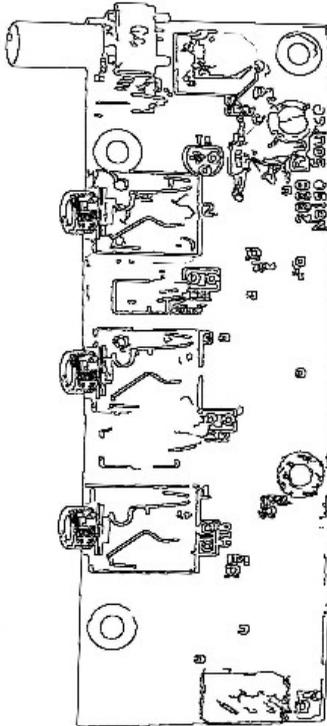




Noise Source

Model 9751 Assembly and Using Manual



This second-generation 9700-series processing element for modular sound synthesizers is designed to provide great sound and excellent value.

This module generates 'white' and 'red' and 'blue' noise. Starting with a transistor 'avalanche' junction noise generator the versatile 9751 may be reconfigured to use an optional Zener-diode for noise generation. A level control is provided for noise volume adjustment or for matching the 9751 output to the control voltage input of another module such as our 9752 Sample and Hold.

Outputs from the module include full-spectrum 'white' noise, plus, filtered sources for 'red' and 'blue' noise, saving the effort of patching through an external filter module to obtain non-full-spectrum noise.

This high-performance module is designed to be compatible with most modular synthesizer systems with little or no modification. Most active components are already mounted, making assembly a snap.

ASSEMBLING THE 9751 Noise Source

Before beginning assembly, go through the manual. Look at the drawings. Feel the parts. You're naturally eager to plunge right in, but take a few deep breaths first. Check the parts supplied against the packing list at the back of this manual.

*In some cases, notes packed with the parts will be used to call your attention to special situations. **If parts are missing, please notify PAiA at missing@paia.com or by phone at (405) 340-6300, fax (405) 340-6378. A NOTES page is included at the end of this manual.***

Notice that each step in the manual is marked with a checkoff box like this:

DESIGNATION	DESC.	MARKING
() R27	100ohm	brn-blk-brn-gld

Checking off each step as you do it may seem silly and ritualistic, but it greatly decreases the chance of omitting a step and also provides some gratification and reward as each step is completed.

Numbered figures are printed in the Illustrations Supplement in the center of this manual. These pages may be removed for easy reference during assembly.

THE CIRCUIT BOARD

The 9751 Noise Source is built on a double-sided circuit board. Note the “top” side of the board has the connector and control placement designators. Surface-mounted components are on the “bottom” of the board. Install parts to the top of the board and solder them on the bottom.

TOOLS

You'll need a minimum of tools to assemble the kit – a small pair of diagonal wire cutters, pliers, screwdriver, soldering iron, and solder.

Modern electronic components are small (in case you hadn't noticed) and values marked on the part are often difficult to see. Another handy tool for your bench will be a good magnifying glass. Also use the magnifier to examine each solder joint as it is made to make sure that it doesn't have any of the problems in the SOLDERING section which follows.

SOLDERING

Select a soldering iron with a small tip and a power rating of not more than 35 watts. Soldering guns are completely unacceptable for assembling solid-state equipment because the large magnetic field they generate can damage components.

Use only a high quality electronic solder. Your kit is compatible with lead-free and/or tin-lead flux-core solders made especially for electronic assembly. Plumbing solder will destroy your kit with its acid core. Jewelry solder (silver solder) will destroy your kit with its high working heat. Neither is for electronics work.

A proper solder joint has just enough solder to cover the soldering pad and about 1/16-inch of the lead passing through it.

There are two improper connections to be aware of: Using too little solder will sometimes result in a connection which appears to be soldered when actually there is a thin layer of flux insulating the component lead from the solder bead. This situation can be cured by reheating the joint and applying more solder.

Too much solder may produce a conducting bridge of excess solder between adjacent pads causing a short-circuit. Continued feeding of solder into a hot joint can result in accumulation on the underside of the board and may cause bridges or impede the action of mechanical components. If you see this, position the board above the iron tip and the excess will flow to the tip.

Use care when mounting all components. Never force a component into place.

CONTROLS AND CONNECTORS

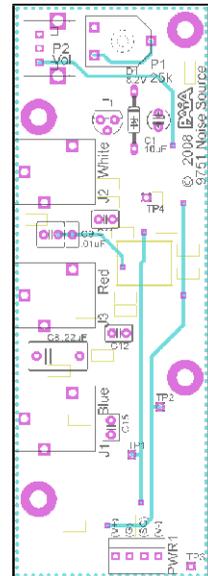
Controls and connectors will be installed on the top side of the board with the placement designators as shown in the illustration to the right.

