

# Modulus

The Quarterly Newsletter for Synth DIY

Well, Edition 4 and still going strong. We have an article this month from a newcomer to the distribution list, James Richardson. We also have a Utility module which will provide some useful features, often neglected on modern synths and finally some good news, Modulus now has a web page with current issues and back issues on as well, hopefully by the time you receive this edition 1 of modulus will also be on the page. The address is, and it's a long one;

[Http://www.geocities.com/siliconvalley/park/2707/](http://www.geocities.com/siliconvalley/park/2707/)

If anyone has any suggestions for new modules and/or improvements or even additions to the web page, let me know. I would like all of the readers of this newsletter to consider the page theirs, not just mine, you have all put effort into some part of this newsletter and I would like to thank you all, Thanks.

And finally, before James's article I would like to apologise for the late arrival of this newsletter, I've had a few personal problems, which now seem to be OK by the way, and Modulus had to take a back seat for a while. But it's back and will keep going for as long as I can keep it going. I still have a dream of turning this into a small business selling kits of these modules, maybe one day.

OK, it's time for James Richardson's article, anyone wishing to submit an article can do so by emailing me it (in Ascii Text) or snail mailing it to me. James's article is a brief appraisal and quick review of the Doepfer system.

# DOEPFER A-100 MODULAR SYSTEM

The purpose of this article is to give some pointers to those who may be thinking of integrating A-100 modules into an existing system, or using an A-100 system as a starting point for a larger modular set-up.

I am not going to give a blow-by-blow account of the various modules for the simple reason that Sean Coppinger (aka ANALOGUEMAN) has already done an excellent job with the series of reviews which he posted to the Analogue Heaven mailing list and which are still to be found in the AH Archive at:

[www.hyperreal.com:80/music/machines/Analogue-Heaven/](http://www.hyperreal.com:80/music/machines/Analogue-Heaven/)

For the totally uninitiated, however, the A-100 is a compact new modular system designed by long-established German synth designer Dieter Doepfer and manufactured by his company Doepfer Musikelektronik GmbH, Geigerstr. 13, 82166 Grafelfing, Germany, tel. 089-89809510, fax. 089-89809511 (use the appropriate international codes outside Germany of course).

At present, about 42 modules are available including two types of VCO (one using a CEM3340 and the other using standard components), four types of VCF (three using the CEM3320 and the fourth using a Moog-style transistor ladder), three types of LFO, various noise sources including a digital noise source with "Roland TR808 sound generator", and an extensive complement of amplifiers, mixers, envelope generators and modifiers.

## PACKAGING

The system is designed around a standard 19 inch frame. All modules are 3U high and come in a variety of widths measured in HP units (1HP=1/5"=5.08mm). A 19 inch rack is 84HP wide. Most modules range between 8HP and 12HP in width. It will be appreciated, therefore, that the system is very compact. This is achieved in part by very efficient PCB design with pots and jack sockets attached directly to the PCB and with the front plate held in place by the pots and sockets.

The standard rack supplied by Doepfer is 2 x 3U and therefore accommodates two rows of modules. All modules terminate in a 14-core flat cable and a 14-pin DIL plug. These connect to a bus which consists of a 19 inch PCB with several 14-pin DIL sockets mounted on it.

The majority of modules operate on a +/-12V supply. A couple of modules (the MIDI/CV/SYNC interface and the MIDI/CV/Shepard Generator) also require a +5V supply. The bus also carries an internal gate and control voltage signal.

The back plate of the frame accommodates a compact +/-12V power supply, and a separate 5V supply if required. A low- cost alternative to the 5V supply is a 5V adapter which plugs into a free socket on the bus board.

The rack supplied by Doepfer appears to be very similar to the 19 inch sub-racks manufactures by Rittal and Vero which can be found in the Farnell and RS catalogues. Farnell also supply low profile power supplies ( at p. 882 of the current catalogue) which could be adapted for use in a home-brew rack.

#### INTERFACING

All sockets are 3.5mm jack sockets. The oscillators operate on the 1V/octave standard. Gate signal is +5V.

#### MANUAL

Each module comes with a hole-punched set of instructions which fit into a ring-binder which is supplied with the rack and is also available separately. At present the manual is only available in German, but Peter Forrest (author of "A-Z of Analogue Synthesisers") is working on a translation. Most modules can be readily understood without the written instructions in any event.

