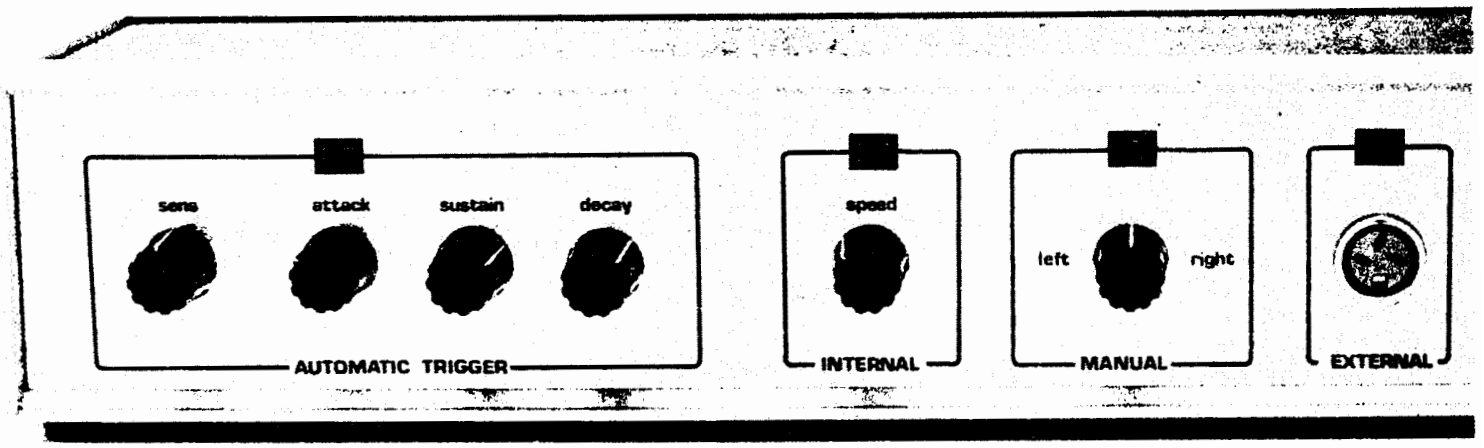
STEREO IMAGE CO-ORDINATOR



Keith Brindley presents the ultimate in sound control.

PERHAPS AN explanation is required! What, you may ask, is a Stereo Image Co-ordinator? Briefly it's a panning control – simple? – well, not so simple. Panning is an effect whereby you apply a single mono sound source and derive two independent adaptations of that original sound, which together form the inputs to a stereo (or 2 x mono) amplifier. By varying the amplitude of these two adaptations, the stereo image they produce can be altered providing an apparently moving sound source. It is an effect used quite often in recording studios usually with modern rock and pop music. Commercial units are now available which produce the effect live, for stage work, but in the past panning has been predominantly a studio technique.

Not Only But Also

The ETI Stereo Image Co-ordinator produces the usual effect of panning using a manually turned pot, but added to this are the exclusive facilities of automatic control over the image produced. The use of these facilities obviously allows the musician to concentrate on the music rather than the equipment.

Control over the stereo image is provided by four methods:

Manual – a single pot positions the image wherever required.

Sweep – the image is swept from one channel to the other at a variable rate, automatically.

Automatic Trigger – the instant a note is played or sung the image is swept from one side to the other at a completely variable rate.

External – control is accorded by an externally applied voltage eg from a foot pedal.

The unit utilises the 1537A Voltage Controlled Attenuator which is a high quality (good enough for studio applications), recently introduced, integrated circuit for VCA use. All other active components used in the audio section of the circuit are high quality, low noise types which coupled with the considerations of careful PCB design should allow the builder to construct a device which is at home in the studio as well as in live stage work.

Any input signal within the range 10 mV to 10 V AC should successfully operate the device, although obviously the best signal to noise ratios will be obtained with the larger values of input signal.

The overall signal gain of the Image Co-ordinator is approximately 6 dB, which allows for a unity gain output signal when the level pot is at approximately three-quarters of its rotation.

Construction

The project consists of two printed circuit boards which together hold all components, switches, pots, etc apart from the nine LEDs.

Roughly speaking, the right hand board includes all components to the right hand side of the circuit diagram and similarly the left hand board includes all left side components. The left hand board also contains the power supply.

PCB mounting pots and switches are used throughout eliminating the use of flying leads, therefore cutting down the possibility of pickup in the audio section. Any jumpers or wires only carry DC control voltages or power and are, therefore, of no problem. There is one exception, however, and that is the connection between the Auto Trig output on the right hand board and the Auto Trig input on the left hand board. This should be screened lead taken neatly, either under or over the boards, keeping it away from the PSU section.

The right hand board is double sided while the left hand is single sided with jump leads. Neither are too difficult to construct, although it is worthwhile when building up the project to construct each stage separately, testing as you go along eg start with the PSU then the automatic trigger, then the

This box of tricks gives you the oportunity to try out what has up to now been an effect used predominately in the studoi. The stereo sound image can be controlled automatically or manually. You can position the image in one place and keep it there or continually sweep the image between channels . . .and more.

sweep, etc, etc. In this way any faults which develop can be traced to one particular area very quickly. Actually this constructional method is highly recommendable with any project! Test procedures are described in the section on Setting Up.

