.

DIMENSIONS:
Main Carcass: 79" (2m) wide by 37½" (950mm) deep by 33" (837mm) high.
Height from ground on special stand — 30" (760mm).

SYNTHI 50
The SYNTHI 50 has all the main devices offered in Synthi 100, but does not include the following items: Multiway control socket; Oscilloscope; Digital Frequency Meter; Specially made stand. In Synthi 50 Cannon sockets are replaced by standard Igranic type jack sockets. In other respects there is no compromise to the specification.


SYNTHI 100

The Synthi 100

Professional Electronic Music Studio

The SYNTHI 100 studio has at its heart a digital sequencer, which makes conventional analogue controllers, with their gigantic array of knobs, seem old-fashioned, inaccurate and cumbersome. With a solid state storage capacity of 10,240 bits, the new sequencer is capable of precisely controlling 6 different simultaneous parameters over a sequence of 256 successive events. There are several modes of operation and full, easy to operate editing facilities, so that any or all of the 256 stored items and their time relationships may be changed without difficulty.

For example, two five-octave dynamically proportional keyboards are included, to operate the studio in real time, on six tracks, with the sequencer remembering what is played. This performance can then be played back backwards or forwards, at any speed, and edited to any degree of precision, prior to recording on magnetic tape.

The SYNTHI 100 also contains new electronic devices exclusive to EMS, such as voltage controlled slew limiters, a frequency to voltage converter and a two-output random staircase generator with controllable time and amplitude variances. Also included are a very full complement of 12 drift-free oscillators, eight dynamic filters and three transformerless i.c. ring modulators (which can be cascaded for double and triple modulation), as well as eight voltage controlled output channels with full panning facilities, eight input amplifiers, two X-Y joystick controllers, a filter bank, three elaborate envelope shapers and followers, noise generators and reverberation units. A double-beam oscilloscope and six-digit crystal-controlled counter/timer/frequency meter ensure accurate setting up and logging of parameters, and patching is by cordless pin matrices (two boards each with 60 x 60 locations).

In the same price range as the larger voltage controlled synthesizers, the SYNTHI 100 offers far more, and is intended for really exacting composition and realisation work in professional recording and electronic music studios, broadcasting companies and universities. First customers include the BBC, Radio Belgrade and the University of Wales.

This photograph shows the EMS Synthi 100. The patching matrixes are on the main desk; the right hand matrix is used for control voltages and is connected to the Digital Interface via two 60 way junctions. The knobs above the desk are used as presets when the SYNTHI is controlled by computer.

General Points

Appearance

The SYNTHI 100 is presented in an afrormosia case, with padded black leather. A cupboard stand and seat are available as extras. The working surfaces are illuminated by dimmer lights, and all outputs and inputs are available behind a sliding screen in the front of the unit, while the input/output cables are channelled on to the rear. The SYNTHI 100 is designed for computer interface, and therefore all control inputs are available for direct connection to digital/analog converters on multiway connectors. The overall size base of the SYNTHI 100 is 79 in. length by 37½ in. depth, the height is 33 in. and the height from the underside to the ground is 30 in.

Signal Levels

The levels of all signal outputs available at the patchboard are controlled by panel mounted potentiometers. In fact, these potentiometers provide control voltages which operate on voltage controlled amplifiers. The advantages of this system include:

Constant low output impedence.

No 'fader scratch' as levels are changed

Less conveying of signals at high impedance (where they are susceptible to crosstalk)

Much simplified wiring system

Ideal logarithmic control of level

In general, signal levels are about ±1V p-p, although most outputs can deliver much more than this. Most devices which have signal inputs are adjusted for optimum operation at this level, although it can be usually considerably exceeded without serious distortion.

Control Voltage Levels

All EMS control voltage outputs are bipolar, that is to say they go both positive and negative. This allows control signals and audio signals to be interchanged, and also allows the magnitude of a control output to be adjusted without altering the mean level of the parameter controlled.

Input Impedances

All input impedances are approximately 10 KOHM. This comparatively high figure was chosen as a compromise between the conflicting requirements of 'fan out' (i.e. the number of inputs an output may drive before it runs out of power) and susceptibility to crosstalk when an input is left open circuit. Screened cable is used for all signal paths in the studio, and impedance at certain central inputs is made infinitely low so that secondary control parameters can be added without readjusting the magnitude of the primary ones.

Noise Levels

The signal to noise ratio of all voltage controlled amplifiers is better than 74 dB for an input signal level which produces a T.H.D. of 3%. This ratio is constant over the upper 30 dB of the control range. In other words, as the amplifier gain is reduced, the noise is proportionally reduced as well. When the amplifier is cut off, the noise at its output is immeasurable.

Specification

Source Modules

Three Voltage Controlled Audio Waveform Generators, Sine and Ramp

Manual Frequency Range: Greater than 1Hz - 10 KHz (extendible by voltage controls in both directions — to 0.25 Hz and 20 KHz).

Sine Purity: Better than 50% total distortion between 10 Hz and 10KHz.

Ramp Output Linearity: Departure from linearity ± 1% of best straight line between 10Hz and 10KHz.

Voltage Control: 5v/octave. Accuracy 0.3% departure from best straight line between 100 and 2000 KHz.

Frequency Stability: Generally better than 2% from month to month, but the oscillators usually hold their setting to within 2 cycles in a thousand during a working session.

A sine shaper is included by which variable amounts of even harmonic distortion may be added.

Three Voltage Controlled Audio Waveform Generators, Triangle and Square.

These can be varied from triangle to sawtooth ramp, and from symmetrical square to short pulse, in either polarity.

Manual Frequency Range: Greater than 1 Hz to 10 KHz.

Triangle Symmetry: ±5% rise time to fall time equality.

Other specifications as for sine/ramp oscillator.

Three Voltage Controlled Low Frequency Waveform Generators.

Same details as before, but oscillators are twenty times as slow.

Frequency range: Greater than 0.025 Hz (40 secs. per cycle) to 500 Hz.

Voltage Control: .5v/octave.

These three oscillators are intended mainly as control sources, but can be used for tone generation at the upper end of the range.

All nine of the above oscillators have synchronisation inputs so that they can operate at an integral multiple of another oscillator, providing a huge variety of waveforms which can be used in additive synthesis.

Three Noise Generators.

Variable from white (central position of colouration control) to dark or light positions (low or high pass filters).

Distortion: In white position, frequency content is flat ±3 dB from 100 Hz - 10 KHz.

We recommend several noise sources, because with different filterings more than one can be used for different purposes.

Dual Output Random Control Voltage Source

This device produces two control voltages which move abruptly from one level to another. The distribution of levels is rectangular rather than Gaussian, and the two outputs are uncorrelated in level, but synchronous in time. The mean time between changes, and the variance about that mean are manually controllable. The distribution of times is rectangular, and in common with all other time controls devices in the studio, a control range of at least 1000:1 is available.

Controls:

Amplitude Variance: Up to 2.5v symmetrically positive and negative (x2, each output separately controllable).

Time Range: From approximately 10 secs to 10 ms if no time variance is applied.

Time Variance: From equal steps to 1000:1 variance. Effect of variance control is obviously limited when time range control is at either entrance.

Treatment Modules

Three Voltage Controlled Trapezoid Generators with Integral Envelope Shapers

These devices might be described as voltage programmable four segment curve synthesizers, the output being available as two control voltages and as the modulation of an audio signal.

The basic waveform produced (at each control output) has four stages:

1 **Delay.** The output remains constant and negative for a controllable time after the generator is triggered.

2 **Attack.** The output rises to a fixed positive value at a controlled rate.

3 **On.** The output remains constant and positive for a controllable time after the completion of 'attack'.

4 **Decay.** The output falls at a controlled rate to its initial value.

In addition, there is a second output which lags behind the first by one quarter of a complete trapezoid cycle. Thus the time set for, say, 'on' in respect of output 1, becomes the time for 'attack' from output 2, and so on.

The amplitude and polarity of both outputs may be adjusted independently so that if they are summed (on the patchboard) any continuous four line function which ends at the value at which it starts may be produced. This arrangement gives an extraordinary flexible range of envelopes.

The envelope shaper portion consists of a logarithmic voltage controlled amplifier permanently connected to one of the trapezoids.

The overall control of each cycle of operation may be in a number of ways selected by a switch, having the following positions:

1 **Signal threshold.** Any signal above a certain level initiates a single cycle.

2 **Hold** sequence starts when control is positive. Decay does not start until control goes negative.

3 **Single shot** positive zero crossing initiates a single cycle.

4 **Free run.**

5 **Gated free run** positive level allows the sequence to free run. Sequence stops at the end of a cycle when level goes negative.

Panel Controls

Initial delay time	2 ms to 20 sec.
Attack time	2 ms to 20 sec.
On time	2 ms to 20 sec.
Decay time	2 ms to 20 sec.

(these parameters may also be voltage controlled over their entire range.)

Trapezoid phase 1 output level (centre zero knob)
Trapezoid phase 2 output level (centre zero knob)
Signal level control
Push button (to initiate cycle)
Trigger mode selector switch

Envelope shaper is logarithmic to within 3 dB over its 60 dB range.

Voltage control function of time parameters is ideally exponential to within 10% (of dependent parameter) over a range of 1000:1. Departure from ideal is gradual beyond these limits. This permits a single voltage applied to all inputs to compress the time scale.

Four Voltage Controlled Filter/Oscillators (Low Pass to Resonating)

Operation as a sine source.

Frequency Range:
Greater than 5 Hz–20 KHz.

Sine Purity:
Better than 3% total distortion between 10 Hz and 10 KHz.

General Noise Figure for Oscillators:
Spurious outputs not greater than 0.1%.

As filters, they are adjustable from Low Pass to Resonating Filters, covering the entire sonic range.

Frequency Range:
Greater than 5 Hz to 20 KHz.

Low Pass Position:
Cut off rate 12 dB for first octave and 18 dB per octave thereafter.

Resonator Position:
Maximum stable 'Q' factor–20.

Accuracy of Exponential Voltage Control Function:
± 1% between 100 Hz and 2000 Hz.

Note: Operation as a voltage controlled oscillator is limited by the time taken to respond to an abrupt change. Maximum slew rate is about 2 ms per octave.

Four Voltage Controlled Filter/Oscillators (High Pass to Resonating)

Similar, but complementary to Low Pass Filters.

One Octave Filter Bank

This consists of eight resonating filters, fixed-tune one octave apart, in the range 62.5 Hz–8 KHz, seperately controllable.

Two Voltage Controlled Reverberation Units

Each spring unit has two elements with delays of 35 and 40 ms.

Maximum Reverberation Time:
2.4 seconds.

Useful Frequency Range:
30 Hz–12 KHz.

Voltage Control Range:
±2v from no reverberation to maximum reverberation.

Three Voltage Controlled Slew Limiters

This device is a unity gain amplifier in which the output exactly follows the input at a rate whose maximum (slew) is defined by a control voltage. One application might be to interpose the device between the pitch control voltage from a keyboard and the oscillator whose pitch is to be controlled. If the key velocity voltage were then applied to the slew control input, the player could produce a glissando between any two notes that he played, the rate of glissando being controlled by his touch.

Steady State Gain:	1 ± 1%
Steady State Linearity:	± 0.05% (BSL)
Range of Slew Control:	1 ms to 10 sec.

Voltage control of slew is exponential.

Note: Unlike all other devices, no output level control is provided as the device has unity gain.

Three Integral Circuit Transformerless Ring Modulators

These very efficient modulators also include amplifiers, and can therefore be used in series for double or triple modulation.

Maximum Input for
Undistorted Output: 1.5v p-p to each input.
Breakthrough with 1.5v
on one input only: 5mV p-p (—60 dB)

One 256 Event, 6 Simultaneous Parameter Digital Sequencer

This machine is, in fact, a small special purpose digital computer, complete with analog to digital and digital to analog converters. It provides a sequence of control voltages which may be used on any of the devices in the studio.

The operation of the sequencer may most easily be described in terms of conventional music, although it must be remembered that the design by no means limits it to this kind of operation.

The sequencer stores 256 'notes' and plays each note at the correct time and for the correct duration. It simultaneously provides two voltages, one of which might be used to define pitch and the other loudness. It is capable of controlling three voices, each with duration, pitch and loudness. The 256 note storage may be distributed to each voice in any proportion, for instance, 254 notes may go to one voice and one each to the others. In fact, the second and third voices need not be used as such, their voltages could be used to control parameters (filtering, decay time, etc.) of the first voice.

The information which is to be stored and subsequently reproduced is presented to the machine as control voltages, which are most easily supplied from the keyboards.

All timing data is entered by playing the keys. To record a sequence the composer sets the speed of a clock and starts it running. As he plays each note, the machine at that instant records how many clock pulses have elapsed since the start of the sequence, and how many during the time that the note was held down. It simultaneously remembers which note on the keyboard was pressed and with which velocity it was struck. (The second parameter, or, indeed, the first, could equally be derived from any voltage source.) The composer continues until he has recorded perhaps sixty notes. He then restarts the clock and turns a switch which tells the machine that the next notes he plays will be directed to the second envelope shaper. While recording each sequence, he can simultaneously hear the results of what he has previously recorded.

The machine may then be set to the edit mode. In this mode the sequence may be advanced at any speed, or step by step, so that each note may be modified or erased. A special feature allows time to be *reversed.* A control rather like the spooling knob on studio tape recorders allows one to go forwards or backwards at any speed. Unlike a tape recorder, however, there is no inertia in the system, so that one can quite easily 'zero in' on a particular note.

Sequencer Controls

Ten controls are provided to adjust the amplitude of the sequencer's output voltages, and a further ten supervise the actual operation.

1 **Range of Layer 1 Output Voltage A**

This control is a slow motion dial calibrated 0-100. If Voltage A were used to control the pitch of an oscillator, then this control could be used to define the musical interval for each step of the output. At 25, for instance, a range of sixty-four quarter tones (covering about 2½ octaves) will be available.

2 **Range of Layer 1 Output Voltage B**

The range of the second parameter for each event may similarly be adjusted with this control.

3 **Range of Layer 1 Keying Voltage**

This voltage, which is positive for the duration of each note in Layer 1, would normally be used to control the envelope shaper. It can also be used to assist in the synthesis of certain instrumental sounds. For this reason, a centre zero control is provided. This inverts the polarity of the voltage when it is counterclockwise.

4 5 and 6 are controls identical to 1 2 and 3, except that they apply to the second layer. Likewise 7, 8 and 9 which apply to the third layer.

10 **Range of 'Key 4'**

A fourth kind of event may be recorded which is similar to the three layers, except that there are no parameter control voltages available with it — just the keying voltage. It is primarily intended to stop or reset the sequencer's clock, allowing one to produce a single finite sequence or a repeating pattern. If not used for this purpose it might be used in conjunction with a slew limiter and a voltage controlled amplifier to initiate a crescendo or a number of other things.

Note that all controls, 1-10, can be adjusted after the sequence is entered, without changing the basic data.

11 **Clock Rate**

This slow motion dial is a centre zero control in a rather special sense. When it is less than halfway, the sequence runs backwards. It controls the clock rate over a range of ±1000:1. That is to say, with the control near its centre position, the clock pulses occur at about 2 per second, allowing a total sequence length of over six minutes. In this case, however, the resolution in time of each event is only half a second. The control has a distinct dead space around half-way, which prevents the clock from 'drifting' during editing. A voltage proportional to the absolute clock speed is available at the control patchboard, so that it can simultaneously control all time variant parameters — envelope shapers, slew limiters and even oscillator frequencies — as the clock rate is adjusted.

12 **Note Distribution**

This control is a four way switch; it tells the machine which of the three layers is being recorded, so that on replay the voltages will appear at the appropriate output. The fourth position denotes 'Key 4' as described above.

13 **Stop at each note**

When this toggle switch is down, the sequencer clock stops at the start of each note that it reproduces.

14 **Stop at end of note**

Similar to 13, except that the sequencer stops at a time corresponding to when the key was released as the note was recorded.

These switches operate in conjunction with the note distribution switch, in that they only stop at a note in the layer defined by the latter.

The purpose of 13 and 14 is to facilitate the editing of events after a tentative sequence has been entered.

15 **Erase note button**

While this button is pressed, any notes in the layer selected by the note distribution switch which start at the time shown by the clock display, will be erased.

16 **Clear memory button.**

This is the 'bulk erase' button.

17 **Reset button**

This button sets the clock to zero, and holds it there as long as it is pressed. It does not stop the clock, it simply restarts the sequence from the beginning.

18 **Start button**

This button allows the clock counter to start or continue counting. It would be used continually during editing, to advance the sequence note by note.

19 **Stop button**

This button stops the clock from counting.

Note that 17 18 and 19 are momentary action push-buttons, not switches. They roughly correspond to the controls on a stop-watch.

When the sequencer clock is driven from pulses previously recorded on tape, or, indeed, from any external source, it will ignore them until the start button is pressed. Remote operation of the sequencer is facilitated by electrical inputs at the signal patchboard.

20 **Rewrite B, D, F**

When this switch is down, the second parameter voltages in each layer may be rewritten without disturbing the first parameter, or the event timing.

Note: In this section, 'Note' is used for musical convenience, but, it must be remembered, can be used for any parameter which has been selected.

Summary of Specification

Total storage capacity: 10,240 bits (of which 9,216 bits are normally used).

Organisation of Data

36 bit words — each word representing one event.

Start-of-event time (referred to start of sequence) 10 bits.

End-of-event time (referred to start of sequence) 10 bits.

Selection of one of three envelope shapers and one pair (out of three pairs) of digital analog converters.

Also internal functions 4 bits.

Data, for digital analog converters 2 x 6 bits.

Details of Coding

The 10 bit event time allows the start of each event to be defined to an accuracy of 1 part in 2 to the power 10 (viz. 1024). Thus, if the clock is set to a rate of, say, one hundredth pulses a second, each event may be adjusted forwards or backwards in increments of one hundredth of a second. The total sequence length would be ten seconds.

The 'end of event' time, i.e. the time at which the key is released, is similarly recorded. Thus three control signals are reproduced, each being positive during the duration of a note intended for one of the three layers of the sequence. They are available at the patchboard as switching voltages which would normally go to the supervising inputs of the envelope shapers.

Digital Analog Converters

Of the six converters, three are of accuracy appropriate to exact control of pitch on the diatonic scale. Six bits give a range of 64 notes. If greater range and/or finer resolution is required, then the output of the second converter may be added to that of the first. In this case, the player might use one keyboard to define a note on the diatonic scale, and the second to raise or lower that note by increments of one thirty-second of a tone.

The precise converters are accurate to $\pm$0.15% (BSL). The second parameter converters are accurate to $\pm$0.78% (BSL).

Eight Multifunction Output Amplifiers

These amplifiers are primarily intended to be the last link in the signal chain before the tape recorder or monitor, but they provide certain subsidiary functions which will make them otherwise useful. All eight are voltage controlled (0.5V per 6 dB).

Controls

Level: Slider type fader.

Pan: A knob which distributes the output to between the left and right bus, these being common to four of the eight amplifiers.

Filter: A single knob providing continuous transition between first order low pass and first order high pass.

Off Switch: Totally disconnect output from the pan control, allowing the amplifier to be used earlier in the signal chain.

Meter Switch: The meter may be used as a centre zero DC voltmeter, or as an AC level meter.

Two X-Y Joystick Controllers

These give continuous control of two parameters together, which is very useful in live performance. The control sticks have a range of 2 x $\pm$2V DC.

Two Five Octave Dynamically Proportional Keyboards

Five octave keyboards giving precise divisions of pitch or any other controllable parameter. In the case of pitch, the range would give anything between 4 and 40 notes per octave. This is useful for microtonal work. By setting 12 notes per octave, the keyboard can be used as a normal melodic source.

A second voltage output is proportional to touch — actually the velocity with which a key is struck.

A third voltage switches positive when one or more keys are pressed. Note that the keyboard produces only one pitch voltage at any instant; when several notes are pressed, the voltage of the highest appears.

oth the pitch voltage and dynamic voltage are emembered', even when a key is released.

eyboard voltage: 0.5V per octave maximum, accurate to better than 0.15% at all points.

ynamic voltage: ±1.5V depending on key velocity. utput function was synthesized to be a compromise etween a strict proportionality to velocity over a range f about 100:1, and a function that would distribute even subjectively equal increments of playing force venly over the output voltage range. The keyboard eels most natural when the dynamics voltage is used o control a modulator over a 40 dB range.

ight-Way Fading/Panning Console (See Multifunction Output Amplifiers)

0 x 60 Pin Matrix Patchboards (7,200 Pin Locations) hese patchboards allow any input to be connected o any output by the insertion of a single cordless pin. ach output is connected to a row of sixty horizontal holes. The holes appear as a square array of 3,600 (x2) cross-points, in any of which a jack may be inserted. he jacks contain resistors so that several outputs may be mixed into a single input. All device outputs are fed o the board at a low impedance, blocking any reverse signal patns.

wo patchboards are provided, one intended for control signals and one for audio signals. A small number of interconnection patches between the patchboards are hard wired, as some signals can be used in both domains.

t is also possible to route external signals to the patchboards by using the jacks in the conventional way. All contacts, including the jacks have a surface coating of silver.

Eight AC/DC Input Amplifiers

Maximum distortion at rated inputs: 0.1%.

Input Sensitivities: Line Input: maximum 1.8V AC (rms) or ±2.5V DC.

These amplifiers convert input signals to a suitable level and impedance to feed treatment devices. The line inputs are directly coupled and are therefore suitable for both signal and low frequency or DC control inputs. Two separate microphones amplifiers are supplied, which can feed any two of the above channels.

Four External Treatment Send and Returns

Provision for sending out to external echo plates and other equipment, and returning to the Studio.

One Frequency to Voltage Converter

This device accepts inputs from a variety of sources, including acoustical instruments (via a microphone or pickup and pre-amplifier) and produces a voltage proportional to the fundamental pitch of the note played. Sophisticated analog circuitry is incorporated to remove overtones, provided that their energy constitutes no more than 90% of the total signal.

Unlike conventional frequency measuring techniques, which count the number of zero crossings of a waveform in a fixed interval of time, the converter measures the period of the signal and transforms this data to a voltage which is compatible with the other devices in the studio. The advantage of this method is that an accurate measure of the pitch can be made in a much shorter time. The output is gated into a track and hold buffer by a discriminator, which suppresses spurious outputs when the signal is dying away.

A single output control adjusts the range and polarity of the output voltage.

Two Envelope Followers

These devices produce a voltage proportional to the mean level of an audio signal. The output is passed through a second order low pass filter to remove ripple while keeping a fast response. Cut off is about 50Hz. Output amplitude is adjustable by a centre zero knob to give positive or negative excursions of up to 1 volt per 6 dB.

Items from other Manufacturers

Dawe 3000 AR/6 Digital Frequency Meter

Brief details as follows:

Crystal frequency:	100 KHz ± 0.002%
Frequency Measurement:	Range — 0-1 MHz Accuracy — ±1 digit ± crystal accuracy Gating Time — 1 ms to 10 seconds
Period Measurement:	Range — 0-300 KHz Time Units 1 10 s to 10 ms Gating Period — 1/7 to 1,000 cycles of input frequency
Time Measurement:	Range — 10 s — 10 secs (nearly four months)

Telequipment Double Beam Oscilloscope, D43R

Rack mounted double gun laboratory oscilloscope, with 6 x 8 cm display area.

Electronic Music Studios (London) Ltd. reserve the right to vary the specification and/or price of the SYNTHI 100 studio without notice, should it be necessary or desirable.

S Y N T H I 1 0 0 C U S T O M E R N O T E S

Calibration Details for Synthi 100, Serial Number ..3019...

1. Sequencer Clock.

The sequencer clock speed knob is calibrated thus:-

Setting	Clock Frequency
0	Ω 0.6 Hz
5	32 Hz
10	Ω 1000 Hz

2. Pitch To Voltage Converter.

Approximate setting for pitch to voltage converter to track octaves ...8.45...

Voltage output is 0 volts for an input frequency of around 320 Hz.

3. Oscillator Bank Calibration.

Dial control characteristic 1 octave per major division.

Oscillators 1 - 9 range: 10 Hz to approximately 10 KHz.

Frequency on dial setting of 5 is 320 Hz.

Oscillators 10 - 12 approximate range: 0.1 Hz to 50 Hz.

Frequency on dial setting of 5 is 1.6 Hz.

Control voltage at patchboard ½V / octave 10K blue pin.

4. Sequencer Pitch Calibration.

Keyboard pitch voltage settings to correctly address analogue to digital converter in sequencer. Upper ..8.1.....

Lower ..8.15....

Approximate BDF settings to produce octaves ..5.2....

" A " " " " ..5.25...

" C " " " " ..5.2....

" E " " " " ..5.25...

5. Keyboard.

The keyboard is aligned to give a pitch voltage of zero between centre F and F♯ on both manuals. This adjustment is made by means of a multiturn preset accessible on the rear connection panel of the keyboard and is very critical for the correct addressing of the analogue to digital converter in the sequencer section of the Synthi 100. It should not normally be necessary to adjust this control.

S Y N T H I 1 0 0

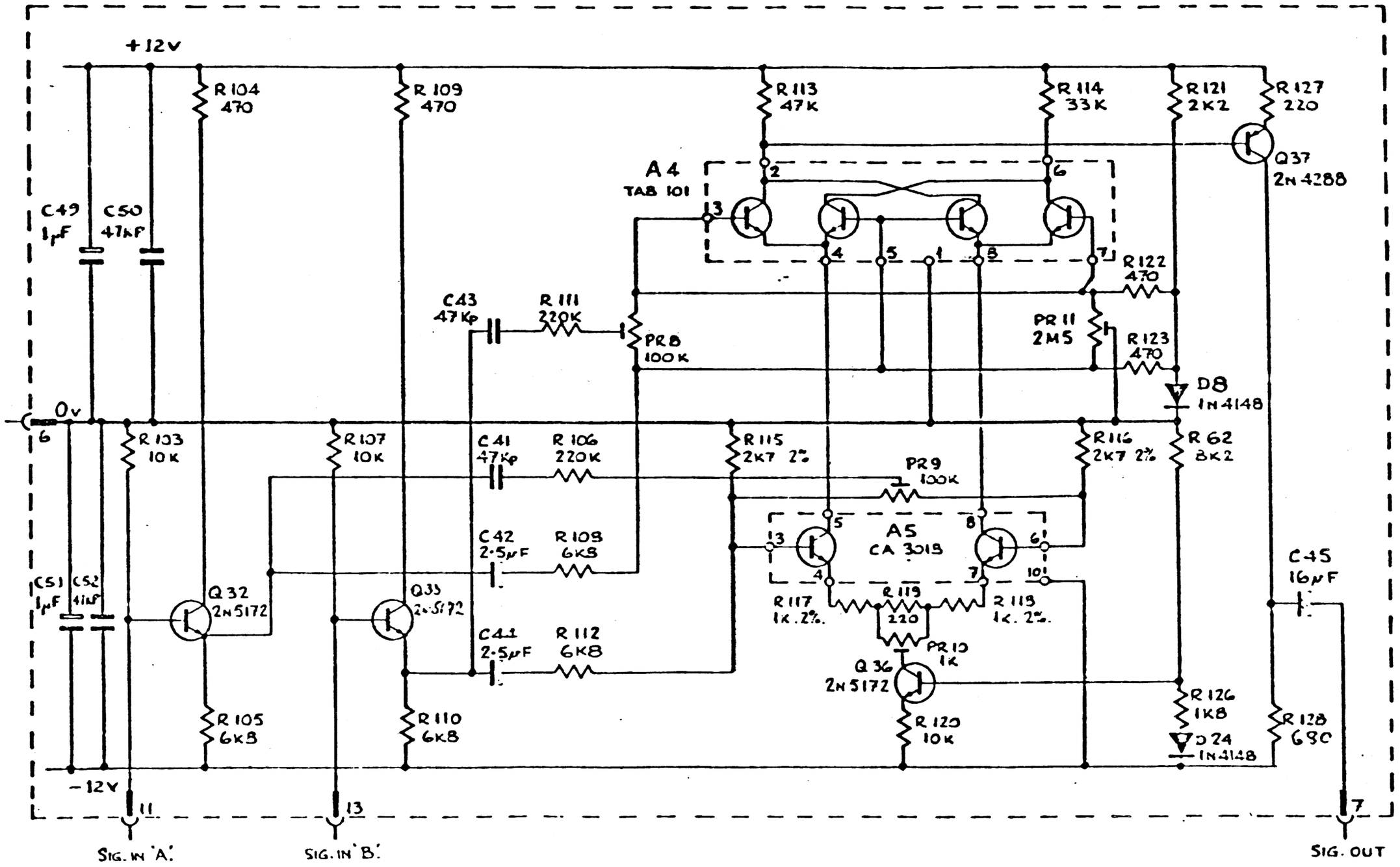
TECHNICAL SERVICES

New Additions

1) Digital Volt Meter. This is situated on the small panel at the top right hand end of the vertical panels on the console. It is permanently connected to the scope "Y1" row on both patchboards. A manual for the instrument is included with the literature provided with the unit.

