

## AP12-XXX networks

The AP12-xx series networks are designed to operate with the Klipsch K33 woofer which represents an impedance of 6 Ohms in series with 1 mHy voice coil inductance. The inductance becomes part of the filter leaving the 6 Ohm component to become the actual resistive load impedance seen by the amplifier. It will operate in a 2-way system or in a 3-way system with the addition of a separate squawker / tweeter crossover such as the ES5800 from the 4 or 8 ohms amplifier connection.

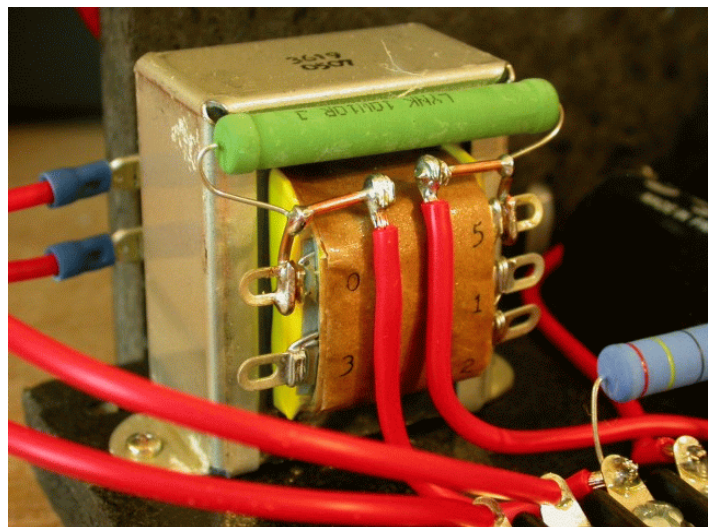
### Driver level and the transformer

High frequency drivers are somewhat more efficient than the Klipsch woofer. This requires that the squawker driver or high frequency driver level in a two-way system be reduced slightly. With the reduced losses of the higher quality components used in the new crossover and a long list of other factors, it is difficult to know exactly what the "correct" level should be. A method has been worked out to allow you to adjust the level to your taste. A resistor pad attenuator could be used, but an autotransformer will allow the needed attenuation without divorcing the amplifiers damping factor from the speaker driver. This yields better frequency and transient response. The "normal" setting is between -3.8 and -9.5 dB. This can be considered a starting place. Change the settings to suit your own taste. Whatever setting sounds right IS right!

A transformer reduces the level by reducing the voltage applied to the driver as a direct function of its turns ratio. A transformer however, has the disadvantage of increasing the load impedance presented to the amplifier by the square of this ratio. By calculating the impedance ratio of various transformer tap connections, it is possible to determine the value of swamping resistor to connect across the input of the transformer to yield a nearly perfect impedance match to the filter and amplifier. Although it would not seem logical that the impedance of the driver in use would not matter, it doesn't. So long as the driver being used has an efficiency rating in the 105 to 110 dB range, the impedance reflected back through the transformer will be nearly the same. A table of transformer settings is provided below.

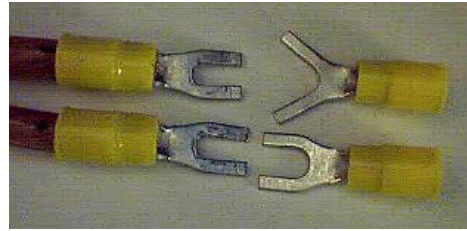
The settings can be changed by simply pulling the connectors off and pushing different ones on. The table below indicates the attenuation using different tap connections. Note that some options do NOT connect the squawker driver to common ground (tap 0) but rather between two other taps.

Plug (-)	Plug (+)	Attenuation dB	
x - 5	1 - 5	1.7	(Loudest)
1 - 5	0 - 4	2.5	
0 - 4	2 - 5	3.0	Ohms
2 - 5	x - 4	3.8 < 16	
x - 4	0 - 3	5.5 < 16	Normal settings
0 - 3	1 - 4	6.0 < 16, 8	
1 - 4	0 - 2	6.8 < 8	
0 - 2	x - 3	9.0 < 8	
x - 3	0 - 1	9.8	
0 - 1	3 - 4	12.0	
3 - 4	0 - x	13.7	
0 - x	2 - 3	15.0	
2 - 3		16.7	(Quietest)