IC sockets are advisable though not necessary, likewise cermet presets, although more expensive, present easier setting up and a high quality than their cheaper carbon colleagues.

The signal switches which comprise SW1 a and b might be slightly difficult to get hold of so it is worthwhile taking your PCB along with you to make sure you get the right ones. If you can find transparent knobs for the switches then you may want to try to mount the LEDs behind them. Square LEDs work well in this application. Alternatively the LEDs can be panel mounted vertically above the switch front. If LED 1, a flashing LED with integral IC, cannot be obtained an ordinary can be used in its place – but replace ZD1 with a suitable limiting resistor eg. 560R.

The control marking LEDs should be positioned close to the corresponding controls in order that the user can clearly see which function is in use.

Finally use PCB pins for external connections so that when the two boards are fixed in their case side by side the nine links can be soldered into position along with input and output connections, without removing the boards.

Setting Up

After the PSU section is complete, it can be tested to make sure that the correct supply rails, +15 V, 0 V and −15 V are obtained.

The components around the automatic trigger should be inserted next (R1–9, C1–7, IC1 and 2, RV1–4 and D1–3). This can be tested by applying an AC signal of about 500 m V at its input on the left hand board while watching the voltage across C7. (All four pots should be mid-position). This voltage should increase from 0 V to about +12 volts then after a short time decrease back down to 0 V DC.

The sweep generator circuit can be built up next (R10–18, C8–14, IC and RV5–9) and tested. Set all pots and presets to mid-position. The DC output voltage at pin 7 of IC1 should be a low frequency near sine wave oscillation approximately 10 Vpk-pk (adjusted by RV8 and varying between 0 and +10 V DC (adjust by RV9). By altering RV6 and RV7 which control the charge and discharge rates of capacitor C9 (which in turn controls the overall frequency and shape) the best setting can be found whereby RV5 controls the frequency of the sine wave between approximately 0.1 Hz and 10 Hz. Fairly careful adjustment of these two presets is necessary and it is a distinct advantage if a scope is available with a slow time base so that the waveform can be studied for purest sine wave.

The manual control function circuitry is simple consisting of only two components RV11 and RV12. The DC voltage at the wiper of RV12 should vary between 0 and 10 V dependent on wiper position and is adjusted by RV11.

The external control circuit is equally as simple but an external pot is necessary in the shape of a foot pedal. RV10 adjusts for a wiper voltage of 0 to 10 V DC for different values of pot. Alternatively a control voltage of 0 to 10 V DC relative to chassis can be fed in from some external control circuit.

The control voltage phase splitter is next to be assembled and set up (R36–40, C27–30, IC5 and RV13,14). With a known input voltage of 0 to +10 V DC (derived best from the manual pot by pressing the manual switch and varying the pot) the voltage at pin 1 of IC5 should be 0 to +10 V DC the op amp

HOW IT WORKS

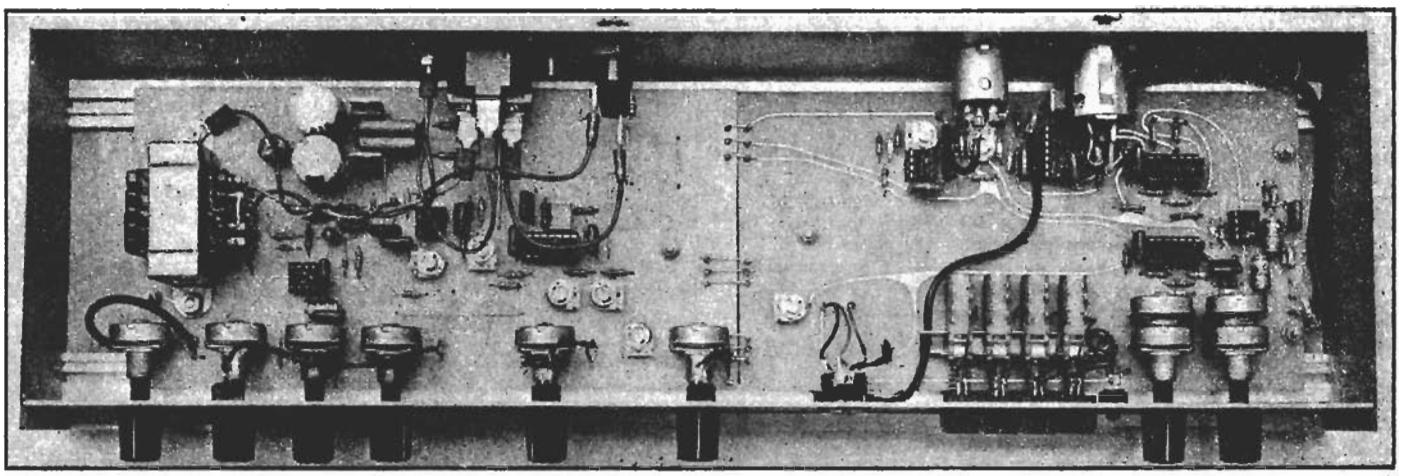
The main function of the unit is to create an impression of a stereo image from a single signal from a musical instrument. This is done by feeding the signal via IC4 (a quad op-amp) to 2 parallelled VCAs whose output amplitudes are controlled by an external control voltage. These VCAs form the output channels and are buffered by IC8a and b, providing drive for a stereo power amplifier. The stereo image is created simply by allowing the signal output from one channel to be greater than that from the other channel. The origin of the sound thus appears closer to the first side of the sound field than it does to the latter.

