

Modulus

The Quarterly Newsletter for Synth DIY

Well, here it is again. The second edition of this newsletter, I would like to issue a plea again to anyone who reads this to submit an article for this newsletter, without your help, it'll simply die.

This month we have two articles, One is an article about British synthesizers and where they've all gone, and why. Its written by David Peachey one of our readers, so guys (Gals) It can be done.

The second article is another VCO design. I get sent this and I've mailed the creator of it asking his permission to print it in this newsletter and he's agreed and he's also on the list. His name is Gene Stopp, I suspect many of you would have come across his name in more than a few places on the internet.

The VCO is from his ASM-1 Synth, It has heat compensation runs of +/- 15V and give saw/pulse outputs. It is 1V/oct and as such I feel that if someone out there has the ability too It would make a nice PCB suitable for replacing the Digisound VCO module (some to that most modular VCO modules). There is more from this kind and generous man to come (VCF/EG).

What I would Like to happen in the future is for some of these modules to have PCB's designed for them and to have Kits available in a sort of catalog. Who knows maybe even trade as Modulus, could it be the next Digisound kits? I personally would love it to happen, I would also make it known that all the designs are from a group of people, and even try to get the group on this list involved with the running of such a company. But we all have pipe dreams.. sigh.

Well, Enough of my waffle. Its someone else's turn now, so heres Davids article, Enjoy.

A British Analogue Modular Synthesizer

An Article by David Peachey

How old are you? Actually, it doesn't really matter how old you are; what I really meant was "How long have you been interested in analogue synthesizers?" Do you, for example, know how many home-grown British synthesizers there have been?

We've all, I'm sure, heard of the big American companies of yesteryear like Moog, ARP, Oberheim, Sequential Circuits, Serge and many others too numerous to mention (and anyway, I don't know all of them). We've also heard of the big Japanese favourites like Roland and Yamaha amongst others. But how many British synthesizer manufacturers can you name?

For example, what about EMS (VCS3, Synthi AKS, Synthi 100 and many more), EDP (the Wasp), the Oxford Synthesizer Company (the OSCar) and Octave (the Kitten and the Kat), not forgetting Cheetah (MS6 and mother keyboards). Then, of course, there were the hobbyist kits produced by various electronics magazines like Practical Electronics (Minisonic), Electronics Today International (Transcendent 2000 and Polysynth), Maplin (3600, 4600 and 5600), Electronics and Music Maker (Spectrum).

If you're keen on synthesizers and you read the right press (or you subscribe to the Analogue Heaven mailing list on the Internet) then you'll have seen mention of most of these British synthesizers. You may also notice that some of them change hands for quite a lot of money (although, because our American colleagues haven't heard of most of them, they're still relatively affordable!). "So what", I hear you cry, "but what has this all got to do with British analogue modular synthesizers?" Well, there is one name I haven't yet mentioned, one which seems to reside in that awkward half-way house between the commercially produced synthesizer and the hobbyist kit. Furthermore, it's the only British fully modular synthesizer design - I am talking, of course, about Digisound. "Who", you may well ask, "are Digisound?". Well, listen very carefully, I will say this only once (but without the very bad French accent).

Digisound was a company set up by Charles Blakey in the late 1970s and run as a family concern based in Blackpool, England. He was primarily responsible for the design of a number of synthesizer modules which appeared in the electronics magazine ETI from February 1980 and into early 1981. From about June 1981, the then newly formed magazine Electronics & Music Maker (which became "E&MM", then "Music Technology", then "MT" and is currently "The Mix") took over the publishing of articles on the new modules as they came out (although ETI did publish one or two others up until mid 1985).

Some time in the mid 1980's, however, Charles Blakey died and the company eventually stopped producing the kits. Then, in about 1987/8, Tim Higham in Wimbledon, South London, took over the rights, production and distribution of Digisound. By the early 1990s his range of modules had expanded somewhat from the range he took over. But, then he suddenly stopped producing the kits and disappeared from the public gaze.

