An l.e.d. synchroscope

In attempting to tune an oscillator to a standard frequency it is convenient to be able to sense the direction of a phase error as one approaches the correct setting. Some instruments provide a cathode-ray tube Lissajous figure display for this purpose, but the hardware required is rather inconvenient and expensive.

It is possible to generate something similar to a Lissajous figure using a few lamps and this is very familiar to power engineers in the form of a lamp synchroscope. With the advent of light emitting diodes, a low consumption version is possible for electronic applications.

A three-lamp system gives the neatest and most elegant display, but it is generally more convenient to generate four phases from an existing signal source than three phases. Thus the circuit described is a four-lamp system.

The four lamps generate a display rotating once per cycle at the reference frequency. The display brightness is modulated at the frequency of the oscillator to be adjusted. The apparent display is therefore a rotation which appears to have a frequency equal to the difference between the two signal frequencies concerned and a direction indicative of the sense of the frequency difference.

The display is most effective when the lamps are mounted on the smallest practicable pitch-circle diameter.

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