IC 5 provides phase split control voltages of 0 to −10 volts DC and −10 to 0 volts DC from a single input voltage of 0 to +10 volts DC. RV15 provides a depth control which simply limits the effect of the control voltages applied to the VCAs. IC5a inverts the DC control while IC5b also is a fairly high impedance buffer so as not to load the source.

SW1a gives selection of whichever source is required, there being three internal, sweep, manual and automatic trigger and one external method of controlling the stereo image. The corresponding LEDs are also switched in via SW1 allowing an indication of which function is in use at the switch and also at the function controls – see photographs. LED 1 is a special type of display. As this is in series with two other LEDs (2 and 6, 3 and 7, 4 and 8, or 5 and 9, dependent on SW1) then all three LEDs will flash on and off simultaneously.

External control of image is provided so that, for example a foot pedal can be used to control positioning of the applied signal within the stereo field. RV10 adjusts for various values of pots inside the pedal, although 100k lin is the nominal value.

RV12 acts as the manual pot in an identical fashion to an external control pedal pot but positioned on the front panel.



being a simple unity gain inverter. The output at pin 7 should be the same size pk to pk (adjusted by RV13) but 180° out of phase ie −10 to 0 DC (adjusted by RV14).

There is no further setting up to be undertaken so the rest of the circuit can be installed and testing of the whole job undertaken. ●

BUYLINES

The Aphex 1537A is available in Canada from Octopus Audio. Cost is $22.00 each, which includes postage and handling (Ontario residents add 7% PST). Send cheque or money order to: Octopus Audio, Suite 315, 69 Sherbourne St., Toronto, Ontario M5A 3A7.

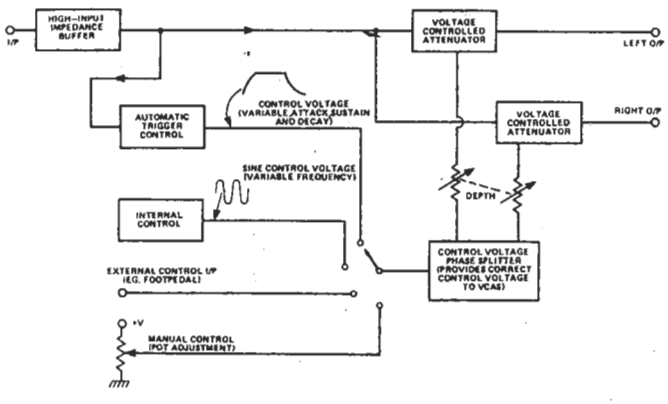


Fig. 1. Block diagram of the Stereo Image Co-ordinator.

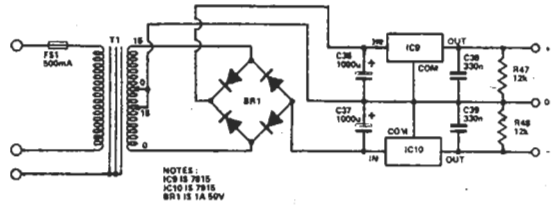


Fig. 2. Power supply producing +15,0,-15 volts output.

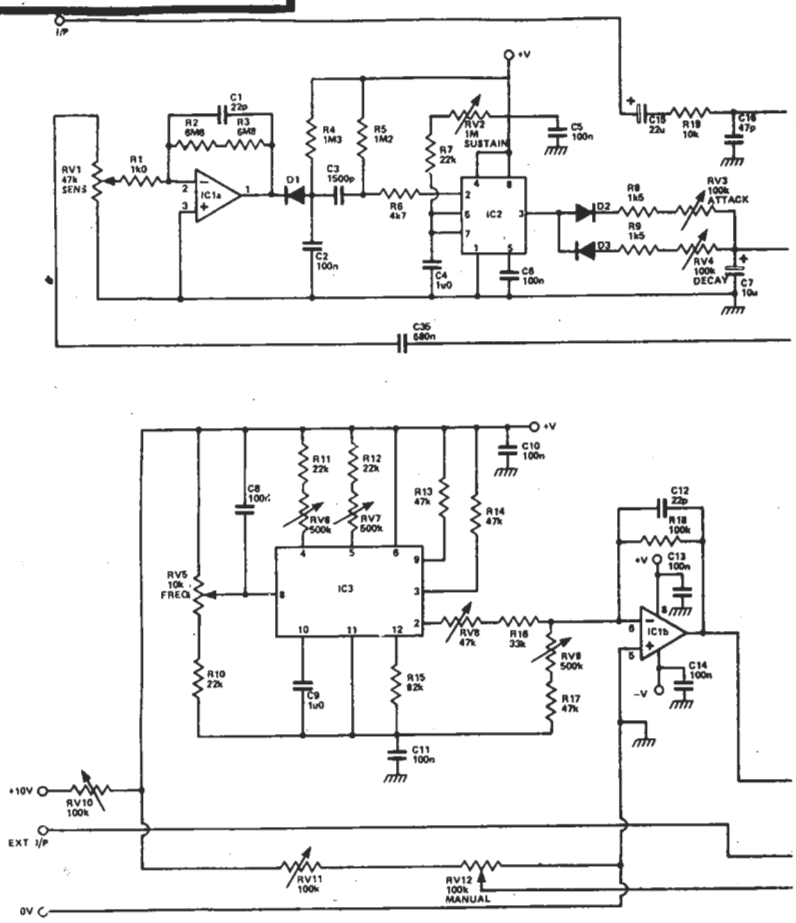


Fig. 3. Circuit diagram. Note the orientation of LEDs connected to signal switch SW1.