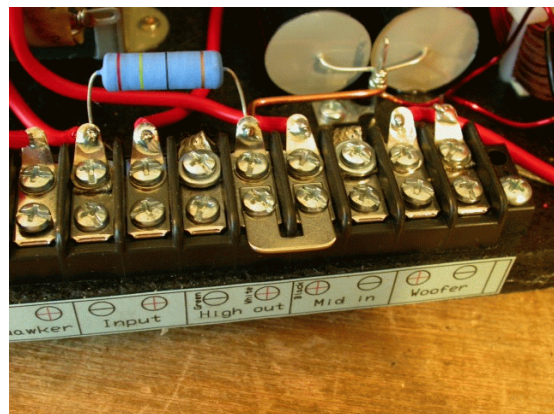
## Big cables

Many installations make use of very heavy speaker cables such as “Monster cable”. Finding a spade lug that will both fit the #6 screws on the barrier blocks and the heavy wire can be a problem. A simple and inexpensive solution is to modify spade terminals intended for larger screw sizes. An example is Gardener Bender terminals (10-116) available at Lowes building supply stores. These are intended for 12 - 10 AWG wire and #8 - #10 screws. Simply spread the two “fingers” using pliers and bend them back on a tighter radius. This looks to be difficult but is actually very easy to do.



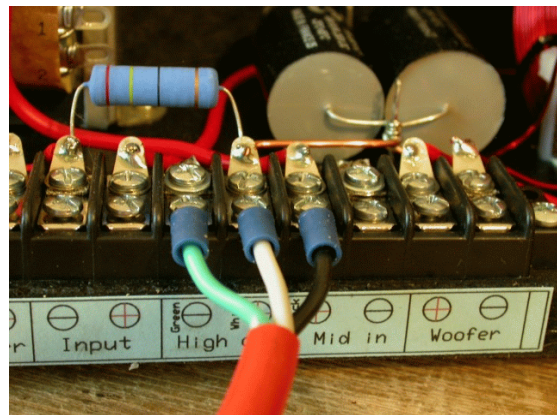
## Two-way operation

A two-way strap may be installed to connect the high frequency output of the woofer / squawker crossover back to the transformer. In this configuration all frequencies above the crossover will go through the transformer to the high frequency driver. The strap connects the **Mid in** to the **High out** barrier block connections.

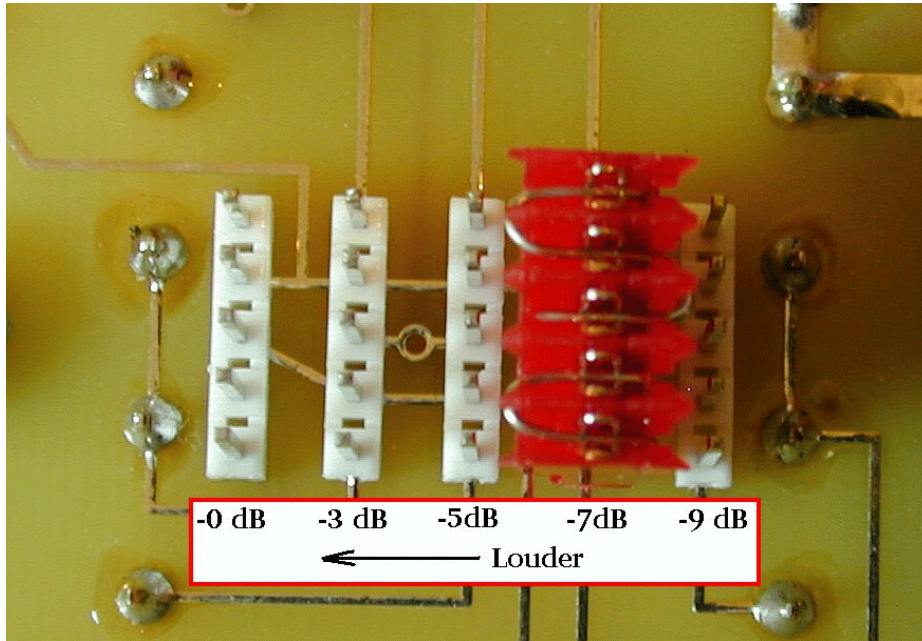


## Three-way operation

When a separate tweeter is to be used in a three-way configuration the two-way strap can be removed and replaced with a three wire cable that will carry everything above woofer's range to a separate squawker / tweeter crossover network. It will also carry the frequency range for the squawker back to the transformer. The barrier block is marked green, white and black for the cable that is provided with the ES5800 network. Any passive crossover designed for an 8 Ohm system may be used.



