



## APPLICATION NOTE: SPECIFICATIONS FOR PPZ TYPE TRANSFORMERS

**PPZ stands for: Push Pull Zero air gap. For Single Ended Parafeed, or for perfectly balanced tubes in PP configuration.**

*First we must explain what normal PP transformers do. It is not so well known, that all Lundahl PP transformers still have a small air gap, to allow a DC imbalance in Push Pull mode. This is an excellent feature, but it costs money since it gives the transformer almost twice the weight. So you will find many PP transformers from other vendors that do not have an airgap. Also it helps to understand the higher price of the Lundahls. With this company, you do not get just something that works on paper, you get something that works in reality.*

A small imbalance can occur when each of the two driver tubes is not having the same bias current, or when the output signal of the tubes is not identical amplitude.

*A different bias current* will occur when tubes are not perfectly matched. This can happen under the following circumstances:

- the tubes are matched for transconductance only.
- the tubes are matched for DC current only
- the tubes have aged. (no pair of tubes will age the same way).

*Output signal imbalance* will result in a magnetic DC component through the core. Note, each tube outputs a half-wave, which has by definition a DC component. This DC component will only be compensated, when it is the same for each transformer half, and that again is only the case when the AC OUTPUT signal of the tubes is identical. For this we need to following conditions:

- the tubes must have the same bias current
- the tubes must have the same gain, which is normally the case if both transconductance and plate resistance is the same.
- the input signal must be the same.

So you see, there are many ways to get an unwanted DC component. The margin for this DC component is 15% of the maximum flux, but it comes from a real air gap. This number of 15% is an estimation, it is not officially specified.

### **The PPZ transformer**

This type of transformer has indeed zero airgap, and consequently this type (ALL BRANDS) can only be used when none of the constraints apply as described above.

A very interesting application is Single Ended parafeed, where you split the normal transformer function, in a Choke for the DC component, and a capacitor coupled pure AC signal. The advantage of a PPZ transformers is, you have estimated TWICE the inductance. This is why they are made. However PPZ transformers are unofficial products. At JAC Music we stock many types though, just check the pricelist for specifications.