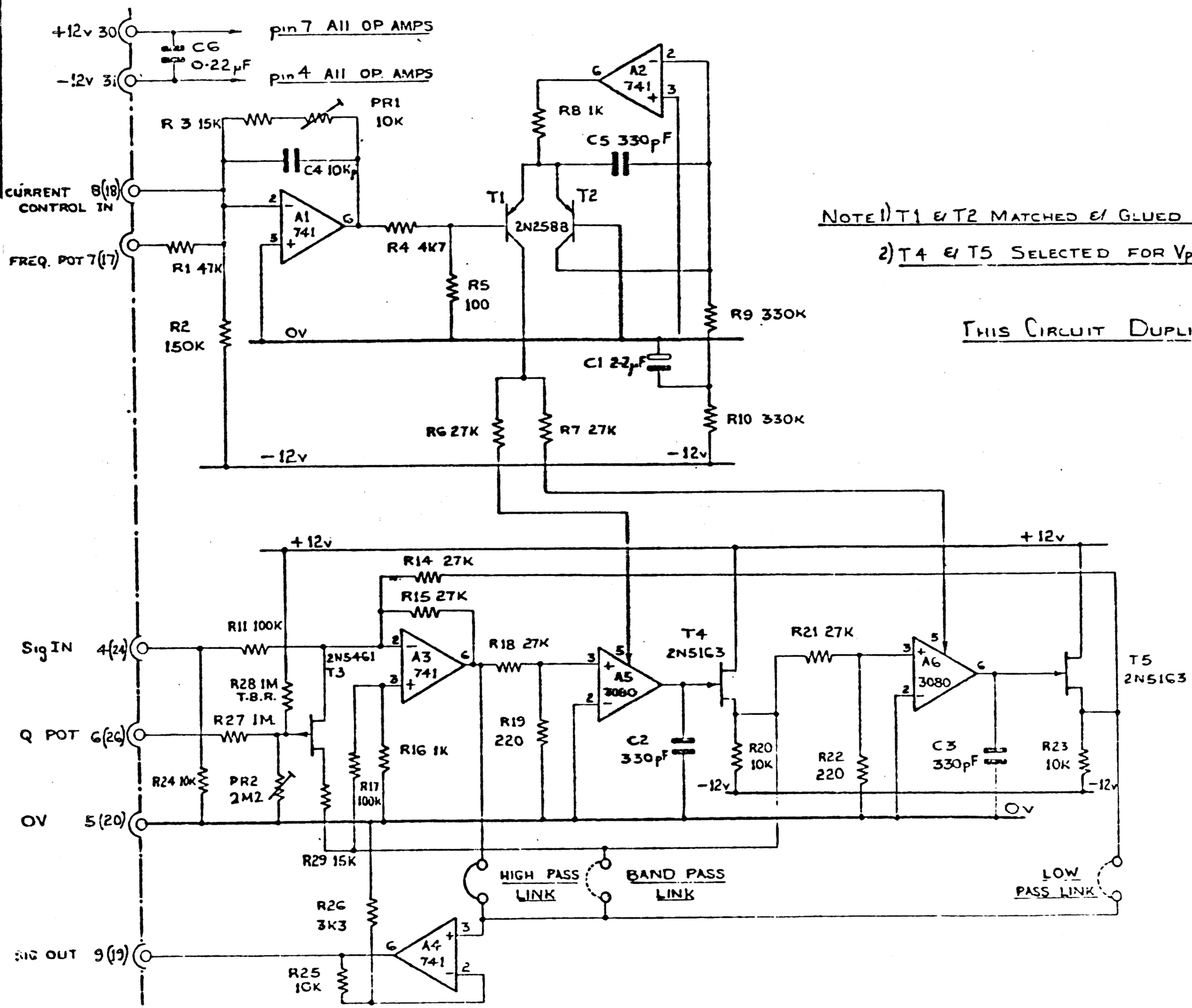
NOTE. When trimming the zero setting, the "Y1" row on the patchboard must be grounded.

2) Sequencer "Available Memory" Meter. This indicates the amount of available memory store for use. The drive circuitry for this meter is located on printed circuit board "M" (red handle). If it is necessary to trim the "100 %" indication, there is a preset for this purpose.



CIRCUIT DIAGRAM RING MODULATOR DRG. Nº EMS 32/00/2. ISSUE C

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.



NOTE 1) T1 & T2 MATCHED & GLUED TOGETHER

2) T4 & T5 SELECTED FOR V_p 2·5v - 3·0v

THIS CIRCUIT DUPLICATED ON 34/01 P.C.B

HILTON ELECTRONIC
WAREHAM LTD

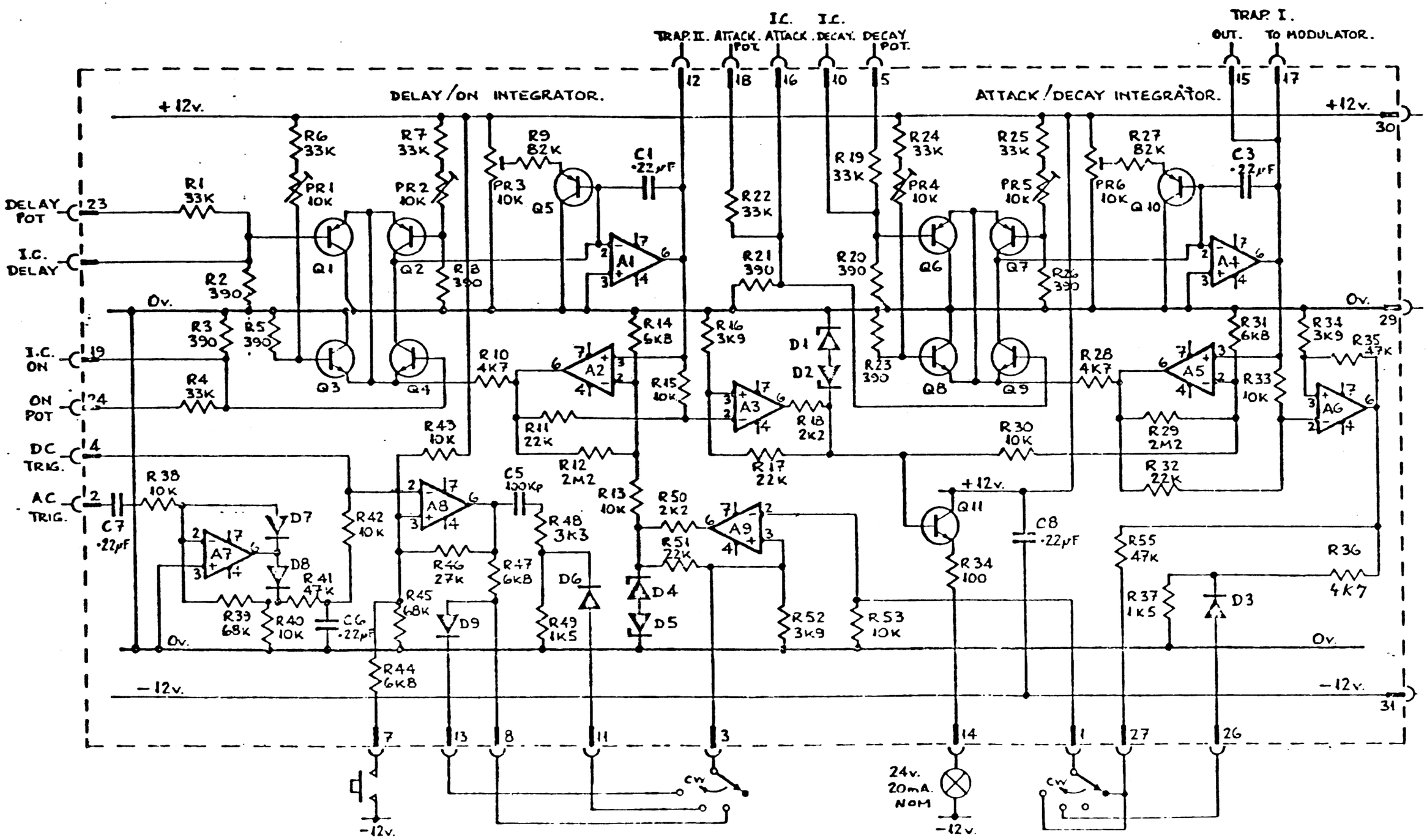
TITLE
HIGH PASS FILTE

SYNTHI 100

ISSUE	DRN	DATE	MATL
1	MB	7/10/74	
			FINISH

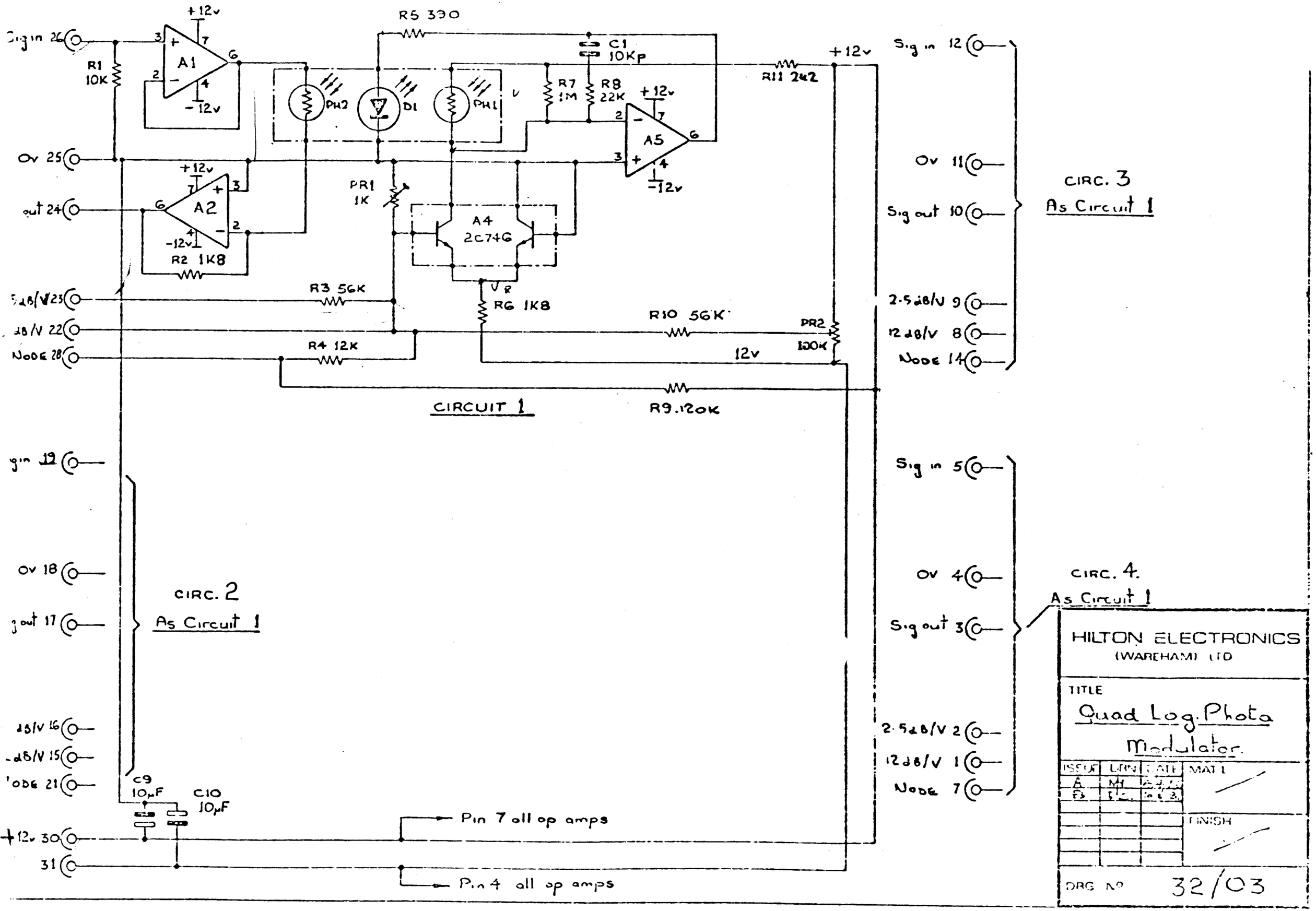
DRG No 32/01

pin 15 d.d read pin 13
MH 22.7.71.
C Q6 & Q8 WEREN'T SHOWN CONNECTED TO 0V.



A1 to A9 INCL. ML 741 C (PIN 7 to +12v., PIN 4 to -12v.).
D1,2,4,5, 6.2v ZENER HS 2062.
D3,6,7,8. SILICON HS 1395
Q3,4,8,9,11. 2N 5172.
Q1,2,5,6,7,10. 2N 4288.

CIRCUIT DIAGRAM TRAPEZOID ENVELOPE SHAPER. DRG. Nº EMS 32/02
ELECTRONIC MUSIC STUDIOS ([redacted]) LTD. ISSUE ~~A~~ C B



HILTON ELECTRONICS
(WAREHAM) LTD

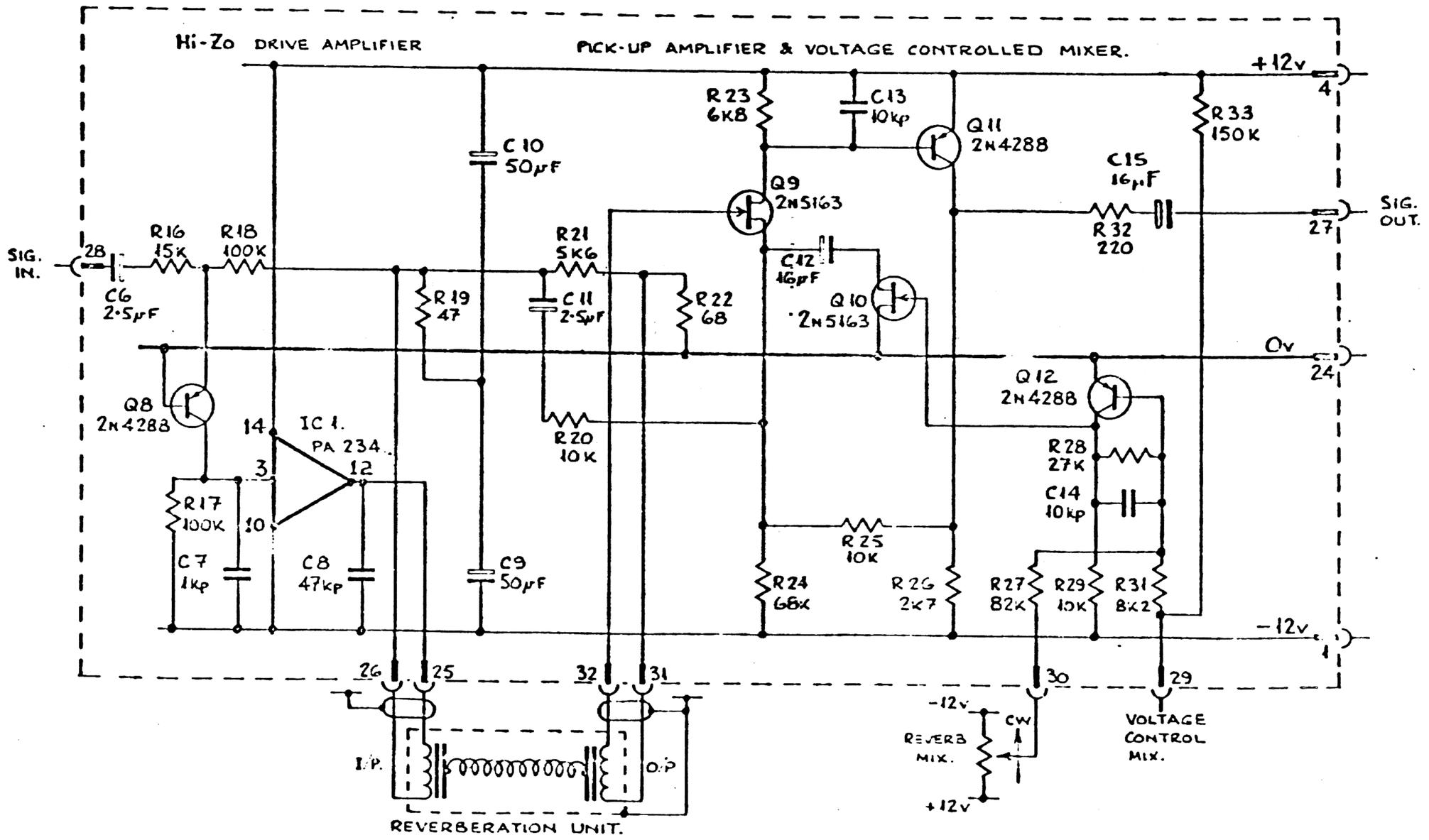
TITLE
Quad Log. Photo
Modulator.

ISSUE	DRN	DATE	MAT'L
A	MH	[illegible]	
B	[illegible]	[illegible]	

FINISH

DRG No 32/03

B R33 WAS R31X
Q12 WAS Q11X
POSITION R32 C15 RE'
ALEC MH 15.4.71

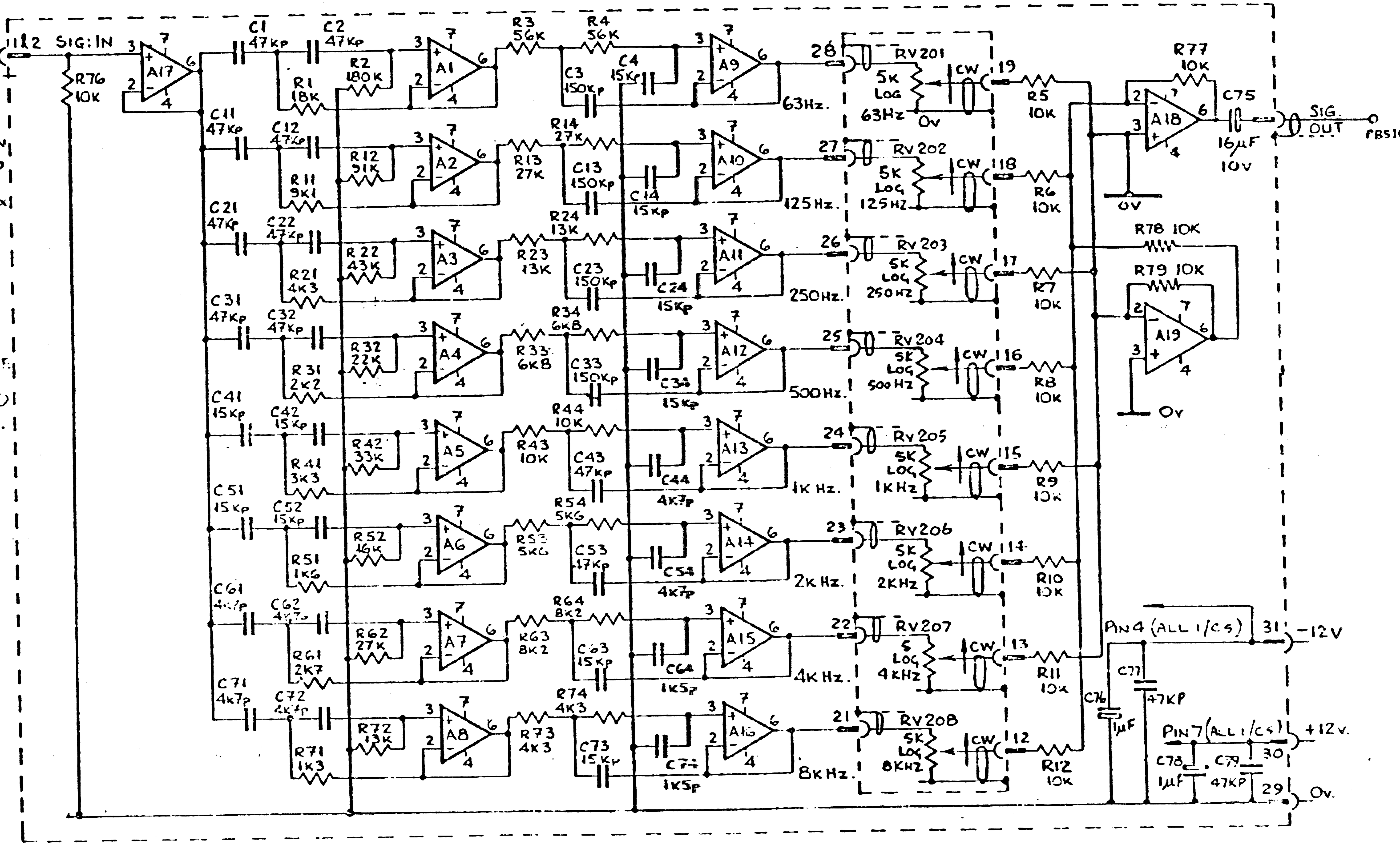


CIRCUIT DIAGRAM REVERB DRIVE DRG. N° EMS 32/04
ISSUE F

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

PBS23

B POLARITY ON CAP. SHOWN, PIN NOS ADDED & SIG OUT SHOWN AS COAX. MH 16.4.71.
C INV. OF PHASE OF ALT. AMPS. R78 ADDED MH 5.8.71.
D ADD. I.C FOR ALT. PHASE ADDED. R78 DELETED. MH 3.12.71.



NOTE.
1. POSITION 2D ON SYNTHI 100
2. MODULE WIRING SEE DRG EMS 31/13
3. C1 – C74 PLASTIC FILM 10%

CIRCUIT DIAGRAM OCTAVE FILTER BANK. DRG N° EMS 32/05 ISSUE

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

B P.278 ADDED.
16.4.71.

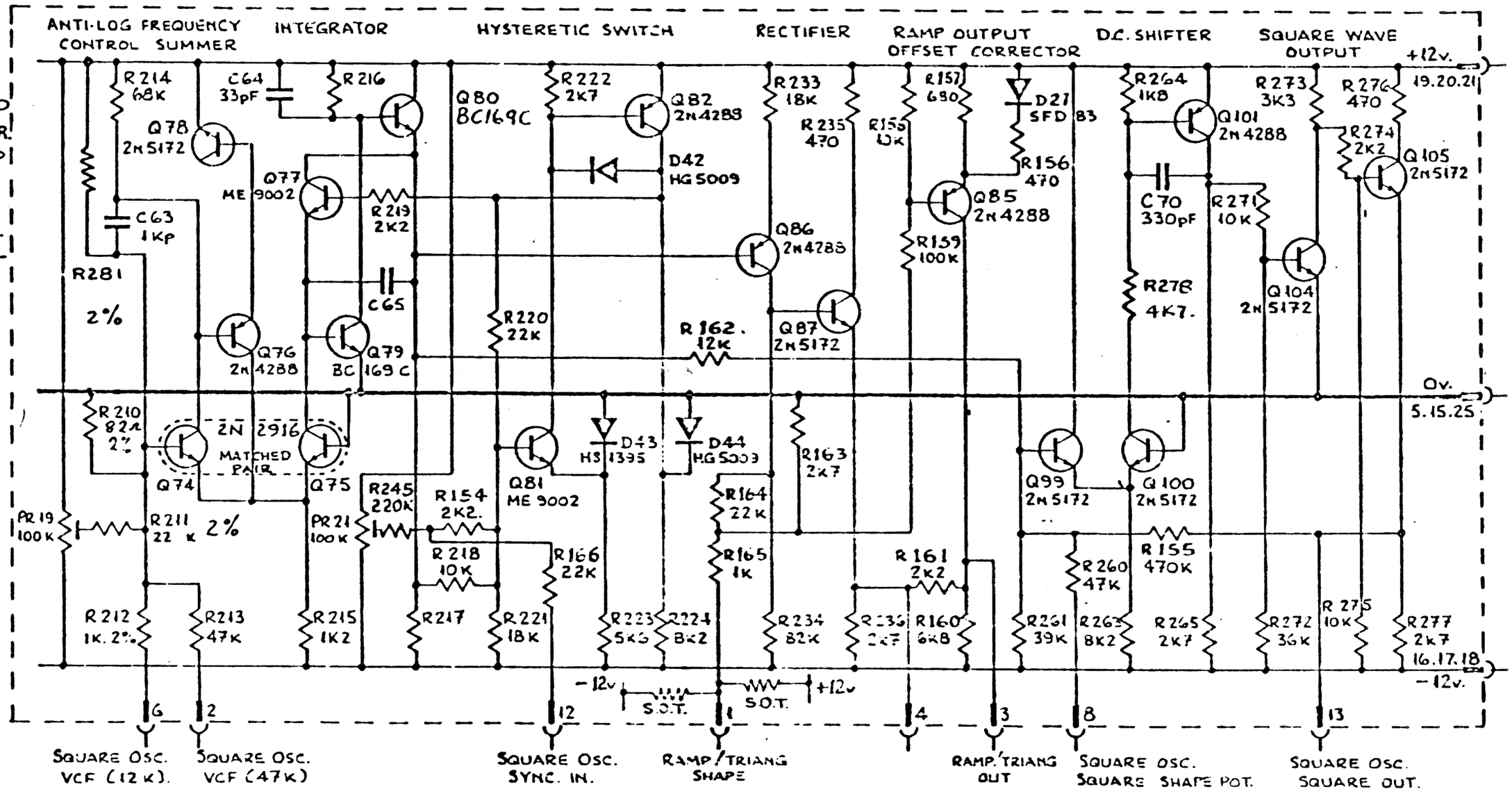
C P211 WAS 220K 'X' Nos REPLACED
R154 ADDED J.R.
C65 WAS 47KP
Q74 & Q75 WERE BC169C.
27.4.71.