#### PRICES AND AVAILABILITY

One of the main advantages of the Doepfer system over some alternatives (eg. the Moog reissue) is that it is actually available here and now.

The German prices are extremely competitive. The system is distributed in the UK by Future Age Music Express ("FAME"), tel. 0181-889 0616. Unfortunately, FAME's mark-up transforms Doepfer's competitive pricing into Serge-like prices. For example, the A-120 Moog-style filter costs 120DM (about £50) if bought direct from Doepfer. FAME charge £100....

Seemingly, part of Doepfer's distributorship deal with FAME is that FAME has the exclusive right to sell the system in the UK. This means that Doepfer will not supply direct to a UK address. However, Doepfer will correspond with and take orders from UK customers as long as the delivery address is outside the UK. Obviously, this involves the hassle of foreign money orders and finding a friend who is willing to help in Germany. Nevertheless, the fact that we are all in the Common Market means that there is no extra VAT or import duties, and even with the larger carriage cost the savings can be considerable. Basically, a two rack system which would cost about £4,000 from FAME will come in at about £2,500 if bought direct from Doepfer!

JAMES RICHARDSON  
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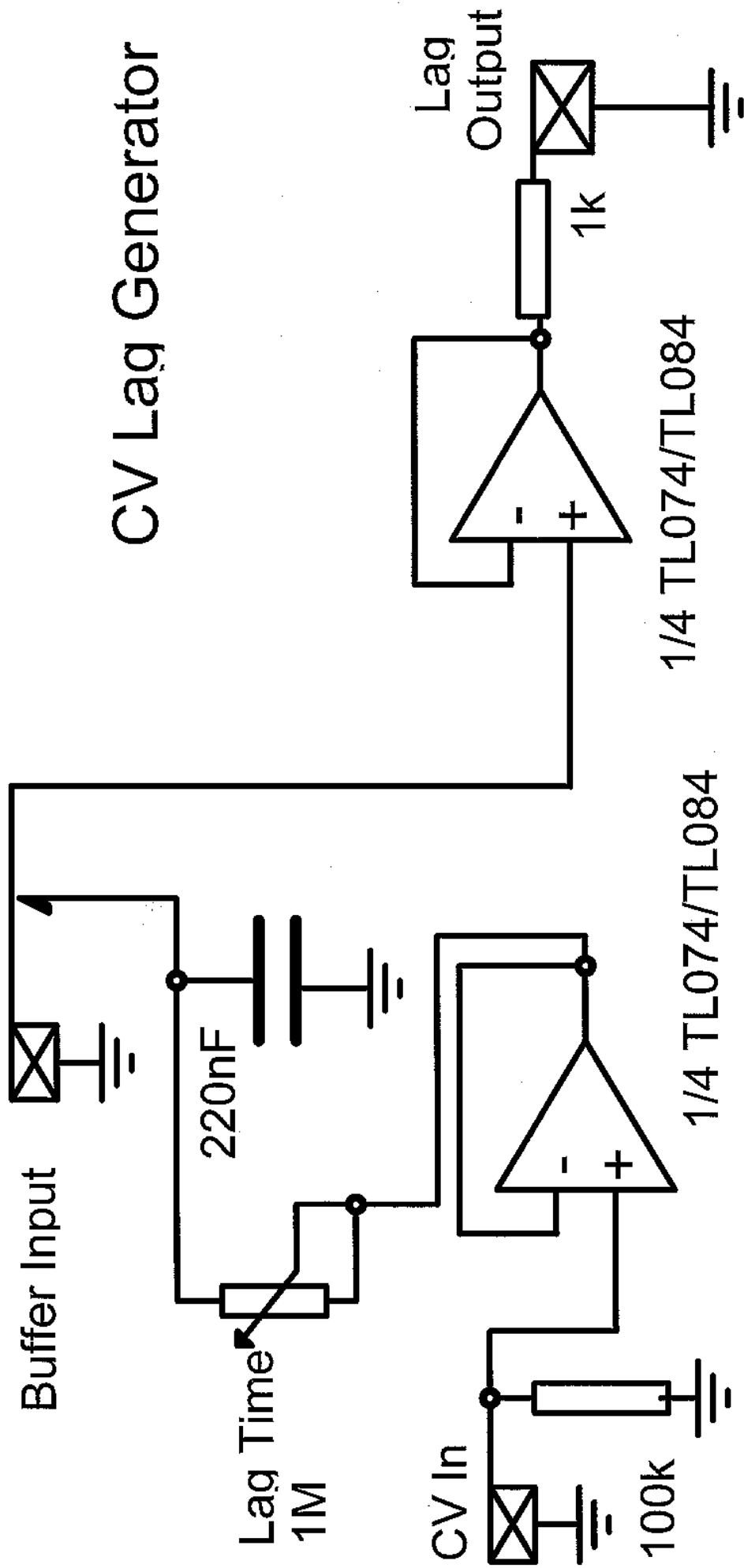
James also informed me that recently EMIS of Bristol now stocks the system and it will be on sale for around £1500 for the basic system, EMIS are on 01179 561855.