No-one seems to have a definitive answer as to why this happened although it was suggested that it might have been because the various CEM chips couldn't be sourced in the (comparatively) small quantities required for the business. Other sources suggest that Tim simply lost interest (if anyone does have a definitive answer, I, for one, would be interested to know). But what of the Digisound synthesizer itself? Well, as with all genuinely modular synthesizers there was no standard configuration - it was all down to the requirements (and available budget) of the individual.

The original module range (built onto PCBs which could be mounted on 9 by 3 inch panels and put into racks) included a VCO, VCLFO, VC Mixer, Dual ADSR, VC Envelope Generator, Dual VCA, VC Low Pass/High Pass/Band Pass/Phase Shift/State Variable Filters, Dual Ring Modulator, Noise Generator plus S&H, External Input, Output Power Amp, digital 4 to 16-voice polyphonic keyboard controller (on a 9 by 9 inch panel) and various other bits including three, four or five octave keyboard options. These were supplemented, over a four year period, by additional VCDO, envelope generator, filter, LFO and waveform multiplier kits as well as a comprehensively equipped single voice card with two VCOs, two ADSR, two VCAs, LFO, noise, etc. Some of the early modules were built around Solid State Microtechnology (SSM) chips although these were eventually replaced with designs using Curtis ElectroMusic Specialities (CEM) chips as used in many of the other modules (and a number of commercially produced American synthesizers).

Someone once asked what the build quality of the modules was like. Well, as with all kits, the build quality depends on the expertise of the builder. Digisound themselves did provide ready-built modules so these are obviously of a high standard. On the other hand, home-built kits can be somewhat variable. I only have to look at my own collection of modules to see how the quality of the soldering and off-board wiring improved with experience - but at least, with one exception, they all worked first time and Digisound did offer a repair service to resolve any little problems.

So, what sort of features does the Digisound synthesizer possess? Again, as with all genuinely modular synthesizers, all the connections (except the power supply) come out to front panel jack sockets. Not, as on some other modular synthesizers, quarter inch jacks - oh no, the Digisound packs them in by using 3mm jacks. This, of course, means that if you have even a comparatively small single voice design then your machine quickly takes on the look of an old-fashioned telephone exchange with leads all over the place for keyboard control and gate voltages as well as all the audio connections. This makes getting at the (sometimes not inconsiderable) number of additional knobs and switches something of a nightmare. Where else could you struggle with a small panel containing anything from eight knobs and ten sockets/switches (an easy one like the Dual Envelope Generator) up to one containing in excess of twenty knobs and twenty assorted sockets and switches (as in the case of the larger voice card panel)? But then that's why you bought one of these in the first place, wasn't it?

So what makes the Digisound synthesizer special? Well, the module range may not have been as comprehensive as those from the older Moog, Serge and Polyfusion ranges or even the newer Doepfer modules (to which Digisound has been most closely compared), but it does have its fair share of voltage controlled goodies for such parameters as envelope generator time constants, filter resonance, VCO (and VCLFO) pulse width modulation and VCDO waveform selection as well as all the usual things. Plus, of course, if you built it yourself, you could customise as you went along - adding extra input and output sockets and control knobs or doubling up the PCBs behind a panel (suddenly a Dual VCA becomes a Quad VCA for the same panel space and a few additional panel holes!).

Was it worth all the trouble? Well, when you could still buy them they were very good value for money. As an example, back in 1980 when it was first produced, the VCO module cost a staggering £30 including PCB, components, panel, knobs and sockets (and this had only reached about £50 when they became unavailable). All you had to supply was a soldering iron and a little bit of time and patience and you got a comprehensive but unfussy VCO module (not, perhaps, as comprehensive as a Serge NTO but still most useable).

How popular are they nowadays? Well, they do seem to be a peculiarly British/European thing unlike the American PAiA synthesizer which has a somewhat larger following world-wide. Few American users seem to have heard of Digisound so that helps to keep the price a bit lower than might otherwise have been the case. Bear in mind that, if you can find second-hand modules, the same VCO module that cost £30 to buy and build back in 1980 could cost you in excess of £150 now, a pair of State Variable Filters (SSM-based) recently sold for £200 and a small ten module package was recently sold at auction for £940.

