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Kora 3T Phono Stage History and Circuit

Good sounding circuits can be developed in many different ways. Sometimes a new circuit idea appears, sometimes a fine tuning and a careful selection of components for a well known circuit can produce great results, sometimes a particular device, like the famous 300B valve shapes a whole range of designs.

The Kora 3T phono stage is a combination of a rarely used but generally known topology with a particular type of a field-effect transistor (FET). The topology in itself is known from valve electronics and I've used it successfully in many of my previous solid-state designs, with both bipolar transistors and FETs, starting from about 1980. However I was taken by surprise when I've tried a particular FET in my phono stage circuit in February of 2008. It started almost as a joke as to my knowledge nobody did use that device in phono stages before, probably even in audio applications in general - at least I've never met an audio circuit with this FET. I did come across a number of these devices by accident, as I bought them a long while ago for a non-audio application, and one day, after measuring some of their parameters (not listed in the datasheet) I've decided to try these in my FET-only phono stage circuit I was developing (at the time with fairly common and considered to be well suited for that job devices).

I did not expect much - my main interest was just to see, if it was at all possible to use these devices in the audio field. When I've hooked a crude bread-boarded circuit to my usual vinyl setup in place of my then current design (which was already considerably better than my previous best and well-respected phono stage I've designed for Creek Audio around 1995-1996 - Creek OBH-8SE), I was completely unprepared to what happened next - this simple, only 3 FETs per channel circuit easily bettered my best previous efforts. Pretty soon I've discovered that the circuit can be precisely tuned for the best sound with a particular cartridge by changing a DC operating point of FETs in a certain range.

At that moment I've built several prototypes and sent these out to few friends with good vinyl experience. After a while one of them, from the US, asked me, if I could make another version for him, using the best premium components and best building techniques available to me. I did that for him and his response was that he could not believe the quality of the sound and a musical nature of that small box. In his opinion it did sound much better than his previous best choice - custom modified EAR. However it took me more than 40 hours to build that version and it would not be possible for me to make such a device viable in production, so I had to develop a somewhat simpler to build version trying to keep as much as possible of the performance level available from these FETs. At the same time I was looking for an alternative FET as the original device was no longer in production though I've managed to obtain some quantity of these. My search resulted in another discovery - a common BSS139 DFET from Infineon did perform almost as good as my original choice FET in most respects - though with about 4-6dB more noise (still providing more than an adequate SNR for a MM phono stage).

The result of this development was the Kora 3T phono stage - produced originally in 3 quality levels - "Standard", "Special Edition" and "Limited Edition", the latter is the closest in quality to the ultimate version I've made earlier, using my originally discovered FETs. All 3 share exactly the same electrical circuit, the difference made only by components quality and the FETs used. On the "standard" version I've also omitted a pot for a user-adjustable biasing. Later in the year, on request from some of my friends and customers I've started the development of the MC version. By November 2008 the Kora 3T MC was born, both in SE and LE variants. Higher gain required for MC did force me to add one more transistor per channel but I've kept the "3T" in the name though the "4T" would be more appropriate.

I can add few words about the circuit I've used - it is a single-ended class A voltage amplifying stage and an output follower, EQ is passive, there is no global feedback. But these are all technical terms and such techniques are used by many manufacturers. What I've got in the Kora 3T design is a marriage made in heaven - between a particular topology and particular devices, a rare combination of properties resulting in a top quality sound. And sorry, no, I am not going to tell you what device I am using in the top level Limited Edition version. There should be some mysteries in this world. On the other hand, as I am no longer making the original Kora 3T Standard and Special Edition versions (though a further development of this circuit is going into production shortly) I publish here the circuit diagrams for both MM SE and MC SE versions. I am quite happy for these circuits to be used for DIY by audio enthusiasts but not for business purposes without my written authorisation.

Fig1 Kora 3T MM version

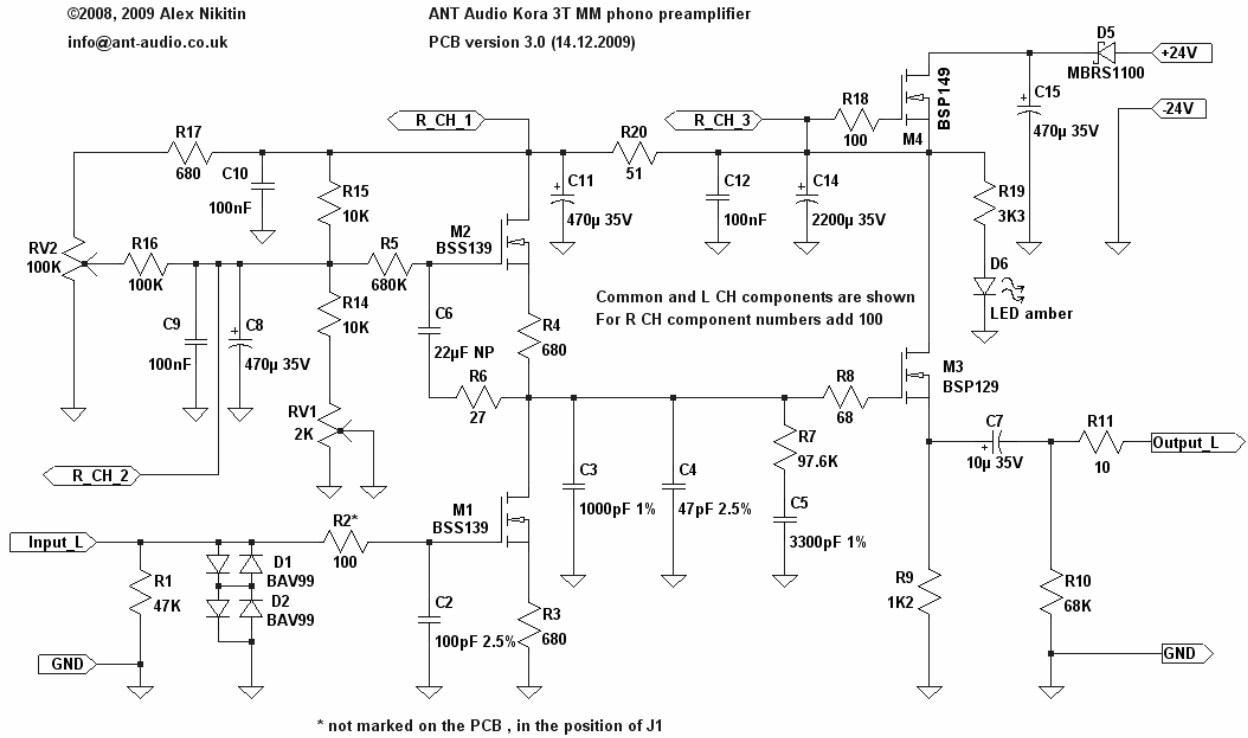


Fig2 Kora 3T MC version

