



# Cup-a-Soup

## Cup-a-Soup – Honey, who shrunk the Soup?

Like the Avalon style cabinet but the Soup is too large or too expensive? Here is the solution: a compact bookshelf version using the midwoofer and tweeter of the original Soup.



### The tweeter

The [Thiel & Partner C2-12/6](#) is a Ferro fluid filled tweeter with a 25 mm lightweight concave ceramic dome. Designed for 3-way systems or small, low-output 2-way designs. Very high resolution and very good dispersion up to 42 kHz. Low resonance frequency allows first order filtering and a crossover frequency as low as 2 kHz. The ultra hard ceramic dome material moves like a piston well above the audible frequency band and the high internal sound velocity features very low distortion and virtually no coloration.

### The mid-woofer

The [Thiel & Partner C2-89/T6](#) is a bass-midrange driver with a 90 mm light weight concave ceramic dome, high loss rubber surround and titanium voice coil former. Made without ears for high excursion. Designed for small 2-way systems as bass-midrange driver or high quality 3-way systems as low midrange. Very high resolution and very good dispersion up to 5 kHz. Low resonance frequency allows first order filtering and a crossover frequency as high as 4000 Hz. The ultra hard ceramic dome material moves like a piston well above the audible frequency band and the high internal sound velocity features very low distortion and virtually no coloration.



*The drivers.*

### The cabinet inside and out

The cabinets were built by Guido Smitsmans from The Netherlands and made of 18mm+4mm mdf; the front baffle is extra thick with a total thickness of 48mm. The cabinet features a faceted front baffle; a shape that further reduces diffraction, allows for a thicker baffle, and contributes to wider dispersion. The entire faceted structure is a solid block made from three layers of mdf. To create the angled baffle the four corners were away as can be seen on the photos below. Internally there are no bradings due to the already sturdy construction and one of the design criteria was to keep the enclosure as compact as possible. All internal walls are covered with a layer of 4mm thick bitumen and thick carpet tiles with a bituminous backing to add extra mass and control panel vibrations. The enclosure is filled completely with sheep's wool. The area around the reflex port is left clear. The 18mm thick black painted base-plate acts as a visual plinth to give the speaker a more graceful appearance and adds a little extra weight and

strength to the enclosure. The Cup-a-Soup is a ported design to give deeper bass extension. The cabinet's swept-back profile better time-aligns the drivers.

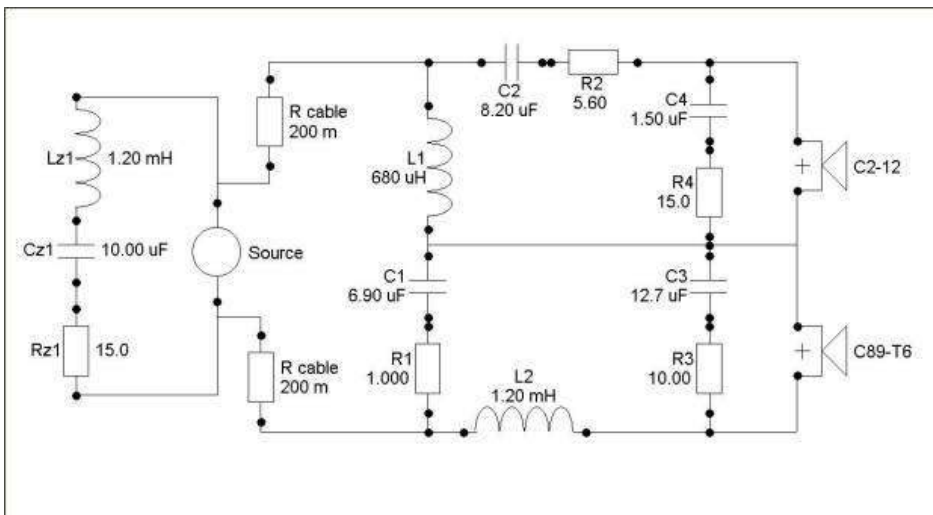


*A higher resolution drawing is available on request.*



### Crossover and listening.

The midwoofer / tweeter network is a symmetric 2<sup>nd</sup> order series crossover. Inductor L1 and C2 form the high-pass for the tweeter and C1 and L2 the low-pass for the woofer. This low-pass function is mildly damped by resistor R1 which acts as part of the tweeter damping network, R2 is the other half - tweaking the values of R1 will match the treble to your person taste. Furthermore the woofer and the tweeter have a parallel Zobel-network that compensates the natural impedance rise due to the voice-coil inductance of each driver, the tweeter RC-network also acts as a slight taming of the upper most frequencies. Finally L2 also works as a baffle-step compensation to bring down the midrange produced by the woofer in line with the bass region. All components are chosen for a good price/quality ratio. There is no stopping you using even better grade components but you may have to build an external crossover to house these things anyway. For C2 for example, I used a combination of 3,3uF + 4,7uF AmpOhm FP-CA-AU Film and Foil with 0,22uF Jensen paper-in-oil and a 0,01uF Vishay MKP1837.