Generally, however, they seem to be as rare as hen's teeth, whether because they were never produced in large quantities (a possibility given that they were primarily a DIY product) or because those who had them either junked them when analogue synthesizers first went out of fashion or are hanging on to them for grim death because they recognise their value. It doesn't help matters that the main CEM chips are difficult to get hold of, although not impossible. OnChip Systems in America who produce the chips will supply them but, once existing stocks of a particular chip are exhausted, they require a substantial (many thousands of one chip) order to do a new production run.

All right then, so what do you do if you want one? Well, there seem to be only two (legitimate) options: i) look around for one on the second-hand market but be prepared to wait a long time and pay quite a bit (especially if the seller knows what it's worth) and that still may not give you all the functionality you want, or ii) get hold of the circuit diagrams, PCB foil patterns and components (subject to the whims of OnChip Systems) and then build it yourself.

Me? Well, I started building mine when the modules first came out way back in 1980 and managed to put together quite a good core four-voice system but without an adequate number of ADSR, VCA, Mixer and supplementary modules before the money, time and space ran out. Now I've decided to try and get them and it looks as though there are going to be some interesting times ahead.

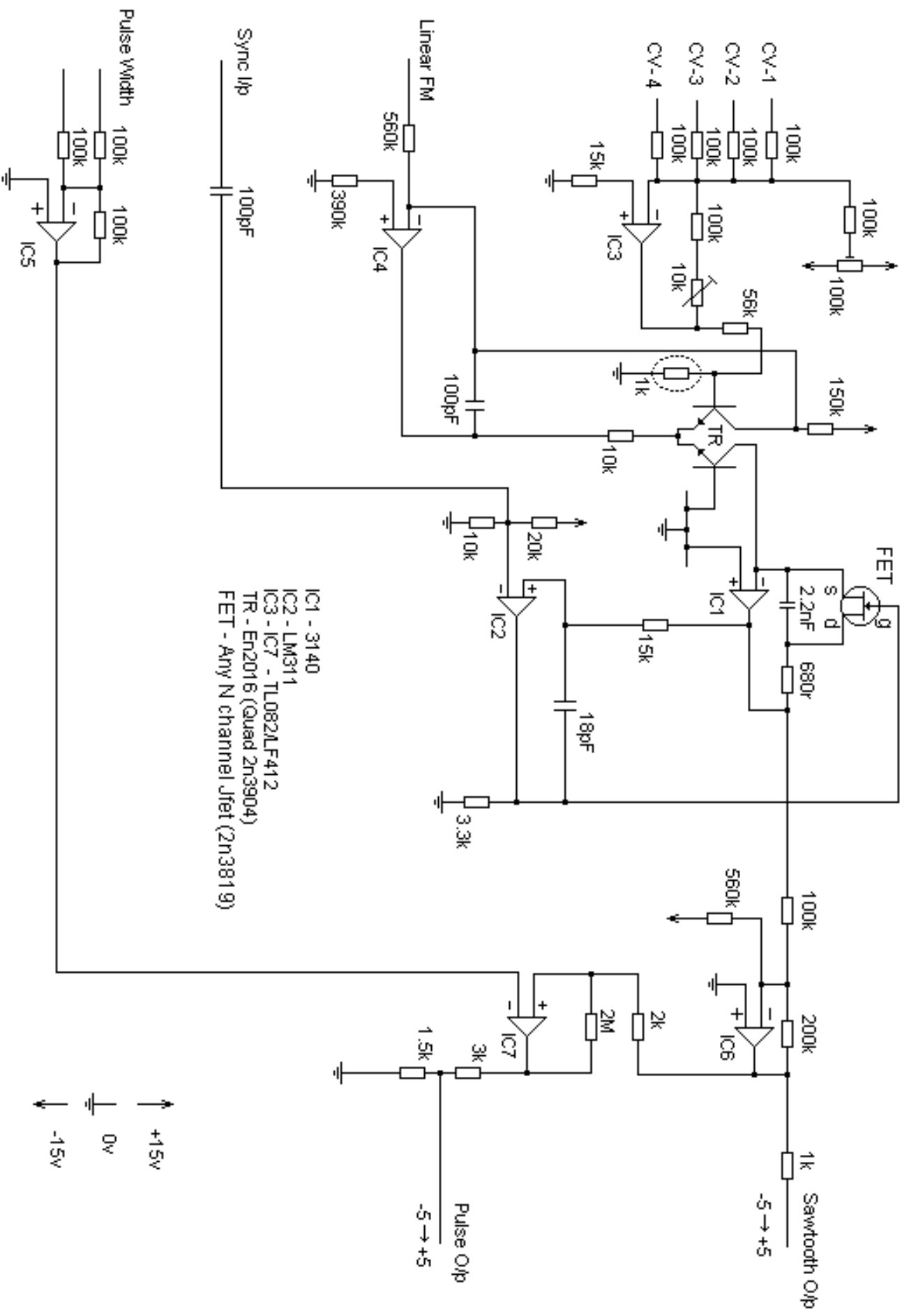
To this end, I'm leaning towards the latter (hopefully cheaper) option - although I've not given up on the former. I've got a virtually complete selection of PCB foil patterns from the original ETI articles - but I'm still at the early stages of contacting likely parties to try and get hold of those for the later modules. I've also managed to produce reasonable facsimiles (on paper, at least) of various panels - so all I have to do is find a way of transferring them to steel or aluminium sheeting. Then I'll need to find someone who can produce the PCBs at a reasonable price for me as I'm not capable of any sort of volume production.