PARTS LIST

RESISTORS
All ¼W, 5%

R1	1k0
R2,3,	6M8
R4,5	1M2
R6,20,32, 35,43,45	4k7
R7,10,11, 12,25	22k
R8,9,	1k5
R13,14, 17,24,39	47k
R15	82k
R16	33k
R18,36, 37,40	100k
R19,20,21, 31,33,44, 46	10k
R22,23,26, 27,28,29, 41,42	3k3
R34	220R
R38	68k
R47,48	12k

POTENTIOMETERS

RV1	47k log PCB mounting pot
RV2	1M0 lin PCB mounting pot
RV3,4,12	100k lin PCB mounting pot
RV5	10k lin PCB mounting pot
RV6,7,9	500k min horiz cermet preset
RV8,13	47k min horiz cermet preset
RV10,11	100k min horiz cermet preset
RV14	220k min horiz cermet preset
RV15	100k lin dual PCB mounting pot
RV16	47k log dual PCB mounting pot

CAPACITORS

C1,12,17,24, 27,30,33	22p polystyrene
C2,5,6,8, 10,11,13,14, 18,19,20,21, 23,25,28,29, 31	100n polyester
C3	1500p polystyrene
C4,9,26,34	1u0 25V electrolytic
C7	10u 16V electrolytic
C15	22u 25V electrolytic
C16,22,32	47p polystyrene
C35	680n polycarbonate
C36,37	1000u 25V PCB electrolytic
C38,39	330n polyester