D R281 ADDED
R211 WAS 5%
18.6.71

E Table Added
Mod. Filed.
28.6.71.

F R154 was 47K.
R166 was 47K
11.8.71.

G C.N. 51
31.7.73



Boards	C65	R217	R216	R281
A	10KP	4K7	120K	27K
B	10KP	4K7	120K	27K
C	10KP	4K7	120K	27K
D	1μF	22K	470K	15K
E	1μF	22K	470K	15K
F	1μF	22K	470K	15K

CIRCUIT DIAGRAM RAMP/TRIANG OSCILLATOR DRG. Nº EMS 32/06
SHT 1 OF 3
ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD. ISSUE G

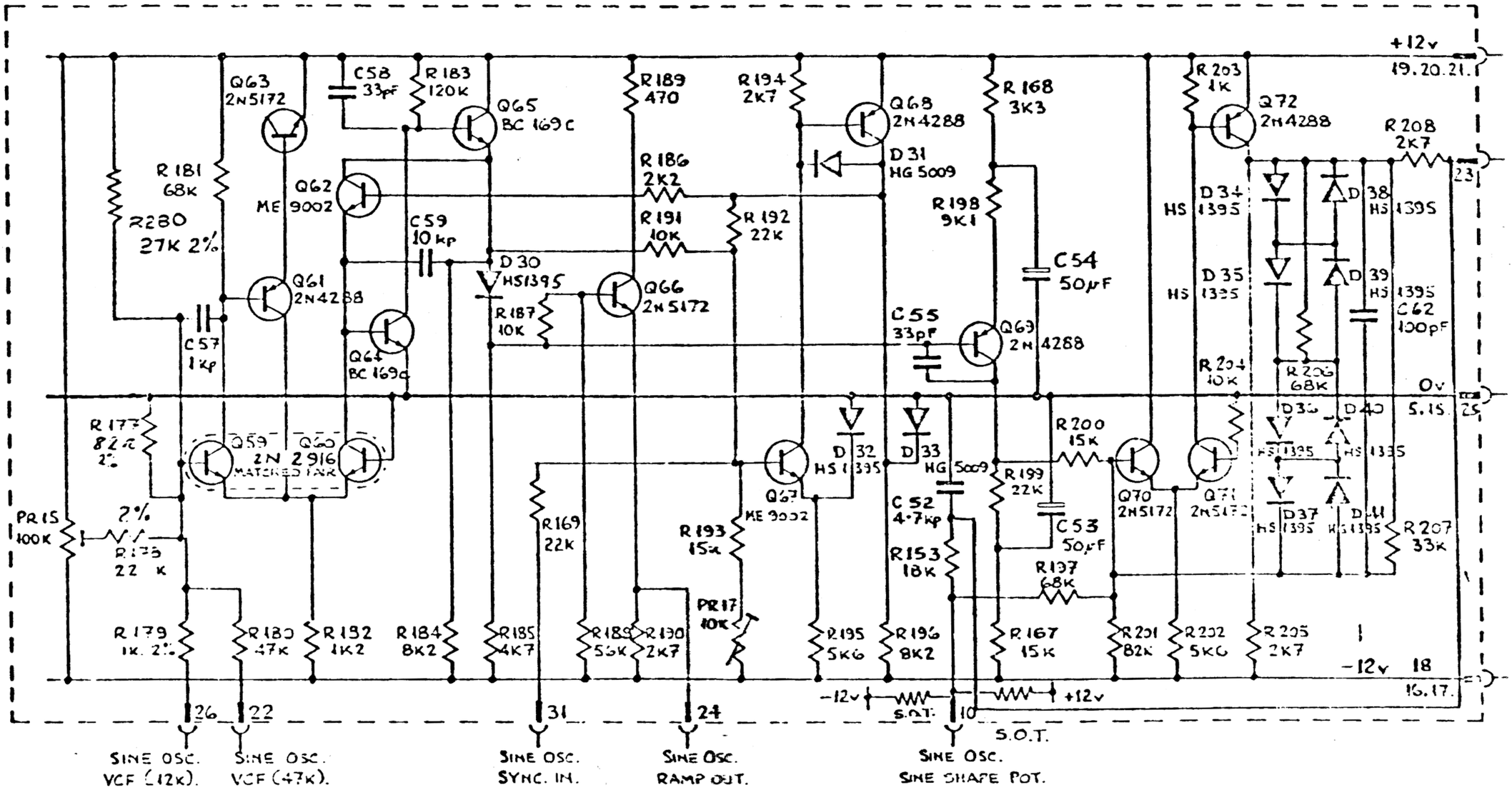
B Connection from pin 23 To Junction of R205X & C62X ADDED.
MH 16.4.71.

C R178 WAS 220K 'X' NOS REPLACED.
C59 WAS 47KP
Q59 & Q60 WERE BC169C
MH 27.4.71.

D R280 ADDED. R178 was 5%
MH 18.6.71

F R169 was 47K
MH 11.8.71

G C.N.51
MH 31.7.73.

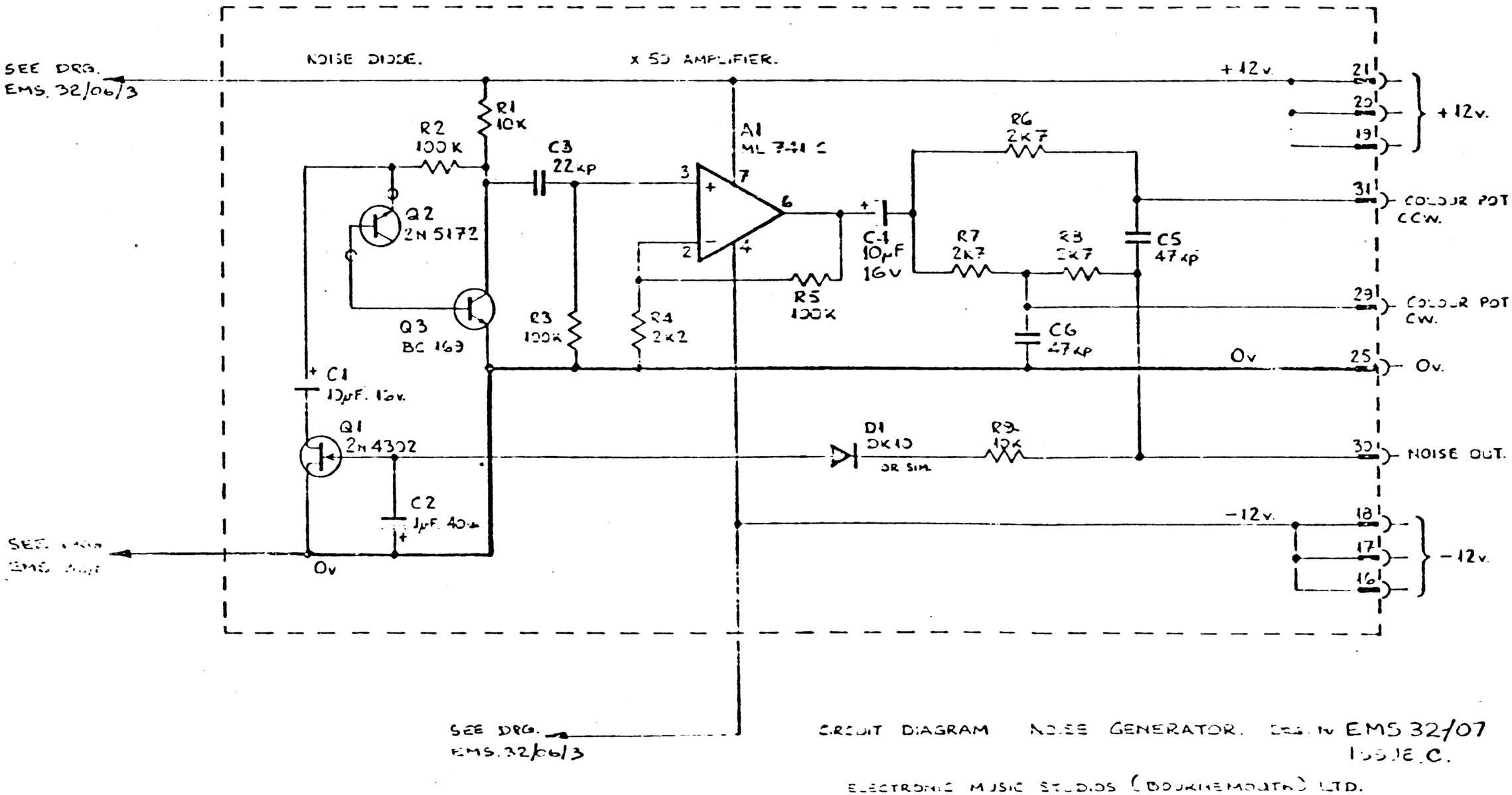


CIRCUIT DIAGRAM SINE/RAMP OSCILLATOR

DRG. N° EMS 32/06
SHT 2 of 3
ISSUE G

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

C. COR REF. ASSEP
7.1.7. 7-5-73.



CIRCUIT DIAGRAM NOISE GENERATOR. DES. N EMS 32/07 ISSUE C.

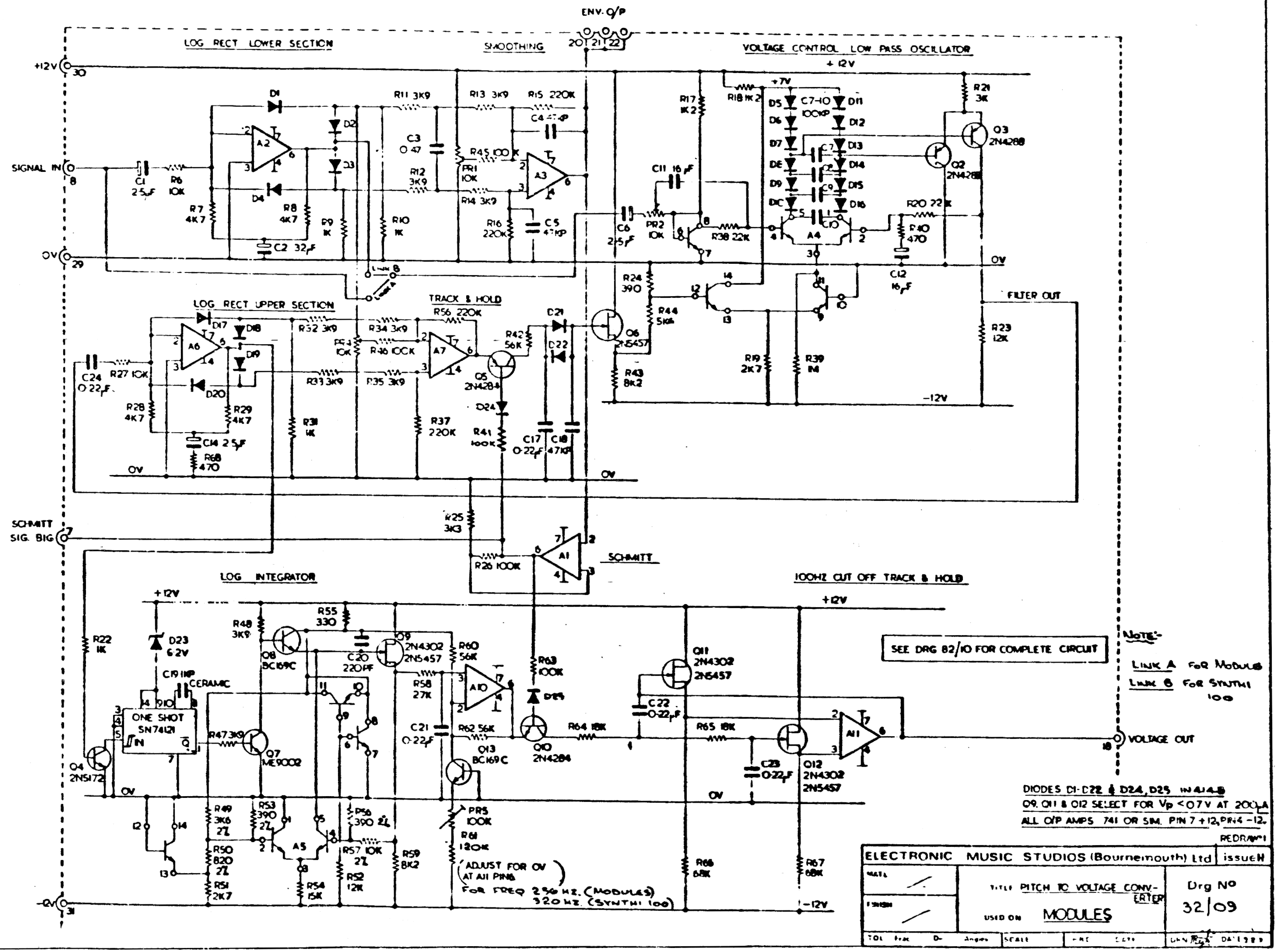
ELECTRONIC MUSIC STUDIOS (DOURNEMOUTH) LTD.

B C2 WAS 10KP
C1 WAS 220KP
C4 WAS 1μF
Q13 WAS 2N4852
Q21 WAS 2N5163
CB WAS 10KP
R43 WAS 6K8
Q28 WAS 2N5163
C12 WAS 10KP
R56 WAS 6K8
D/S OF Q21
DID GO TO +12V
D/S OF Q28
DID GO TO +12V
MH 16.4.71
C; R68 & R69 ADDED
Q13 W/S UT46
~~MH~~ 3.12.71
& C4 WAS 2·5μF

NOISE SOURCE
SCHMIT TRIGGER
RAMP & HOLD
TIMING OSCILLATOR
+12V
R1 47K
R3 470
Q3 2N5172
R7 1K5
Q6 2N4288
R13 6K8
PR1 100K
R16 470
Q10 2N5172
PR2 100K
R22 22K
R24 22K
R25 18K
R27 22K
R29 470
Q16 2N5172
R26 10K
R2 68K
Q2 2N5172
Q1 2N5172
0V
C2 10μF
Q4 2N5172
R5 4K7
Q5 2N5172
R8 4K7
R9 220K
R12 2K2
D2 HS1395
D3 HS1395
R18 10K
20
KEY OUT
RV 363
R28 4K7
C1 10μF
-12V
D1 HS1395
Q7 2N4288
Q9 2N5163
Q8 2N4852
C3 10Kp
R4 4K7
R6 8K2
R11 8K2
R14 4K7
R15 4K7
R17 10K
R19 330
Q11 2N4288
Q12 2N4288
Q13 2N4852
Q14
Q15 2N5172
R20 27K
R21 12K
C4 1μF
PR3 100
R23 1K2
R30 2K7
14
15
18
TIME VARIANCE
RV360 10K
CW
+12V RV359 MEANTIME 10K -12V
CW
FIRST VOLTAGE
SECOND VOLTAGE
30 +12V
RAMP HOLD
SLEW LIMITED BUFFER
RAMP
HOLD
SLEW LIMITED BUFFER
D7 HS1395
R53 470
R48 22K
R69 10M
R45 1K5
D5 HS1395
R44 4K7
R43 3K3
R42 2K2
R40 470
PR4 100K
Q20 2N5172
R35 22K
R32 1K5
R69 10M
R31 4K7
27
VOLTAGE OUT PUT 2
PBC
R56 3K3
R55 2K2
PR5 100K
Q27 2N5172
R49 15K
C9 10μF
C10 10μF
D6 HS1395
R36 15K
C5 10μF
C6 10μF
D8 HS1395
0V
29
Q30 2N4238
Q28 2N5457
R46 6K2
Q23 2N4238
Q21 2N5457
Q19 2N4288
Q18 2N4288
R39 6K2
Q29 2N4352
Q26 2N4288
Q25 2N4288
Q24 2N5172
Q22 2N4852
CB 100Kp
R41 4K7
Q17 2N5172
C12 100Kp
R54 4K7
R52 4K7
R51 15K
R47 3K3
C11 47Kp
R33 4K7
R38 15K
R34 3K3
C7 47Kp
-12V
31
13
12
17
22
28
OUTPUT 1
RV 361
RANGE CONTROL LEVEL
VOLTAGE 1 RANGE
CW
VOLTAGE OUTPUT 1
PBC 84
OUTPUT 2
RV 362
RANGE CONTROL LEVEL
VOLTAGE 2 RANGE
CW

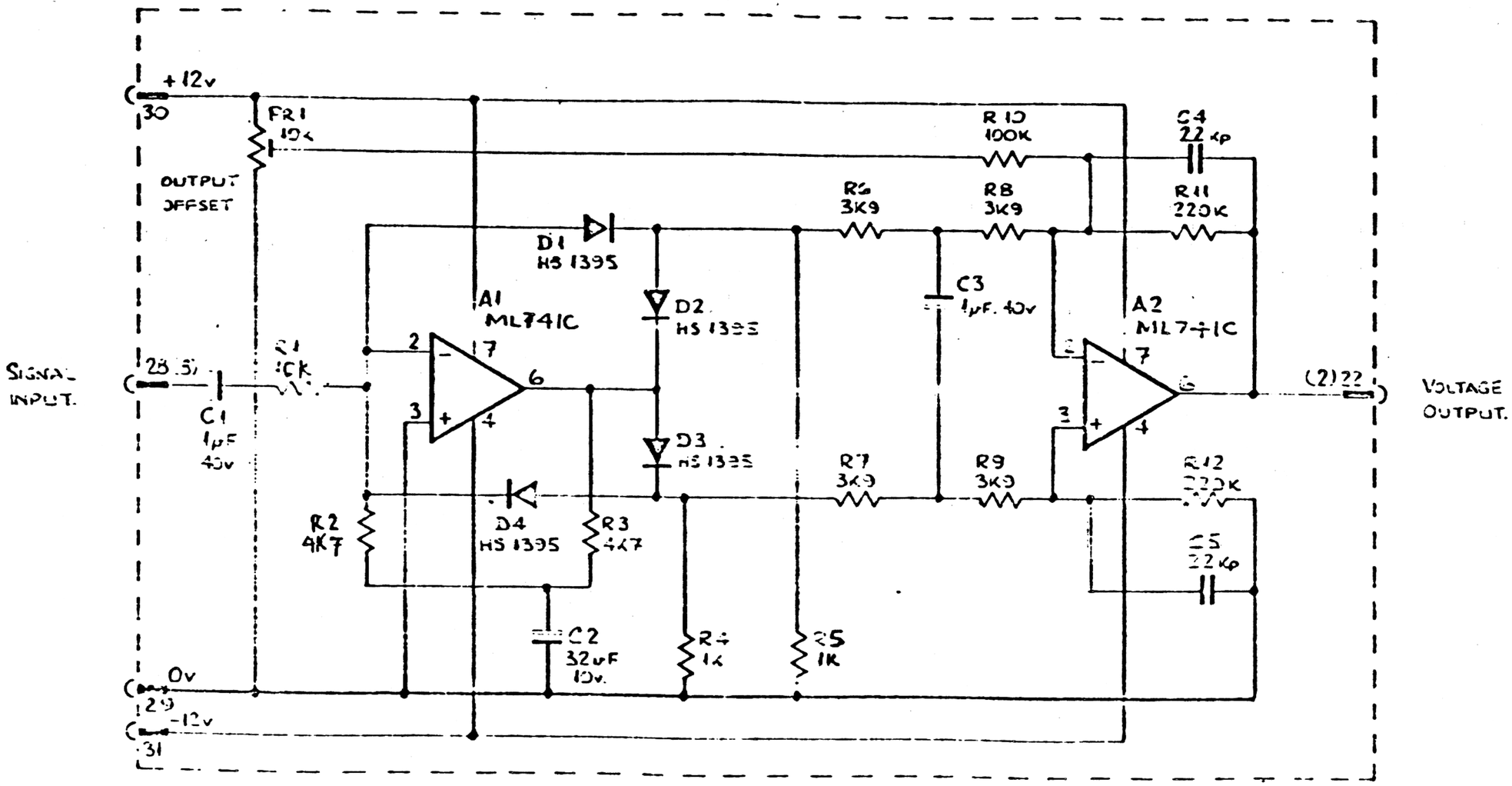
NOTE.
1 POSITION 2P ON SYNTHI 100
2 MODULE WIRING, SEE DRG E.M.S. 31/20

CIRCUIT DIAGRAM RANDOM GENERATOR DRG E.M.S 32/08 ISSUE
ELECTRONIC MUSIC STUDIOS (WOBURN MILTON) LTD



ENV. O/P
LOG RECT LOWER SECTION
SMOOTHING
VOLTAGE CONTROL LOW PASS OSCILLATOR
+12V
SIGNAL IN
0V
LOG RECT UPPER SECTION
TRACK & HOLD
FILTER OUT
-12V
SCHMITT SIG. BIG
SCHMITT
LOG INTEGRATOR
100HZ CUT OFF TRACK & HOLD
ONE SHOT SN74121
SEE DRG 82/10 FOR COMPLETE CIRCUIT
Note:-
LINK A FOR MODULES
LINK B FOR SYNTHI 100
VOLTAGE OUT
ADJUST FOR 0V AT A11 PIN6
FOR FREQ 256 HZ (MODULES)
320 HZ (SYNTHI 100)
DIODES D1-D22 & D24, D25 IN4148
Q9, Q11 & Q12 SELECT FOR Vp <0.7V AT 200μA
ALL O/P AMPS 741 OR SIM. PIN 7 +12, PIN 4 -12.
REDRAWN
ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd issue H
TITLE PITCH TO VOLTAGE CONVERTER
USED ON MODULES
Drg No 32/09

A1 - A2 WERE 72741P.
B 0V DID READ PIN 5
22.4.71



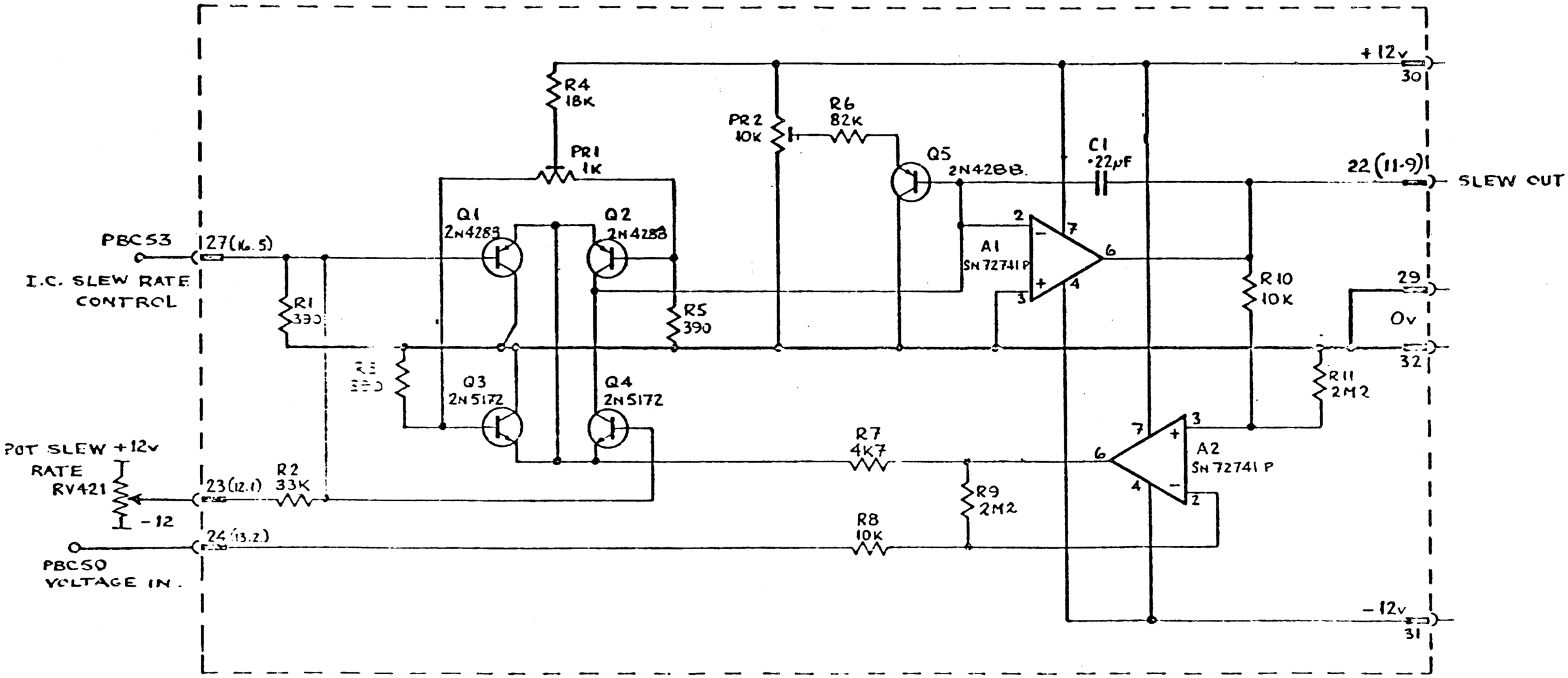
CIRCUIT DIAGRAM DUAL ENVELOPE FOLLOWER. PROM EMS 32/10
ISSUE 2

ELECTRONIC MUSIC STUDIOS (SOUTHAMPTON) LTD.