### Crossover components:

L1 = 0,68 mH Intertechnik Tritec inductor 3,5 mm wire, R = 0,11ohms

L2 = 1,20 mH Intertechnik Tritec inductor 3,5 mm wire, R = 0,16ohms

Lz = 1,2 mH air-core inductor 0,71 mm wire, R = 0,61ohms

C1 = 6,8uF + 0,1uF Mundorf Supreme MKP polypropylene foil capacitor\*

C2 = 8,2uF Mundorf Supreme MKP polypropylene foil capacitor\*

C3 = 10uF + 2,7uF Mundorf M-Cap MKP polypropylene foil capacitor\*

C4 = 1,5uF Mundorf M-Cap MKP polypropylene foil capacitor\*

Cz = 10uF MKP polypropylene foil capacitor

R1 = 1,0 ohms, 10 watts metal film resistor

R2 = 5,6 ohms, 10 watts metal film resistor

R3 = 10 ohms, 10 watts metal film resistor

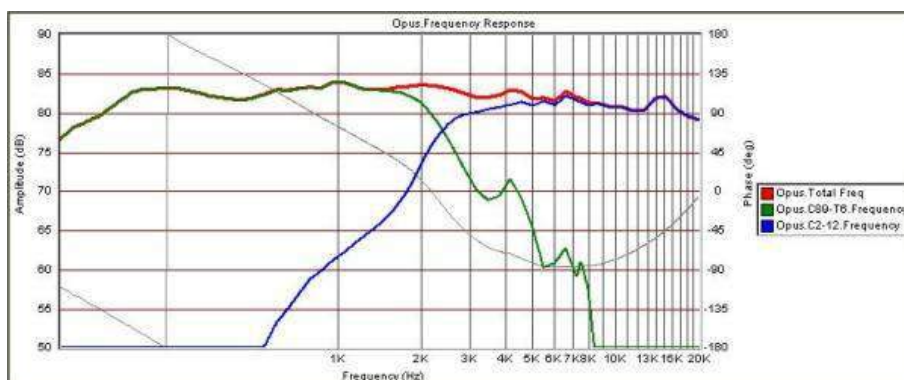
R4 = 15 ohms, 10 watts metal film resistor

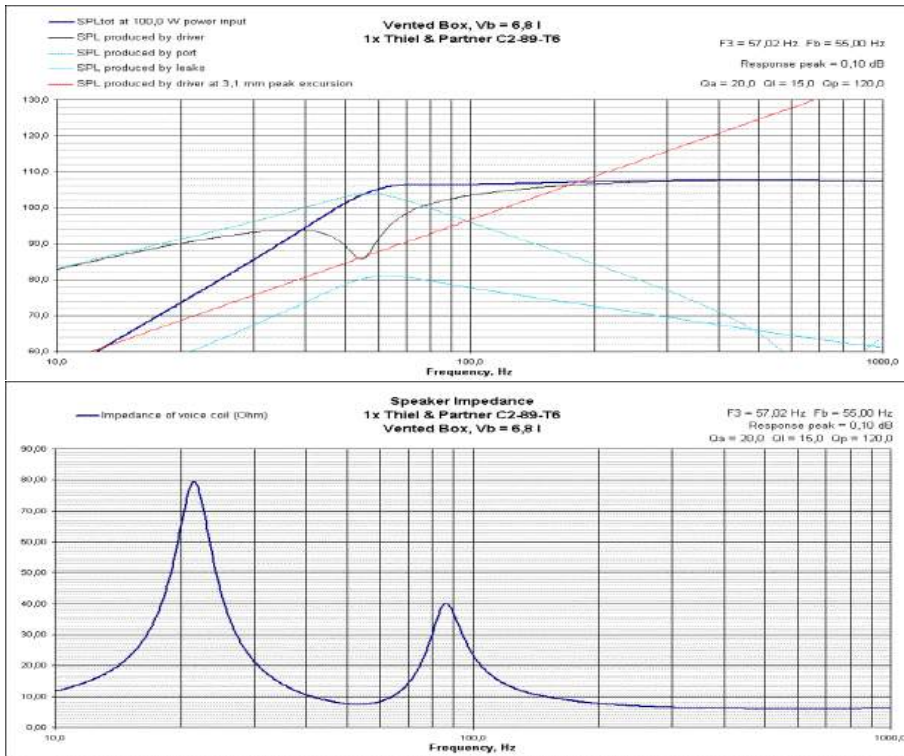
Rz = 15 ohms, 10 watts cemented resistor

\*Small bypass capacitors of the type 0,01uF Vishay MKP1837 can be added to each capacitor to add detail and smoothness.

As with all Accuton / Thiel&Partner drivers they need about 8 weeks of burn-in time (under normal listening conditions) before they open-up. Before burn-in they sound cold, constrained and lack bass and dynamics but after burn-in you are rewarded with a well balanced speaker that offers you a nice black-background, lets you hear everything it's fed (can be a bad thing sometimes!) and sounds larger than its physical dimensions suggest. Treble is well etched and smooth at the same time, the midrange is clear and slightly forward, bass is tight and well defined, never thick.

### Measurements





Overall output level is within  $\pm 1,5$  dB's. The crossover point is centred at about 250 Hz. Sensitivity is specified at about 83 dB at 2.83 V and 1 meter. The tuning frequency of the box/port combination is 57 Hz giving a  $-3$  dB point around 57 Hz, not bad for such a small system. The nominal impedance ranges from 7 ohms in the bass to 12 ohms in the treble; impedance minimum is 6,5 ohms at 220 Hz and the electrical phase is moderate so a very easy load for most amplifiers although they do like a bit of power due to the low efficiency.





NOTE: This design is strictly for the home DIY enthusiast and not to be used professionally without my permission!

Tony Gee, The Netherlands

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