

... Why transformers make a humming noise?

Transformer noise is caused by a phenomenon which causes a piece of magnetic sheet steel to extend itself when magnetized. When the magnetization is taken away, it goes back to its original condition. This phenomenon is scientifically referred to as magnetostriction. A transformer is magnetically excited by an alternating current & voltage so that it becomes extended and contracted twice during a full cycle of magnetization.

The magnetization of any given point on the sheet varies, so the extension and contraction is not uniform. A transformer core is made from many sheets of special steel to reduce losses and moderate the ensuing heating effect. The extensions and contractions are taking place erratically all over a sheet and each sheet is behaving erratically with respect to its neighbor, so you can see what a moving, writhing construction it is when excited.

These extensions are miniscule proportionally and therefore not normally visible to the naked eye. However, they are sufficient to cause a vibration, and consequently noise. Applying voltage to a transformer produces a magnetic flux, or magnetic lines of force in the core. The degree of flux determines the amount of magnetostriction and hence, the noise level.



Reducing flux level helps to reduce noise? Transformer voltages are fixed by system requirements. The ratio of these voltages to the number of turns in the winding determines the amount of magnetization. This ratio of voltage to turns is determined mainly for economical soundness.

Therefore the amount of flux at the normal voltage is fixed. This also fixes the level of noise and vibration. Also, increasing (or decreasing) magnetization does not affect the magnetostriction equivalently. In technical terms the relationship is not linear.