Laser Communication Demo

(High school & up)

In this activity, students will build their own free space laser/LED communication circuit to transmit music.

Lesson Plan

- Start the lesson with a discussion of the role of lasers and optics in telecommunications
- Provide students with materials and instruction sheet and have them assemble the transmitter
- Have the students explore LED vs. laser transmission and transmission through media, such as fiber
  - What is the longest link you can make using the LED? What about the laser?
  - What happens to the signal when you bend the fiber?
  - What are the benefits and trade-offs of free space communication and fiber optical communication?

Tips:

- Bring extra parts in case some components fail
- Give students at least 45 minutes to assemble transmitter, plus time to experiment

Equipment & Budget
(for 20 setups)

2-in-1 LED/laser pointer keychain (20 pcs.)	$20.00
CdS photo cell (20 pcs.)	$17.20
Audio transformer (20 pcs.)	$43.20
Earphones (25 pcs.)	$33.99
Audio cable (male-to-male) (10 pcs.)	$9.30
Alligator clips (8/setup) (160 pcs.)	$35.52
AA batteries (40 pcs.)	$17.08
1 m long, 0.50 NA, 200 µm core MMF (10 pcs.)	$16.60

Total cost: $192.89

(not including taxes and shipping)

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Assembly Procedure

Step 1: Disassemble laser & LED package

Step 2: Assemble battery pack

Step 3: Connect the transmitter circuit

- Connect one of the wires from the audio jack to pin 4 of the audio transformer
- Connect the other audio jack wire to pin 6
- Connect the negative side of the battery pack to pin 1
- Connect the negative side of the laser (spring) to pin 3
- Test your laser and LED to make sure they turn on

Step 4: Connect the receiver circuit

- Connect one of the photo cell pins to the negative side of the second AA battery
- Connect the other photo cell pin to the negative contact of the earphone jack
- Connect the positive side of the earphone jack to the positive end of the AA battery

Step 5: Initial test of the optical communication system

- Plug in the audio jack into your music player
- Aim the laser or LED at the photo cell and press play!