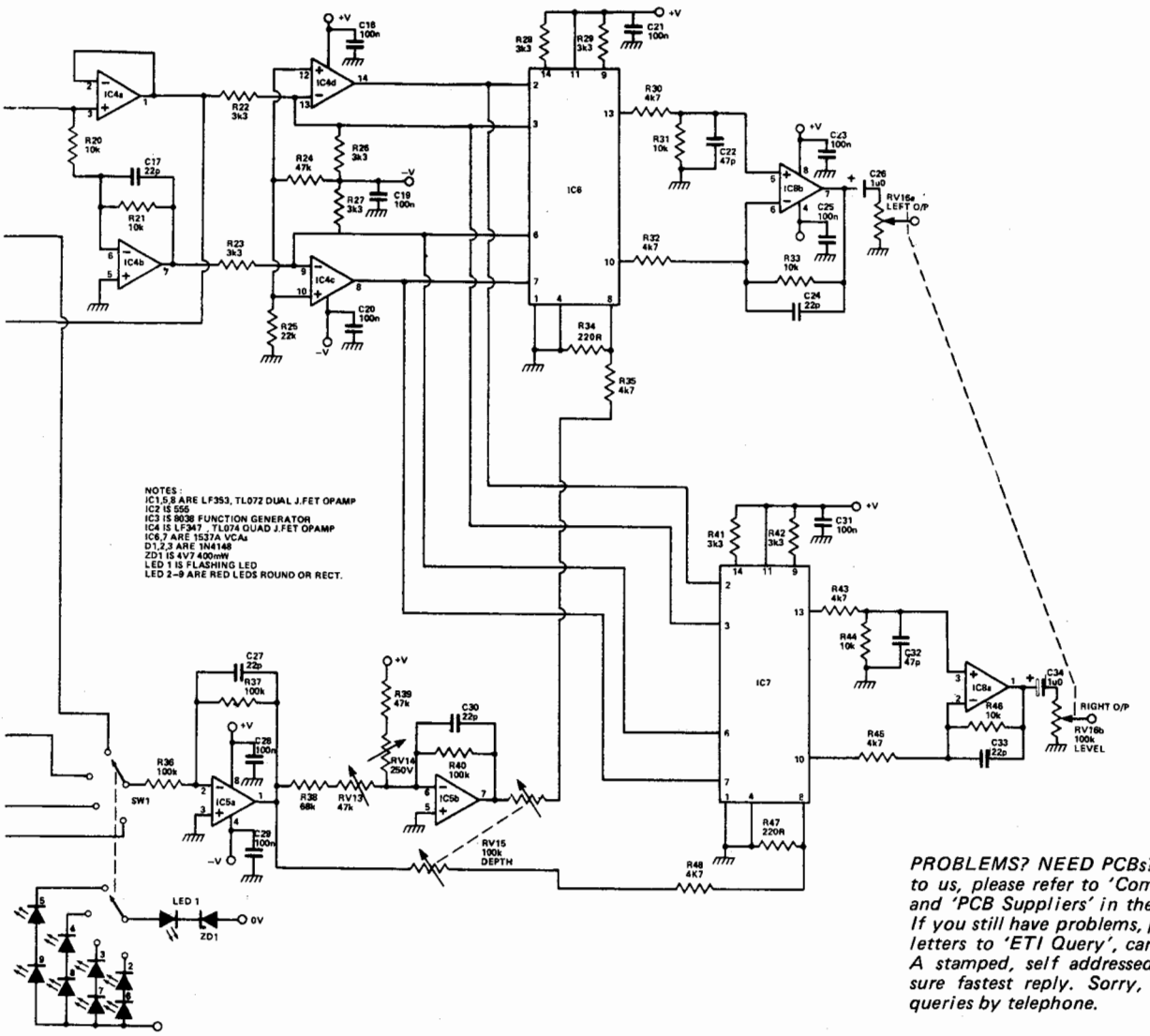
SEMICONDUCTORS

IC1,5,8	LF353, TL072 etc dual op amp
IC2	555
IC3	8038
IC4	LF347, TL074 etc quad op amp
IC6,7	1537A (Aphex)
IC9	7815
IC10	7915
ZD1	5V1 zener 400mW
LED 1	Flashing red LED Litronix FRL4403 or sim.
LED 2–9	Red LED
D1–3	1N4148

MISCELLANEOUS

