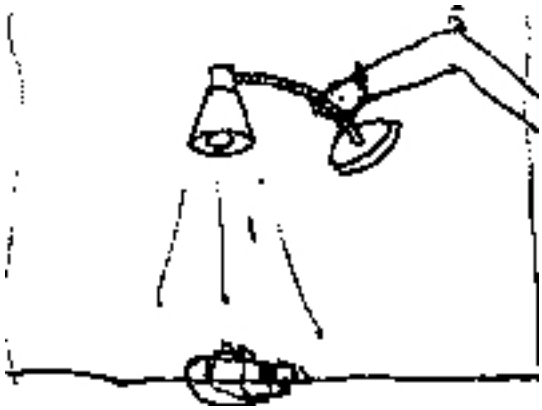
Now to finally determine once and for all, what really IS the effect of varying the incident light on an LED used as a varicap?



The somewhat crude G0UPL test apparatus (diagram right) consisted of a 60W incandescent desklamp held approximately 0.5m above the test apparatus. Experiments were performed at night (which is always the best time for homebrewing anyway) and so total darkness could be assured by switching off the desklamp, to see the effect on the 5mm standard red LED under test. Pressing a button on my mobile phone enabled me to be able to read the LC Meter capacitance reading by the pale light of the mobile phone screen.

When the light was switched from OFF to ON, I measured an increase in the capacitance of the red 5mm LED from 32.88pF to 33.01pF, at zero volts reverse bias (maximum capacitance). That's an increase of 0.13pF, or put another way, approximately 4,000 parts per million. Quite substantial! The effect of incident lighting decreases in line with increasing reverse bias voltage, such that at 12V reverse bias no effect can be seen.

All good science also tests a control. Here at G0UPL research headquarters, we do TRY. So we also tested some of the rectifier diodes like the 1N4007, which is in a black plastic enclosure and has a similar capacitance to the LED. The capacitance did not change when the light was switched on and off. I suppose this validates the method and rules out any possible thermal effects due to heating from the 60W light bulb.

The undesirable effects that this might do to a circuit's operation depends largely on the application. For example, if the LED is used to create a 5Hz FSK shift in a QRSS beacon , then it is unlikely to be a problem. On the other hand, I can foresee a situation where an LED might be used to tune a VFO from 5.0 to 5.5MHz, and a large change in ambient lighting conditions might easily cause the VFO to shift by perhaps 1kHz or more. If the VFO is Huff Puff stabilised , then even a small shadow or movement in the room might cause enough ambient light variation to cause the stabiliser to jump between lock points.

Another concern might be what happens in flourescent lighting situations. I am purely speculating here - but I would suspect that unlike incandescent bulbs, flourescent lighting could easily modulate the capacitance at a frequency of 100Hz (120Hz in the US), thereby causing

100Hz frequency modulation (FM) of a VFO for example, which might cause nasty 100Hz hum in a receiver.

Possible remedies might include painting the LED black. Or perhaps taking a small electrolytic capacitor can, the metal type, removing the capacitor internals, and epoying the LED into the can to keep the light out.

An interesting experiment, and thanks to Roger K7RXV for providing the necessary stimulus to undertake it.