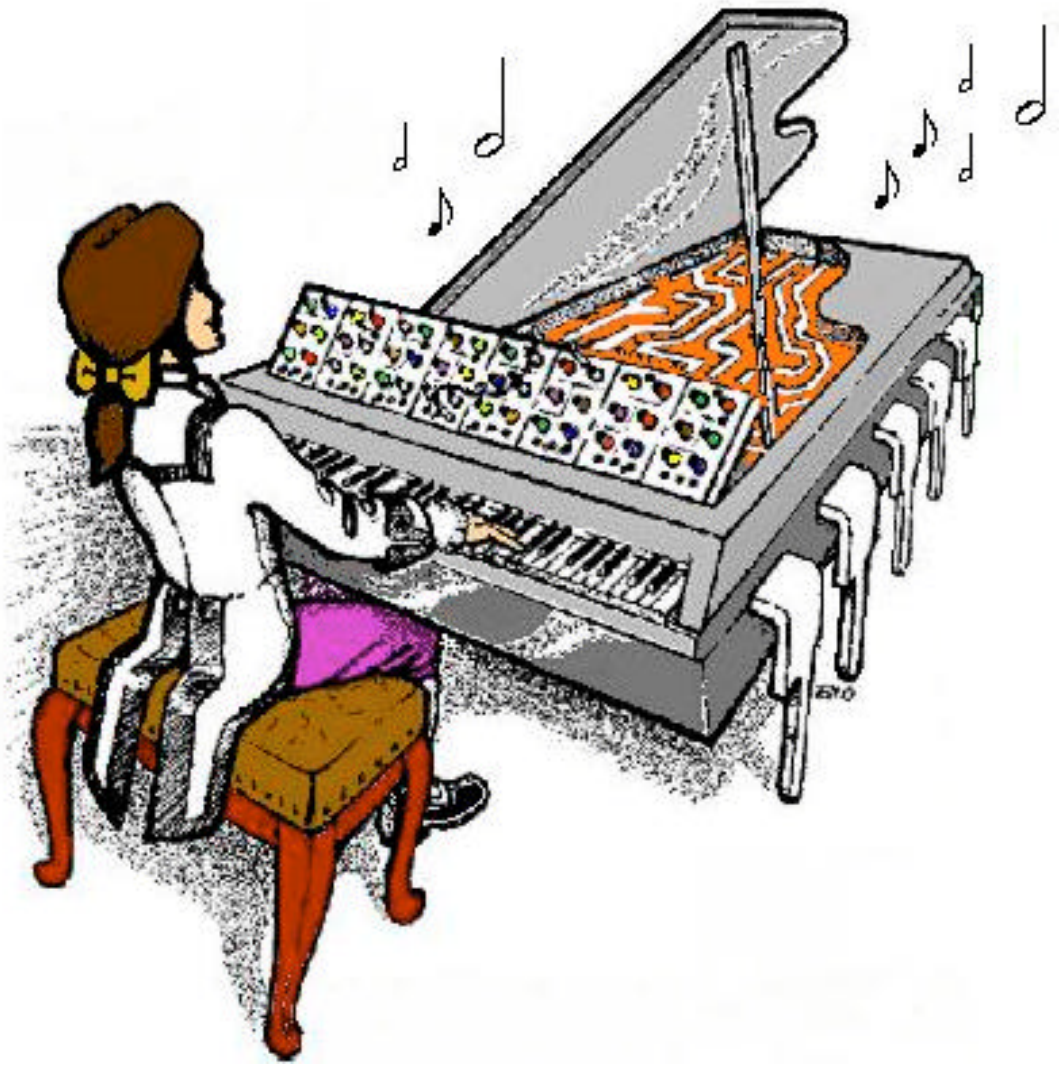

ASM-1 Manual

Appendix A

Assembly Instructions

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Reprinted with permission from Gene Stopp and updated by Laurie Biddulph

Please note that this document is still currently under revision and we apologise for any errors or omissions. Readers should feel free to e-mail any comments to me at the address given below.

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Assembly Instructions

Included with your ASM-1 pcb is a large drawing which is a blow-up of the silkscreen and shows the recommended value and placement for each component as per the various schematics.

When assembling the board we recommend one of the following two strategies:-

1) Assembly of the full board by component type. In this method the board is built up in layers starting with resistors and diodes, then ICs, capacitors, trimpots and transistors. The disadvantage of this approach is that the unit cannot be tested until the complete board has been assembled.
2) Assembly by module. In this method each module is assembled in its entirety one at a time. Once assembled, the module can be tested with, in many, cases minimal external componentry being added. The disadvantage of this method is that as you will need to connect some external components to many of the modules for testing, that they will then need to be disconnected to allow for easy assembly of the next stage with the possibility of damaging the board connection points.

Option (2) may suit users with less confidence in their assembly skills as they can quickly ascertain if a module works properly and as to how things are going.

Once you have figured out what components you want to stuff, mark up the drawings to show this. Proceed to solder the components into the board. Here's the order in which we recommend you proceed:

1. Half of the resistors, then cut the leads.
2. The rest of the resistors, then cut the leads.
3. All capacitors that are not the bypass capacitors, then cut the leads.
4. All the bypass capacitors, then cut the leads.
5. All diodes, transistors, and FETs, then cut the leads.
6. All trimpots.
7. All op-amps and the LM311s.
8. All CA3080s, the 4002s, and the 4053s.
9. All CA3140s.