SW1	4 station interlocking DPDT push button switch with lockout. Switchcraft No. 90044B06.
T1	15-0-15 6VA transformer
FS1	500mA fuse + panel mounting holder

Case, sockets, line cord etc.



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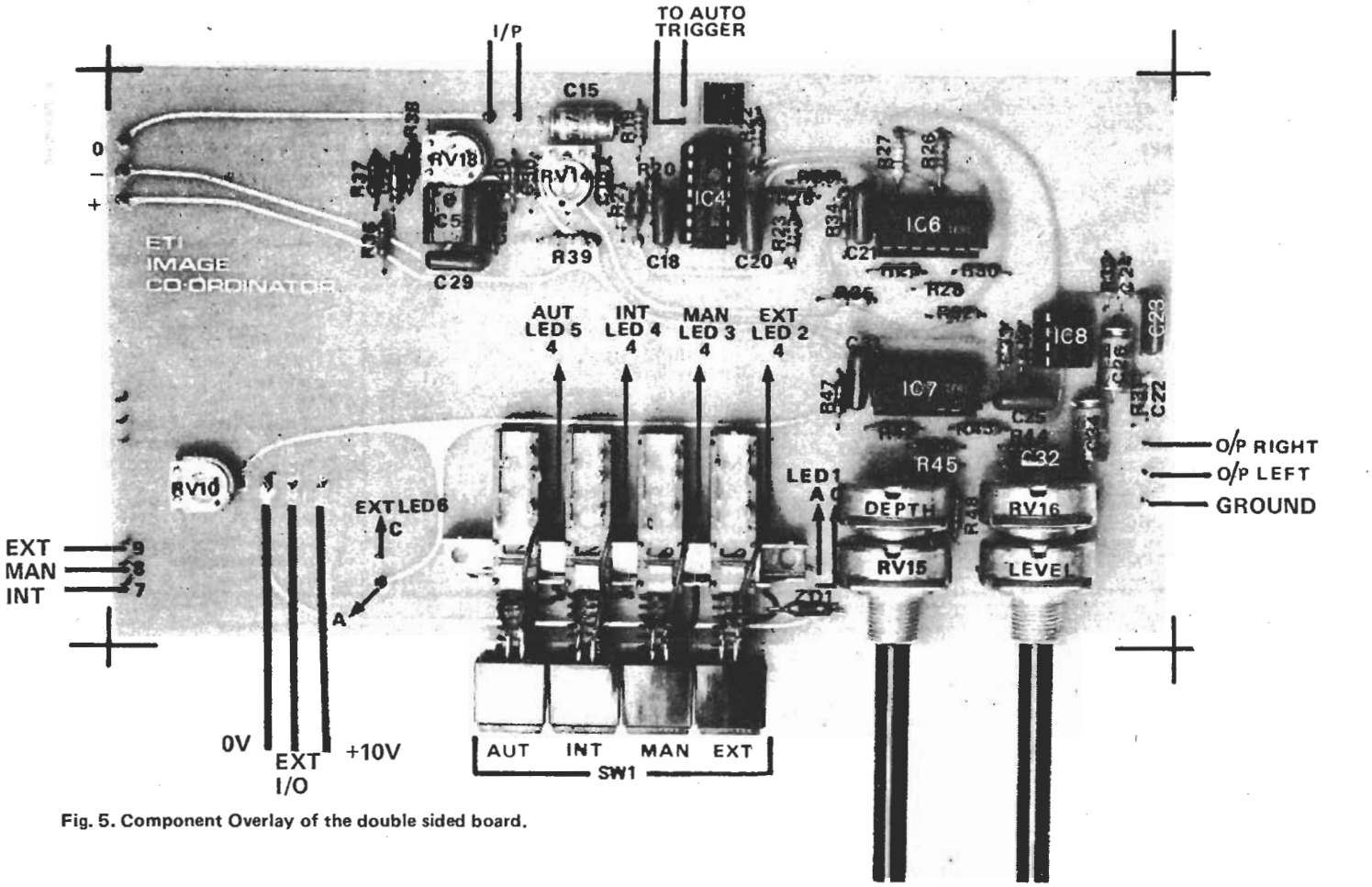


Fig. 5. Component Overlay of the double sided board.

