Two blue LEDs illuminate the clock, which is needed for it to operate reliably when there is no ambient light.

When hours indicate 24...29, this capacitor discharges, changing DC-bias for buffer lamp such that it will oscillate to skip these hours.

When a magnet closes the reed switch, the DC-bias for the buffer lamp changes such that it will oscillate, thus allowing the user to set the clock.

There’s nothing magic about the +8V: one shunt regulator couldn’t supply enough current, so a second one was added whose output voltage happened to be less. Similarly, there’s nothing magic about +157V vs. +151V.

-- save some current (but +8V now varies slightly with ambient light)

5−stage ring counter together with the lowermost lamp oscillate by themselves around 25 Hz (which is divided by 5 by the ring counter). The entire thing is locked to the incoming 50 Hz.

(After ignition by a 50 Hz pulse, the R’s and C’s turn off the lowermost lamp late enough to skip the next pulse.)

Principle: Assume one lamp is lit. Current through it develops voltage across its cathode resistor, which charges coupling capacitor to next lamp. Capacitor is still charged, but resistor pulls side that was previously positive to 0V, so other side must go negative (diode prevents discharge); this side is cathode of next lamp, which thus ignites first when anode voltage rises again.

This is a buffer stage. Ignition of this lamp gives a pulse to the ring counter. The trimpot sets the voltage across lamp to just below its striking voltage. The incoming pulse is "filtered" by the combination of diode, resistor and capacitor to prevent short spikes from igniting the lamp.