

6710 Vocoder Assembly Details Supplement

Please read through this information before beginning assembly of the kit.

Two printed circuit traces were omitted in this updated version of the board.
Two patches are needed to link the following sets of circuit points:

- a) R9/R11 and R13/R15/JB.
- b) R21/R23 and R17/R19/JD.

Tack solder two 4.5 inch lengths to the sets of points as follows to make the patch:

- a) the "9" end of the resistor at R9 and the "3" end of the one at R13.
- b) the "7" end of R17 and the "1" end of R21.

note if you're 'building-in' the mod for the board this patch is not needed

Update the following wires with these new lengths:

- a) JB 3.5", b) JH 3.5", c) JI 4", d) JJ 4", e) K 10.5", f) Z 12.5", g) AN 5",
- h) AY 5".

Note on the parts list that only resistors R49 and R50 install on the panel,
R51 is on the board.

Note on the parts list that ICs 7-10 may also be 570 compandor ICs.

Note on the parts list that the 47pF polystyrene capacitors may be ceramic
disk ones.

Capacitors are often marked with a code to eliminate the decimal point.
There will be significant digits listed with a number of the zeros that follow.
This number is the value in pF. Moving the decimal six places to the left is
the value in uF (ie, 0.1uF may be marked 104 or 10_0000 pF which is the same as
0.1uF). Significant values of 4.7 or 2.2 may interchange with 5 or 2.

Rotate through the colors of the insulated wire as the lengths are cut. This
will make it easier to check your work if needed. Also, it is mentioned to
cut and solder the longest lengths first. This ensures all lengths can be cut
from the amount provided. Here is the order of the wire lengths from longest
to shortest: BB, BC, AK, AA, Z, AJ, AL, AH, X, K, H, AB, AI1/AI2, Q, L, O,
AW, AE, AF, M, N, AV, AT, AS, U, W, AQ, AN, AY, AO, E, T, AD, AP, AR, AU, AX,
AG, AZ, A, P, and Y. Refer to this list when cutting and soldering the wires,
or number the list in the manual according to this sequence and proceed in
this order.

The potentiometers have a mounting tab that is not needed. Use pliers to

bend it outwards and break it off so the part sits flat against the panel.

The spdt switches supplied in the kit may be substituted with dpdt type.
There is an unused 'half' or row of three terminals in this instance.

The slide switches supplied in the kit may include a type with threads for the mounting screws. On the two lower and outermost mounts, the screw goes through to the threads of L-brackets. Before installing the L-brackets at these positions over tighten the screws here so they turn freely and can tighten into threads of the brackets.

The circuit is designed for operation on a dual-dc (bipolar), regulated +and-15vdc power supply such as our 9770R-15 or similar.

The Vocoder originally appeared as a diy project in the May 1985 issue of Keyboard magazine and included a schematic for a power supply for the unit.

sl 5/4/2004

Trouble-shooting tests, checks.

Vocoder power supply...

The Vocoder requires dual dc power supplies at +and-15v dc. These type of supplies have three wires. It would take two single polarity dc supplies to get this arrangement (wall mount dc supplies are usually unregulated though and could introduce power supply ripples which could cause hum), one wired for the positive supply and the other wired for the negative supply and each with a connection to the 0v circuit ground/common (the positive has it's minus pole on ground and the negative has it's plus pole on ground). A tester would measure 30v reading from the negative to positive dc supplies.

The PAiA 9770R-15 outputs regulated (clean, stable) +and- 15v dc supplies. It uses a wall mount transformer with an ac output to get the positive and negative dc supplies.
<http://www.paia.com/proddetail.asp?prod=9770R-15>

For the following tests, start with the controls set as follows:

Bypass Select - n/a
Bypass - Vocode
Stereo/Mono - Mono
Vocoder Level - about mid
Fuzz - Out
In1 Level - minimum
In2 Gain - Lo
In2 Level - minimum

A VCO's (or signal generator's) sine or triangular wave is split and connected to both inputs, and with the controls set and adjusted, the frequency is adjusted through the range of the filters in the bands (about 150Hz to 5kHz) and the output is monitored for eight consistent peaks. I use an alligator clip test lead to jumper input and input two together and plug the input signal into

one or the other. Then, the input levels are advanced in turn beginning with input one, and, when adjusting the IN Level controls, adjust the input signal frequency back and forth so the level setting is maximized for all bands. One or more may be more sensitive than others and while you may not get the overload sound on one, you might on another and a big difference here will reveal trouble. When both levels are set, you should be able to slowly vary the oscillator signal through the range of the bands and get eight peaks corresponding to the bands in the vocoded output. The pin 1 and 16 dc voltages of the 570/571 ICs will also increase for corresponding peaks. These peaks should all be comparable in volume at the output or voltage on the pins. Switched to Stereo, four peaks will be on the left and four on the right. The Threshold should have an effect of minimizing the effect of the mic on the vocoded output at the minimum setting and letting the IN1 leak through on the maximum setting. A setting just shy of the leakage will yield the most sensitivity.

Trouble can usually be traced to a solder joint or a part installed wrong or out of place. Identify the band with the trouble by matching the 570/571 pin 1/16 voltage with a section on the schematic. For instance when within a band, the pin 1/16 dc voltage will be more than when out-of-band. Or, if a band is missing, there might not be a pin 1/16 voltage for when the input is in-band. It could be a bad solder, wrong value resistor, broken printed-circuit, etc, keeping the band from mixing to the output stage though (Re, Rg in each schematic section (8 places)). If any of the op-amp output pins (3, 4, 10, 12) in the filter circuits has an appreciable dc level, say, more than 0.5v dc or so (and likely about 12-13v), then there is probably trouble in the immediate area. Each 4136 op-amp is two bands and each band is two filters at the same tuning, one for each input. The schematic shows input one going to one section of IC6 and input two going to another section of IC6. These two sections are filters tuned to the same frequency with the output of one going to a 570/571 vca input and the other to the to an input to control the level through this vca. Pins 1, 2, and 3 are the section for input one and pins 6, 5, and 4. are the section for input two on this first band shown in full on the schematic. The band below (condensed, schematic-wise) includes the op-amp sections with pins 14, 13, and 12, and, 8, 9, and 10.

If all seems normal, or if the balance of the bands seems a bit too unbalanced, the mod I have might make the difference. It optimizes the dynamic range through the bands and flattens the mix for this all adding to enhance the vocode effect and quiet background hiss. It's on our website, linked from the site map (Scott's Vocoder Clarifier mod). It consists of four quad-op amp ICs wired between the level controls and the filter inputs.

And, some extra Using details...The filtering of the IN1 signal will be best when it is rich/lush/buzzy. Strings, Brass, Orchestra, and Organ type voices are good . So are synth vco sawtooth and square/pulse waves. Smoother sounding tones are OK, but play big chords to put energies in multiple bands. Switching the fuzz ON will enrich the IN1 signal. It will also make the input more of a constant level making it easier to obtain an optimum IN1 Level setting. If the signal is percussive, the average input level that doesn't overload will be less than a more constant type sound like an organ would provide. Synthesizer or instrument voicings may have resonant ranges and while the IN1 level may be good in one area of the keyboard, it might be low in another, or the rest of the range.

sl, 1/12/2005

<http://www.paia.com/ProdArticles/vocodmod.htm>

Sorry, but we don't have a pcb or kit for the modification to the vocoder. The RadioShack Component PC Board

I used for the mod (276-168) is not too far from what a designed pcb for the mod would be. It's for making solder connections to DIP ICs and it holds the four TL-084 quad-op amps with the wires to them just fine.