Again, Thankyou James, anyone else wishing to submit an article is more than welcome to do so, simply email me, and Ill do the rest, please send it as a text file this makes importing it much much easier..

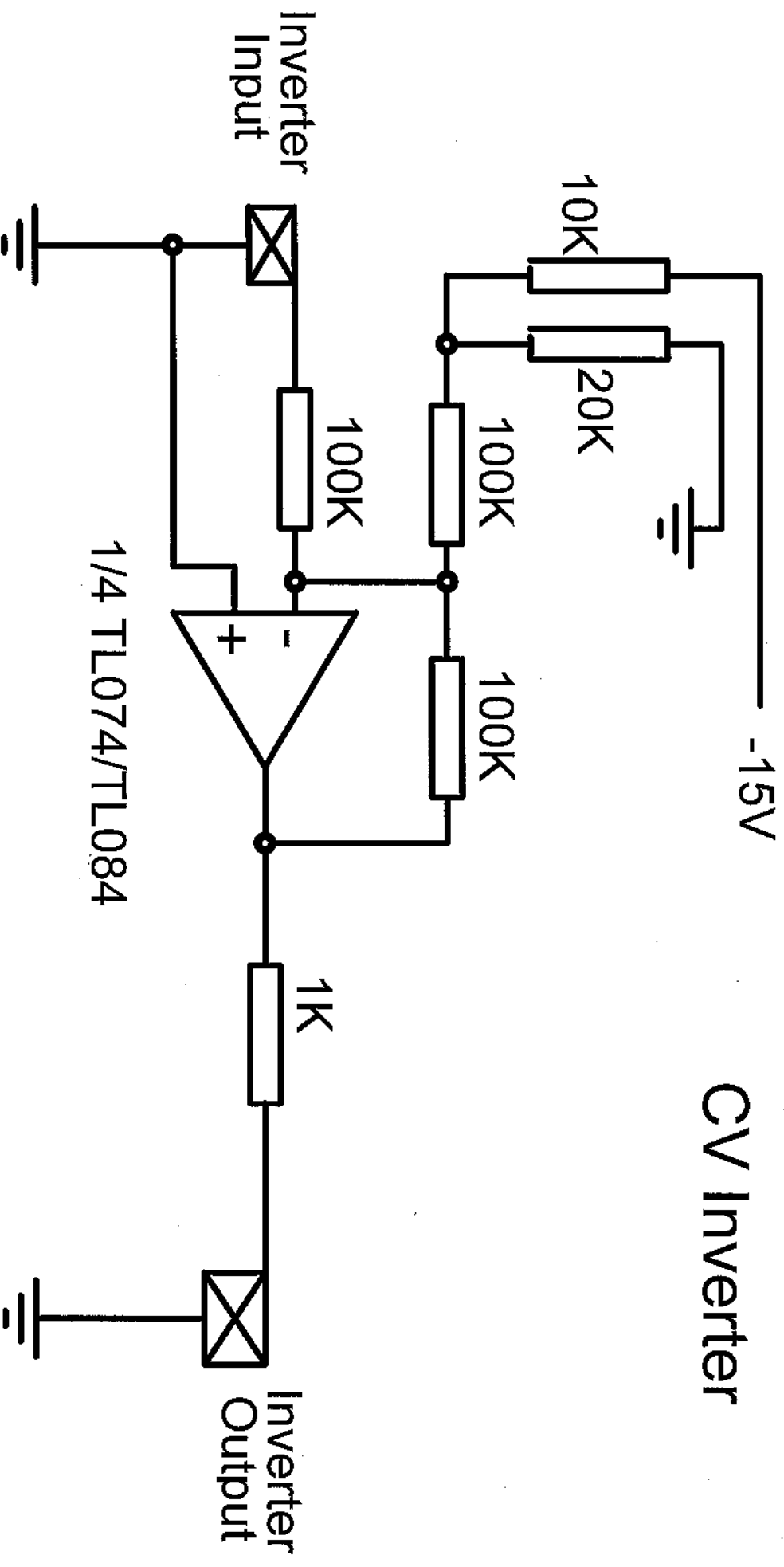
Ok next up, the Utility module designed by Chris Crosskey, It includes a PCB foil, component layout and also a Schematic to go with it. Again, it uses commonly available parts and as with most of Chris's PCBs you have the ability to mount many different sizes of capacitor and variable resistors.