E R37 & R17 ADDED
R11 & R12 WERE 560
C5 & C6 ADDED
FURTHER EDGE CONN.
INFM. ADDED
16. 4. 71.
C C7 & C8 added 11.8.71
D CN 50 D Elliott 3/4/73
E. R7, R27 was 180K 8-5-73.
F. C/N 61 25/7/73.
UPPER KEYBOARD.
DIFFERENTIATOR
ENVELOPE CONTROL (FROM KB)
+12v
0v
SW409
NEW PITCH
NU
R1 10K
C5 10KP
R3 220K
A1
R5 2K2
Q1
Q2
Q3
R6 1M
R7 91K
C2 ·22µf
R8 100K
R9 47K
A2
R10 3K3
R17 1K5
R2 1K
C1 100Kp
R4 220K
Q1, Q3 BC 169 C.
Q2 2N4288.
WHEN THIS LINE IS GROUNDED THE NEW PITCH DETECTOR CIRCUIT IS DISABLED.
± 2·5v
RV414 ENV. CONTROL RANGE
CW
PBC 110
ENV. CONTROL OUT (TO KB)
R11 10K
R12 10K
A3
R13 4K7 2%
R14 2% 4K7
A4
C7 1µF
PITCH FROM KB RV402
R15 4K7 2%
R16 4K7 2%
A5
VELOCITY FROM KB RV408
PBC 109
VELOCITY VOLTAGE OUT
-12v
R39 1KΩ
Low o/p Z. 5/21
o/p SIGNAL
A11
C9 ·22µf
+8v KEY PRESSED
A
B
LEGATO PLAYING
PITCH VOLTAGE
C
+·7v
-·7v
D
+12v
E
+2·5v
-2·5v
INITIATE ENVELOPE CYCLE (ON).
END ENVELOPE CYCLE (OFF).
E IS THE ENVELOPE CONTROL VOLTAGE WHICH IN THE 'OR NEW PITCH' MODE, IS THE KEY PRESSED VOLTAGE FROM THE KEYBOARD, INTERRUPTED BY ANY CHANGES IN PITCH, SO THAT, IF A NEW KEY IS PRESSED BEFORE THE SUBSEQUENT ONE WAS RELEASED, A NEW ENVELOPE SHAPER CYCLE CAN BE INITIATED.
C2 DEFINES THE LENGTH OF THE INTERRUPTION OF THE ENVELOPE WAVE FORM (~ 50mS) AND SUPRESSES MULTIPLE OUTPUTS WHICH WOULD OTHERWISE RESULT FROM CONTACT SCRATCH.
LOWER KEYBOARD (IDENTICAL TO UPPER.)
SW410
R21
C6 10KP
R23
A6
R22
C3
R24
R25
Q4
Q5
Q6
R26
R27
R28
R29
A7
R30
C4
R37 1K5
RV415
R31
R32
A8
PBC 113
R33
R34
C8 1µF
A9
RV409
R35
R36
A10
PBC 112.
R38
C10
A12
ALL OP AMPS. SN 72741 P (PIN 4 TO -12v. PIN 7 TO +12v.)
KEYBOARD CONTROLLERS (NEW PITCH DETECTOR) (MAIN CONSOLE). DRG No EMS 32/11 ISSUE F
ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

B. EXTERNAL NOTES ADDED. 9/4. 23.4.71.

C R2 WAS 39K. 9/4 7.8.71.

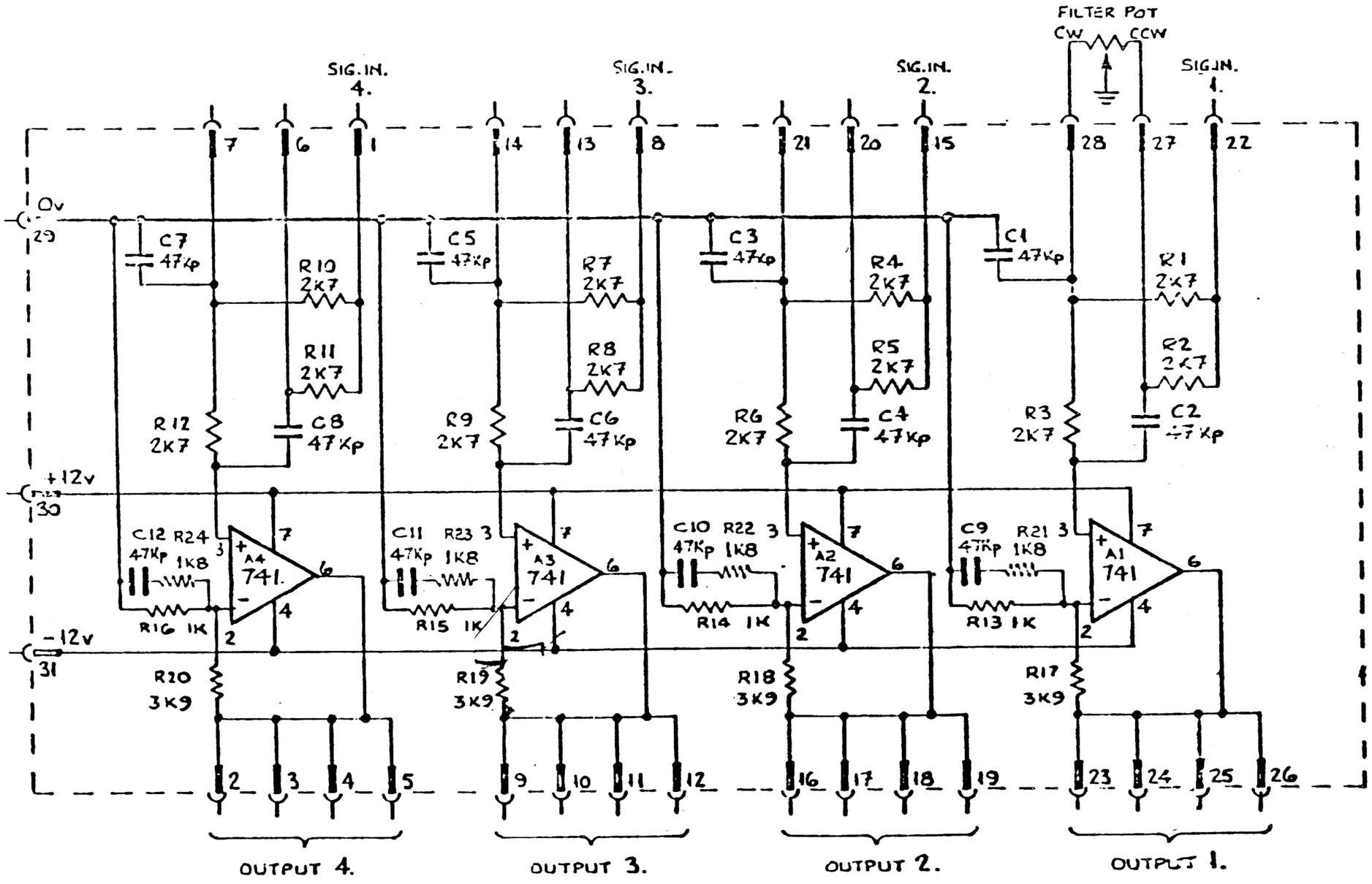


CIRCUIT DIAGRAM TRIPLE SLEW LIMITER. DRG. Nº EMS 32/12 ISSUE C

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

B R13 – R16 ADDED.
FROM PIN2 TO 0v
R17 – R20 ADDED
MH 16. 4. 71

C R21 TO R24 added
& C9 TO C12 added
MH 3. 12. 71.



CIRCUIT DIAGRAM QUAD OUTPUT CHANNEL FILTERS. DRG.Nº EMS 32/13
ISSUE C

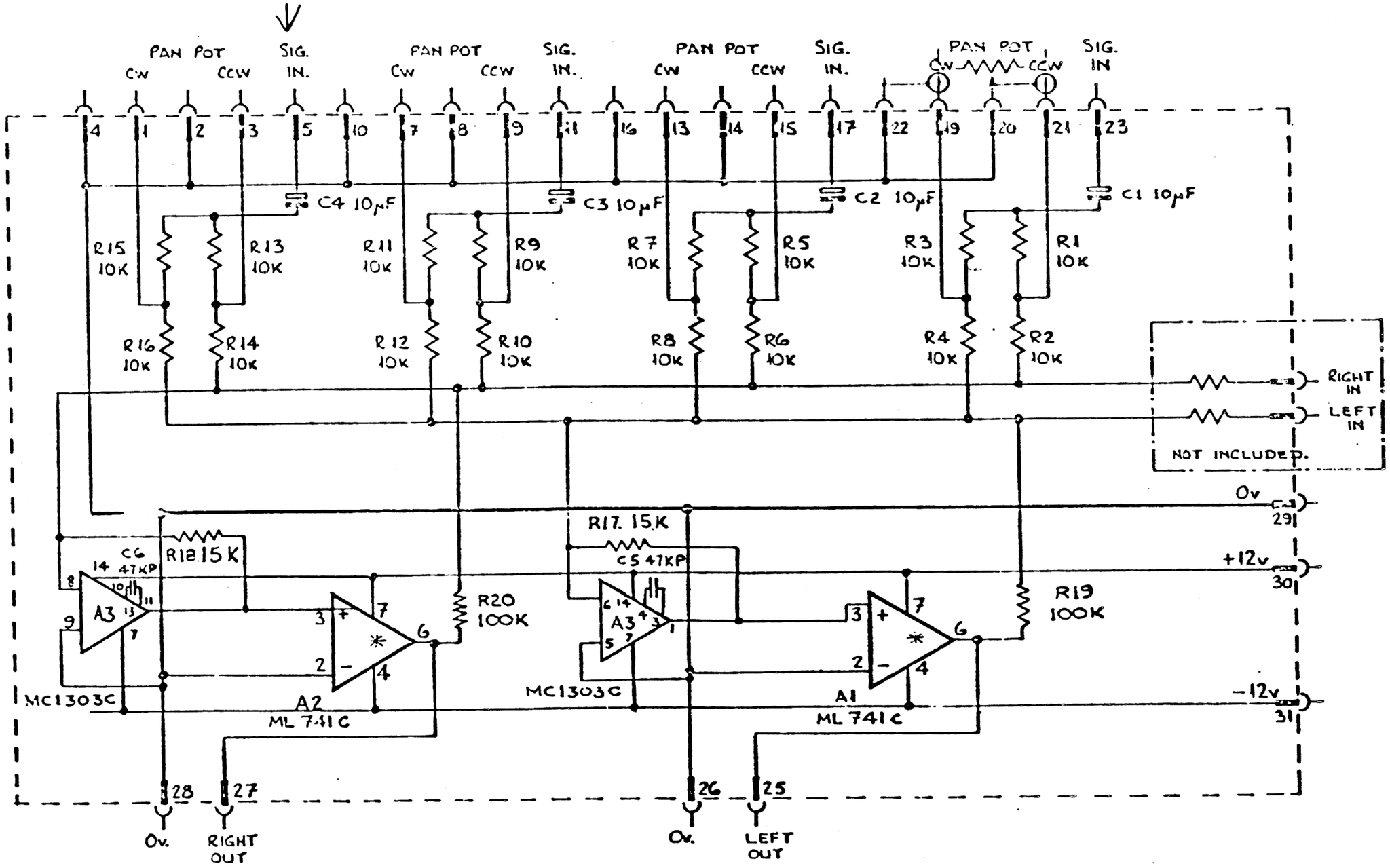
ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

B C1-C4 ADDED
A3, C5, C6 R17, & R18 ADDED
R17 & R18 DELETED FROM O/P OF PIN 2.
MH 16. 4. 71.

C R17 & R18 WAS 15K
MH 25. 6. 71.

D R17 & R18 WAS 33K
R19 & R20 ADDED.
CIRC. CHANGE. REC.
MH 4. 8. 71.

E C.N. 20.
MH 5. 3. 73.



* A1 & A2 TO BE LOW NOISE TYPE (NOT TEXAS)

CIRCUIT DIAGRAM PAN SUMMING AMPS. DRG. N° E.M.S 32/14 ISSUE E

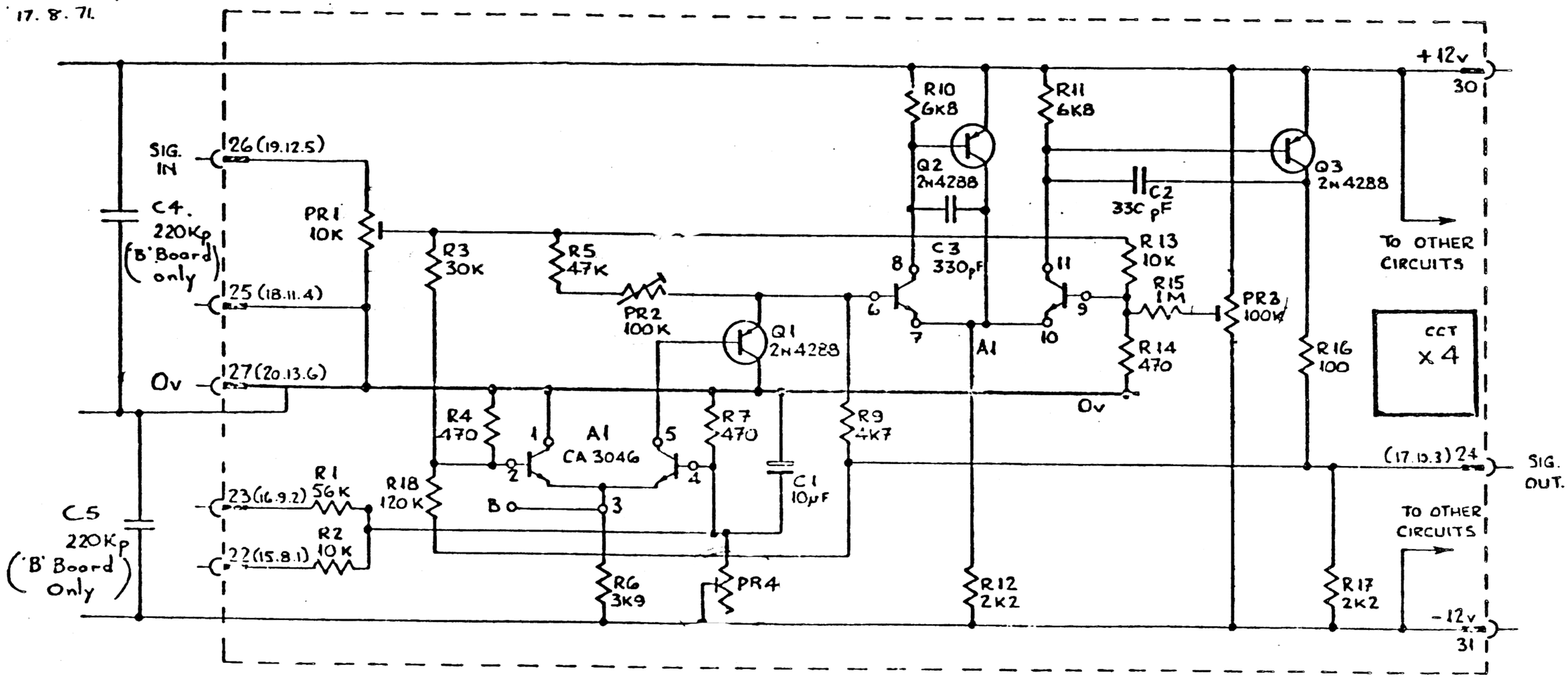
ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

B C2 WAS 1KP
C3, C4, C5 ADDED
MH 16.4.71

C R15 WAS 470K
MH 25.6.71.

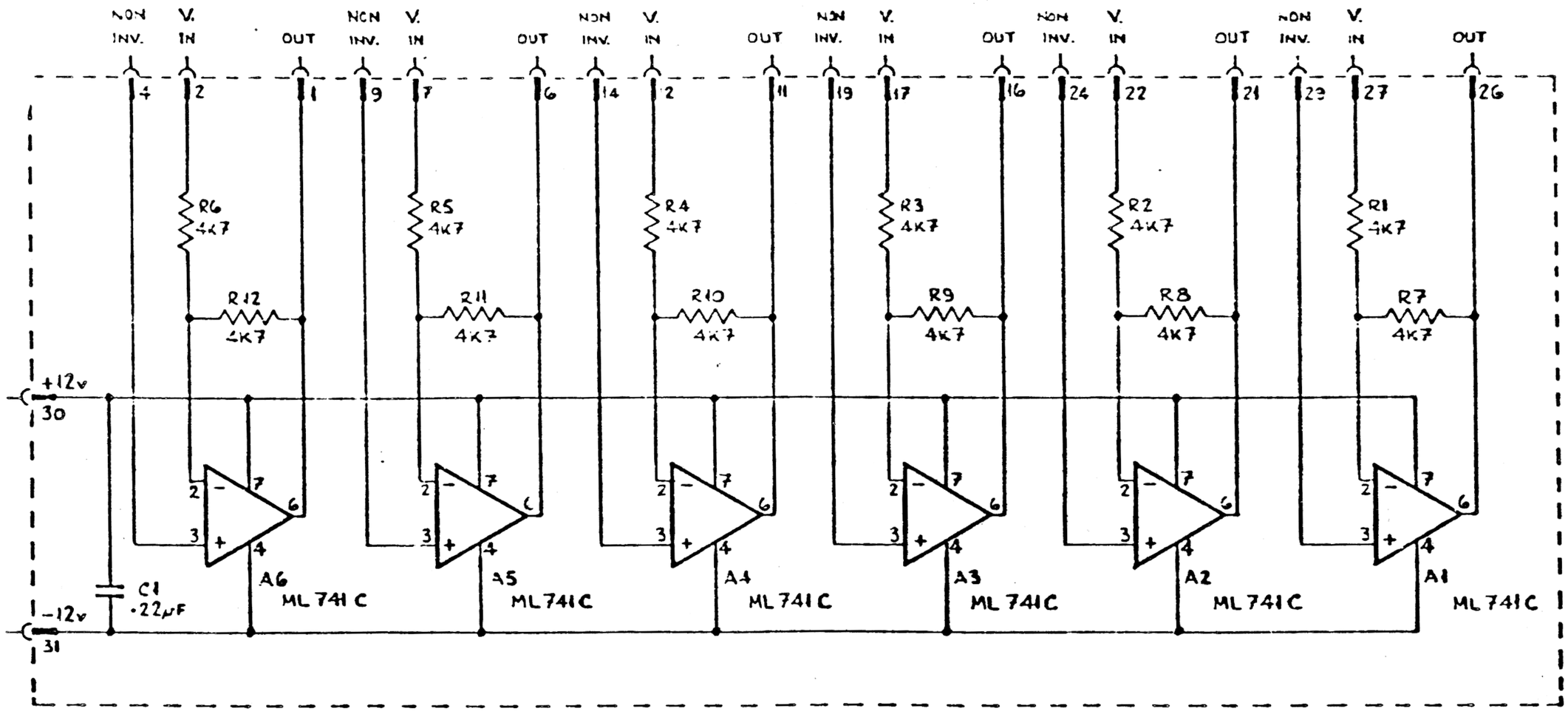
D RB Details changed.
note. filed becomes PR4.
MH 28.6.71.

E C2 & C3 d.d read 330KP
MH 17.8.71.



CIRCUIT DIAGRAM QUAD LOG MODULATOR. DRG. Nº EMS32/15
ISSUE E

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.



CIRCUIT DIAGRAM HEX OPERATIONAL AMPLIFIER DRG. N° EMS 32/16
ISSUE A

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

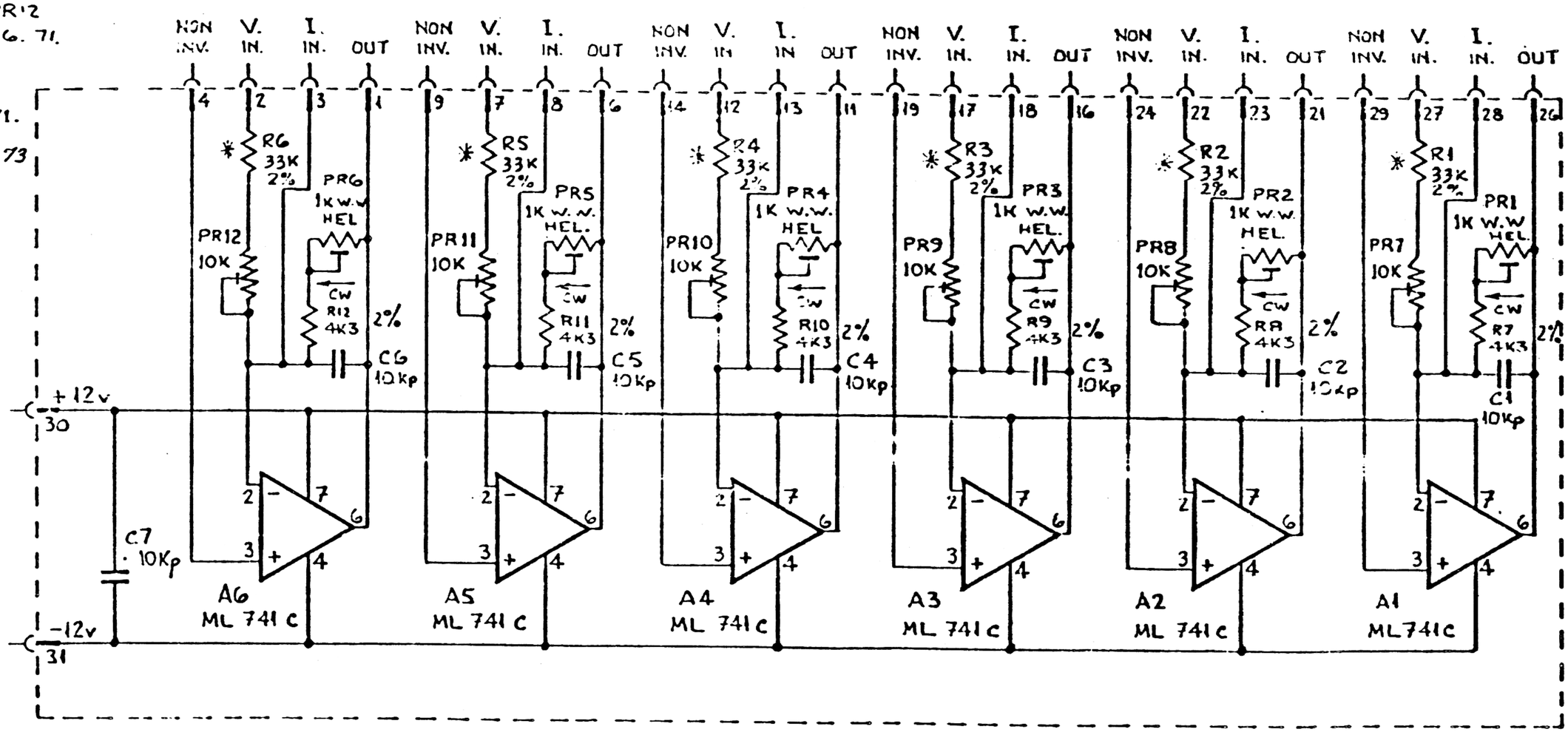
B C7 WAS .22μF
NOTES ADDED
R13 → R18 ADDED
MH 26.4.71.

C PR7 - PR12 ADDED
MH 19.5.71.

D R13 - R18 DELETED.
IIN WAS SHOWN.
COMING FROM JUNC.
OF R6 & PR12
MH 17.6.71.

E R7 to R12
WAS 3K9.
A/PC.N. 2.9.71.

F CN 49 4.4.73
DE



10K Trimpot in series with R* Osc 1→9

Replace 22K with 33K on circs 1-4 L.P. Filters

CIRCUIT DIAGRAM HEX ORERATIONAL AMPLIFIERS SUMMING BUFFER. DRGN° EMS 32/17 ISSUE F

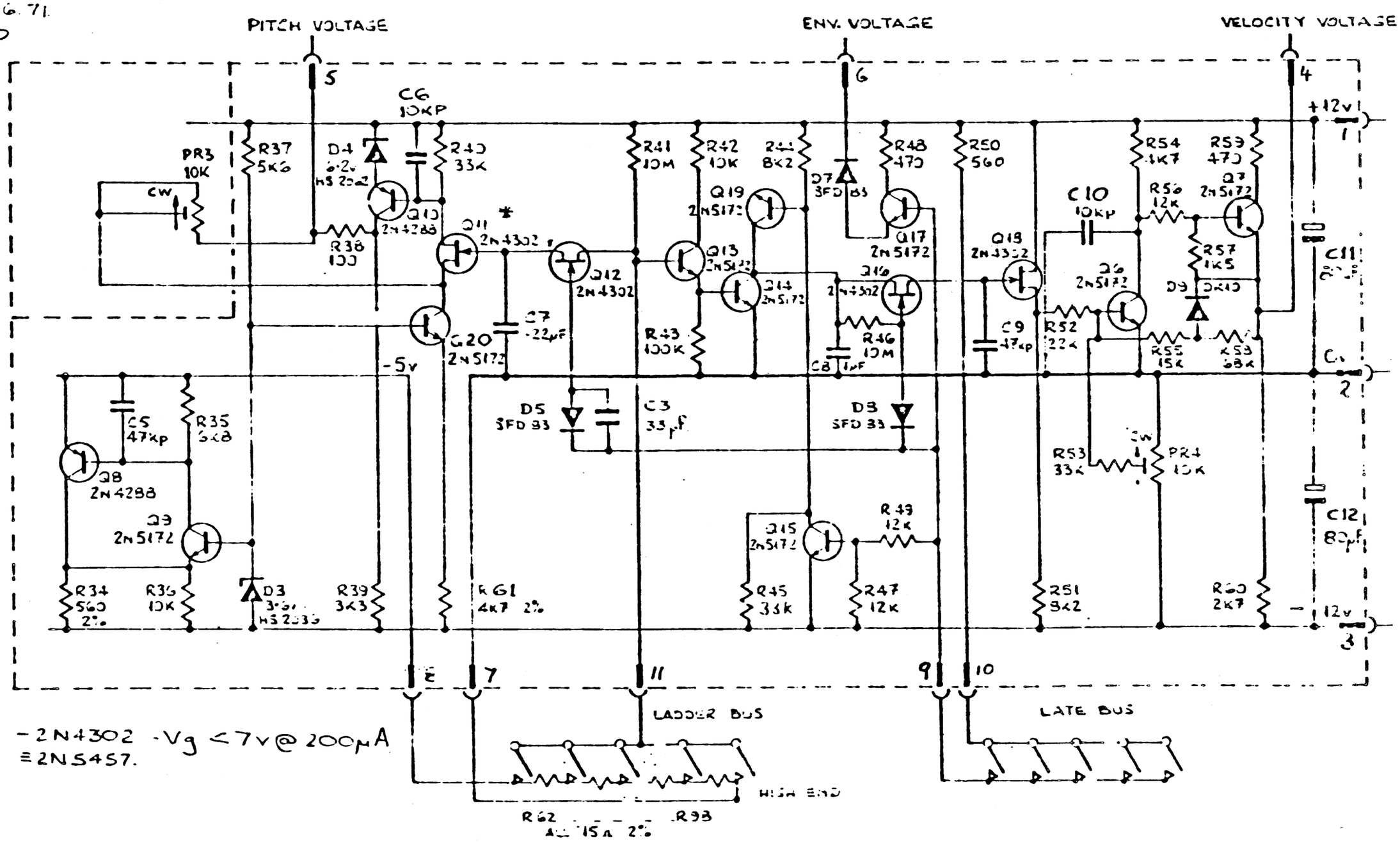
ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD.

B NOTE ADDED.
M/H 16.4.71

C C11 & C12 ADDED
M/H 28.4.71.

D [illegible] ADDED
M/H 17.6.71.

E [illegible] ADDED
M/H 11.8.71.



Q1 - 2N4302 -Vg <7v @ 200μA
≡2N5457.

CIRCUIT DIAGRAM MODIFIED DYNAMIC KEYBOARD DRG. Nº EMS 32/18
ISSUE E

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD

B R2 & R9 were 100K 27.8.71 Also C4 & C5 added.

C R8 & R9 were 270K also PR2 was 1K fixed. 4.12.72.

+12V RED

PR1 1K

C.M.R.

A1 - PIN 7

R3 10K

R4 10K

R9 270K

C5 15μF

C2 2·5μF

C3 2·5μF

2

3

6

A1

72741P

SIG OUT

Q1

Q2

2N5457

+

R8 270K

R1 1M

OV

OV

R2 1M.

