

Powering the new 9700 Series Modules

Powering the new 9700 Series modules is a matter of connecting the free ends of their power supply connecting cable directly to a power supply or connectors to match a power supply's or a means of distribution. This deviates from the original 9700 Series daisy-chained, tandem 4ckt dc power connection areas, with one 4ckt area being eliminated — each module is linked to the supply, instead of its neighbor. The 4ckt scheme has the positive and negative dc supplies and two grounds, G as a power ground and SG as signal ground. PAiA supplies have separate connections for G and SG, but they do ultimately join at a single point. If using a different supply with only a single ground/0vdc/circuit-common, just run the two wires to this single node.

One of the next modules to be released will be a regulated, $\pm 15\text{v}$ supply with many power supply connection points. Our present 9770 options, the 9770U or the 9770R-15 only have six 4ckt dc power connection areas so if these are used you might want to employ one of the following examples. Note too, for a system of very many modules on a 9770U or 9770R-15, some modifications are needed to provide additional power of the regulated supply or filtering/smoothing of the unregulated supply ($\pm 16\text{-}17\text{vdc}$ with the entire set connected) and these changes are included in this information sheet. Dual, twelve volt supplies may be used too, but they must be regulated. The present nine-module set of new 9700 Series modules needs about 140mA per supply.

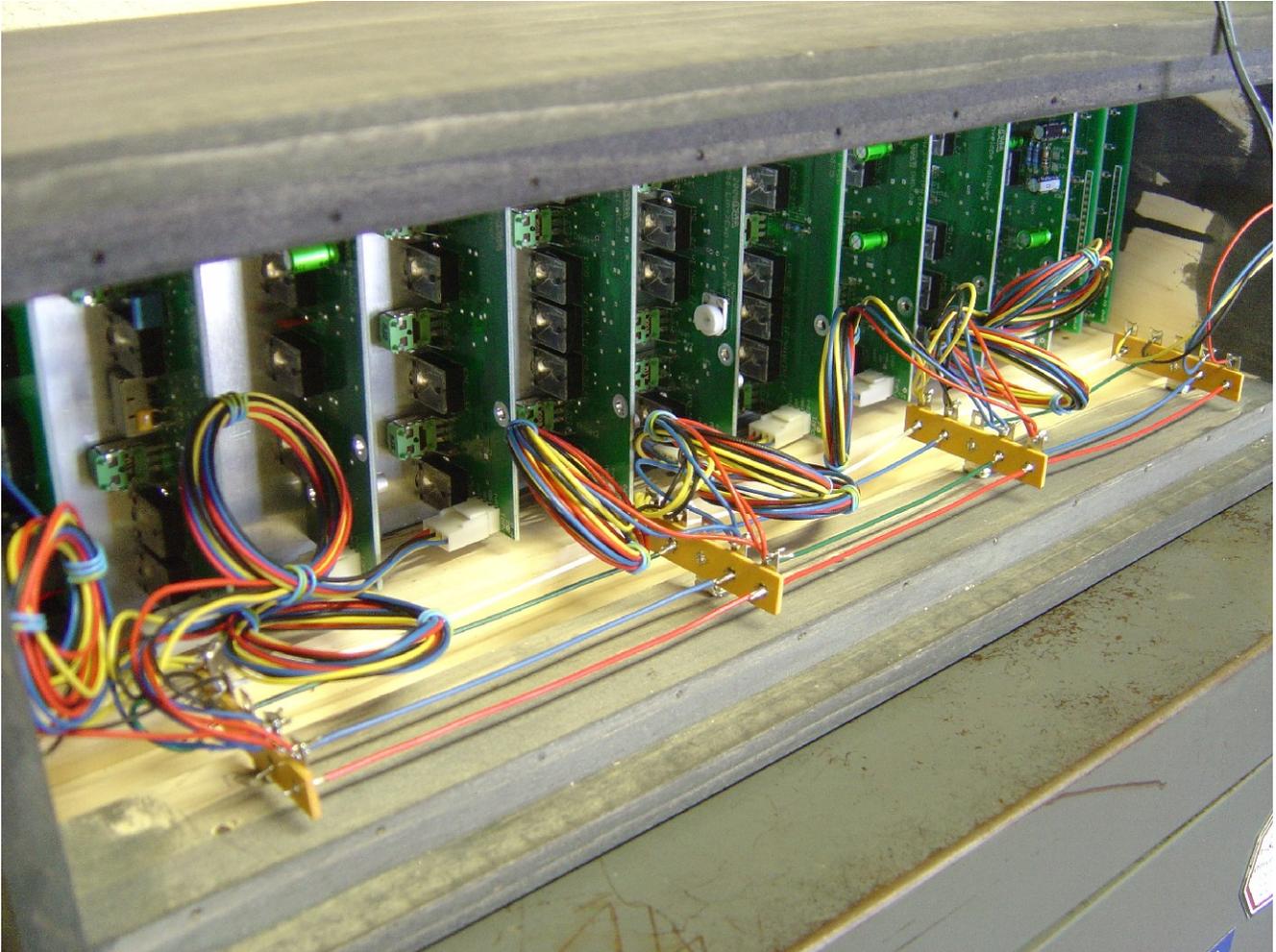
This first example of a power distribution scheme uses four, five-lug terminal strips to extend the four circuits of a 9770 Series power supply to reach a set of the new 9700 Series modules. The middle of the five terminals is the same metal as the mounting hole that extends at a right-angle from the base of the strip, so it is not used so as to keep the power supply circuits isolated from the chassis if it is metal. Lengths of insulated wire were prepared and used to link the rivet-holes of the lugs, one to the next, for the four strips, for each of the four circuits V+, G, SG, and V-. Radio Shack has these strips in a four-pack for about \$2.