So, after almost ten years of inactivity on this front, my dream of owning a massive eight voice fully modular synthesizer is once again under way. The only problem is, where am I going to put it?

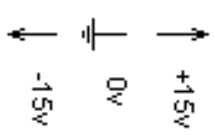
Again, Thankyou for the article David, anyone else wishing to do the same, please do, e-mail me or write. Articles can be on any topic related to synths, be it circuits or simply comments about building/using them. I know there are people who read this who have built synths or even simply bought modulars, so why not contribute, after all its in you interest.

And now for the other VCO design, A few points that you should be aware of first.

- 1) The tempco resistor is optional, It'll work without but not as stable.
- 2) The tempco resistor is available from Farnell at a cost of £2.33 (uk only)
Its hidden in the sensor section (cat No.:143-584)
- 3) The Fet can be any n-channel Fet, obviously the lower the Rds on the better it will function.
- 4) The transistor pair can be simply two trannys, but they should be thermally bonded, or use a Mat02 (if you can find one), Or you could try the Elantec EN2016 (from Maplin), this is Four matched 2n3904's. Probably the best pair is the LM394.
- 5) The addition of pots/switches should be fairly easy, simply connect the wiper to the i/p one end of pot to ground and the other to the socket on the front. (I've added a simple diagram)
- 6) Sync I/p is -ve edge triggered from any edge going -ve, so You could simply connect it to the square out from another VCO.
- 7) I've redrawn the diagram to make it easy to put in this newsletter, sorry Gene.



- IC1 - 3140
- IC2 - LM311
- IC3 - IC7 - TL082LF412
- TR - En2016 (Quad 2n3904)
- FET - Any N channel Jfet (2n3819)



Pulse O/p
-5 → +5

Sawtooth O/p
-5 → +5

Well, There we have it, All the values are on the drawing and I've been told by Gene Stopp and many others that the circuit performs well and is reliable.

I've been in touch with one of our NEW readers recently who says he is a dab hand at designing PCB layouts. So if He wants to do this for us I'm sure everyone will be VERY thankful. (BTW the en2016 is a 14pin chip, I suggest simply grounding the two unused trannys bases and emitters.)

Thats about it for this month, except to say that ANY contributions are most gratefully received and if you want this to keep running, PLEASE,PLEASE send me some!.Also could anyone comeup with a Logo for modulus?. Next month Ill publish a VCF (again courtesy of Gene Stopp). From then could someone else submit some stuff, sequencers/midi to cv/whatever.

Also, Anyone who asks you for a copy of this, or anyone you feel would like it, please feel free to photo copy it for them. I've got a fairly big list of people now and I'd really like to try and avoid anymore being put on (I cant post too many people before someone notices me mailing 300 people.

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