TRANSFORMER POLARIZATION

The performance characteristics of any ferromagnetic transformer will be dependent on its previous magnetic history. Even taking a winding resistance measurement with an ohmmeter will place a dc current through the windings and leave some amount of residual magnetism in the transformer's core. This situation will frequently occur at incoming inspection, as the incoming tests will place the transformer into some kind of test circuit under various electrical parameters. Eventually, the transformer will be placed into a circuit either in the development lab or on the production assembly line and its performance characteristics will now depend on its previous magnetic history.

To better understand this phenomena, refer to the hysteresis curve in below. As can be seen, subjecting the core to current flow in a given direction will result in a certain amount of residual magnetism (F_{REM}) when the current source is removed. This residual magnetism will have the effect of changing the core's pulse permeability as shown by loop A to B. As long as the same signal is applied to the transformer, no further changes to its pulse permeability will occur. Thus, once the first pulse has passed through the transformer no further changes will occur unless the pulse itself is changed. This is true regardless of the interval between pulses whether it's 1 microsecond or 1 year. If this same transformer were moved to another circuit application it would acquire a new magnetic set point based on that circuit's signal. Furthermore, if we now returned this same transformer to its original application, it would not return to its original magnetic set. Instead it would acquire a new set which would be based on its total magnetic history. In any case, where the transformer is not highly magnetized, these effects can be neglected-especially in applications where the transformer is being used as a coupling device. On the other hand, if the transformer is being used in a blocking oscillator scheme, the magnetic history, of the transformer can have significant effects on the circuit's overall performance.

The problem of residual magnetism can be solved by erasing the transformer's magnetic history any time it is transferred into a new circuit. We can accomplish this by degaussing (depolarizing) the transformer, allowing it to begin circuit operation in a neutral state from which it can achieve and maintain a magnetic set throughout its life in the given circuit.