

Laser Spy Device

Cedric Anthony Terance

Center for Young Scientists. Chandra Kumala School, Indonesia.
Gold Medal in Physics (APCYS 2018)

1. Introduction

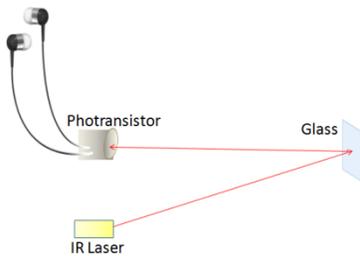
Crime is a major issue for everyone. Those crimes includes robbery, murder, etc. Those crimes can be stopped if police/ investigators know what type of crime is going to happen, when, and where it is going to happen. This is possible if police/ investigators know what the criminals are planning by spying.

2. Research Goals

- To prove that laser can transmit sound vibration.
- To help police and investigators listen to what the suspects are talking about.

3. Experiment Design

Infrared laser is fired to the glass on a box which has a phone in it as a sound source. Then, the infrared laser beam is reflected to a phototransistor as a receiver. Then, we can hear the sound through a headphone/ earphone.



Graph 1. Diagram of the setup

4. Result and Analysis

Laser wavelength = 808nm

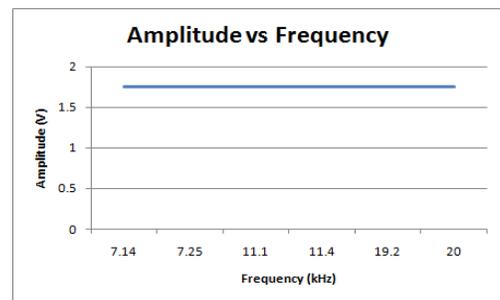
Power of laser = $P = V.I$

$$P = 3,7V \times 100mA \\ = 370mW = 0,37W$$

Maximum distance the laser can transmit the sound and reflected back to the phototransistor is 2.1m

$$\begin{aligned} \text{Radius of beam} &= w_0 = \frac{\lambda}{\pi \times \theta_0} \\ &= \frac{808 \times 10^{-9}}{\pi \cdot \frac{\pi}{1800}} \\ &= \frac{808 \times 10^{-9} \times 1800}{\pi^2} \\ &= 1,475mm \end{aligned}$$

Diameter of beam = 2,95mm



Graph 1. Frequency response

5. Conclusions

- The infrared laser which is reflected from the glass transmits the sound vibration to the fototransistor which we can hear through the headphone.
- The power of the infrared laser 0,37W.
- Maximum distance the laser can trasmit the sound and reflected back to the phototransistor is 2.1m when the sound is still heard through the headphone.
- The diameter of the laser beam is 2,95mm.
- When the input frequency is changed, the amplitude stays the same.
- The input voltage and the output voltage are the same.

REFERENCES

- <http://ukurandansatuan.com/cara-mengubah-satuan-sudut-dari-derajat-ke-radian-dan-sebaliknya.html>
- http://laser.physics.sunysb.edu/~wise/wise187/2005/reports/deb/rep_ort.html
- <https://www.youtube.com/watch?v=1MrudVza6mo>