Miniature phone connectors referenced as “stereo phone jacks” in the manual parts list are specified below with the contact/terminal names, Tip, Ring and Sleeve (TRS) and are labeled on the board and schematic as such.

The potentiometers have tabs extending from their body for stability. They have a snap-fit to the board. Align the tabs and pins with their holes and press them into place. There is no need to bend the tabs or terminals.

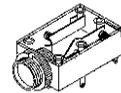
To ensure the best alignment with these parts with the front panel, begin by soldering only one of the multiple terminals associated with each of the following parts as it is installed. Then, if a part is tilted or crooked, it is only a matter of reheating the joint as the part is aligned.

Match the tab of the polarized power connector with the corresponding board marking.

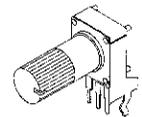


Top of circuit board

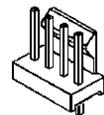
DESIG.	DESC.	MARKING
() J1	TRS socket	
() J2	TRS socket	
() J3	TRS socket	
() P2	100K ohm potentiometer, audio	A100K
() PWR1	Header	



TRS socket
“stereo phone jack”



Potentiometer



Header

NOISE DIODE OR TRANSISTOR

Install the supplied noise source, either a diode or transistor.
Match the diode band or the transistor flat to the board graphic.
Solder each leg and clip the excess from the joint.

() D1 8.2V Zener Diode

(or)

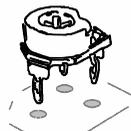
() Q1 2N3904 NPN Transistor



zener diode



transistor



trimmer

TRIMMER POTENTIOMETER

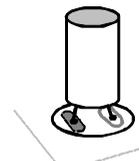
Install and solder the trim. Be mindful that solder might flow through to the top side of the board if too much is fed into the heated joint.

() P1 25K Trimmer Potentiometer 252, 25k

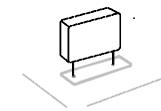
CAPACITORS

Install the non-polarized electrolytic capacitor. Note that even though one leg is longer than the other and the board shows a difference for the two holes, either lead can go in either hole. Locations are provided for optional, tone altering capacitors at the Cs 8, 9, 11, 12, and 15 designations. Do not install these parts for standard applications.

() C1 10uF/35v Non-Polar. Electrolytic Capacitor



electrolytic



polyester



ceramic

(see page 9 for details on one more capacitor)

COMPLETION

The front panel is used for mounting the module in a rack system or cabinet. Complete the module assembly by mounting the 9751 PCB sub-assembly to the front panel as follows:

Referring to Fig. 1A of the illustration supplement, use the knurled phone jack nuts to secure the sub-assembly to the front panel. Check for clearance of the potentiometer shafts to ensure they rotate freely. Finger-tighten the phone jack nuts and then use the tips of the diagonal cutters to give them another quarter of a turn or so.

Complete the soldering of all multi-terminal parts. Take care the solder doesn't run through to the opposite side of the board when soldering the mounting tabs. With practice, it is possible to flow solder to cover the opening; otherwise, just flow a bit to secure the tab to the pad ring.

Cut a 3/8" (10mm) long shim sleeve for each pot from the length of polyethylene sleeve provided. Set the shafts fully counter-clockwise, slip the shims over the pot control shafts, put the knob in place with the pointer aligned to about a 7:00 setting, and use a small screwdriver to tighten the set-screw just enough that it grips.

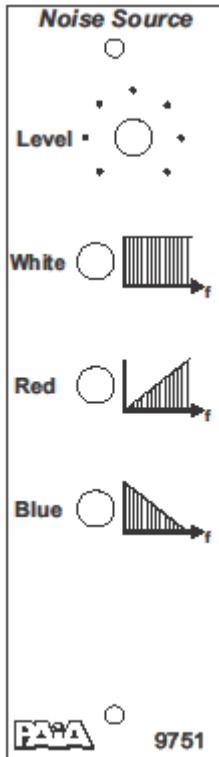
POWERING AND TESTING

Power to the circuit is via a four-circuit, dual-polarity DC power supply. A power connector cable matches the header for connection with one of the PAiA 977x supplies at 15v or more. Connect the circuit labeled (+) to the positive DC source (V+), the circuit labeled (-) to the negative DC source (V-), the circuit labeled (G) to the power ground (G), and the circuit labeled (SG) to the signal ground (SG). For other supplies without separate signal and power grounds, use two wires to join the two grounds (G and SG) to the one ground (aka GND, 0VDC or common) at the supply.

Before applying power, check again, to be sure the wiring for the two DC polarities and that the polarized 4ckt connectors are as intended (see Fig.1B).