So take it away Chris.

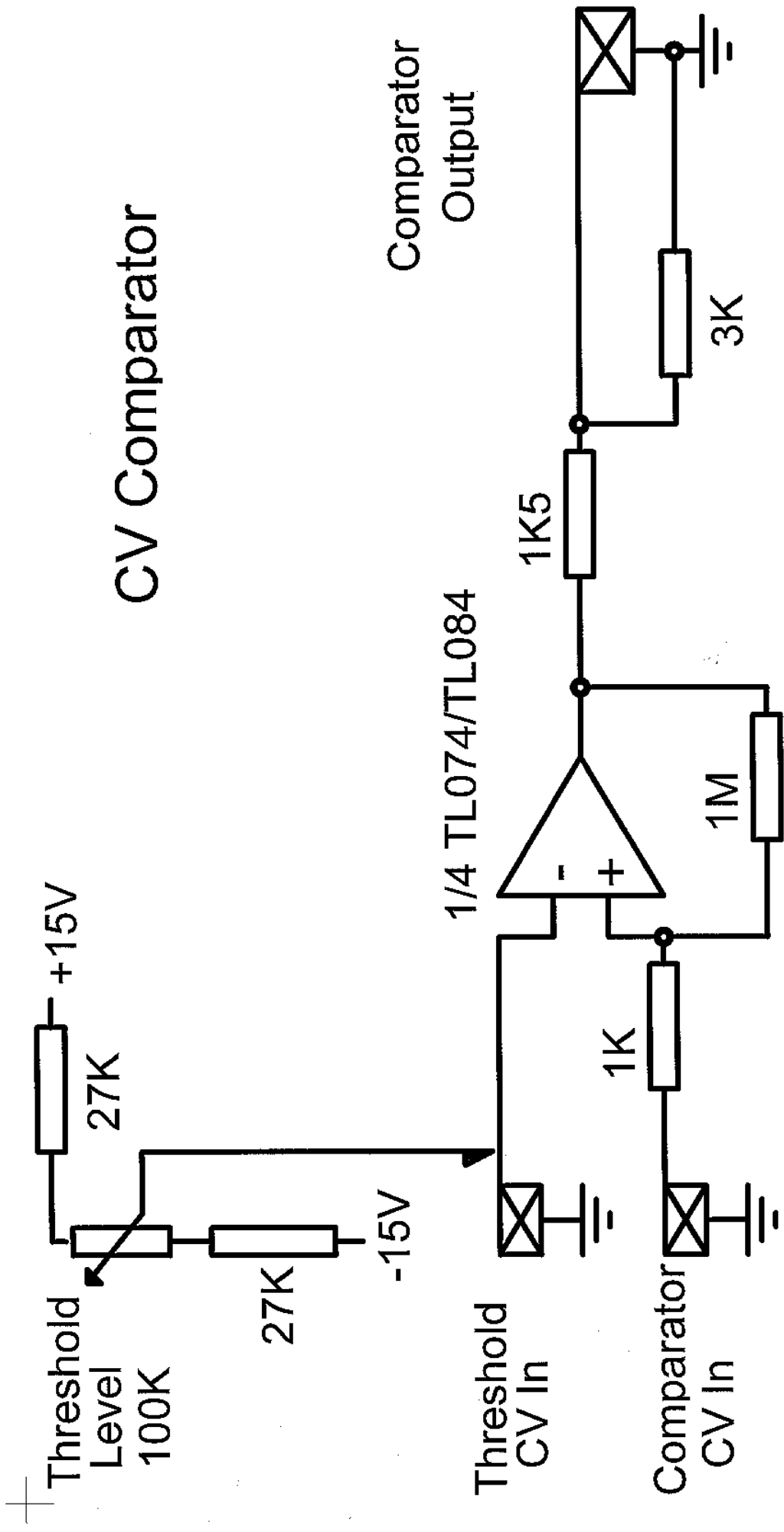
# CV Lag Generator

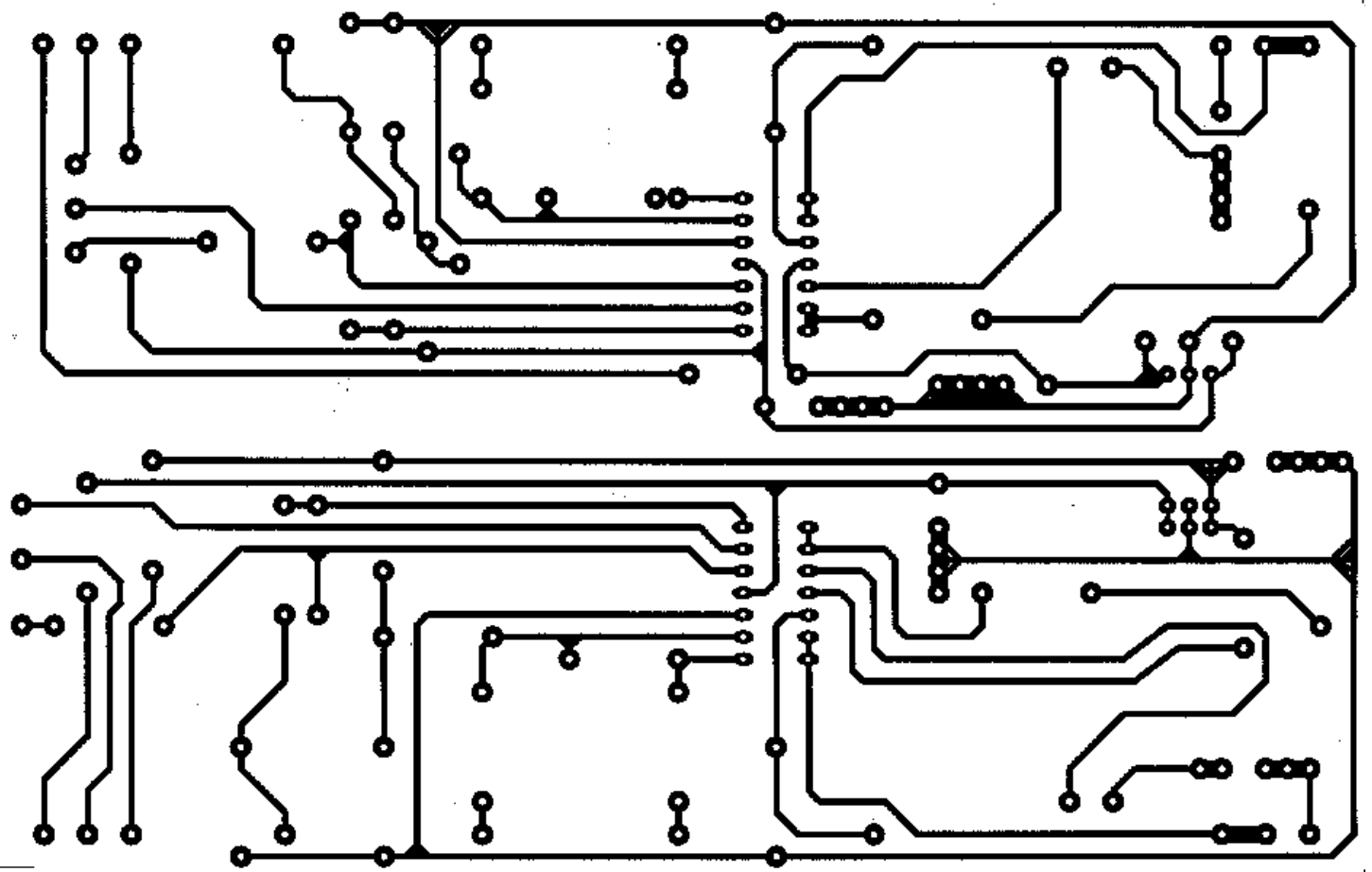
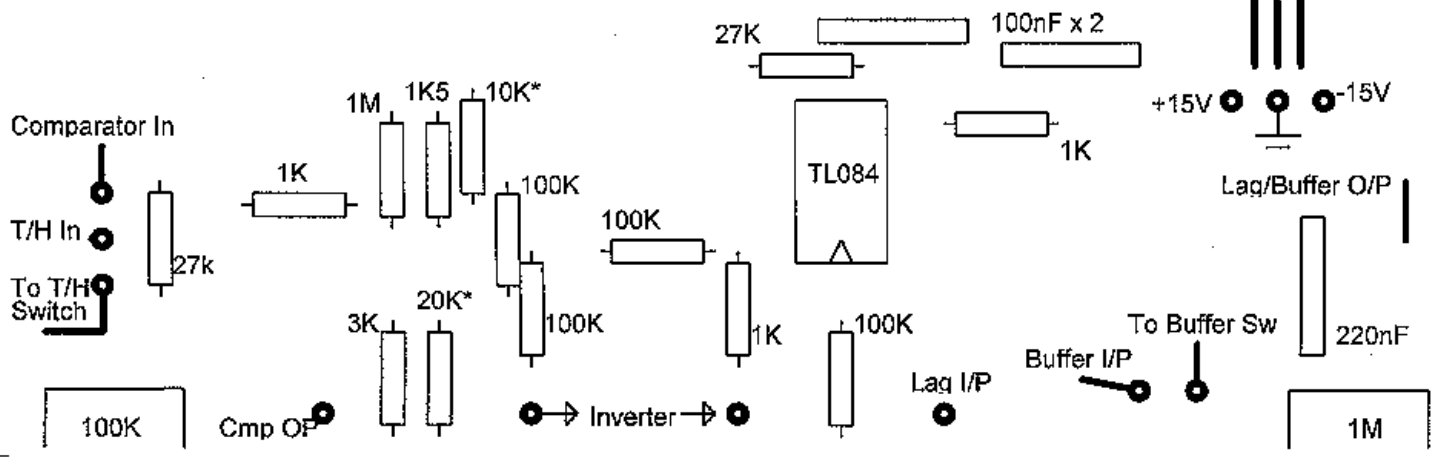
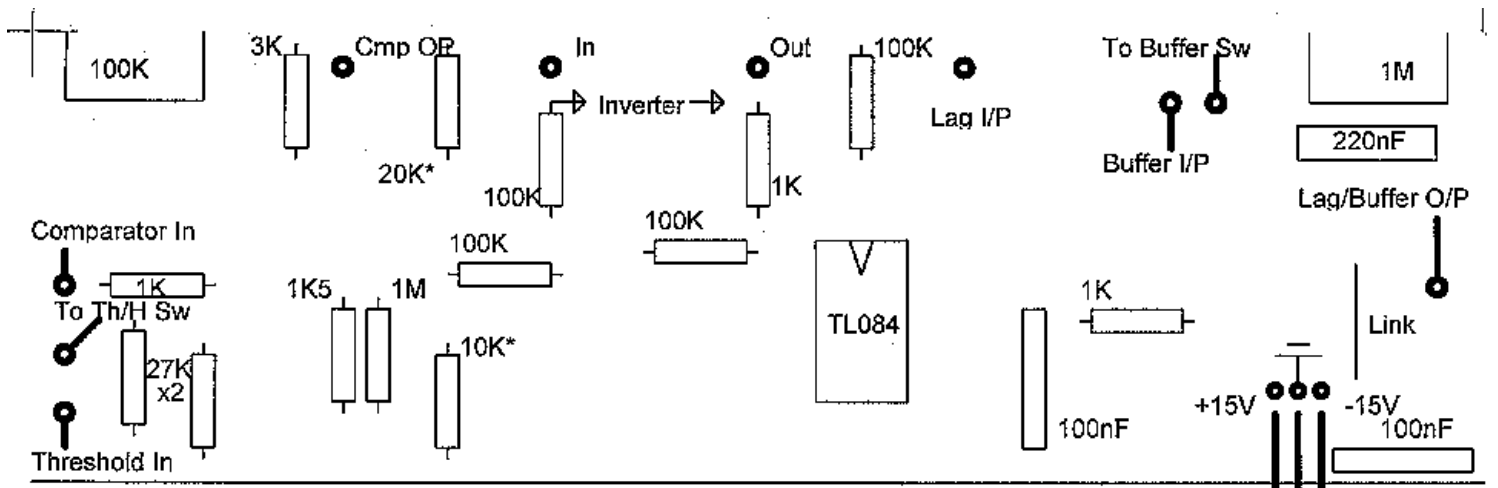


# CV Inverter



# CV Comparator







## The Utility Module:

Up there with the Multi-jack field in terms of boringness, but rather more importantly up there with the multi-jack field in terms of usefulness, the Utility module is one of the items to be found on any self respecting modular system. They have different names and some have different functions to others, but a set of basic control voltage manipulators are invaluable to the modular synthesist. There will be two different Utility modules eventually, and the other one will be even more boring and worthy than this one.