−

C4 15μF

C1 15μF

GAIN

PR2 1K

R5 68K

R6 68K

A1 - PIN 4

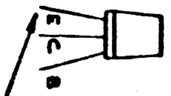
−12V BLK

LANCED
IC:
PUT

CIRCUIT DIAGRAM: MIC: AMP DRG: Nº EMS 32-51

ELECTRONIC MUSIC STUDIOS (BOURNEMOUTH) LTD ISS D

BOTH CIRCUITS IDENTICAL.



Emitter to be cut out.

UPPER

LOWER

-12v
0v
12v
Voltage
Voltage
Voltage

7u 8u 9u 10u 11u

7L 8L 9L 10L 11L

Q11 Selected 2N4302 (V_g < 0.7V @ 200μA)
2N5457 Preffered.

Transistors shown thus to have Lead Sockets mounted in P.C.B.

ELECTRONIC MUSIC STUDIOS
BOURNEMOUTH LTD

TITLE DYNAMIC KEYBOARD

DRG N° 33/18 ISSUE BC

DRN M 28.4.71.

33/18

View from Connectors.

P.C.B N°

	34/02	34/15	34/02	34/15	34/02	34/16	34/00	34/00	34/15	34/15	34/00	34/00	34/17	34/01	34/15	34/01	34/04	34/04
pin32	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
1	31/08	31/08 31/09	31/09	31/10	31/10	31/08 31/09 31/10	31/06 31/11	31/06 31/11	31/06 31/11	31/06 31/11	31/06 31/11	31/06	31/06	31/07	31/07	31/07	31/12	31/12
	Trop. 1	L.M.	Trop. 2	L.M.	Trop 3	Hex op	L.P.F.I.	L.P.F.I.	L.M.	L.M.	L.P. F.I.	L.P. F.I.	H.Sum B	HI Pass	L. Mod	H. Pass	R Drive	R Drive
						Env. 1							F.I. 1					
		Env. 1		Env. 3		Env. 2			F.I. 1	F.I. 3			F.I. 2					
		"		"		"			F.I. 2	F.I. 4			F.I. 3		F.I. 5			
		Env. 2		Spare		Env 3	F.I. 1	F.I. 2	R Mod 1	R. Mod 3	F.I. 3		F.I. 4		F.I. 6			
pin 1		"		"		"	R. Mod 1	R. Mod 2	R. Mod 2	Spare	R Mod 3	F.I. 4	Spare	F.I. 5	F.I. 7	F.I. 7		
													Spare	F.I. 6	F.I. 8	F.I. 8	Rec. 1	Rec. 2

GREEN HANDLES 1

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
pin32				31/13	31/14	31/14 31/15	31/15 31/22	31/22	31/23	31/24	31/28	31/28	31/20 31/21 31/27	31/20	31/21			
2			Spare Connector	Octave F.I. Bank	Hex op	Hex op	Hex op	env. fol 1 env. fol 2	Key bd Control	Slew Limiter	Hex op	Hex op	Hex op	Rand. Gen.	Pitch V	Spare Connector	Spare Connector	
					in ch. 1	in ch. 7	env fol 1				Sqr.	Sqr.	Rand.					
					in ch 2	in ch. 8	env. fol 2				Sqr.	Sqr.	Pitch-V					
					in ch 3	ext S. 1	ext. R. 1				Sqr.	Sqr.	L Joy —					
					in ch 4	ext S 2	ext. R. 2				Sqr.	Sqr.	L Joy |					
					in ch 5	ext S 3	ext. R. 3				Sqr.	Spare	R Joy —					
pin 1.					in ch 6	ext. S. 4	ext. R. 4				Sqr.	Spare	R Joy |					

34/05	34/16	34/16	34/16	34/10	34/11	34/12	34/16	34/16	34/16	34/08	34/09

P.C.B. N°

YELLOW HANDLES 2

Screening Plate in position

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd			issue A
MATL	TITLE MODULE LOCATION CARD FRAME 1&2		Drg NO 31/01
FINISH	USED ON SYNTHI 100		
TOL FRAC DEC ANG	SCALE	CHKD DATE	DRWN DATE 16 6 7

View from Connectors.

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z
pin 60	34/41	34/42	34/43	34/43	34/43	34/44	34/45	34/46	34/47	34/48	34/49	34/40												
3	← See Drg 31/47 →																							
pin 1																								
pin 32	A meter osc. meter op ch 1	B meter osc meter op. ch 2	C meter osc. meter op. ch 3	D meter osc. meter op. ch 4	E meter osc meter op ch 5	F meter osc. meter op. ch. 6	G meter noise meter op. ch. 7 Noise Gene. 1	H mete noise meter op. ch 8 Noise Gene 2.	J Quad Log Mod	K Quad Log Mod	L Quad Log Mod	M Quad. Log Mod	N Quad Log Mod	P Quad Log Mod	Q Quad Log Mod	R Hex op Amp Summing Buffer	S Hex op Amp. Summing Buffer	T Log Mod	U Quad F Iter Network	V Quad Pan Summer	W Log Mod.	X Quad F. Iter Network	Y Quad Pan Summer	Z
4	osc 1	osc. 2	osc. 3	osc. 4	osc. 5	osc. 6			noise 1	osc 1 ∿	osc 2 ∿	osc 3 ∿	osc 4 ∿	osc 5 ∿	osc 6 ∿	osc. 1	osc. 7							
	osc. 7	osc 8	osc. 9	osc. 10	osc. 11	osc. 12			noise 2	osc 1 ∩	osc 2 ∩	osc 3 ∩	osc 4 ∩	osc 5 ∩	osc 6 ∩	osc. 2	osc. 8							
										7 ∧	8 ∧	9 ∧	10 ∧	11 ∧	12 ∧	osc. 3	osc. 9	och 1	och 1	ch. 1-4 L	och 5	och 5	ch 1-4 L	
										7 ∩	8 ∩	9 ∩	10 ∩	11 ∩	12 ∩	osc. 4	osc. 10	och 2	och. 2	ch. 1-4 R	och 6	och 6	ch 1-4 R	
																osc. 5	osc 11	och 3	och. 3		och 7	och 7		
pin 1.																osc. 6	osc 12	och 4	och 4		och 8	och 8		
	34/06	34/06	34/06	34/06	34/06	34/06	34/07	34/07	34/15	34/15	34/15	34/15	34/15	34/15	34/15	34/17	34/17	34/03 or 34/15	34/13	34/14	34/03 or 34/15	34/13	34/14.	
	31/16 31/17 31/18	31/16 31/17 31/18	31/16 31/17 31/18	31/16 31/17 31/18	31/16 31/17 31/18	31/16 31/17 31/18.	31/19	31/19	31/19	31/16 31/17	31/16 31/17.	31/16 31/17	31/16 31/18	31/16 31/18	31/16 31/18	31/16	31/18	31/25	31/25	31/25	31/26	31/26	31/26	

White Handles 3

Blue Handles 4

P.C.B. N° Interconnection N°

8 positions T & W. were 34/15 P.C.B° T.R.K. 24/4/73

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue B
MATL —	TITLE MODULE LOCATION CARD FRAME 3&4	Drg N° 31/02
FINISH —	UNIT ON SYNTHI 100	
TOL Four — Dec — Angles —	SCALE — CHKD DATE	DRN T.R.K. DATE 16.6.71

PBC 18 — 28 I IN
29 NON INV
+12V — RV 101 — CW — 27 V. IN — -12V

PBC 19 — 23 I. IN
24 NON INV
+12V — RV 102 — CW — 22 V. IN — -12V

PBC 20 — 18 I. IN
19 NON INV
+12V — RV 103 — CW — 17 V. IN — -12V

PBC 21 — 13 I IN
14 NON INV
+12V — RV 104 — CW — 12 V IN — -12V

34/17
HEX OP AMP
(SUMMING)
BUFFER

1N

OUT 26 — PBS 15 — 14 FILTER FREQ CONTROL — 17 SIG IN — 19 SIG OUT
+12V — RV 109 — CW — 15 RESPONSE CONTROL — -12V
34/00
(FILTER PART)
1G

OUT 21 — PBS 16 — 14 FILTER FREQ CONTROL — 17 SIG. IN — 19
+12V — RV 110 — CW — 15 RESPONSE CONTROL — -12V
34/00
(FILTER PART)
1H

OUT 16 — PBS 17 — 14 — 17
+12V — RV 111 — CW — 15 — -12V
34/00
(FILTER PART)
1L

OUT 11 — PBS 18 — 14 — 17
+12V — RV 112 — CW — 15 — -12V
34/00
(FILTER PART)
1M

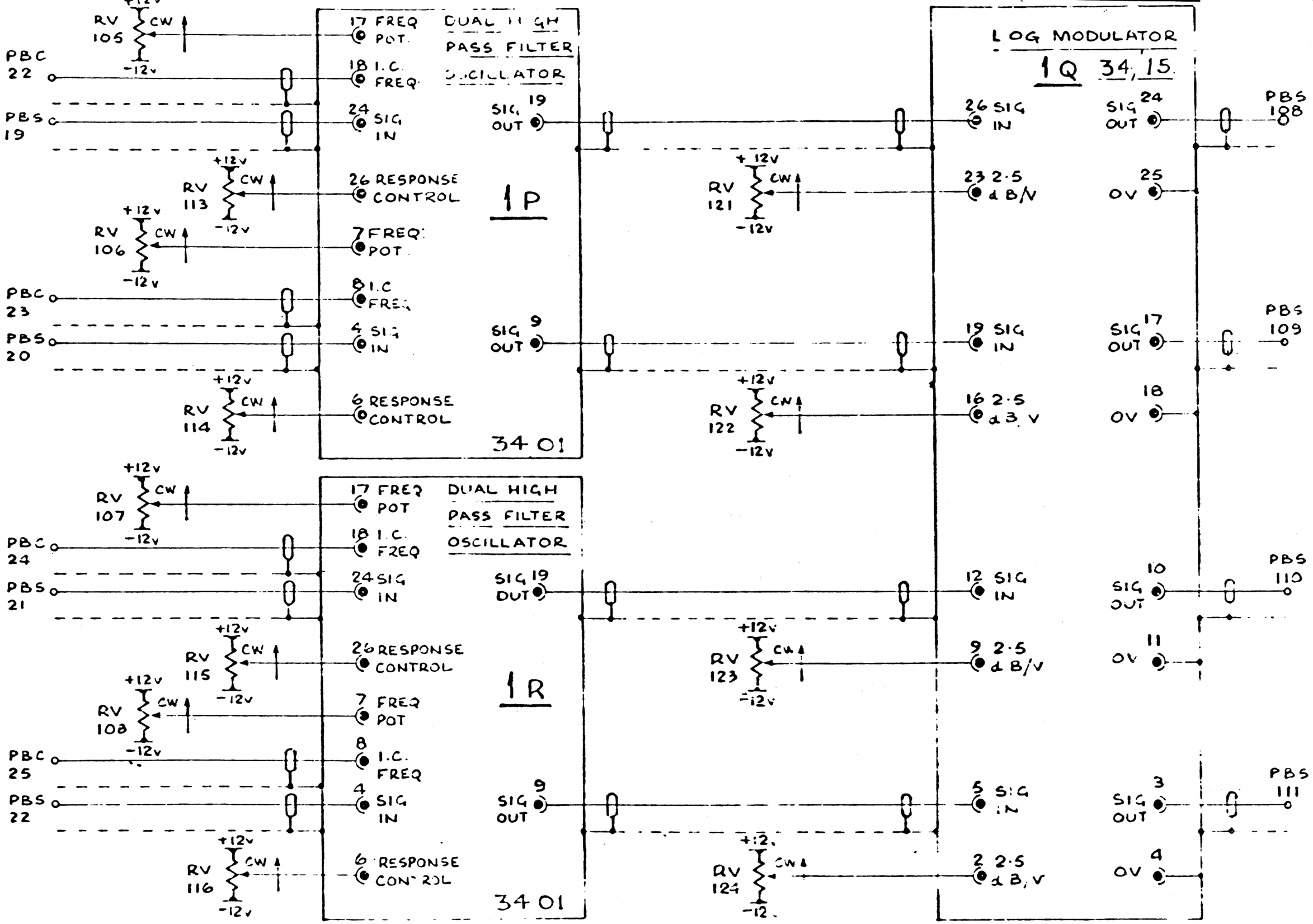
LOG MODULATOR
34/15
19 — 26 SIG IN — SIG OUT 24 — PBS 104
+12V — RV 117 — CW — 23 2.5 1 B/V — -12V
0V 25
1J

19 — 19 SIG IN — SIG OUT 17 — PBS 105
+12V — RV 118 — CW — 16 2.5 1 B/V — -12V
0V 18

LOG MODULATOR
34/15
19 — 26 SIG IN — SIG OUT 24 — PBS 106
+12V — RV 119 — CW — 23 2.5 dB/V — -12V
0V 25
1K

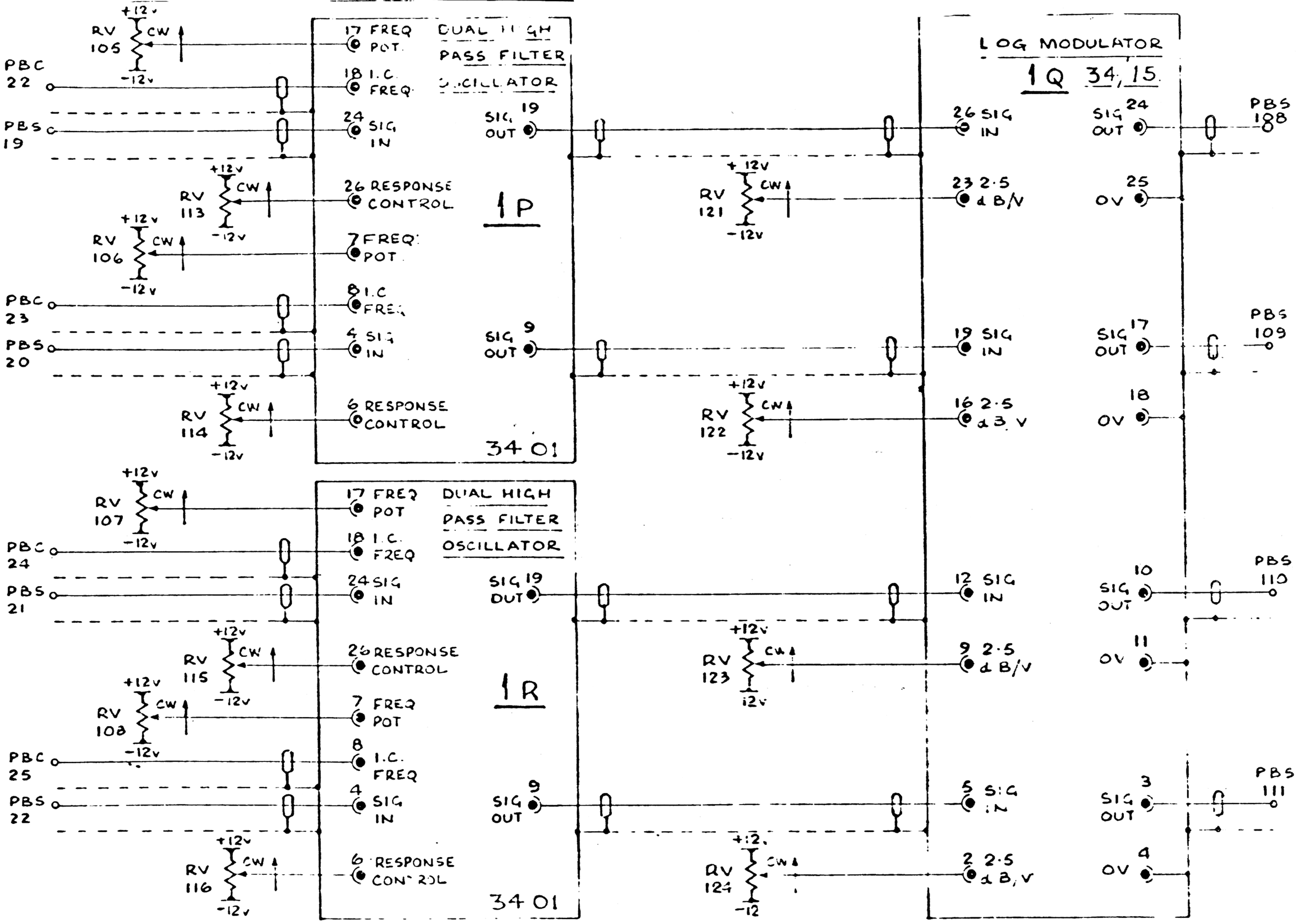
19 — 19 SIG IN — SIG OUT 17 — PBS 107
+12V — RV 120 — CW — 16 2.5 dB/V — -12V
0V 18

ELECTRONIC MUSIC STUDIOS Saxmundham Ltd | Issue A
L.P. FILTER/OSC 1-4
SYNTHI 100
Dwg No. 31/06



HIGH PASS FILTER OSCILLATORS 5 6 7 & 8

DRN. M [illegible] ELECTRONIC MUSIC STUDIOS LTD 31/07



HIGH PASS FILTER OSCILLATORS 5 6 7 8

DRN. M [illegible] ELECTRONIC MUSIC STUDIOS LTD 31/07

PBC
3
8
13

PBC
4
9
14

PBC
5
10
15

PBC
6
11
16

PBC
7
12
17

PBS
12
13
14

+12V
RV 125 132 139
CW
-12V

+12V
RV 126 133 140
CW
-12V

+12V
RV 127 134 141
CW
-12V

+12V
RV 128 135 141
CW
-12V

4 ENV CONTROL

23 POT
28 I.C.
DELAY

18 POT
16 I.C.
ATTACK

24 POT
19 I.C.
ON

5 POT
10 I.C.
DECAY

2 SIGNAL THRESHOLD

13 MULTI-CYCLE (1)
11 SINGLE CYCLE (1)
8 HOLD ON (1)
3 COMMON (1)
27 MULTI FREE (2)
26 SINGLE CYCLE (2)
1 COMMON (2)
7 BUTTON

CW D C E B A
SW11 SW13 SW15
CW J H K G F
SW12 SW14 SW16
A B
-12V

1A
1C
1E

TRAPEZOID GENERATOR
34/02

TRAPEZOID II
12
RV 130 137 144
CW

TRAPEZOID I
15
RV 129 136 143
CW

TRAPEZOID I
17

LAMP
14
LP1
LP2
LP3
A B
-12V

27
17 V
7 IN
25
19 NON INV.
9

22
12 V
2 IN
24 NON
14 INV
4

HEX OP AMP 34/16
(CENTRE ZERO CONVERTER

IF

26
OUT 16
6

21
OUT 11
1

PBC
92
94
96

PBC
91
93
95

22 (1B,1D)
8 (14.48V)

24 (1B,1D)
10 (SIG. OUT)

25 (1B,1D)
11 (0V)

19 (1B,1D)
5 (SIG IN)

+12V
RV 131 138 145
CW
SIGNAL LEVEL
-12V

16 (1B,1D)
2 (2.5 x 8/V)

26 (1B,1D)
12 (SIG IN)

16μF TO BE MTD ON EDGE CONNECTR

PBS
9
10
11

17 (1B,1D)
3 (SIG OUT)

18 (1B,1D)
4 (0V)

PBS
112
113
114

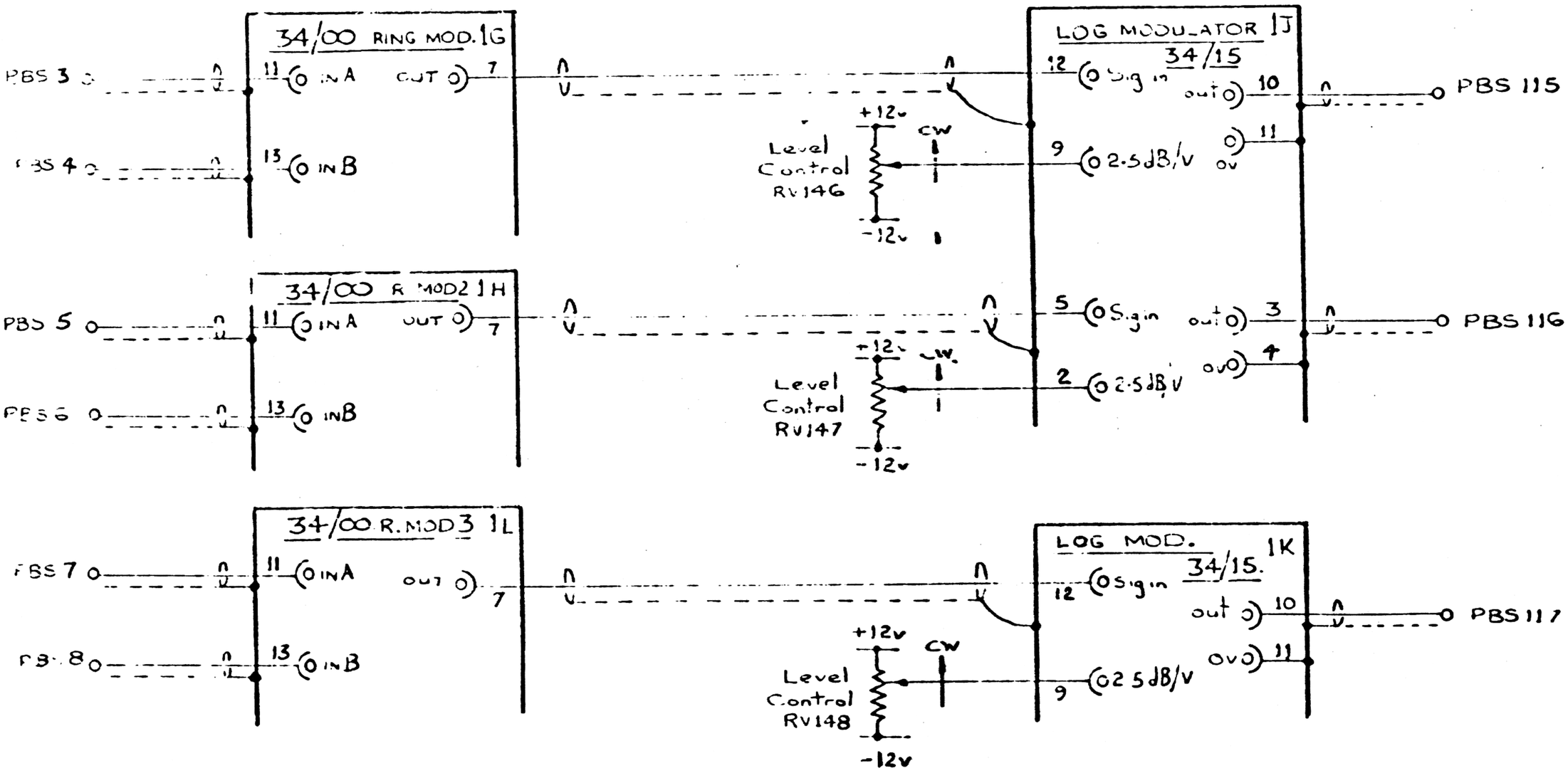
1B & 1D

LOG MODULATOR
34/15

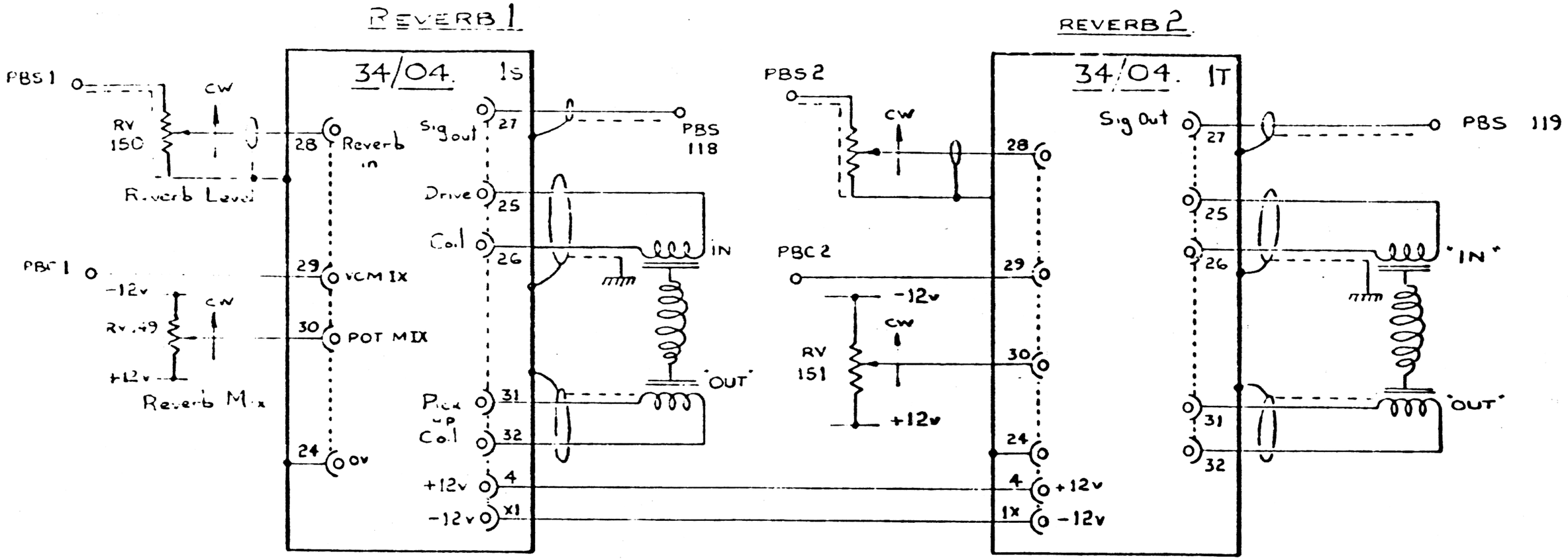
NOTE: REF TO 3 CIRC. DIAGS IS MADE ON THIS DRG

CARDS 1A TO 1F
ENVELOPE SHAPER (3 IDENTICAL)

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		Issue A
FINISH	ENVELOPE SHAPER USED ON SYNTHI 100	Drg No 31/08-10
TOL	CHKD	DRN JIM