## ES5800 Squawker / tweeter network



The 5800 Hz squawker / tweeter crossover provides an adjustable attenuator equalize the tweeter level with the squawker. Normal settings with the Klipsch K77 and most quality tweeters will be -5 or -7 dB. Higher numbers result in lower tweeter levels. Moving the plug to the right results in quieter highs and a “softer” sound. -9 dB is the softest setting and 0 dB is the

loudest highs resulting a “crisper” sound. As with the tap settings for the squawker, what sounds right is right!

The ES5800 is designed to operate with the ES700T, ES600T, ES500T or AP12 series woofer / squawker networks. A 3-wire cable is provided that carries everything above woofer frequency range to the ES5800 and returns the squawker signal (below 5800 Hz) back to the transformer located on the woofer / squawker network. The barrier block terminals are marked green, white and black corresponding to the wire colors in the cable. The tweeter is connect to the barrier block on the ES5800.

### Installation

Place the old screws through the holes in the new network and tap each lightly with a small hammer. This will make marks which will locate where to drill pilot holes. It is not recommended that you tighten the mounting screws completely. These should be left about one quarter turn from tight. This will prevent the bottom cushions from being compressed.

Make sure each driver is connected to the connections marked for it on the network and that the + terminal is connected to the + terminal of each driver.

### Power handling

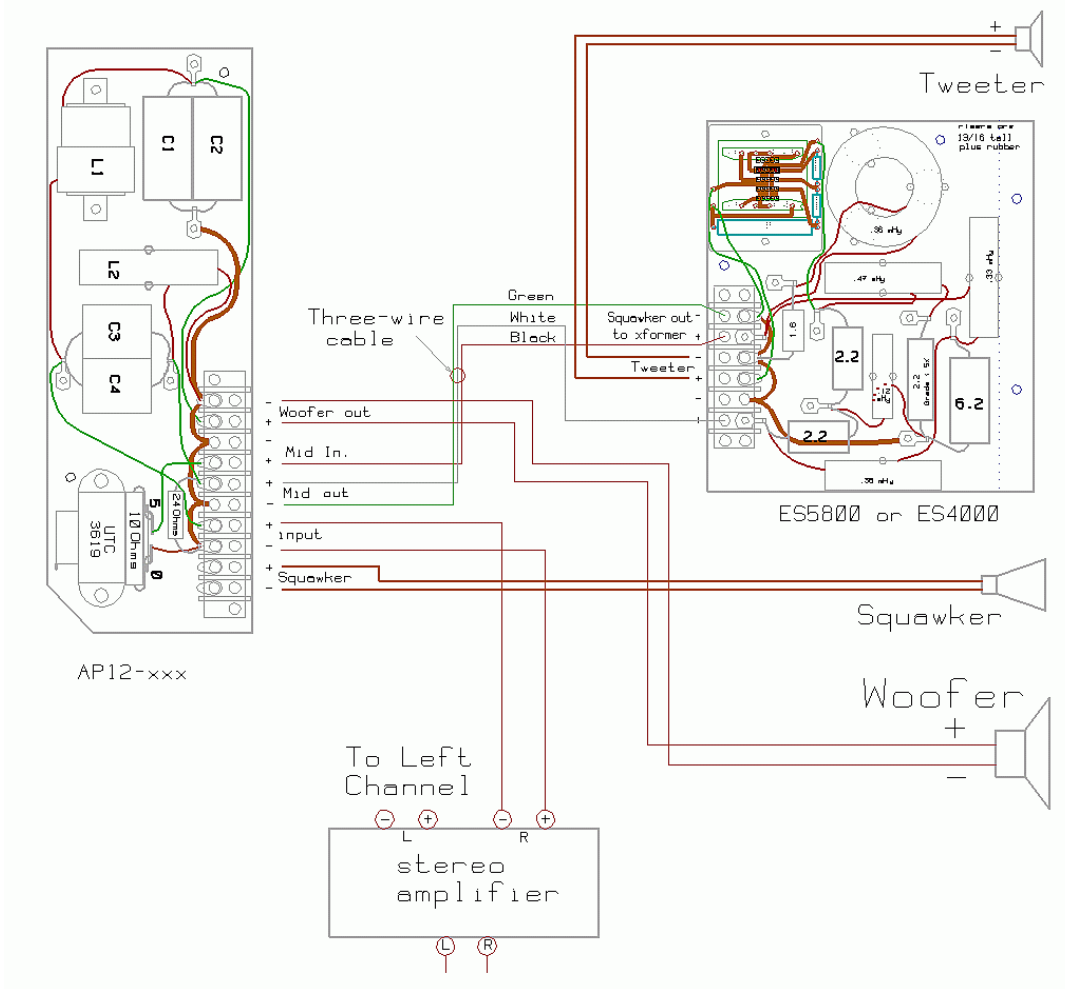
No extreme measures have been taken to protect the tweeter from damage caused by high power levels. These protection circuits cause distortion and are therefore considered inappropriate for an upgrade designed solely for improved sound quality such as this. The extreme filter slopes used in the ES5800 network reduce unwanted low frequencies very rapidly. This allows the tweeter to operate at a lower average level for any given volume setting than with normal first, second or even third order crossover networks. Keep in mind however that extreme levels could