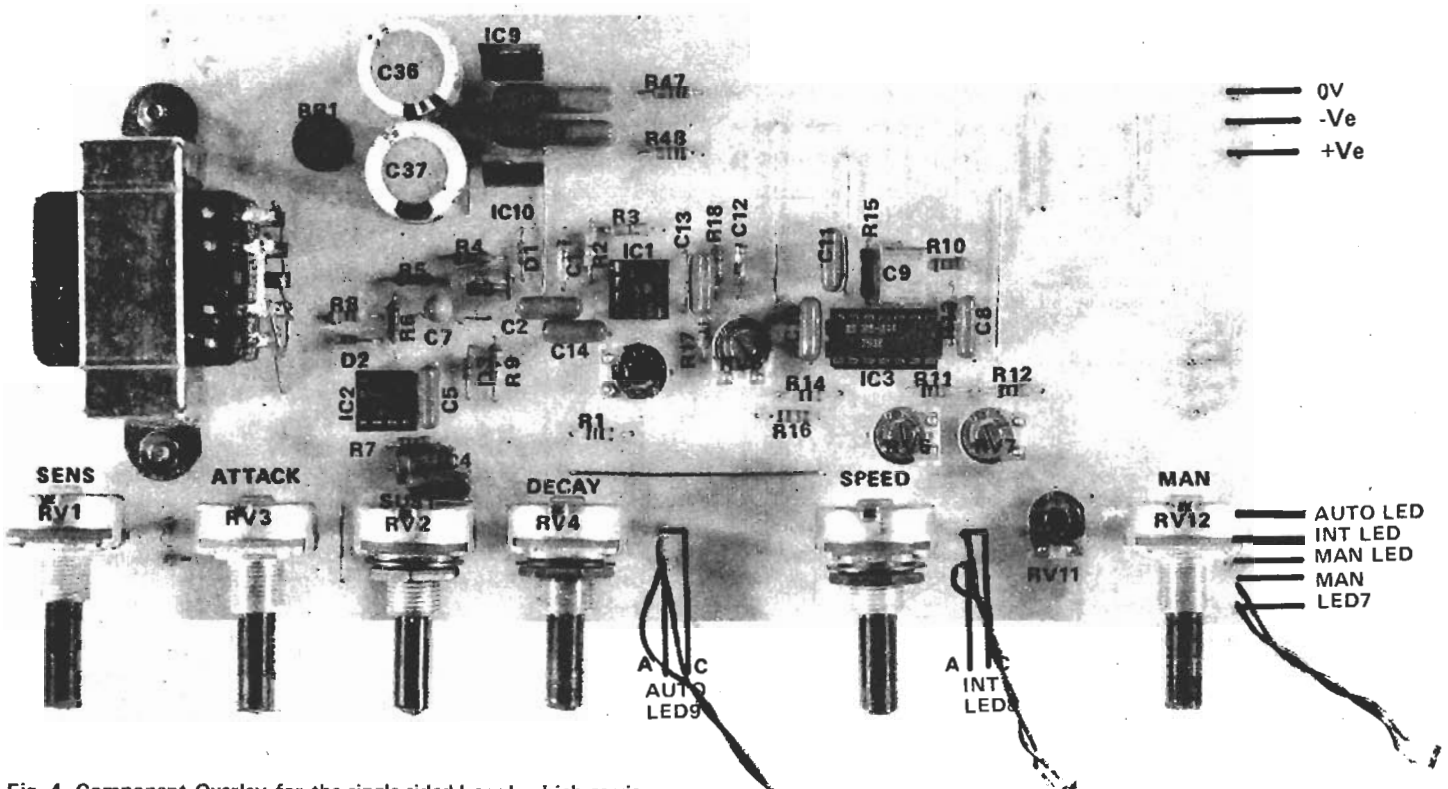
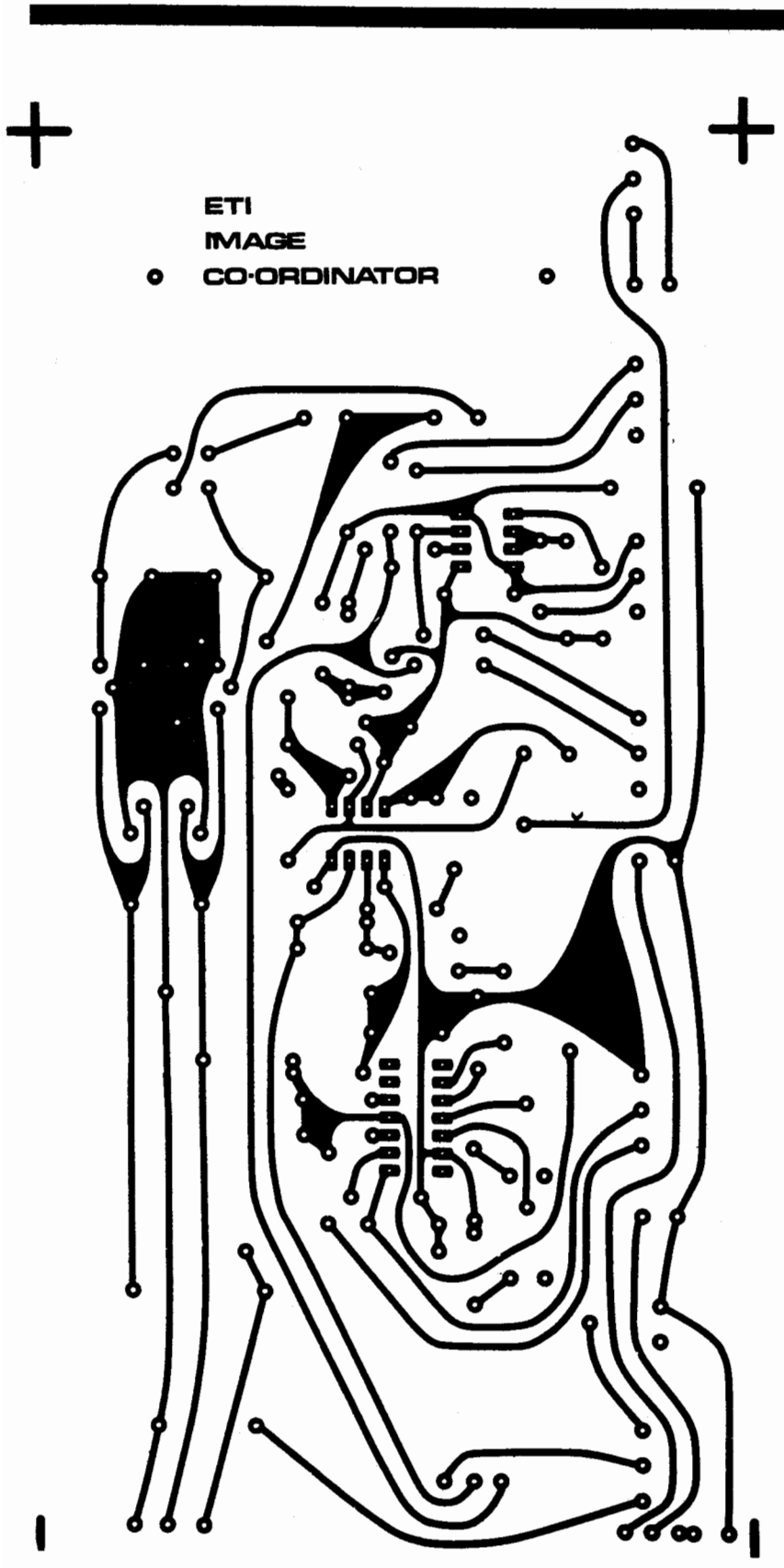
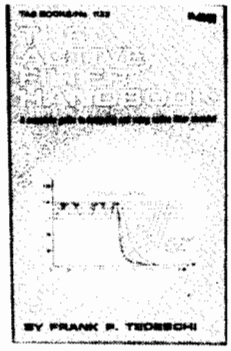


