LIGHT EMITTING DIODES

A Use for them in Caves

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Light Emitting Diodes (LED's) are bright, virtually indestructable point sources or light with low power consumption.

They have a use as temporary or emergency track markers and have made ideal survey markers.

This paper attempts to demonstrate their usefulness.

A USE FOR THEM IN CAVES

Light Emitting Diodes (LED's) are a bright, virtually indestructable point light source of low power consumption. Originally designed for use in scientific instruments and computers, they have now found uses in all sorts of appliances, from industry to the domestic scene.

The use of LED's in caves was first proposed by Charles Willock of SRGWA in 1976. Following the introduction of brighter and more efficient LED's a few years later, the idea became viable. Originally intended to lay out the angle of view for large scale speleophotographs (fig. 1) as well as marking the camera position, the device also had application for survey and temporary track markers.

Several single LED units assembled in 1979 have been used as survey markers and aiming points for a theodelite survey as well as a solo survey of Frolic Cave in Tasmania during 1981 (Poulter 1981). Aiming a compass, clinometer or theodelite at a low intensity point source of light seems far easier than using caving lights. Utilising a twin 'AA' battery pack, the single LED had an effective light duration in excess of nine days although a disadvantage was that the light could only be seen from one direction making their use as emergency two-way track markers limited.

With the recent introduction of red and green fresnal LED's by Tandy Electronics ($1.29/pair), it became possible to manufacture a colour coded two-directional marker, mounted on a twin 'AA' battery pack without the LED's protruding past the pack bodyline. Once soldered into position with their enabling resistors (fig. 2) the diodes and resistors are embedded in epoxy to protect the connections. Red and green LED's are the best colours to use as these give the easiest colour determination from a distance. Another aid, when using the LED's as markers, is to number them with waterproof felt pens. Weighing 45 grams with batteries and costing about $2.00 for components excluding batteries, the units have an effective light duration of at least 4-5 days depending on the quality of medium priced batteries used. The resistor values shown in the diagram are designed to give optimum illumination with reasonable battery life.

Another type of marker is one that uses the new red flashing LED ($1.59 each, Tandy). Due to the necessary higher operating voltage, the flashing LED (fig. 3) must be used with four 'AA' cells thus giving a weight disadvantage in relation to the constant light LED's. By wiring a standard green LED in series with the flashing LED, the green LED is made to flash in unison. This twin flashing unit has an effective battery life in excess of six days.

CONCLUSION

The LED markers can be used for:

laying out the parameters of photographic setups,
marking survey points,
acting as aiming points for surveys,
temporary or emergency track markers.

As the LED's produce their own light, a person does not have to shine a light in their general direction in order to find out where to proceed. In a rescue situation, where people may be unfamiliar with caving or a particular cave, this feature could be a distinct advantage.

With a visible range as great, if not greater than reflective markers, LED markers may have a role to play in the continuing, safe study of caves.

REFERENCES

Poulter, N., 1981 **'Rocky Boat Inlet, Tasmania'** ASF Newsletter #94 pp. 7.

DISCUSSION

What effect does the cave environment have on the circuit? Because the circuit is in epoxy resin, the only concern is a short-circuit or corrosion of the batteries. Dampness will limit battery life. Can encapsulate the batteries to prevent corrosion.

There is no on/off switch in the circuit; to stop, disconnect the battery.

Can use slower flashing rate to increase battery life.

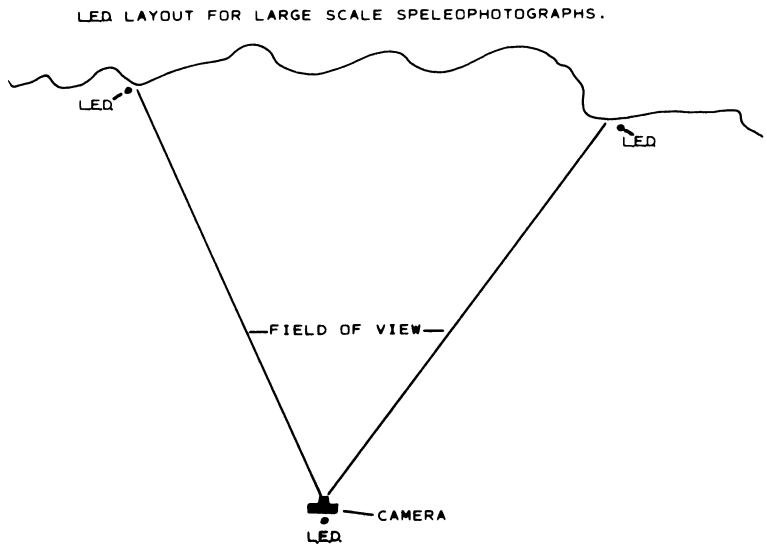

FIGURE 1

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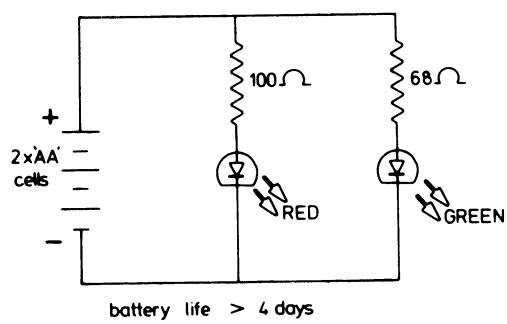

FIGURE 2

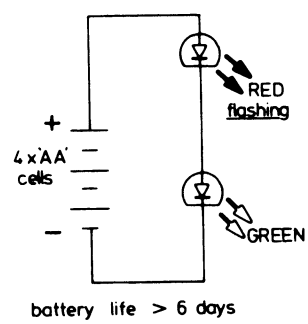

FIGURE 3

LED MARKERS CIRCUIT DIAGRAMS

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