NOTE: Please note that the pcb overlay for Q3 in the VCO's are for the 2N4856. The J108 has its Source and Drain legs cross over however you can insert the J108 directly in to the pcb using the component outline shown on the board. In this application the S and D pins can be freely interchanged.

This kit does NOT include any panel hardware such as potentiometers, sockets or switches, as the choice of these will depend entirely upon the users plans for the unit.

Occasionally some components may become obsolete or very difficult to get hold of. In these instances, substitute components are provided. Wherever possible, these will be pin compatible (as well as functionally compatible) allowing them to be inserted in to the PCB

without modifications. However, this is not always possible and some components may need to have their legs bent to fit the PCB location. We are continually on the lookout for alternative substitutes and will replace components in our kits as approved substitutes become available.

General notes on the assembly of the ASM-1 PCB:
All resistors and diodes on the PCB are on a 0.4" spacing and readily accommodate most of the readily available resistors without a problem, including those supplied in the kit. A resistor colour code chart is on the CD included with your kit and is also available on our website at http://www.ozemail.com.au/~boobies/elby/datasheets/resistorcolourcodes.jpg

TEMPCO resistors have been included in the kits for the VCO to offer superior performance.

All capacitors on the PCB have 0.3" spacing. Many capacitors may not fit this spacing so you will need to bend the legs of capacitors to fit the board. Extreme care should be take when doing this to prevent damage to component, especially at the junction between the leg and the body. A pair of snipe-nosed pliers should be used if available.

Integrated Circuits (IC) may be socketed if desired (a kit of sockets is available) but is not required in normal use. If you wish to experiment with the modules then we recommend the use of IC sockets. If used, we strongly recommend using machine-turned-pin sockets as these offer better long-term use. Most of the ICs on the board are orientated the same way but several modules, specifically GLIDE, VCA and NOISE have their ICs either sideways or upside down in relation to the other modules.

Wiring to the boards is made easier by having all of the module connections at the edges of the PCB. We recommend running your cables around the outside of the boards in a loom leaving the centre of the board clear. This will be a boon when setting up and adjusting the modules and will also simplify debugging should it be needed. This will result in slightly longer cable runs but this should not adversely affect the quality of the system through induced noise.

Colour coding of cables is not a pre-requisite but once again using colour-coded cables will simplify tracing faults. The table below gives two examples of suggested colour schemes:-

Cable Colour	Function	Or	Cable Colour	Function
Red	+15V		Red	
Black	Ground		Black	
Yellow	-15V		Yellow	
Orange	Control Voltages		Orange	VCO*
Blue	Pot Connections*		Blue	ADSR
			Green	VCA*
			Brown	VCF*
			Grey	NOISE*
			White	LFO
			Pink	GLIDE

* Audio signals are better wired using screened audio cable.

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The first scheme on the left will have the advantage of allowing you to bulk buy a handful of cable colours but will make fault finding a little harder. The second scheme, on the right, will require smaller quantities of more cable colours but will allow you to trace wires for a given module more easily. I would recommend this second approach for beginners.

For the choice of wire type and sizes I would suggest:-

- 7/0.2mm (24AWG – 7/32AWG) for control wires
- 16/0.2mm (22AWG – 7/30AWG) for power rails (NB: 7/0.2mm is also fine for this purpose
- Single-core screened audio cable for all signal wires

When selecting audio cable, choose the smallest outside diameter possible. I use 10/0.12mm with an OD of 1.6mm. Larger cable OD will result in a larger cable loom.

Most of the parts aren't very static-sensitive, with the exception of the CMOS parts and especially the CA3140s (that's why they get soldered in last). Be real careful with these – they are unbelievably easy to blow up. You can, optionally, use ic-sockets for the IC's if you want. It is recommended to use sockets for the CD4002 and LM358 chips in the ADSRs, and for the output buffer op-amps in the VCF. Also, you may want to socket the CA3140s in the VCOs since they are so easy to blow up.

Component Substitutions and Your Own Modifications:
If you know what you're doing, go for it. If not, stick with the recommended parts.

TEMPCO's:
Our kits include a TEMPCO resistor for each of the VCO's. A TEMPCO can also be used in the VCF but is not included in the kit as this is less critical. Our kits provide a 1% metal film resistor for the VCF.

Thermal contact:
All of the critical exponential converter components are physically placed next to each other so that they can be in physical contact. The transistors and the TEMPCO resistors (if used) should be gooped up with heatsink compound and, optionally tie-wrapped together, for best thermal results. This is totally optional and only for those who are after perfect performance. The result will be almost negligible so no big deal if you don't do it.

Component polarity:

- Capacitors over 1uF are polarised. The markings are on the assembly drawing.
- The diode polarities are on the circuit board silkscreen.
- The transistors on the VCF and Noise Source are standard E-B-C layouts on the silkscreen.
- The NPN transistors on the VCOs are marked for a MAT-02 and also the LM394.
- The FET position on the VCOs must be examined to determine the proper orientation.
- The IC orientations are marked on the silkscreen; Note that the IC's in the VCA are "upside-down". All op-amp locations are marked "TL082", but you can ignore those based on the information above. Of course using all TL082s will give satisfactory results in most applications.

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