Fig. 4. Component Overlay for the single sided board, which carries the power supply.



AUDIOPHILES! SYNTH NUTS!



No electronic enthusiast should be without one! The Active Filter Handbook discusses all types of filters. The author starts with two fundamental filter types, Butterworth and Chebyshev, and explains all definitions, concepts and fundamentals. Unlike others, this book does not ignore mathematics, but rather shows the derivation of all design equation.

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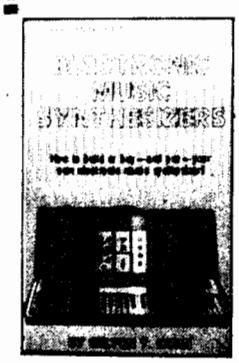
NEW!



Get started in the expanding field of electronic music. Electronic Music Synthsizers is the ideal starter book for people interested in making novel sounds electronically.

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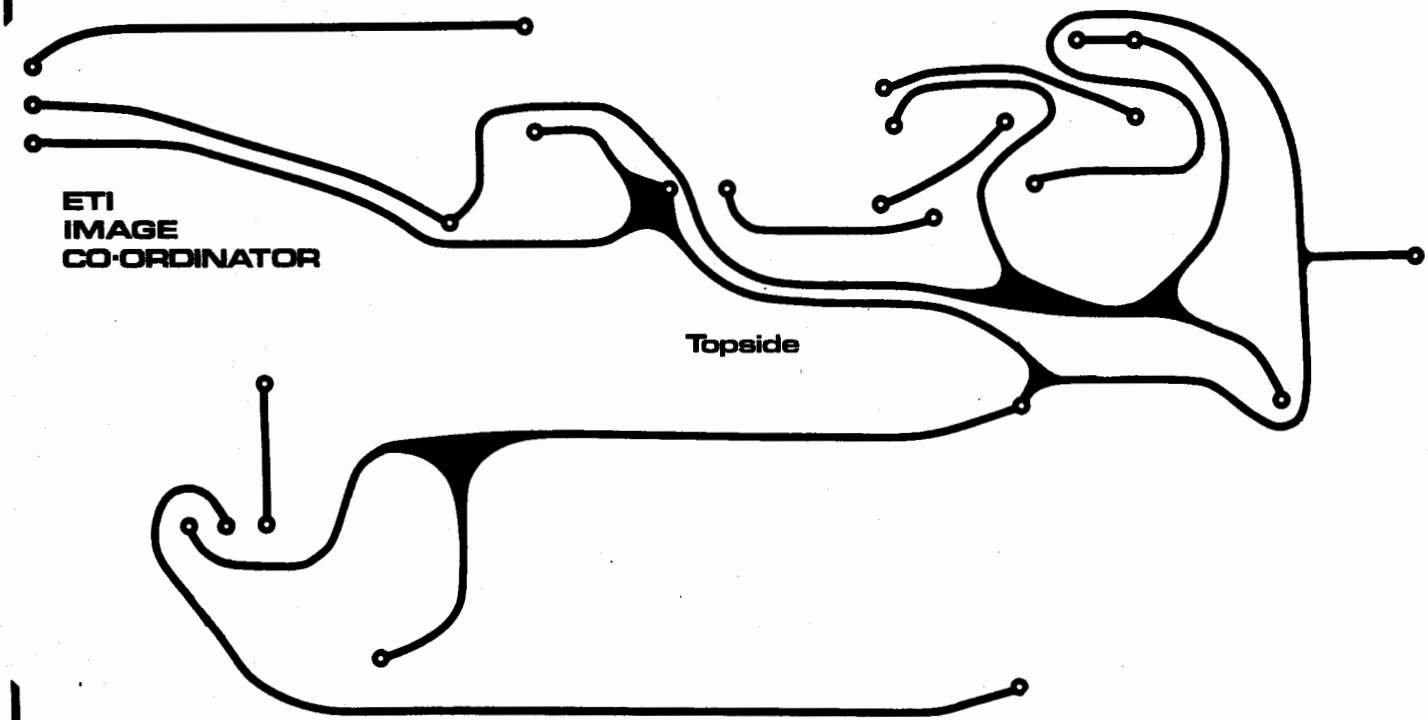
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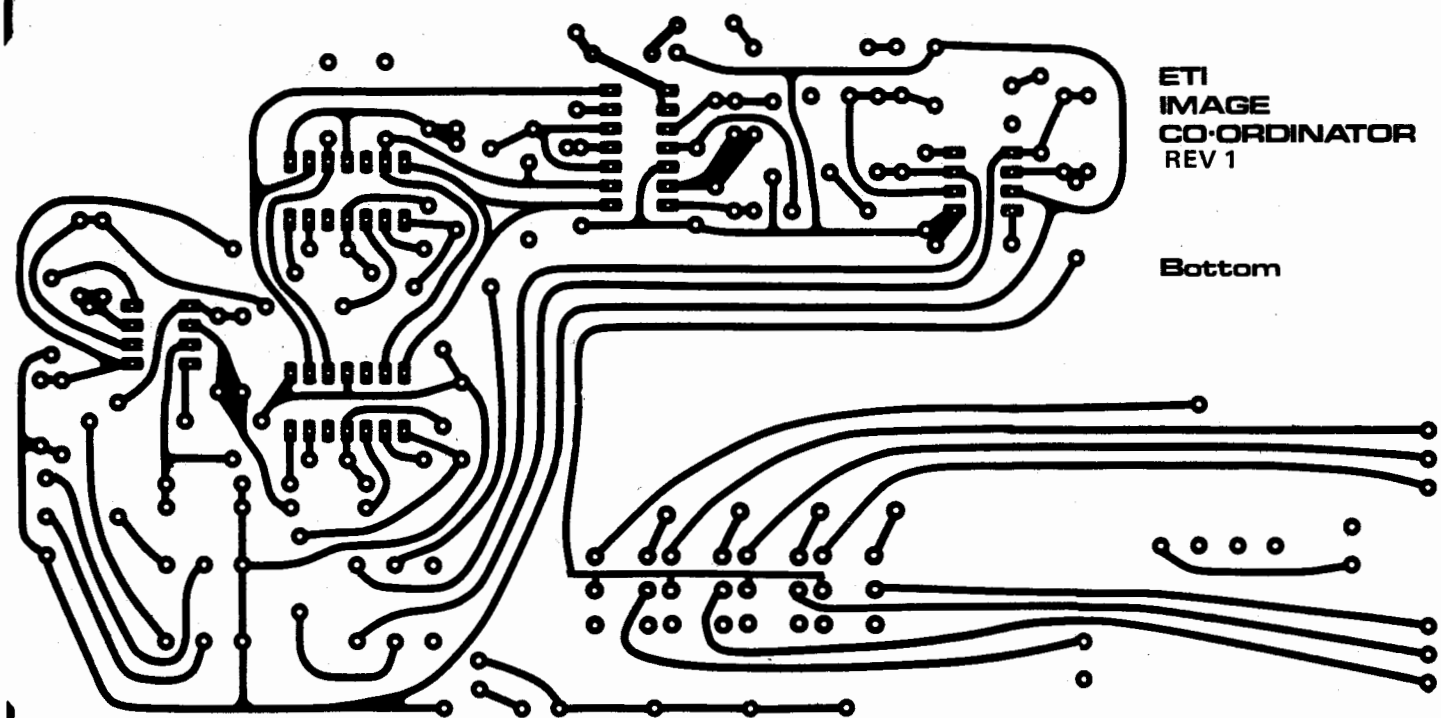
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