The power supply attaches as one end and three sets of three power supply connector cables solder to the lugs of the other three strips. This example has the cables left at their maximum lengths, but they may be trimmed to be shorter but not so short that the module can't be detached from the chassis if not accessible from the rear. The excess was coiled and some short lengths of insulated solid wire used to wrap opposing sides of the coils together.

The second example uses prototyping board with copper strips linking holes on the board. It has been cut to a four-wide strip and has connectors (vertical, four-pin 0.1" spaced headers) so the modules can be unplugged at this end too, or instead of at the

module. Low value, 0.01 to 0.1 uF capacitors have been added between taps for increased filtering of the supplies.

Power Buss with Wires/Terminal-strips



The four sets of insulated wire lengths are measured to extend slightly more than the span from one strip to the next, insulation stripped to be slightly short of the span, and the wires smoothed, straightened, and positioned between strip rivet-holes. The end not receiving an extending set of wires is soldered and the next set prepared and added in a similar fashion. Finally, the last set of wires is soldered to the end strip. The lugs of the strips can then hold several power connector cable sets, with the terminations soldered.

Prototype Strip Board Four-circuit Supply Extender



Prototyping strip board such as model ST3U or ST6U by BusBoard Prototype Systems and available at Mouser can be cut down to hold the connectors used in the PAiA system. The four strips are wired to terminals and a housing for connection with a header on a PAiA power supply.

PAiA power supply, chassis, and connector cable details.

The 9770 series power supplies are available with the following dc voltage ratings:

Unregulated, +and- 18v (9770-U)

Regulated, +and- 12v (9770R-12)

Regulated, +and-15v (9770R-15).

These three versions all use the same printed circuit board with some minor variations.

A 12vac 1A wall-mount transformer is provided as the power source for each of the kits. The basic circuit is a voltage doubler so there are +18 and -18v outputs under 350mA each. This circuit is modified with voltage regulators for 12v regulated outputs at about 200mA each or for 15v at about 80mA each.

There are six, four-circuit power connection points (+)(G)(SG)(-) on the boards where power cables can be wired or 0.1" spacing headers used for connection. The G circuit is the circuit-common/ground for the power supply filter circuits, LED circuits etc, and the SG is the audio or signal ground.

There are the parts available from Mouser for making power supply connector cables. These cable items are included in the FR-7 Fractional Rack-mount 'FracRak' FRM accessory modules for the 9710, 9720 and 9730 modules with instructions for the assemblies in the kit manuals. Completed assemblies are provided in new 9700 Series modules.

Four Pin Header

<http://www.mouser.com/search/refine.aspx?Ntt=538-22-23-2041%09>

Four Pin Terminal Housing

<http://www.mouser.com/search/refine.aspx?Ntt=538-22-01-3047>

Terminals

<http://www.mouser.com/search/refine.aspx?Ntt=538-08-50-0114>

The power supply kits can mount in an FR-7 and not occupy any of the ten single spaces using a power wing panel, FR-PWP. Links for this and an image of it installed on an FR-7 are copied below.