On to the spec, basically the Utility has four functions on a board and two boards on a module, making a total of eight separate functions available. There are two of each:

Voltage Comparator, a CV in, Gate out module that compares the CV input to a Threshold level (either another CV or a panel control) and if the Input is higher than the Threshold it outputs a Gate signal. The Gate Voltage level may be changed during the construction of the module to suit different positive gate standards;

CV Inverter, takes a 0-10V CV and turns it into a 10-0V one. Output range can also be customised during construction;

Lag Generator/Buffer. A combined module, the first stage provides a lag generator to slow down gates and CV's, may be combined with the Comparator to function as a Gate Delay if desired. Due to the need to keep the timing capacitor isolated within a high impedance circuit there is a buffer stage at the end of it, and this buffer may be used purely to reinforce the drive of a CV that is being split into many inputs. If the buffer is used in this way the Lag Generator is inoperative.

The circuitry is based on the kinds of circuits to be found in any text on op-amps, and is fairly self explanatory. However a short description of each circuit is a good idea, and also offers an opportunity to explain various modifications that may be made if so desired.

The comparator functions by comparing the voltage applied to the non-inverting input of the op-amp against a voltage derived, either from the Threshold CV Input, or from the 100K panel control, applied to the inverting input of the op-amp. If the Input is higher than the Threshold then the output will drive high, and the divider chain formed by the 3K and 1K5 resistors will ensure that the output is held to a maximum of 5V.

The 27K resistors connected in-line with the potentiometer clamp its voltage to the range of +/-10V which should be adequate in most situations, however they may be replaced with links if +/-15V operation is desired, or 200K resistors if +/-5V is required. Likewise the 1K5 resistor may be replaced by a link and the 3K resistor removed if a +15V gate is desired at the output.

The CV Inverter is basically an inverting voltage summer that adds the CV input to a fixed -10V generated via the 20K/10K divider chain and inverts the result, thereby turning a 0-10V input into a 10-0V output. If it is so desired the 20K/10K chain may be replaced by a 3K/1K5, saving on the necessity to buy two types of metalfilm resistors.

The lag generator functions by using the CV Input, to charge a 220nF capacitor via the 1M potentiometer. In order to isolate the capacitor, which should be a good quality polyester or better, it is buffered on both sides by op-amp stages. As the second amp functions purely as a voltage follower, it is made available as a stand-alone buffer by sending the output of the capacitor to the switched input of a socket, which then goes into the second buffer stage. Care must be taken to keep the wires used to connect the socket to the PCB as short as possible as such systems are noted for being prone to noise pickup.

The PSU entry to the module may be made to either side, and a .1" option is offered along with a .2" one, the two boards can be bridged together to save on PSU leads, and both boards have a 100nF decoupling cap for each rail, although as usual, any builders favourite decoupler will do here, and the layout will support .2", .3", .4", and .5" pitch capacitors for both the decoupling caps and the lag generator cap. The spacing of the panel controls is in line with the common panel design from issue three of Modulus, the comparator inputs occupy the top row of four holes (two on each side), with the lag buffer output in the bottom row. All other ins, outs and controls should line up with holes down the sides of the panel.

Well, there you have it... Yet another edition of modulus and yet another module towards your synth.

Finally I slight re-lay of the VCO PCB, for those of you who have the MK2 of this PCB then it will still work ok, This just has a minor correction for the position of the tempco resistor. nothing major... SO you will find this attached aswell..

Ok, and finally... Modulus now has a web page.. yes indeed, for those of you on the net you will be able to get back issues and current issues. Anyone who is on the net I would appreciate it if you would let me know and if you could download the acrobat file and use that instead of the paper copy, this will save my postal bill and enable others who aren't on the net to receive this newsletter. Please could you let me know asap, and modulus 5 will be out in the next 3 months... A Midi to CV converter is the next planned module and with any luck a VCF/VCA combination aswell..

Again, anyone with an article can email me at;

space\_banana@hotmail.com

Yours

Paul Maddox