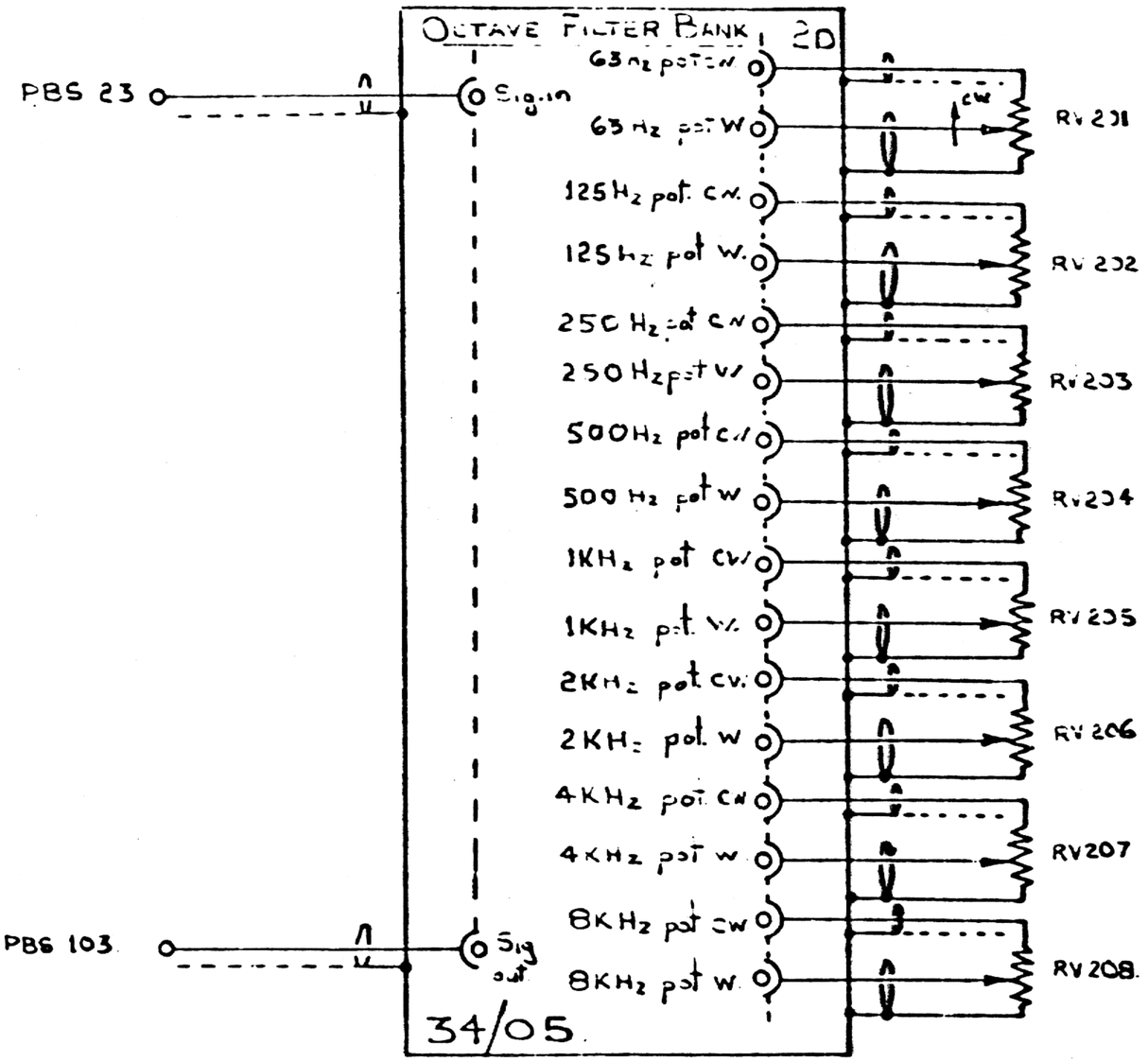


ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL —	MODULE WIRING. RING MOD. 1 2 & 3	Drg NO 31/11
FINISH —	USED ON SYNTHI 100.	
TOL —	SCALE — THIRD ANGLE DATE 16 6 71	



If Reverb chassis is mounted in Electrical Contact with the main chassis. Then neither Drive Coil Screen nor pickup Coil Screen must be connected to Reverb chassis This is necessary to preserve isolation between circuit ground 0v and chassis (mains earth)

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL	TITLE MODULE WIRING REVERB DRIVE 1&2	Drg NO 31/12
FINISH	USED ON SYNTHI 100	
TOL	SCALE —	DRN MJ DATE 6.6.78



ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL	TITLE MODULE WIRING OCTAVE FILTER BANK	Drg NO 31/13
FINISH	USED ON SYNTHI 100	
TOL	SCALE — CHK'D DATE	DRN DATE 16 6 71

SK5 SK13 SK6 SK14 SK7 SK8 SK9 SK10 SK11 SK12

+12v RED -12v BLUE

CW RV 209 RV 210 RV 211 RV 212 RV 213 RV 214 RV 216 RV 217

0v BUS

29 27 24 22 19 17 14 12 9 7 4 2 29 27 24 22

NON INV IN V IN

HEX OP AMP (x2 AMP) 2E 34/16

HEX OP AMP (PART OF CARD 2F 34/16

OUT 26 21 16 11 6 1 26 21

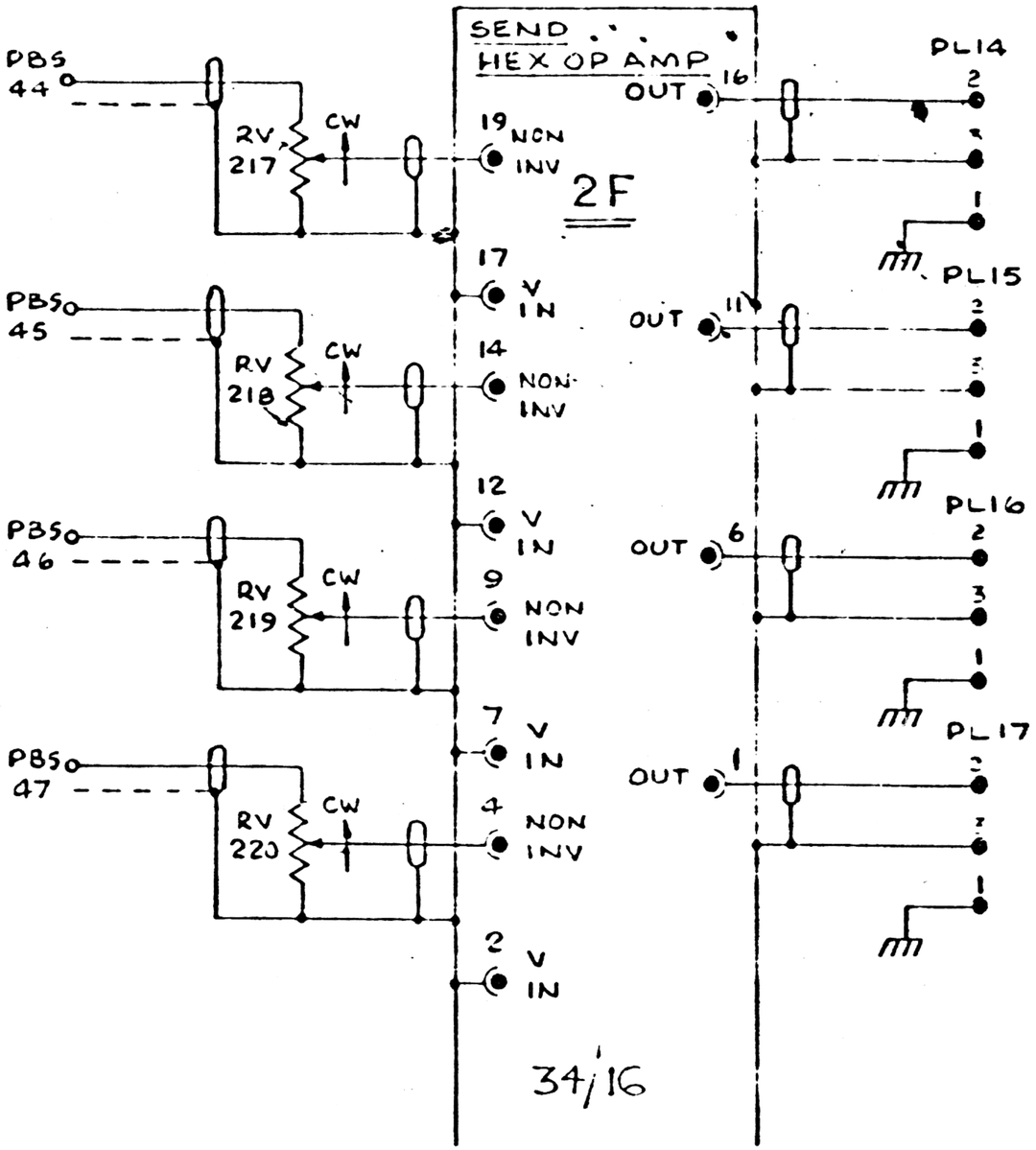
PBS 61 PBC 61 PBS 62 PBC 62 PBS 63 PBC 63 PBS 64 PBC 64 PBS 65 PBC 65 PBS 66 PBC 66 PBS 67 PBC 67 PBS 68 PBC 68

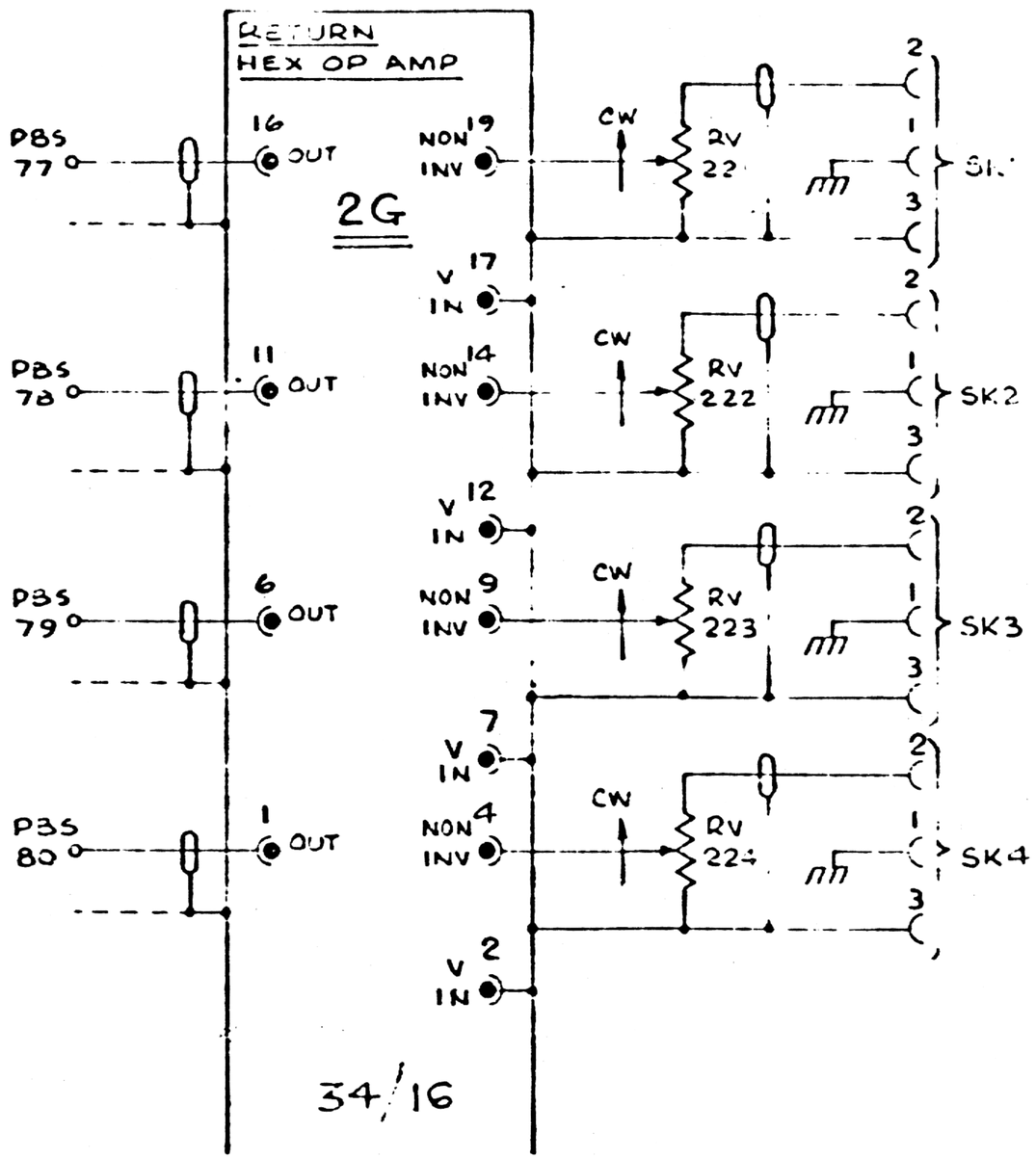
AMP1 AMP2 AMP3 AMP4 AMP5 AMP6 AMP7 AMP8

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd. Issue

INPUT AMPLIFIERS Drg No

SYNTH 100 31/14





EXTERNAL TREATMENT DEVICE BUFFERS

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		Issue A
	EXT. TREATMENT DEVICE BUFFERS SYNTHI 100	Drg No 31/15

34/17
HEX OP AMP
(SUMMING BUFFER)
4R
34/06
(SINE/RAMP)
OSC 1 (4A)
OSC 2 (4B)
OSC 3 (4C)
OSC 4 (4D)
OSC 5 (4E)
OSC 6 (4F)
4K
34/15
(LOG MODULATOR)
4L
4M
4N
4P
4Q
FREQ
SINE SHAPE
WAVE SHAPE
FREQ CONTROL
SYNC
RAMP OUT
SINE OUT
SIG IN
SIG OUT
LEVEL
RAMP LEVEL
SINE/RAMP OSCILLATORS 1-6
E.L. TRONIC MUSIC STUDIOS 31/16

PBC 32 — 28 I.IN — 25 OUT — OSC 7 — 29 NON IN. — 27 V.IN

f7 RV 309: +12V, CW, −12V

6 FREQ CONTROL — RAMP 3 TRIANG 7 V

RV 307: +12V, CW, −12V — 1 RAMP SHAPE

PBS 30 — 12 SYNC

RV 305: +12V, CW, −12V — 8 RECT SHAPE

4A

7Π SQUARE RECT. 13

34/06 (RAMP/RECT) OSC 7

8∿ 3

4B

8Π 13

34/06 (RAMP/RECT) OSC 8

9∿ 3

4C

9Π 13

34/06 (RAMP/REC) OSC 9

12 SIG C IN — SIG OUT 10 — PBS 98

RV 308: +12V, CW, −12V — 8 2·5V C 1B/V

5 SIG IN D — 4K — SIG OUT 3 — PBS 97

11 OV

RV 306: +12V, CW, −12V — 2 2·5V Γ dB/V

4 OV

34/15 LOG MODULATOR

RV 317: +12V, CW, −12V — 8 C — 4L — 5 D

RV 315: +12V, CW, −12V — 2 D

34/15 LOG MODULATOR

RV 326: +12V, CW, −12V — 8 C — 4M — 5 D

RV 324: +12V, CW, −12V — 2 D

34/15 LOG MODULATOR

PBC 33 — 23 I.IN — 21 OUT — OSC 8 — 24 NON IN. — 22 V.IN

f8 RV 318: +12V, CW, −12V

34/17

RV 316: +12V, CW, −12V — 1

PBS 31 — 12

RV 314: +12V, CW, −12V — 8

PBS 100 — 11 — PBS 99 — 4

PBC 34 — 18 I.IN — 16 OUT — OSC 9 — 19 NON IN. — 17 V.IN — 4S

f9 RV 327: +12V, CW, −12V

HEX OP AMP (SUMMING BUFFER)

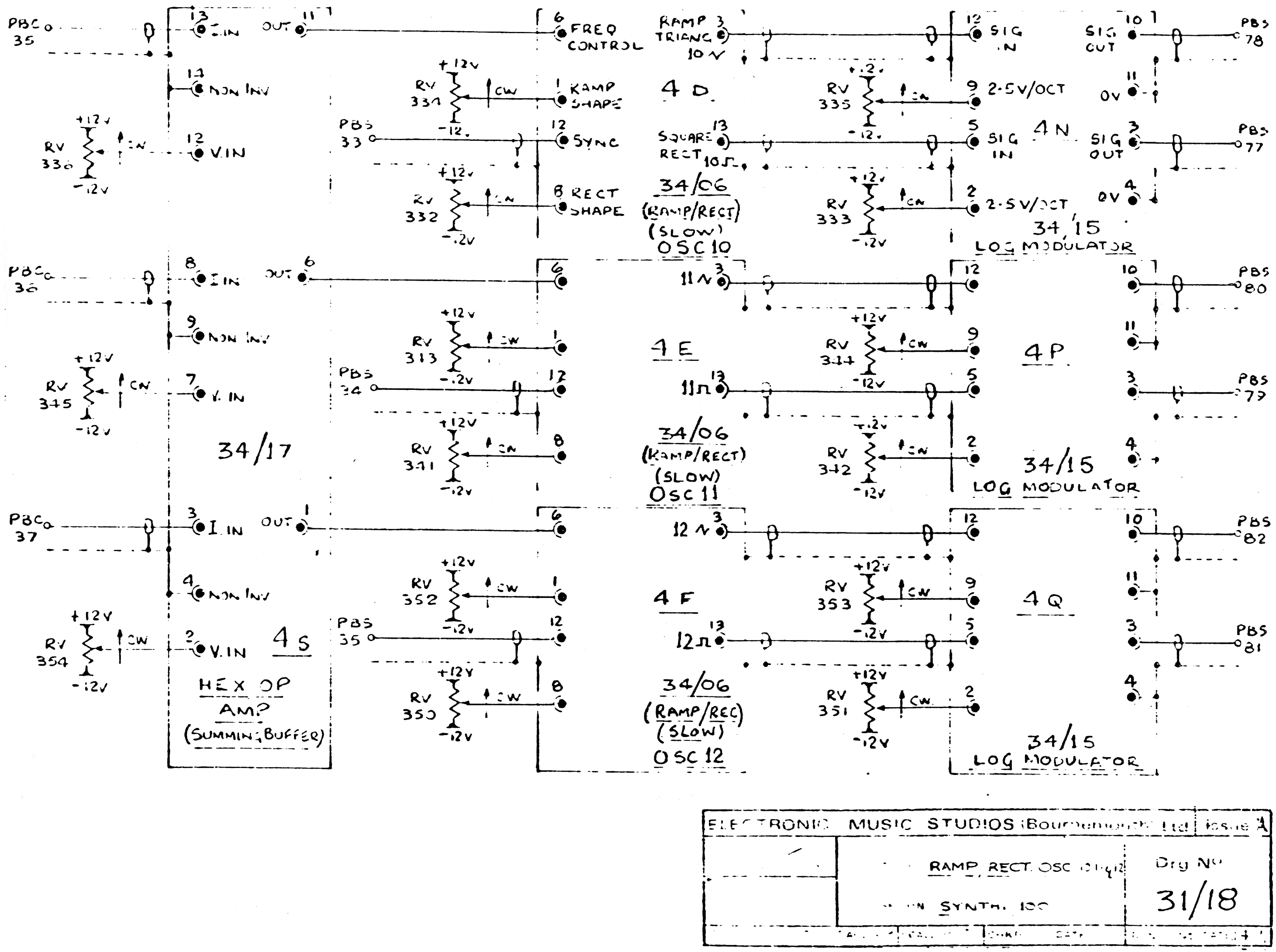
RV 325: +12V, CW, −12V — 1

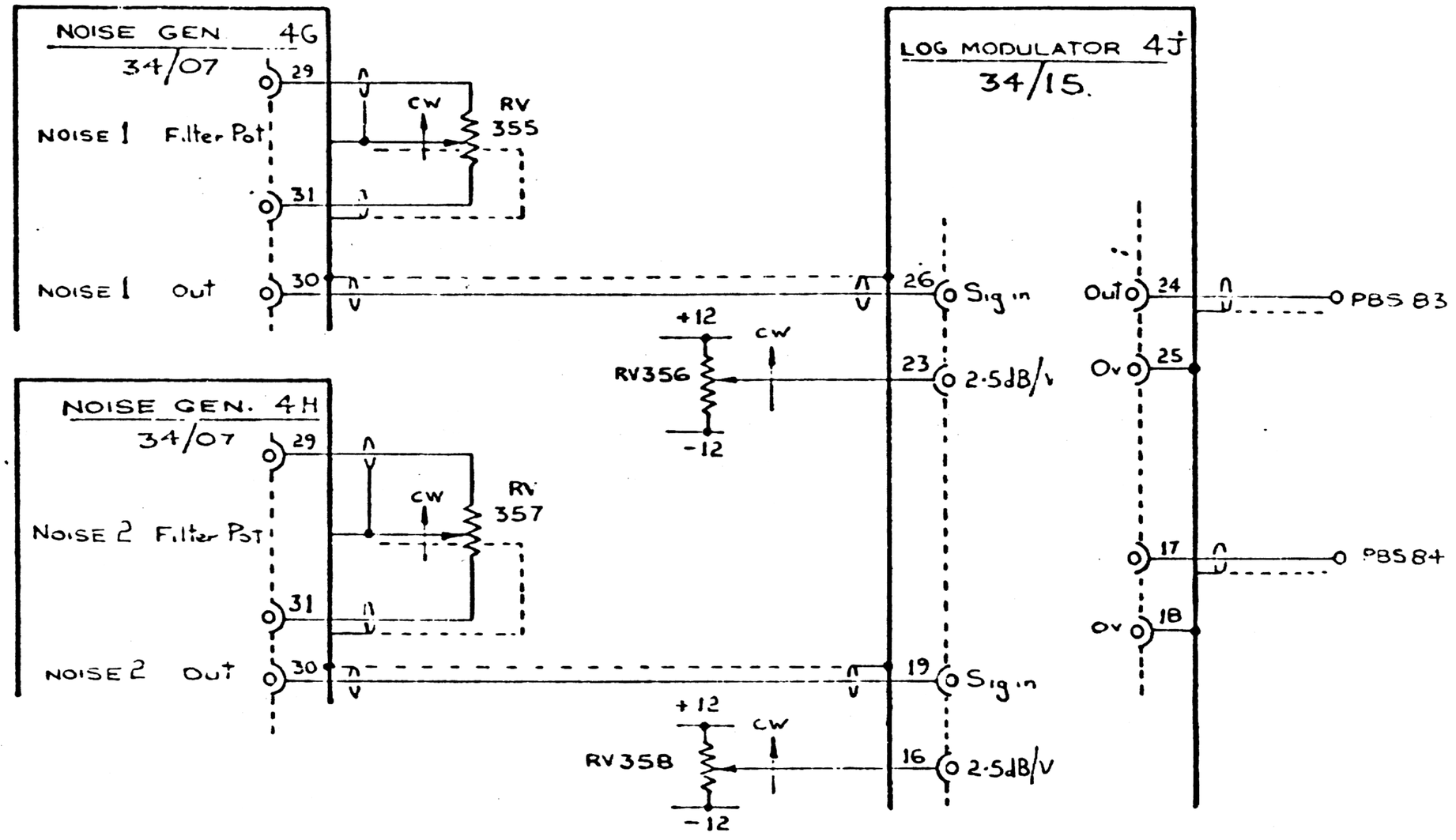
PBS 32 — 12

RV 323: +12V, CW, −12V — 8

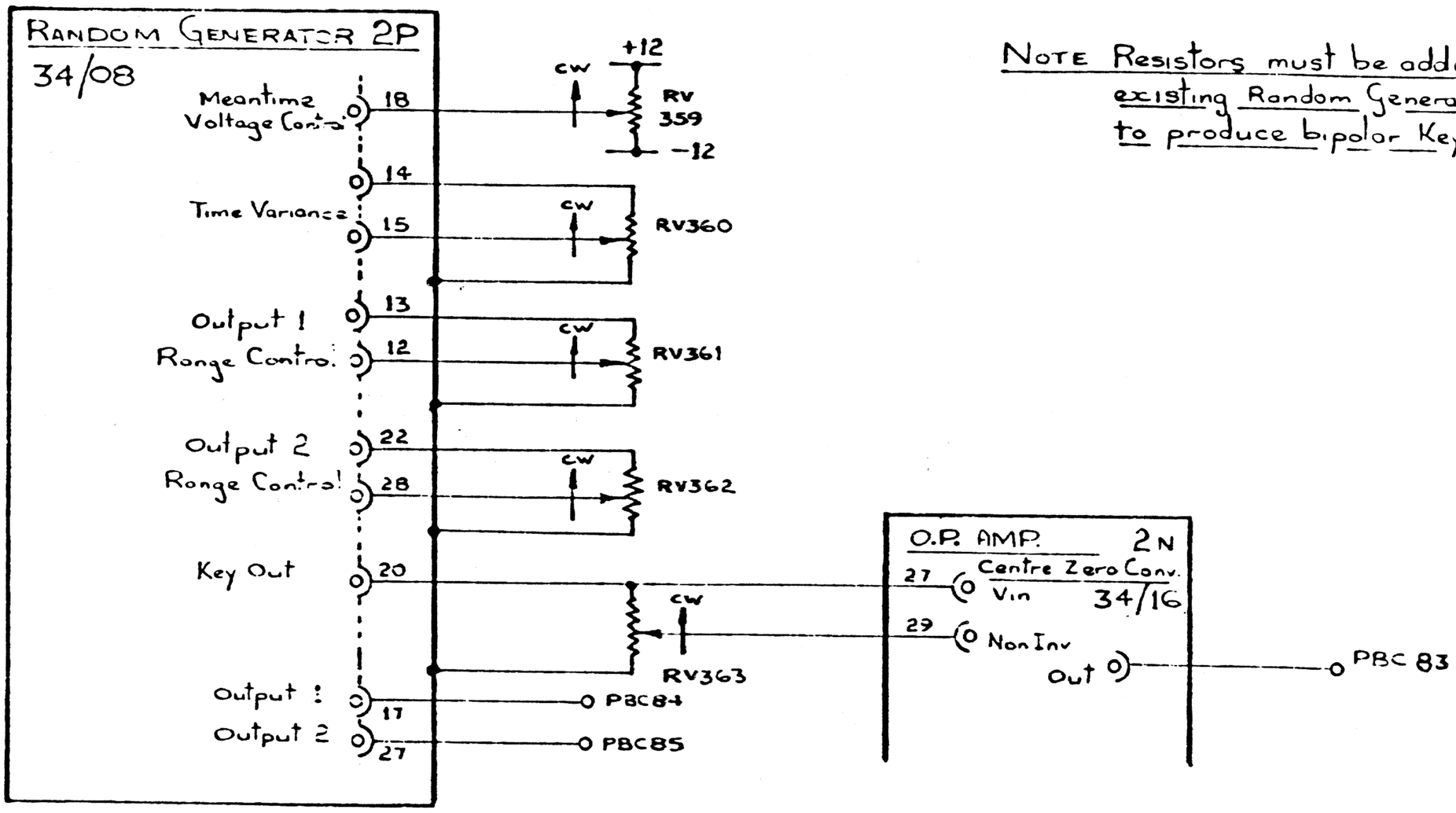
PBS 102 — 11 — PBS 101 — 4

ELECTRONIC MUSIC STUDIOS Bournemouth Ltd			Issue
MATL	TITLE RAMP/RECT. OSC. 7&9		Drg No
FINISH	USED ON SYNTHI 100		31/17
TOL	SCALE	CHKD	