FR-PWP

<http://www.paia.com/proddetail.asp?prod=FR%2DPWP&cat=44>

FR-7 (shown with options for FR-PWP and a 9770 series supply mounted inside)

<http://www.paia.com/proddetail.asp?prod=FR%2D7>

9770 Series Power Supply Modifications

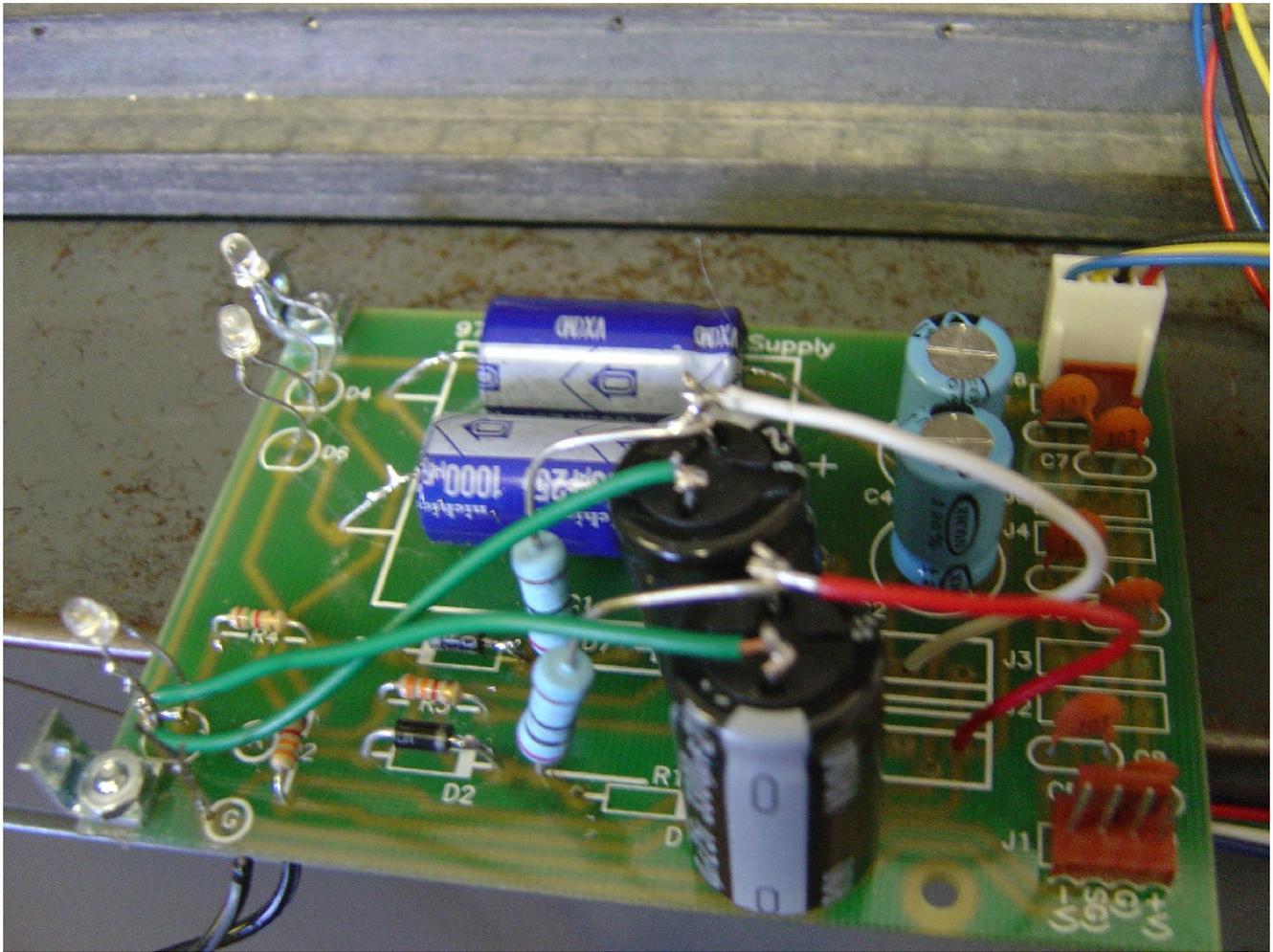
9770R-15

A 9770R-15 can be modified for more output power by ordering the kit less the transformer and obtaining a substitute. Contact sales@paia.com for a discount coupon code, or make the request in the shopping cart comment field. Suitable substitutes are with voltages ranging 14-16vac rated at 400mA or more (any connector on the end is not a concern as the instructions are to strip and solder the wire ends direct). Mouser stocks types made by Triad and AMESCO. Note you'll see in the instructions for the 9770R-15 that a 14vac, 400mA transformer is specified: however we stopped stocking this part and now provided a 12vac with all versions. The more powerful transformer is needed though for a complete set of modules. Again, a new, more powerful dual, 15v regulated supply is in the works.

