C100 Circuit Description

The C100 adds about 50,000 uF to each rail. Capacitors that large must be charged slowly or fuses will blow. The voltages +V and -V are about +/-74 Volts DC. The electronics of the C100 assure that the big capacitors get charged slowly enough to stay friendly to power outlets.

The input voltage is applied to fuses F1 and F2, producing voltages that I've labeled +VF1 and -VF2. The coil of KP is energized by +VF1 and the connection to ground through R15. KP's contacts pass the +/- 74 volts onto R29, R30, R31, and R32. These are four 600 Ohm 10 Watt resistors placed between the raw 74 volts and the uncharged 50,000 uF capacitor banks. That limits the charging current to a very modest 74/300=0.25 Amps.

Eventually, when the capacitor bank voltage gets high enough, KF energizes and closes, applying full voltage to the capacitor bank. Let's see what has to happen to energize KF.

All four comparators in the LM339 have open collector outputs. All four comparators must have inputs in a direction that makes their outputs go high. That allows R16 to pull up the base of Q1, turning on Q2, driving the coil of KF, closing KF's contacts, applying full voltage to the capacitor banks. Let's see then that happens.

- Comparator 5-4-2
    - The voltage at the negative input of comparator 5-4-2 is set off the +74 volts by the R7 R6 voltage divider to a voltage of 74*2.4/(43+2.4)=3.91 volts.
    - The positive input of that comparator has V=(Vp11-27)*2/(2+9.1) based on D6, R14, and R5 (Vp11 is the voltage on pin 11). The output of the comparator goes high when (Vp11-27)*2/(2+9.1)>3.91.
    - Solving the previous equation, we see that Comparator 5-4-2 goes high when Vp11 is greater than 48.7 volts.
- Comparator 7-6-1
    - The voltage on the positive input is set to (74-43)*2.7/(2.7+8.2)=7.68 Volts
    - The negative input has the same voltage as the positive input of the 5-4-2 comparator.
    - The output goes high so long as (Vp11-27)*2/(2+9.1)<7.68 volts, or Vp11<69.62 volts. This actually makes no sense. It says that once the caps charged fully, that KF would open up.

That last point is a mystery…as of 12/18/2016…Is there still an error in the schematic?