

# Soma

## General description

Soma is a clear departure from the old "passive EQ:s are for general shaping only" paradigm. It is the only commercially available passive EQ with real Q adjustment, which makes it more usable and accurate than other products which use only a resistor based Q adjustment which affects boost/cut amount and does not offer a wide range.

It is not surprising that this type of "real Q adjustment" passive EQs have not existed before Knif Soma. When passive circuits reigned the EQ world there was no feasible technology available for the rather complex requirements. And when engineers started to require more control, active circuits were already there and thus passive designs were abandoned until it was realized that they offer superb sonic results. It was taken for granted that they have their limitations and were used accordingly.

Well implemented real Q adjustment in passive EQs requires logic circuits and a lot of subminiature relays (around 140 pieces in Soma). Signal path in Soma is short, because frequency and Q adjustment (switching different capacitors and inductances) is executed locally and signal is taken to the front panel for gain control only.

Because reliability and long time ease of repair is important, there are no programmable IC:s or microcontrollers. Only basic CMOS logic is used. Relays are rated for 100 million operations and thus it is likely that not a single one will ever break.

MS-matrix in Soma is passive, transformer based, and does not add one single component in the signal path and thus does not degrade sonic performance. Input and output transformers have multiple windings which are switched locally, with relays, to perform sum and difference operations.

Filter section is very simple. There is the possibility to switch S-channel high pass for 6dB/oct for "elliptical" bass equalizing.

Filter caps are mostly polypropylene. Only in the lowest range it was necessary to use some polyester ones. Coils (enclosed in mu-metal) are hand wound by Mr.Knif and have maximum amount of taps to make the Q-adjustment possible. Make up gain amplifier is a simple two-stage thing with moderate amount of feedback, with tubes of course. Soma has individual discrete regulators for anode supplies, mu-shielded signal transformers, all teflon/copper/silver wiring, no connectors on signal path.

Since the unit runs quite cool, ventilation above it is not necessary unless there are hot equipment next to it.

## **MS codecs**

These work with combining input and output transformer windings. No extra electronics is switched on the signal path. Since the impedances change a bit, there is about 0,1dB level loss when switching the unit into MS modes and output impedance doubles. The codecs work along this “math” :

Input:

$$M=(L+R) / 2$$

$$S=(L-R) / 2$$

Output:

$$L=(M+S)$$

$$R=(M-S)$$

This way the level inside the EQ stays the same for M-channel as for mono material. This is smart because most program material has maximum level content in the center.

## **+6dB switch**

This connects input transformers in a different way raising the signal level to EQ circuits.

## **Filters**

HP filter slopes are gentle, with round corner, and reach 12dB/oct. Right (Side) channel HP can also be switched for elliptic filter, which has 6dB/oct slope.

LP filter slopes are standard 12dB/oct.

## **About parallel passive circuit**

Bands interact in some surprising ways, but in general typical combinations have fairly logical outcomes. It may be a good exercise to just play with white noise and spectrum analyzer to get a picture of what can happen.

## **Hints and tips**

-Some parasitic capacitances in the circuits generate very small, very high Q dips when bands are off. They are not audible, but in general one should use the band on/off for comparisons, and if a band is not needed, then theoretically the best option is to keep it on and at zero dB.

-The internal level of Soma is fairly low to keep colorations caused by inductors low. If more obvious color is needed, switch on “+6” and use Trim levels to compensate.

-Sometimes very low frequency, high level bass can sound a bit muddy. In these cases a drop in the level of the mastering chain will help.

## Trimming procedures

There are only 2 trimmers inside, near the smaller tubes for gains. Checking channel balance periodically is a good idea because when tubes age, their gain changes.

## Tubes

2 pieces of 12AY7 and 6H30Pi. These don't necessarily need to be matched, but we here at Knif Audio test and grade tubes according to their distortion characteristics to make matched sets. Typically 2<sup>nd</sup> harmonic distortion is between 0.2 and 0.4% @ 20dBu and 1kHz.

It is difficult to know when exactly tubes will be too old. Keep adjusting the gains every now and then, perhaps twice a year, and check how the gain of the unit changes. When tubes age distortion will keep raising, and ends of frequency spectrum start to loose definition. With normal luck 5 years of everyday use should be OK.

## Some specifications

Input impedance	8k minimum (depends on EQ setting)
Output impedance	150 Ohms (300 Ohms with codec)
Maximum output level	25 dBu
Frequency response, -1dB points	10Hz and 55kHz
Noise level (tubes in good condition)	-90 dBu A-weighted

## Typical faults

Soma has been a solid performer. Sometimes an output tube shorts. If this happens, a 50mA fuse on the power supply board will trip. There is one for each channel.

Unfortunately earliest units don't have these fuses and bigger damage may be possible.

## Revision history

2 earliest units (from ca 2012) have C3g and 12AX7 tubes.

At some point +6dB switch was added.

From 2015 the output transformer has been equipped with static shield. (this can be seen from the output transformer circuit board, which now has one black wire too.)

## The issue with “ingenious” line receivers (for example in Dangerous gear)

These chips, made by THAT corporation may be “ingenious” but they have one fundamental issue which comes with the indefinite common mode impedance. They do not work well with floating tube amp outputs, and can even self destruct. This is why we have built our gear for many years with “not quite floating” outputs, i.e. we have resistors from transformer secondaries and signal output to ground.

The earliest units don't have these. Also, unfortunately a batch of Somas made in 2014 have these resistors floating due to a PCB mistake. Please contact Knif Audio if you experience interfacing problems.