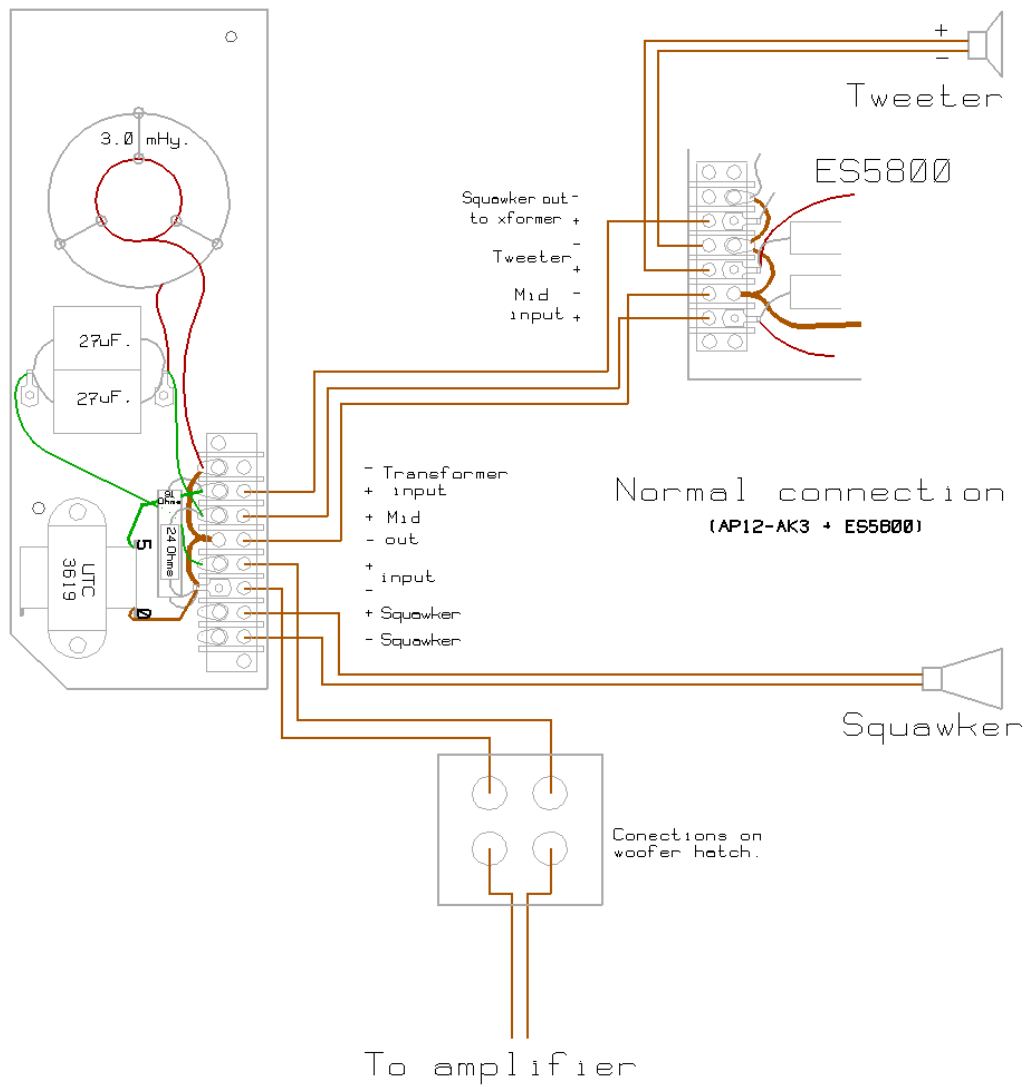
blow the tweeter! In the case of two-way operation, a high frequency wide range driver is also better protected from low frequencies by extreme-slopes but is still vulnerable to extreme levels. The AP12 series woofer / squawker networks provide very little protection for the squawker driver from extreme lows. It is NOT a good idea to operate the Klipschorn two-way for this reason (AP12-350 or AP12-AK3).

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### Normal single-amp operation AP12-xxx





AP12-AK3 model

# Bi-Amp operation AP12-xxx

