

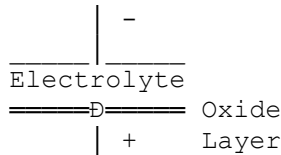
Reforming Caps

By G8MNY

(Revised Apr 07)

(8 Bit ASCII Graphics use code page 437 or 850)

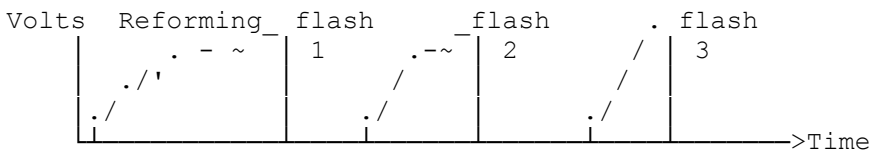
Electrolytic capacitors are formed by repeatedly apply a formation voltage that corrodes the anode of the pure aluminium foil, to make a very thin insulating oxide layer.



This thin layer is the reason the capacitance value is so high (1000x) compared to other types of the same size, the oxide layer's thickness is proportional to the operating voltage. The electrolyte is a WET salt solution in a porous tissue used to initially keep the foils apart. If the electrolyte dries out the capacitance value often decreases by >100 times.

NEED FOR REFORMING

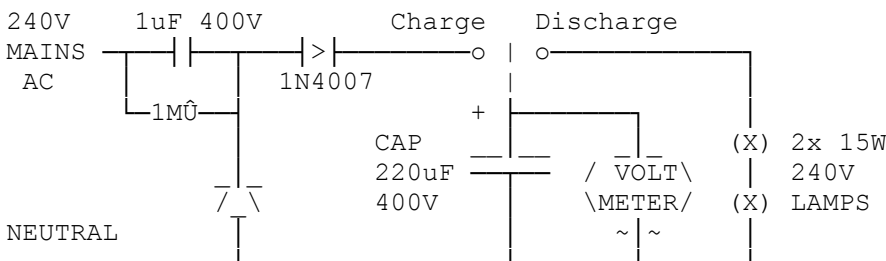
The problem is that over time if the capacitor is not excersized to the formation voltage, the layer shrinks in thickness & the capacitor will need reforming to safely work at its rated voltage. This occurs in some applications like a photographic flashgun every time the capacitor is 1st used after a few days, & it takes much longer to charge up as formation current is flowing. After each flash the recharge is quicker.



But for larger power capacitors in PSU's, the formation voltage will be some 10% greater than the rated voltage, so when the formation voltage (voltage the oxide layer will withstand) is too low, much higher currents will flow & heat up the capacitor. To reform the layer the capacitor must be charged & discharged sometimes repeatedly. Hence on unused kit it is wise to power up briefly for a few seconds, then let the HT's drop to zero & re-power.

REFORMING CAPS

For new caps that may have been stored for a while the same applies. Here is a reforming circuit I have used for high voltage electrolytes.

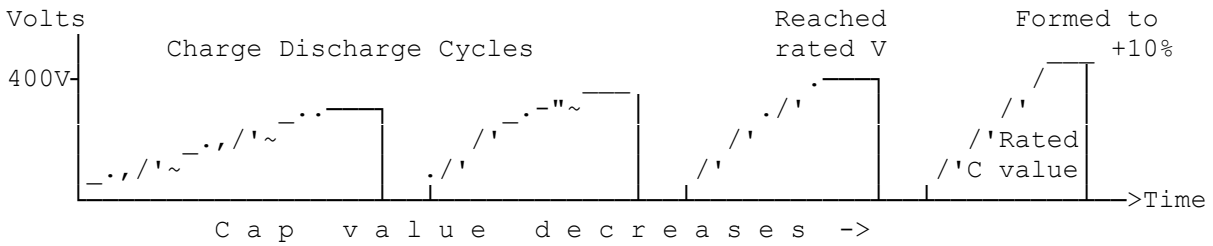


The 1uF limits the charging current, but the peak voltage can be +680V so an eye on the meter is needed. THIS IS A HIGH VOLTAGE MAINS CIRCUIT! Take safety precautions!

For lower voltage high value Caps use a variable voltage bench PSU to do the same thing.

REFORMING

Apply the charging current until there is very little rise in the voltage (e.g. current stays flowing), then discharge.



Repeat the charge & something like a 10% voltage increase will be seen for each charge discharge cycle. Repeat the cycles until the voltage is about 10% higher than the rated is achieved. Anymore will risk insulation failure & or a drop in the rated capacitance value.

NON POLAR TYPES

These are really just 2 electrolytic capacitors in series in one can. So a middle foil is needed in manufacture to make the 2 caps, but not wired to the outside world. Because of this no reforming can be, but using them on AC solves this. Typical used are rotators low voltage split phase capacitors that must be very high value as they are on low voltage.

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73 De John, G8MNY @ GB7CIP