9770

A 9770U needs additional resistor-capacitor filtering parts built into it. If already built, remove diodes D7 and D1 to open the path between the rectified-filtered DC power supply circuits and the six, four-circuit power supply connection areas. Otherwise, do not install D1 and D7 when assembling the 9770U.

Reference the following image for the remainder of the procedure.



Position two 3300uF/25v electrolytic capacitors, legs-up, in the area of D7/R5 and D1/R1.

Two 20ohm/1W resistors will be used to connect the rectified-filtered DC supplies to these capacitors.

Insert one resistor to the hole nearest and joined by a printed-circuit trace to D5 and arc the free end up to join with the minus end of added capacitor (Cneg). Trim the resistor to just slightly longer than is needed to make the link and form a crook in the end to secure to the capacitor leg. Solder the resistor at the capacitor and the board.

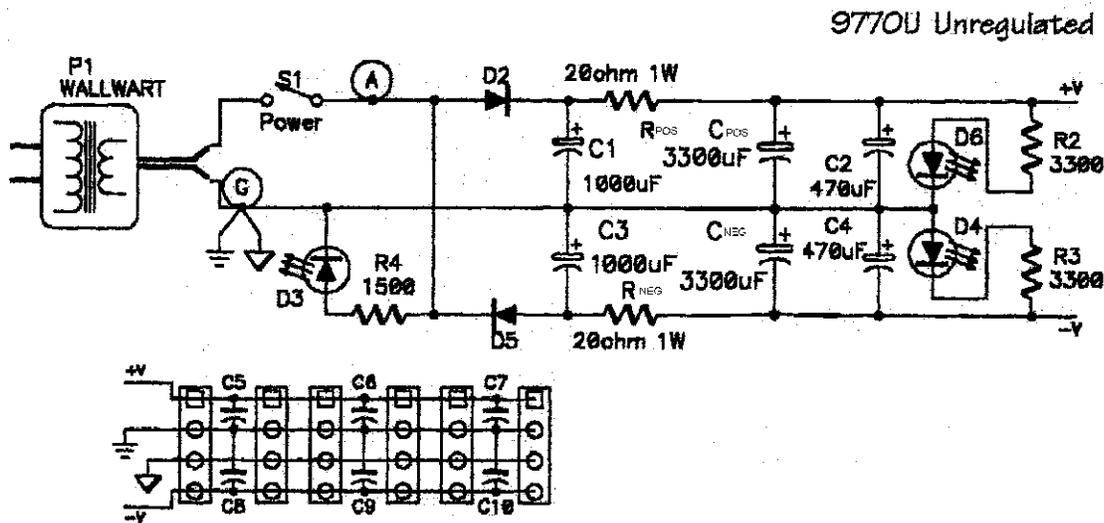
In a similar manner, prepare and solder the second resistor to join the D2 node to the plus leg of added capacitor Cpos.

Prepare insulated, stranded wire lengths with crooks at each end to tie the free legs of each added capacitor to the minus or cathode leg (marked with a flat edge of the circular

graphic) of LED D3, or, a bare wire length added to extend pcb wiring point G (and to hold the transformer wire for this point). It is important to use this specific location or node for the ground for these added power supply filtering components.

Prepare two more insulated, stranded lengths of wire to make the run from the junctions of added capacitor/resistor sets to points in the IC1 and IC2 voltage regulator graphic outlines. The Cneg junction goes to the nearest of the three holes for IC2 and the Cpos junction goes to farthest of the three holes for IC1 (the V- and V+ circuits, respectively).

Finally (*and this goes against what would seem to be correct or advisable*), on my test set-up from the supply to the terminal strip distributed power, I found it necessary to bridge the G and SG joints at the 9770 J6 area, further minimizing hum-causing ripple currents. Hum, which can be apparent in the 9748 Balanced modulator when not on a regulated supply, was practically eliminated with the addition of one more link between the G and SG circuits — out at the last terminal strip lugs for the distributed power.



9770U with increased filtering (R/Cpos, R/Cneg).