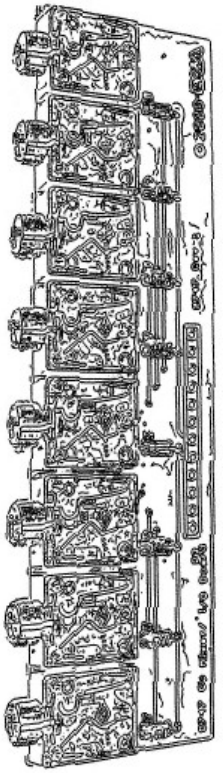
Passive Mixer/Splitter

Model 9747
Assembly and Using Manual



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

The 9747 Passive Mixer/Splitter is a set of four separate networks (each with four 1/8" TR jacks) on a single-width panel. Each network can be used as a mixer (3 into 1) or a splitter (1 out to 3).

The networks can also be wired together for other functions (7-to-1 or 11-to-1 passive mixer or splitter, etc.) and the network resistance can be modified or removed for special purposes. Although the panel is simple, it is very handy for building patches.

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 9747 PASSIVE MIXER/SPLITTER

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 9747 Passive Mixer/Splitter is built on a double-sided circuit board. The module is comprised of two boards. Note the “top” side of the board has the connector and control placement designators. 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 is 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.

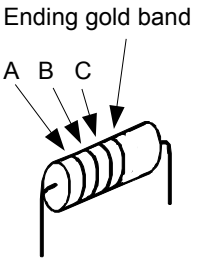
There are two improper connections to be aware of: Using too little solder will sometimes result in a connection which appears to be soldered when actually there is a thin layer of flux insulating the component lead from the solder bead. This situation can be cured by reheating the joint and applying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

RESISTORS

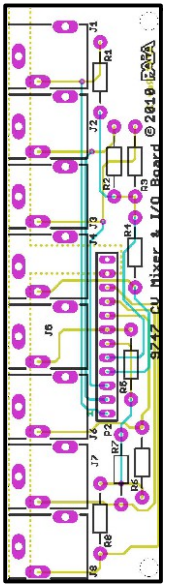
Install resistors by bending the legs as shown to the right and insterting them through holes on the top side of the board (shown next page). Solder each leg on the bottom side of the board and clip the excess at the top of the joint. Save a couple of the clippings to be used as jumpers in later steps.



DESIG.	DESC.	MARKING A-B-C-D
( ) R1	10K ohm, 5%	brown-black-orange-gold
( ) R2	10K ohm, 5%	brown-black-orange-gold
( ) R3	10K ohm, 5%	brown-black-orange-gold
( ) R5	10K ohm, 5%	brown-black-orange-gold
( ) R6	10K ohm, 5%	brown-black-orange-gold
( ) R7	10K ohm, 5%	brown-black-orange-gold

CONTROLS AND CONNECTORS

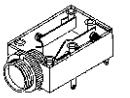
Controls and connectors will be installed on the top side of the board with the placement designators as shown in the illustration to the right. *The two boards used for the module kit do not utilize a connector (or wiring) to the P2 designation.*



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.

Before installing the connectors, use clippings saved from the previous resistor installation steps as wire jumpers at the R4 and R8 designations. Bend the ends of the wire at right angles at the width of the hole spacing, insert the wire to extend completely though at each end, and solder each leg on the bottom side of the board. Clip any excess from the joint.

DESIG.	DESC.	MARKING
( ) R4	Jumper wire	
( ) R8	Jumper wire	
( ) J1	TRS connector	
( ) J2	TRS connector	
( ) J3	TRS connector	
( ) J4	TRS connector	
( ) J5	TRS connector	
( ) J6	TRS connector	
( ) J7	TRS connector	
( ) J8	TRS connector	



TRS Connector

Repeat the previous operations to complete the second board in this module set.