FREQ CONTROL
RAMP SHAPE
SYNC
RECT SHAPE
RAMP TRIANG 10 V
SQUARE RECT 10
SIG IN
2.5V/OCT
SIG OUT
0V
4 D
4 N
34/06
(RAMP/RECT)
(SLOW)
OSC 10
34/15
LOG MODULATOR
4 E
4 P
34/06
(RAMP/RECT)
(SLOW)
OSC 11
34/15
LOG MODULATOR
4 F
4 Q
34/06
(RAMP/REC)
(SLOW)
OSC 12
34/15
LOG MODULATOR
I. IN
NON INV
V. IN
OUT
34/17
4 S
HEX OP AMP
(SUMMING BUFFER)
PBC 35
PBC 36
PBC 37
PBS 33
PBS 34
PBS 35
PBS 78
PBS 77
PBS 80
PBS 79
PBS 82
PBS 81
RV 336
RV 345
RV 354
RV 334
RV 332
RV 343
RV 341
RV 352
RV 350
RV 335
RV 333
RV 344
RV 342
RV 353
RV 351
+12V
-12V
CW
ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd
Issue A
RAMP RECT. OSC 10-12
SYNTH. 100
Drg No
31/18

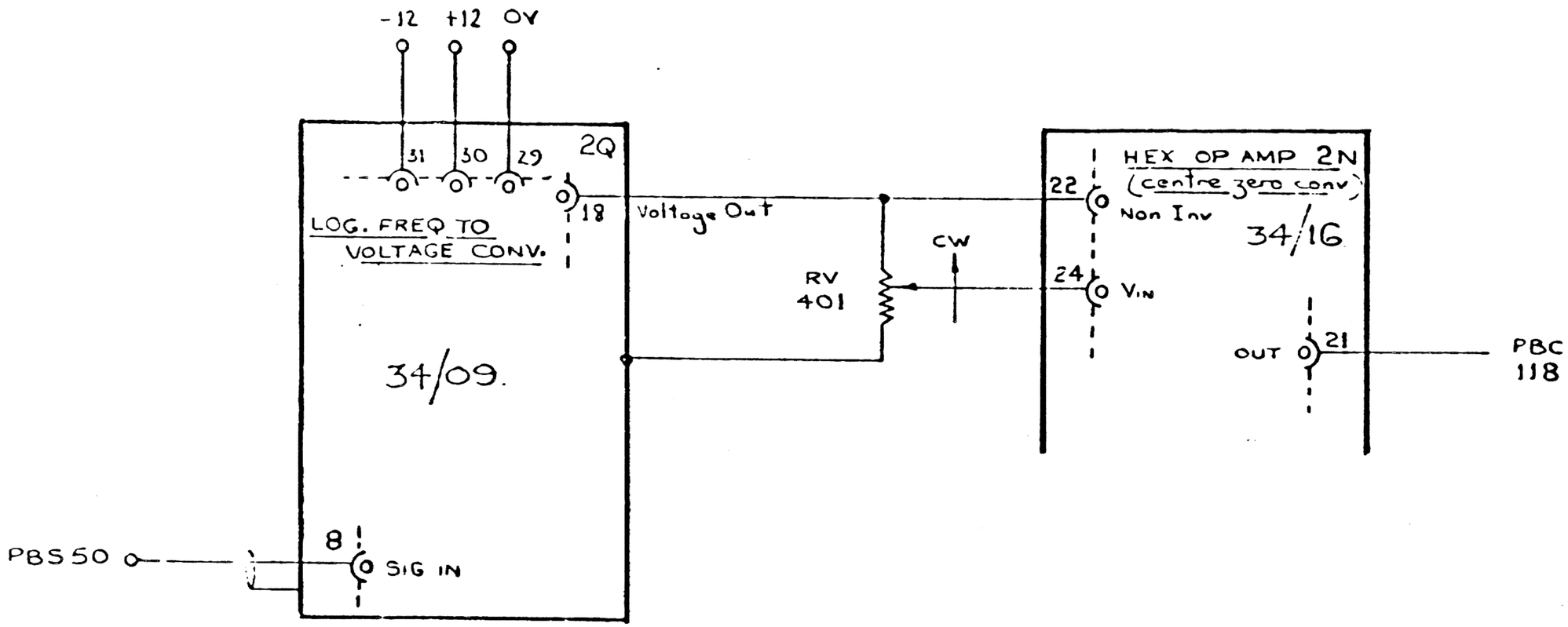


ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL / FINISH	TITLE MODULE WIRING · NOISE GEN 1 of 2 USED ON SYNTHI 100	Drg NO 31/19
Finish / Des / Angles /	SCALE / CHKD /	DRN / DATE 16 6 71



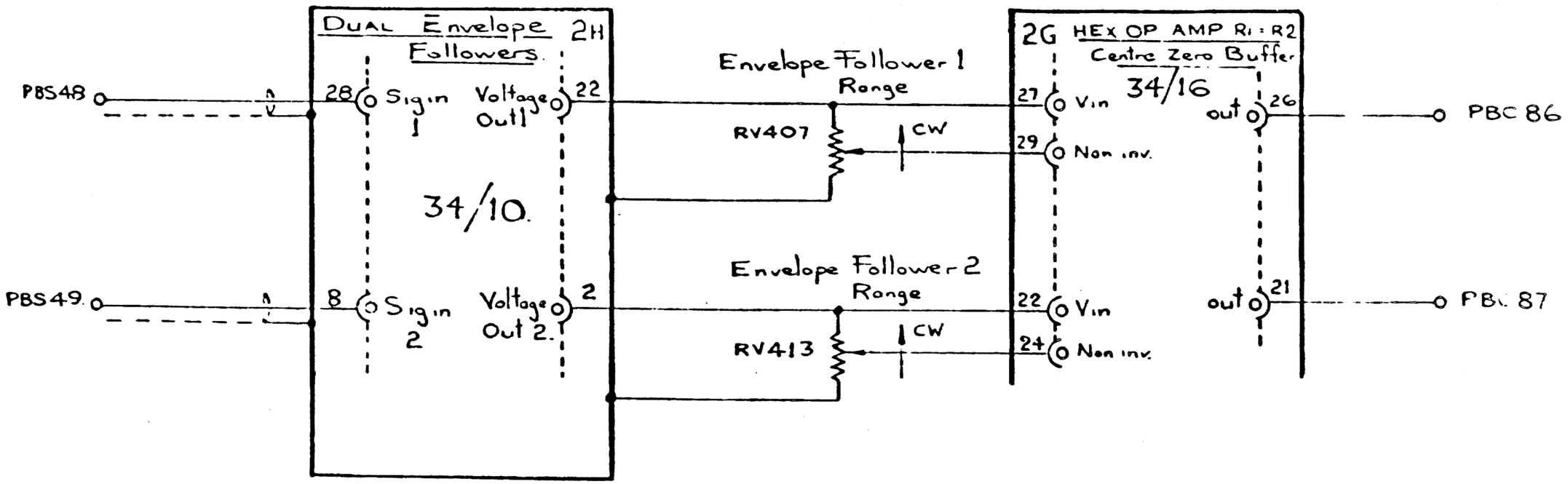
NOTE Resistors must be added to existing Random Generator module to produce bipolar Key Voltage.

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL —	TITLE MODULE WIRING RANDOM GENE.	Drg No 31/20
FINISH —	USED ON SYNTHI 100	
TOL Fnc — Dec — Angles —	SCALE — CHKD DATE	DRN DATE 16 6 71

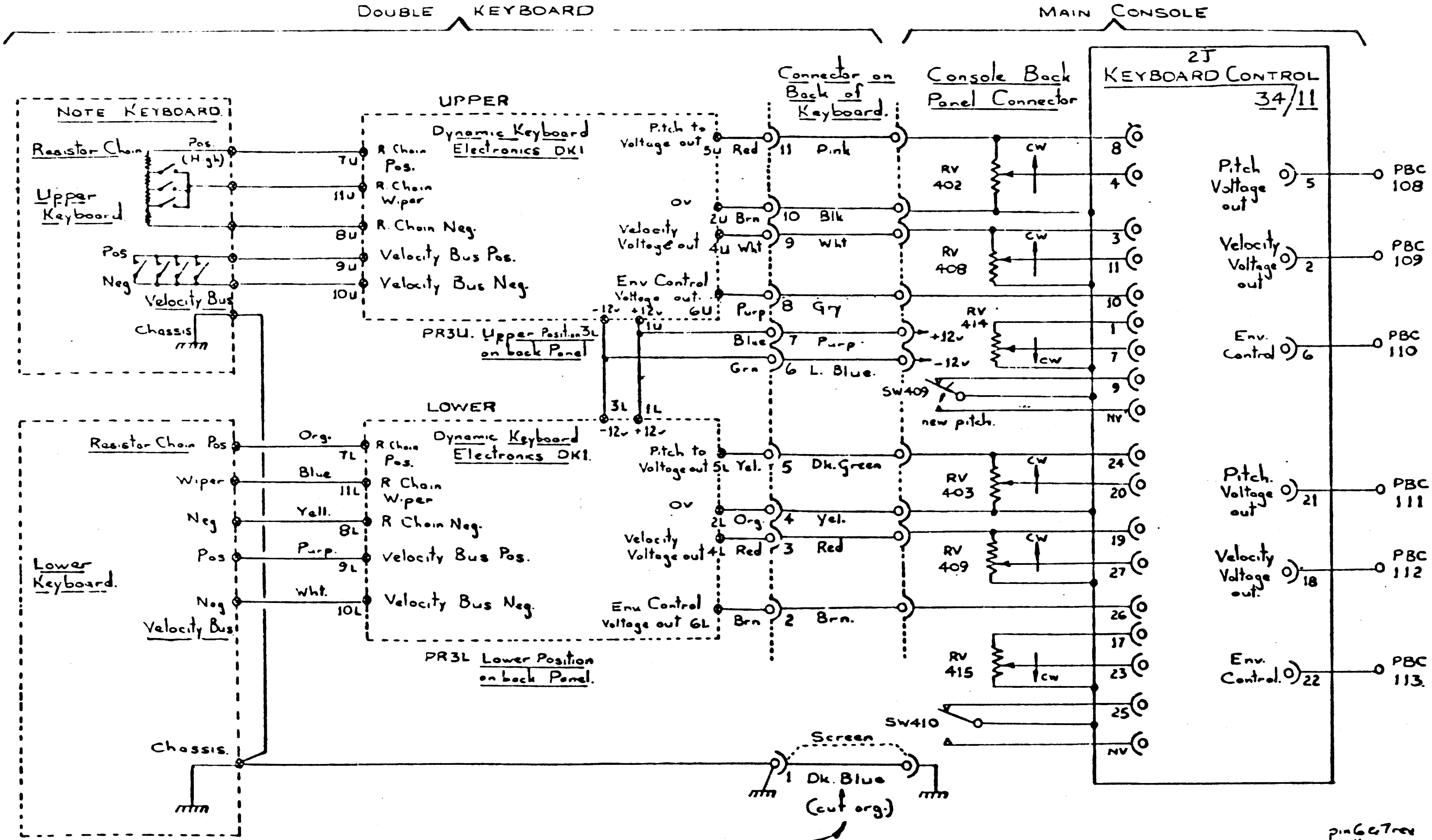


B Nos 24 & 22
rev.
5.8.71

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL / FINISH /	TITLE MODULE WIRING PITCH TO VOLT. CONV. USED ON SYNTHI 100.	Drg No 31/21.
TOL Frac — Dec — Angles —	SCALE —	CHKD DATE / DRN DATE 16 6 71



ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL / FINISH /	TITLE MODULE WIRING ENVELOPE FOLLOWERS USED ON SYNTHI 100	Drg No 31/22
TOL Fract / D... / Angles /	SCALE / CHKD DATE	DRN DATE 16.6.71



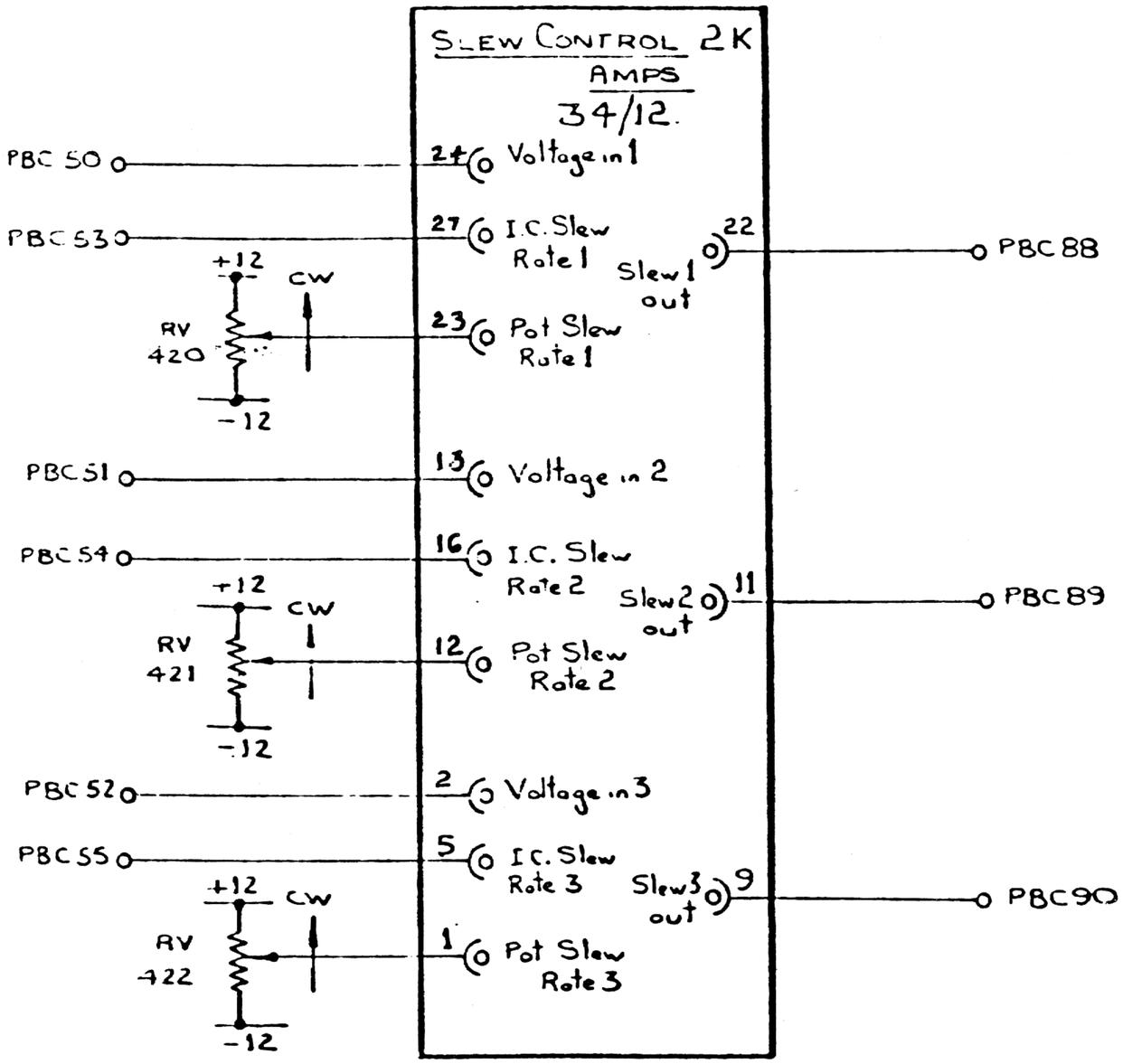
UMBILICAL CONNECTION.

1 L. Green.	7 Purp.
2 Brn.	8 Grey
3 Red	9 Wht.
4 Yel.	10 Blk
5 DK. Green.	11 Pink
6 Blue	12 Org

12-17 Connected @ plug (kbd) to floating leads pin 18 floating

pin 6 & 7 rev
B 23.8.71.

ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MAT'L	TITLE KEYBOARD CONTROL	Drg No
FINISH	USED ON SYNTHI 100 KEYBOARD	31/23.
TOL Frac Dec Angles SCALE	CHKD DATE	DRN DATE 17.6.71



ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		issue A
MATL / FINISH	TITLE MODULE WIRING SLEW LIMITERS 1,2 & 3 USED ON SYNTHI 100.	Drg NO 31/24.
TOL Fract / Dec / Angles /	SCALE / CHKD DATE	DRN DATE 16.6.71

PL3 did read PL2
PL2 " " PL3
26. 7. 71
c No's Added
21. 11. 72.

ELECTRONIC MUSIC STUDIOS LTD.

OUTPUT CHANNELS 1 TO 4.

DRN 9. 7. 71. ISSUE A B 31/25.

B PLS did read PL4
PL4 " " PLS
26.7.71.
P.C.B N° change
21.11.72.

ELECTRONIC MUSIC STUDIOS LTD

OUTPUT CHANNEL 5-8

DRN 9.7.71. ISSUE A[8] 31/26

RV521

QUAD LOG MOD 4w 34/15

PBS40 CW
26 Sig in
Sig out 24
PBC46 22 14 dB/V
0v 25
RV522
PBS73
PBC 73
PBS41 CW
19 Sig in
Sig out 17
PBC47 15 14 dB/V
0v 18
PBS74
PBC 74
RV523
PBS 42 CW
12 Sig in
Sig out 10
PBC 48 8 14 dB/V
0v 11
RV524
PBS 75
PBC 75
PBS 43 CW
5 Sig in
Sig out 3
PBC 49 1 14 dB/V
0v 4
PBS 76
PBC 76

QUAD O/P CHANNEL FILTER NETWORK 4x 34/13.

22 in 1
28 pot cw1
RV 505 CW
27 pot ccw1
24 out 1
15 in 2
21 pot cw2
RV 506 CW
20 pot ccw2
17 out 2
8 in 3
14 pot. cw3
RV 507 CW
13 pot ccw3
10 out 3
1 in 4
7 pot cw.4
RV 508 CW
6 pot ccw4
3 out.4

1out 26
1out 25
SW505 RV513 CW
1out 23
2out 19
2out 18
SW506 RV514 CW
2out 16
3out 12
3out 11
SW 507 RV515 CW
3out 9
4out 5
4out 4
SW508 RV516 CW
4out 2

PAN SUMMER 4Y 34/14.

23 in
19 pot.cw
21 pot ccw
out left 25 ch. 1-4.
17 in
13 pot cw
15 pot ccw
out right 27
11 in
7 pot cw
9 pot ccw
5 in
1 pot cw
3 pot ccw

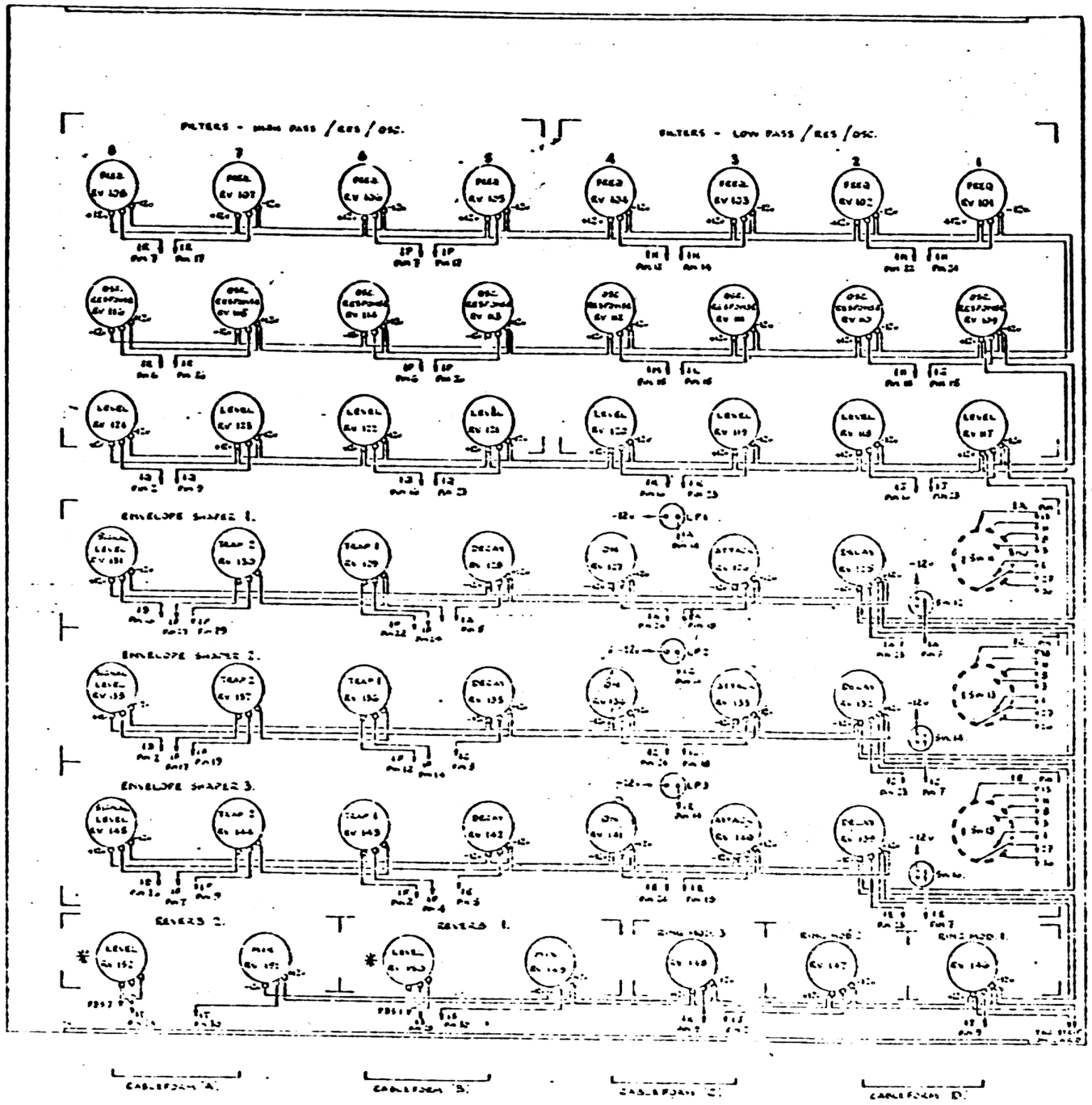
PL10
PL4
PL11
PL5
PL12
PL13

METER AMPS.

4E DC out 32, AC out 28, Meter in 27 — 34/06 — SW405 — MS
4F DC out 32, AC out 28, Meter in 27 — 34/06 — SW406 — MG
4G DC out 32, AC out 28, Meter in 27 — 34/07 © — SW407 — M7
4H. DC out 32, AC out 28, Meter in 27 — 34/07 © — SW408 — M8

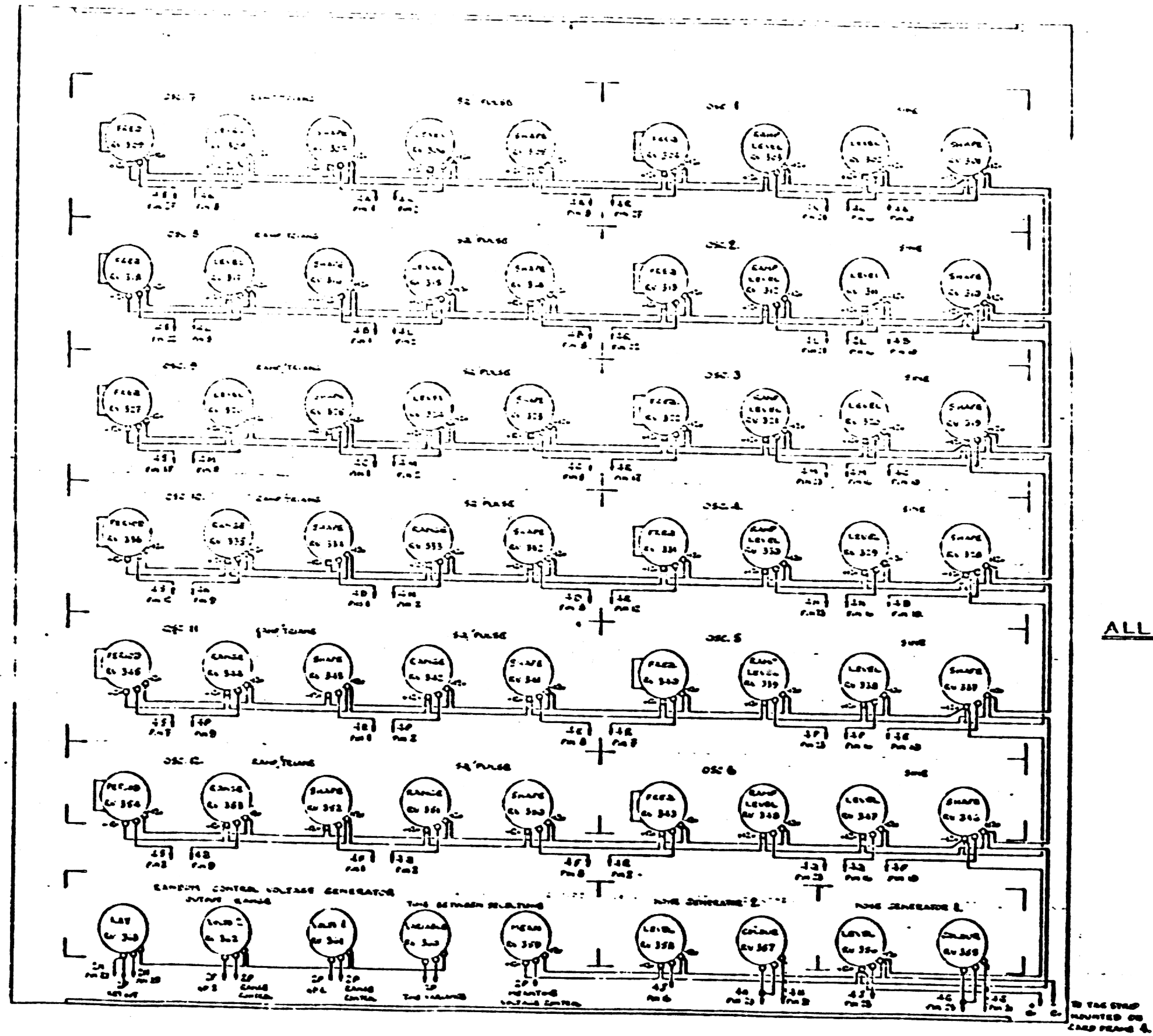
Sequencer Digital
C.D. 3
Clock Rate
RV 527
+2.5v
-2.5v
Start Forward
SW515
Start Rev.
SW516
Stop
SW517
Reset
SW514
Erase Event
SW512
Clear
SW513
Stop @ each event
SW511
Stop @ event end
SW510
Rewrite BDF.
layer 1
layer 2
layer 3
SW509
NOTE DIST.
Key 4.
SW512
CW
A16
out
Modulus Clock Control Voltage
A17
Clock out
A14
PBS 82
A29
A27
J20
J19
G16
G15
H15
H19
G17
H17
H16
H18
H14
G14
PBC 56
PBC 57
PBC 58
PBS 51
PBS 53
PBS 54
PBS 52
B15
First parameter in (A,C,E)
B17
Secound parameter (B,D,F)
B13
Key Voltage in.
J16 Clock in
J12 Remote Start
J14 Remote Stop
J18 Remote Reset
J15-0v
J11-0v
J13-0v
J17-0v
4 DIGIT UP/DOWN
BCD DISPLAY
COUNTER
34/19
up count pulse
J26
down count pulse
J23
1000s overflow
J27
1000s underflow
J24
Reset zero
J28
+5v
Logic power
BUS2
0v
BUS1
A
B
C
D
o/p Buffers
13
18.5v
0V
NESTRA
mains distribution
PBC 107
HEX OP. AMP
2L
unity Buffer
34/16
A out
C14
C13
B out
C16
C15
C out
D14
D13
D out
D16
D15
E out
E14
E13
F out
E16
E15
RV 404
RV 410
RV 405
RV 411
RV 406
RV 412
CW
non inv
out
PBC 97
PBC 98
PBC 100
PBC 101
PBC 103
PBC 104
HEX OP AMP
2M
Centre Zero Conv
34/16
Key 1 out
C17
Key 2 out
D17
Key 3 out
E17
Key 4 out
B13
0v
B11
RV 416
RV 417
RV 418
RV 419
V in
V non inv
PBC 99
PBC 102
PBC 105
C1
0.1µF
PBC 106
PBS 81
1.9.71.
C1 added
12.8.7
B pin Nos 34/19 changed
ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd
issue A
MATL
FINISH
TITLE MODULE WIRING SEQ.
USED ON SYNTHI 100
Drg No
31/28
SCALE
CHKD
DATE
DRN
DATE 16.6.71