Use two-circuit, Tip-Sleeve (TS or mono), cords for patching in or out of the Noise source when connecting with external devices. Within a 9700-series system, either single conductor (Tip-only), or TS cords may be used. If this seems confusing, remember that a regular mono cable will always work for most home studios. PAiA equipment allows tip-only connections for professional applications where star grounding is required.

The P1 Trim adjusts the signal level of the noise into the white-noise circuit section and an oscilloscope or similar may be used to view this at the J2 Output connector tip. Advance the trim until the tops and bottoms of the noise image develop lines (the clipped wave peaks). The setting may be made by ear, listening for the point at which the sound stops getting stronger. Listen at the white noise output and at a very low P2 setting for this method so the increase with the cw rotation of the trim does not exceed the input range (clip) the amplifier and speaker or phones. The 9752 Sample and Hold module may also be used to sense whether or not the Noise is being clipped—in this instance there will be more minimum and maximum sampled voltages than random ones.



Adjust the Level control to match the expected input of the following device,



Full-spectrum Noise



Treble Noise



Bass Noise

(see page 9 for updates to this page)

Notes

DNI marking is Do Not Install note to manufacturer. These are designations where optional capacitors may be installed to modify the Red and Blue output frequency range.

Mounting holes are provided on the board for custom applications.

* Update *

As this new series of modules has rolled-out, it has been discovered there is a conflict with the panel and manual labeling for the 9751 module. The panel graphic representations for the Red and Blue outputs are in each others place and the manual descriptions of Treble and Bass responses follow suit.

The panel graphics represent slopes in the frequency content of the noise and the one for the Red output should be shown as a downward slope. The one for the Blue output should be shown as an upward slope. The manual should show the Red output as Bass and the Blue output as Treble.

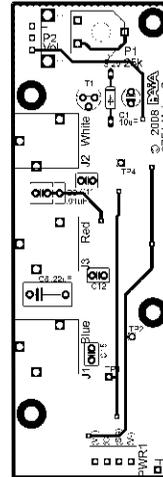
Please reference the details below when using the Red and Blue outputs.

Also related, the surface-mounted C17 is not in place on this board and instead, three capacitors provided with one being installed at the designation C9 Do Not Install (DNI). The low-pass corner frequency for the three parts are as follows:

101 marked 100pF	20KHz
102 marked 0.001uF (1nF)	2KHz
104 marked 0.1uF (100nF)	300Hz

The output voltage drops with the lower cut-offs and is adjustable to 10V with the first two, but for the third, gain is needed for the full output (Preamplifier, Inverter/Gain stage, Mixer w/Gain, etc.)

() Install the selected capacitor at the C9 location with one leg in the single hole and the other in either dual hole (the two legs are separated by the capacitor plate symbol).



DESIGN ANALYSIS

The heart of the noise source is built around a reverse biased 8.2V Zener diode. When reverse biased at just the right current levels (set by trimpot P1), the Zener diode outputs a broadband white noise signal. This signal is amplified by U1D and is distributed to the three output filters with gain. The U1C amplifier provides a white noise output which, when the trimmer is set correctly, outputs a nominal 10V P-P signal. U1B forms a low-pass filter with gain that provides a “red” noise output. U1A is a high-pass filter with gain that provides a “blue” noise output.

9751 Parts List

Please check the parts against this list. As you locate a part type and verify the quantity (and mounting hardware -- if required) check it off in the space provided.

Because we have introduced surface-mount parts with these kits, we are providing the printed circuit card as a subassembly with the surface-mount parts already in place.

Also, we want to make you aware that we are using both linear- and audio-taper potentiometers in some of the modules. They are marked differently so we are asking that you check carefully.

If anything is missing please notify PAiA at missing@paia.com or by phone at (405) 340-6300, fax (405) 340-6378.

	Quan	Description	Ref Des
()	1	9751 PCB Sub-assembly, Noise Source	
()	1	9751 Front Panel, Noise Source	
()	1	100K ohm Potentiometer, 9 mm Snap-In, Audio	P1
()	1	25K ohm Potentiometer, Trimmer, Carbon, 9 mm Horizontal Mount	P2
()	3	Phone Jack, Stereo, 3.5mm	J1, J2, J3
()	1	Knob, Set Screw	
()	1	Shim, Knob, Polyethylene Sleeve	
()	1	10uF, 35V Capacitor, Electrolytic, Non-Polarized, Radial	C1
()	1	8.2V Diode, Zener, 1/2W, Axial	D1

9751 Test Point Data

TP1	+12 VDC
TP2	-12VDC
TP3	0 VDC
TP4	Noise Signal (Capacitively Coupled)

9751 Power Requirements

Voltage	Current
+15 VDC	12.2 mA
-15VDC	13.0 mA

9751 Noise Source