COMPLETION

The front panel is used for mounting the module in a rack system or cabinet. Complete the module assembly by mounting each 9747 PCB sub-assembly to the front panel as follows:

Referring to Fig. 1 of the illustration supplement, use the knurled phone jack nuts to secure the sub-assembly to the front panel. Either board can go on either panel section; however, it is important to have J1 at the lower end of the panel and J8 at the upper end of the panel. 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. Over-tightening the nut could break the part or strip the threads.

Complete the soldering of all connector terminals.

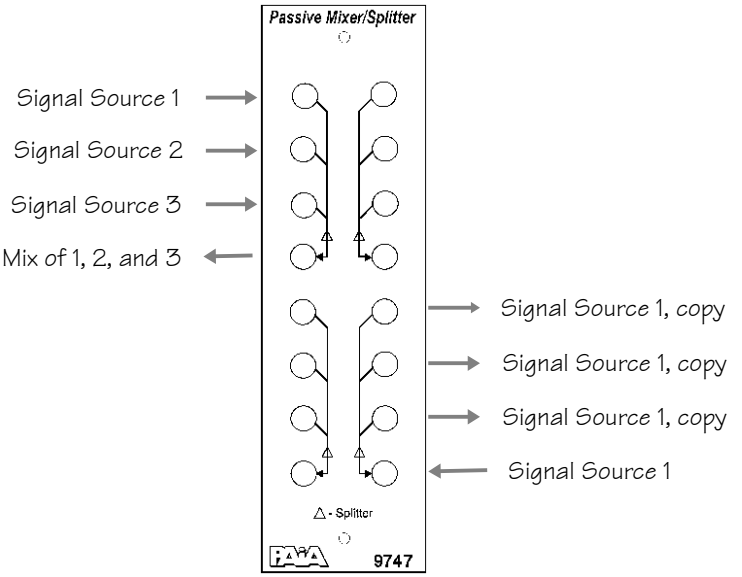
TESTING

Use two-circuit, Tip-Sleeve (TS or mono), cords for patching in or out of the Mixer/Splitter when connecting with external devices. Within a 9700-series system, 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.

Notice on the panel the upper three connectors in a section are shown ”spilling” down to the lower connector and this implies the Mixer function: One, two, or three signal sources input to these connectors are mixed or combined in equal amounts to the single output. On the way down to this lower connector is an upwards pointing arrow and this shows that the module can also work in the other direction, with one signal source connected as an input to this connector, being made available to the upper three connectors as outputs.

The resistors serve to provide a link between the connectors, but also, some isolation. The strength of the typical signal source easily overcomes the resistance in the path and practically all the signal will appear on the other side of the resistance. If one tap of a split or one source in a mix is trying to overcome the other, then the resistors reduce the conflict. There is a limit to their signal handling capability and too much power through them could result in them making a burning smell or smoke. The module should not be used with speaker-level audio or power-supply voltages, just modular synthesizer CV or Audio signals or other “line-level”.

In turn, apply a CV or Audio signal to each of three Mix inputs and listen/measure for most of the signal at the Mix output, or, Split--apply one signal and monitor this signal at the three split outputs. Repeat for the four sections.



Mix of three inputs to a single output.

Splitting one input signal to three outputs.

DESIGN ANALYSIS

The Passive Mixer/Splitter consists of four identical resistive networks linking the tip and sleeve contacts of TRS connectors to function as mixer and/or splitter sections in a modular synthesizer. The 10K ohm resistances work to combine multiple signal source inputs to a single output, or, a single signal source input to multiple signal source outputs.

When connected with a signal source having a typical output impedance in the range of nearly zero ohms and up to 1K ohm, most of the signal source will appear at the typical load impedance of about 10K ohms to 100K ohms or more.

Notes

9747 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.

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	Marking
( )	2	9747 Printed Circuit Board, Passive Splitter-Mixer		
( )	1	9747 Front Panel, Passive Splitter-Mixer		
( )	16	Phone Jack, Stereo, 3.5mm	J1 – J8 (x2)	
( )	2	Screw, Self tap, #4 x 3/8, Pan Head Phillips, Black Oxide		
( )	12	Resistor, 10K ohm,1/4W, Carbon Film	R1-R3, R4-R7	

There are no test points or power requirements associated with this module.