B NOTE ADDED
R113 - RV116 +6- REV
LP1 - LP3 - 12V ADDED
SW12 SW10 - SW16 - 12V ADDED
RV 130 27 29 REV.
RV 129 22 24 REV.
RV 128 17 17 REV.
RV 136 12 14 REV
RV 144 7 9 REV
RV 143 2 4 REV
RV 145 [illegible] REV
* - REV. on RV151
C C.N. 46 [illegible] RV142.
[illegible] 11/4/73



ALL POTENTIOMETERS 10K LIN
EXCEPT A FEW WHICH ARE: 5K LOG

ELECTRONIC MUSIC STUDIOS (L) LTD
PANEL ONE (A)
REAR VIEW ASSEMBLY
EMS 30-29



ALL POTENTIOMETERS 10K LIN

DRAWN	D.A.C.	ELECTRONIC MUSIC STUDIOS BOURNEMOUTH LTD	
DATE		PANEL THREE (C) REAR VIEW ASSEMBLY	DRG. No. C
SCALE	1:1		EMS 31.31.
AMEND'D			

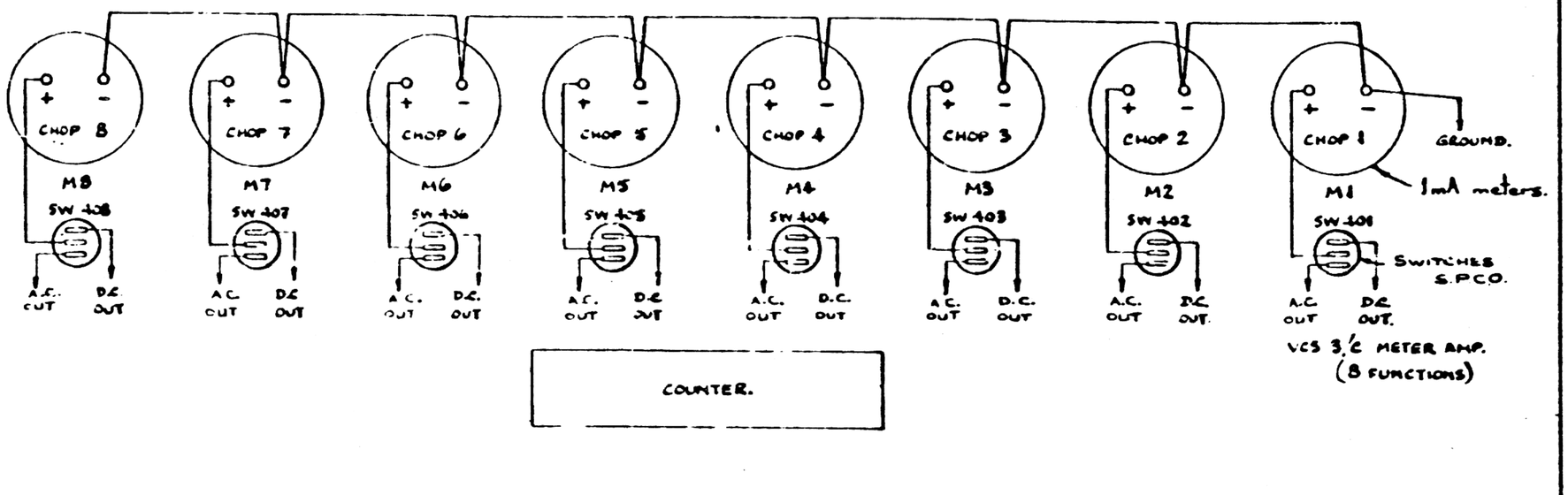
E additional No's added MH 16.4.71

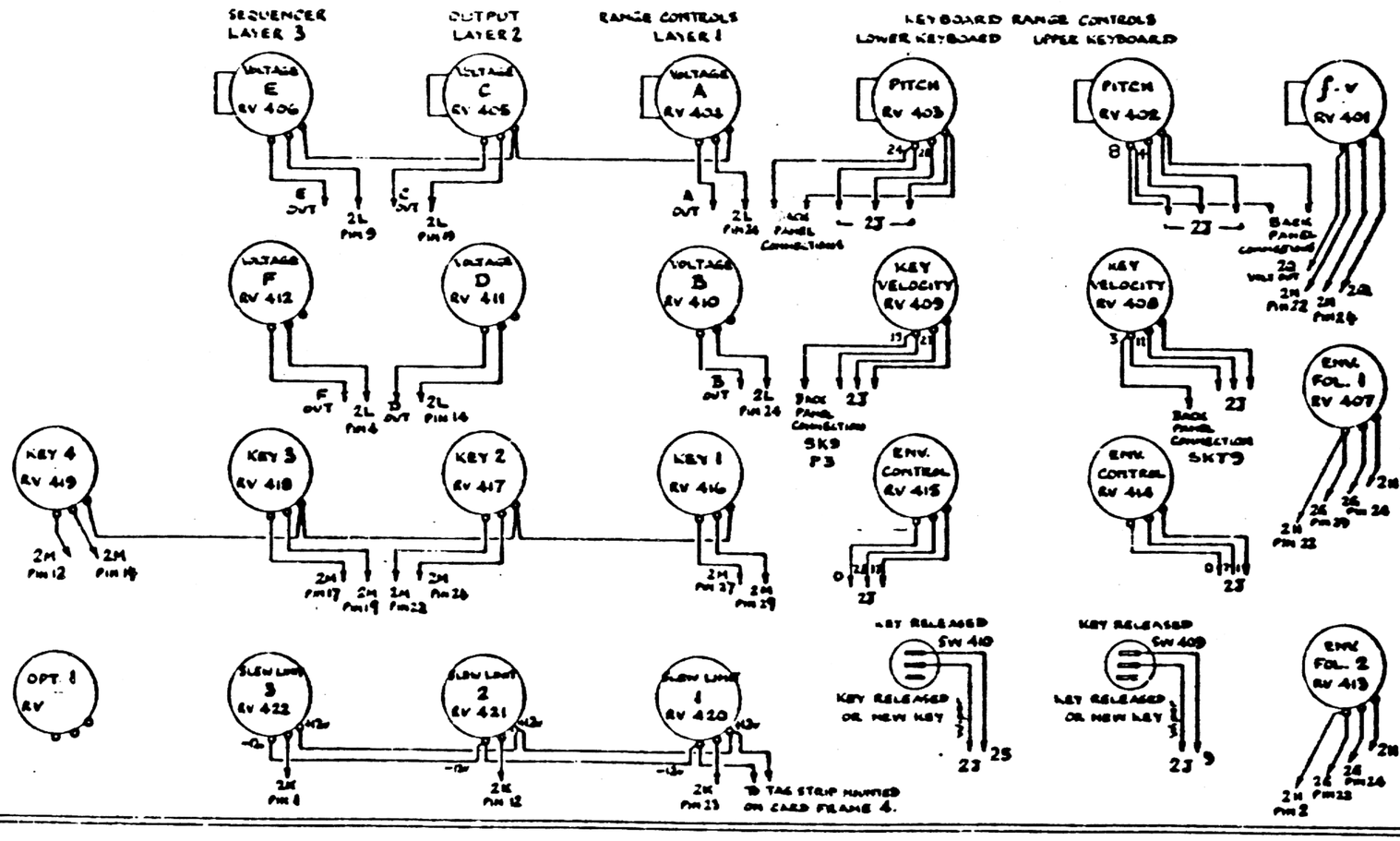
C pot values rev to meters & switches made - MH 25.6.71.

D SW401 TO SW408 Turned through 90° MH 6.8.71

E SW409, SW410 changed 23.8.71

F Pot No's added MH 27.8.71

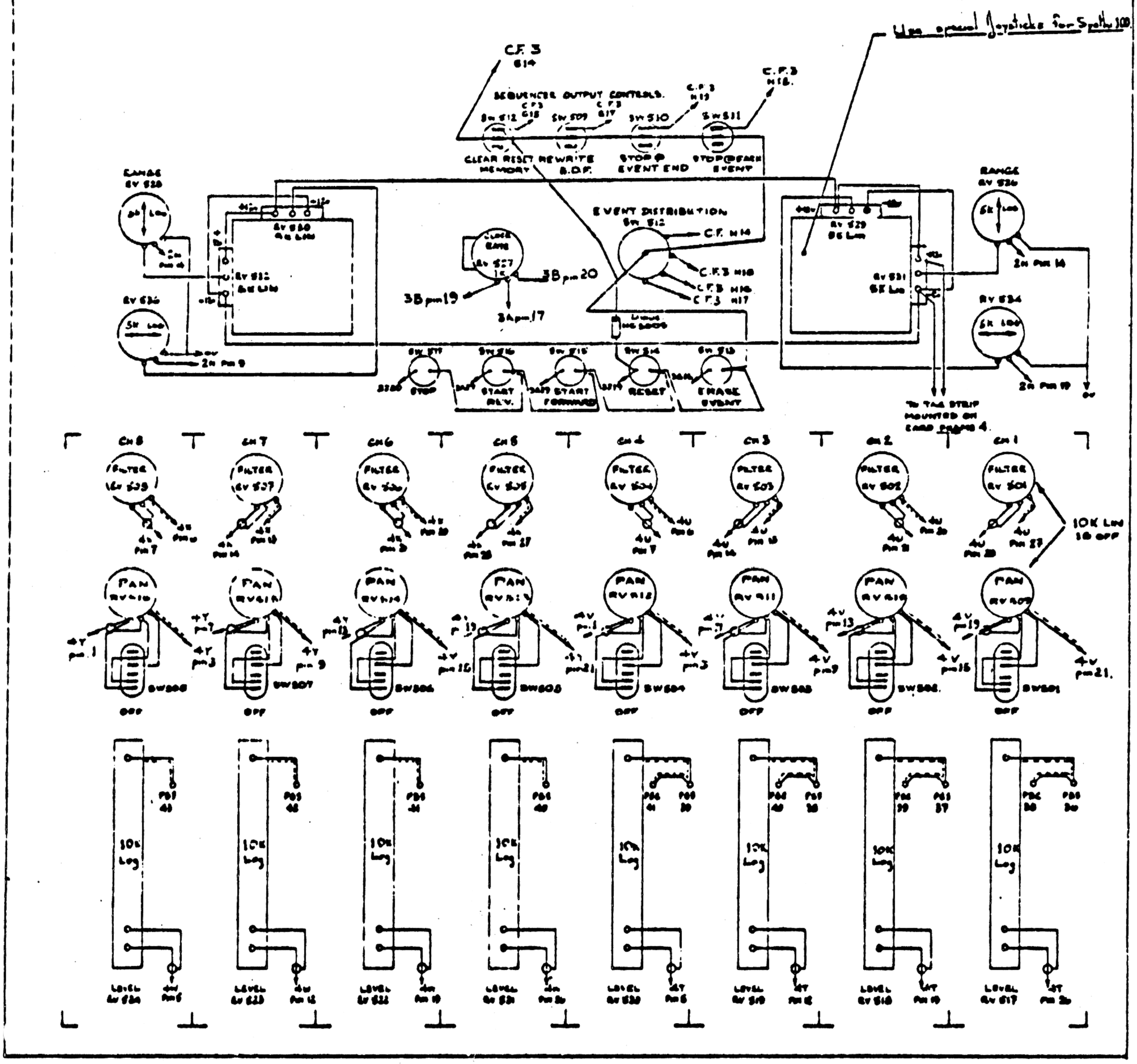




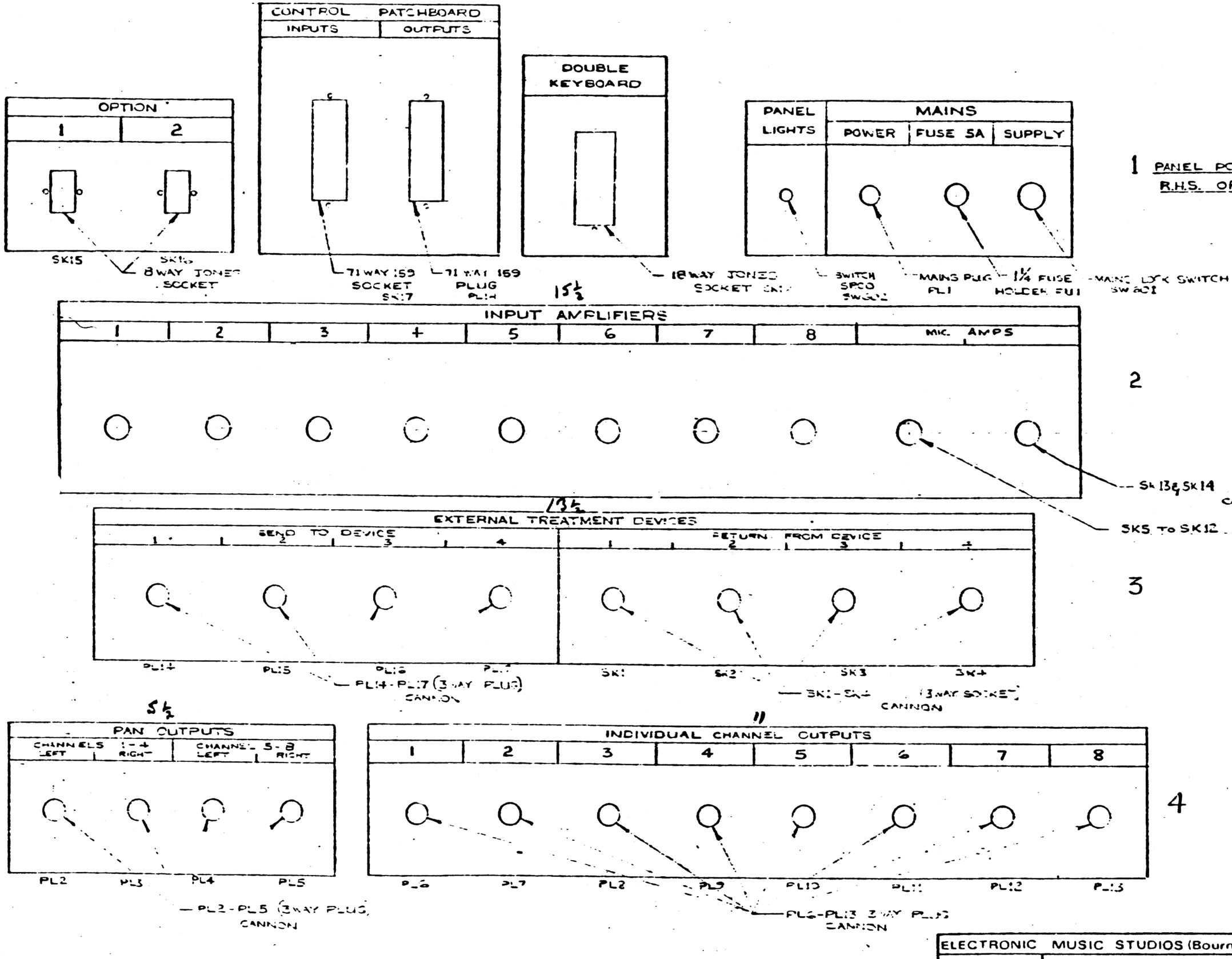
ALL POTENTIOMETERS 10K LIN.

DRAWN	[illegible]	ELECTRONIC MUSIC STUDIOS BOURNEMOUTH	
DATE	16.4.71	PANEL 4.	DRG. No. F
SCALE	1:1		EMS 31, 32

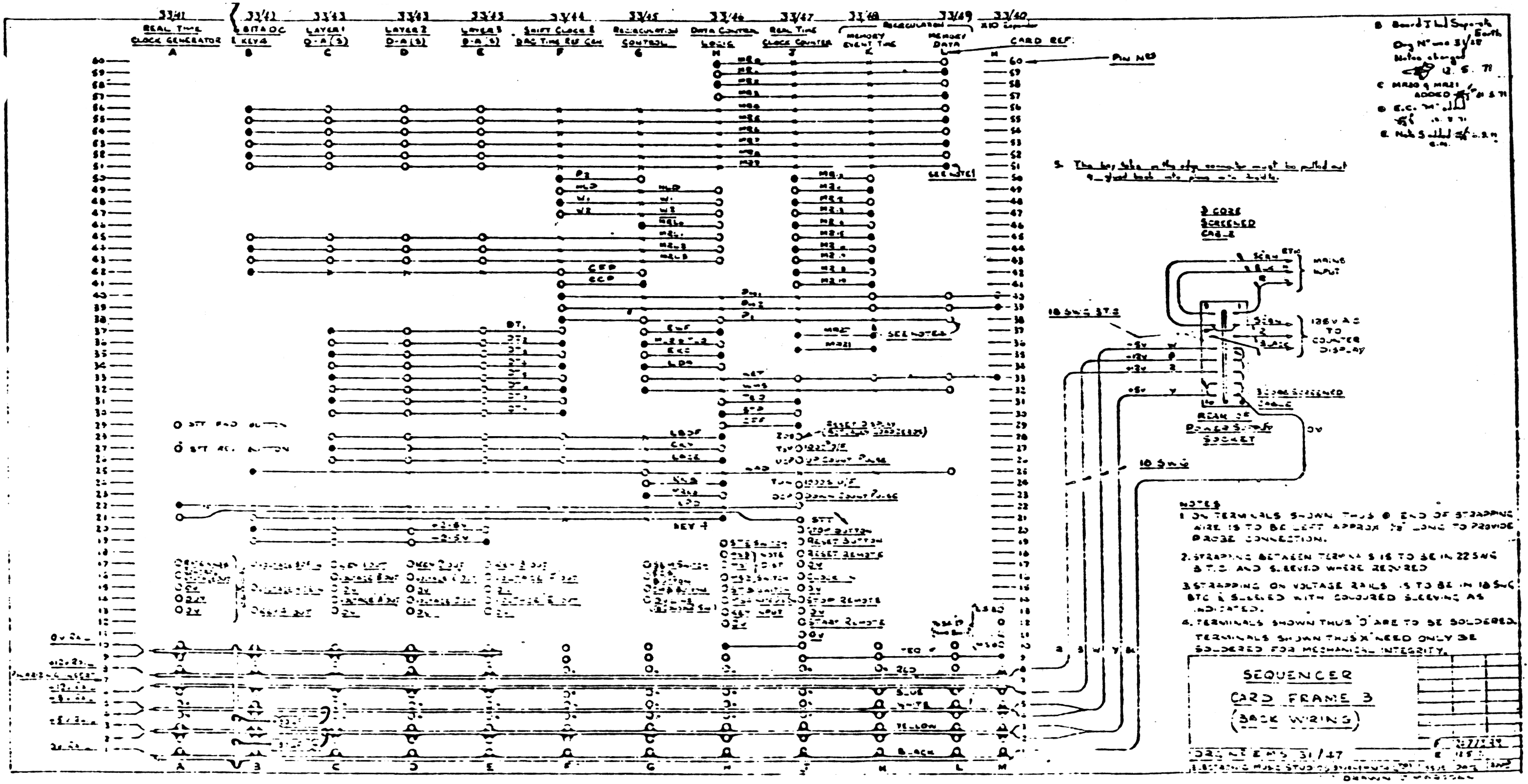
B Further Detail Added
C +– to joystick was reversed pot wiring corrected SW 612 & SW 613.
D M17, M19 rev. SW 612 M16, M18 rev
26. 7. 71
E Note – Joystick added
6. 8. 71.
F SW 627 Ctrl Rate Knob pin 19 & pin 20
20 8. 71

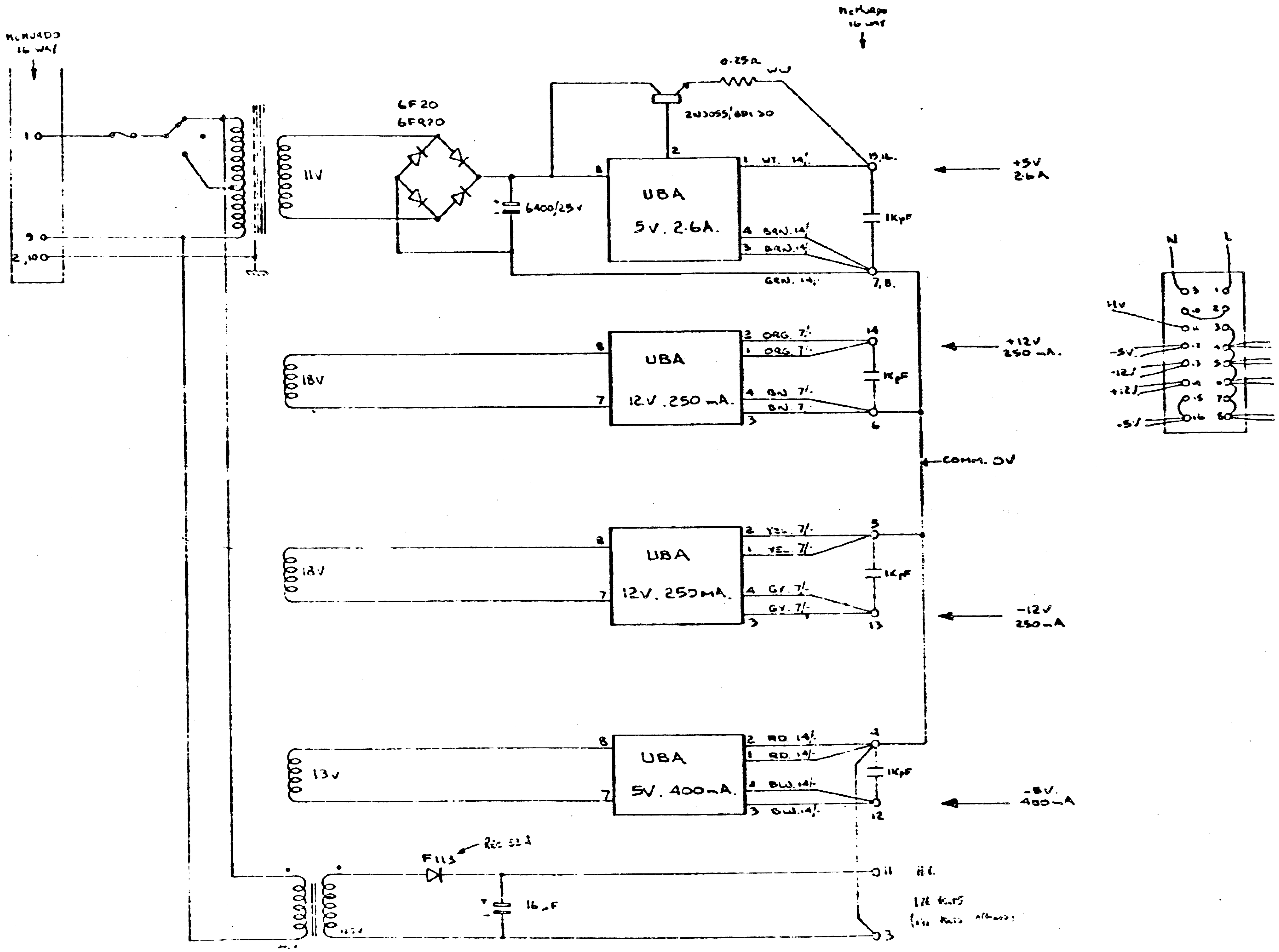


DRAWN	B.Dent.	ELECTRONIC MUSIC STUDIOS Brentwood Ltd	
DATE	14.Dec.70	PANEL 5. SEAL VIEW ASSEMBLY.	DRG. NO. F EMS.31-33.
SCALE	1:1		
AUTHORITY			



ELECTRONIC MUSIC STUDIOS (Bournemouth) Ltd		Issue
MATL	TITLE INTERFACE PANELS	Drg NO 31/34
FINISH	USED ON SYNTHI 100	
TOL Fract / Dec / Angles	SCALE / CHKD / DATE	DRN / DATE


33/41 REAL TIME CLOCK GENERATOR A
33/42 8 BIT ADC & KEYS B
33/43 LAYER 1 D-A (3) C
33/43 LAYER 2 D-A (3) D
33/43 LAYER 3 D-A (3) E
33/44 SHIFT CLOCK & DAC TIME REF GEN F
33/45 RECIRCULATION CONTROL G
33/46 DATA COUNTER LOGIC H
33/47 REAL TIME CLOCK COUNTER J
33/48 RECIRCULATION MEMORY EVENT TIME K
33/49 MEMORY DATA L
33/40 X10 expander
CARD REF.
Pin No.
SEE NOTES
SEE NOTES
3 CORE SCREENED CABLE
MAINS INPUT
125V AC TO COUNTER DISPLAY
18 SWG BTC
REAR OF POWER SUPPLY SOCKET
0V
18 SWG
NOTES
1. ON TERMINALS SHOWN THUS ● END OF STRAPPING WIRE IS TO BE LEFT APPROX ½" LONG TO PROVIDE PROBE CONNECTION.
2. STRAPPING BETWEEN TERMINALS IS TO BE IN 22 SWG B.T.C. AND SLEEVED WHERE REQUIRED.
3. STRAPPING ON VOLTAGE RAILS IS TO BE IN 18 SWG BTC & SLEEVED WITH COLOURED SLEEVING AS INDICATED.
4. TERMINALS SHOWN THUS 'O' ARE TO BE SOLDERED. TERMINALS SHOWN THUS 'X' NEED ONLY BE SOLDERED FOR MECHANICAL INTEGRITY.
RED
BLUE
WHITE
YELLOW
BLACK
SEQUENCER
CARD FRAME 3
(BACK WIRING)
DRG No EMS 31/47



31/49.

NESTRA ELECTRONICS LTD.

P.S.U. TYPE 3100 SK 3102/10