

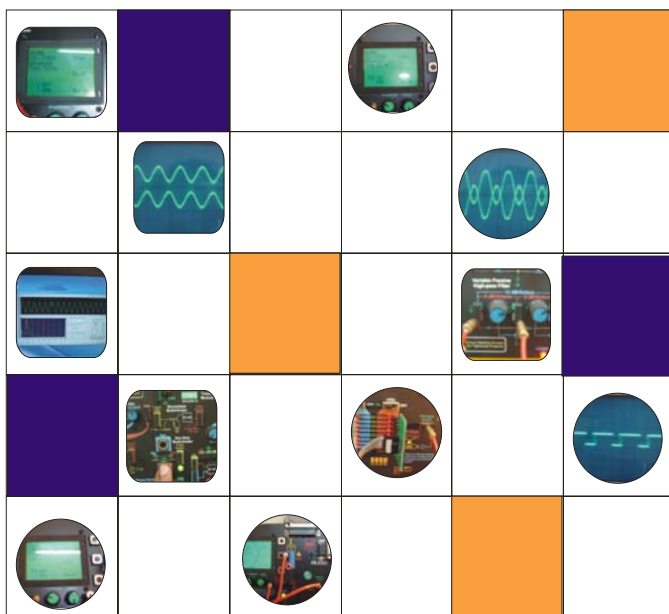
RIMSResearch Instrumentation
& Measurement Systems

DEV-2783

Electro-Optics

EXPERIMENTS

PART NO. 2783-00-321



COMPREHENSIVE & ILLUSTRATED EASY EXPERIMENTS STARTUP LAB MANUAL

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Once you have made it through this guide, you will have a firm grip on your lab experiments and operations of the RIMS product you are using. How to get your training equipment operational, basic maintenance and setting up desired experiments will just be a breeze. Everything you need for a quick and easy start is presented here—useful hints and tips makes it simple to conduct your lab and hands-on training sessions. We are happy that you have joined our vast community of over 30 thousand valued users, which grow as we bring you the latest technology at most competitive prices. We value your business and hope that you will enjoy being an important member of the RIMS Education Community.

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LEARNING OBJECTIVES

WHAT YOU SHOULD KNOW AFTER READING THIS MANUAL?

- Solar Cell
- Laser Transmission
- LDR
- Fiber Optics
- IR Transmitter & IR Receiver

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1

SOLAR CELL**Aim**

This experiment aims at providing introduction to the concept of solar cells.

Apparatus

RIMS DEV-2783 Electro-optic Trainer
Solar Cell Module (DEV-2783-05)
Male to Male DB-9 Connector Cable (provided with the Trainer)

Setting up the Experiment

Connect the cable to the trainer where the solar cell is be connected.

You may hold the solar cell in hand and bring it closer to any light source

You would see the LED bar on the trainer increasing

This shows that the voltage level is increasing

Now connect a voltage meter on the output connector and note the voltages. You would observe the voltages also increasing with the increase in light

Now connect the oscilloscope to the output of the solar cell.

Observe the sine-wave output just before it is saturated with light

Calculate the frequency of the sine-wave being observed

It will be closer to 50Hz. Why?

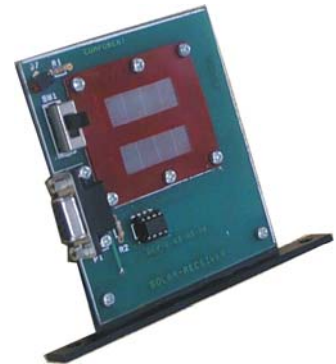
NOTE:

Sine-wave of 50Hz is observed because the response of the solar cell to the glow of light is very fast. The bulbs are oscillating at 50 Hz but due to our incapability to observe this variation we see output light.

You would see that in pure DC source this effective will be negligible.

SPECIAL:

The switch on the Board (solar cell module can be used to bring two cells in series, just like dry battery cells.



2

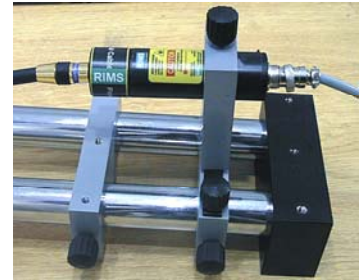
LASER TRANSMISSION

Aim

This experiment aims at providing introduction to the concept of Laser Transmitters.

Apparatus

1. RIMS DEV-2783 Electro-optic Trainer
2. Laser Transmitter Module (DEV-2783-06)
3. 3-pin round to Male DB-9 Connector Cable (provided with the Laser Transmitter)
4. Laser Receiver Module (DEV-2783-07A)
5. Male to Male DB-9 Connector Cable (provided with the Trainer)
6. Turn Table mount Assembly DEV-2729

**Setting up the Experiment**

Connect the turn table assembly as shown in the figure below.

Connect the laser to the DEV-2783 Main board on the connector marked Laser transmitter.

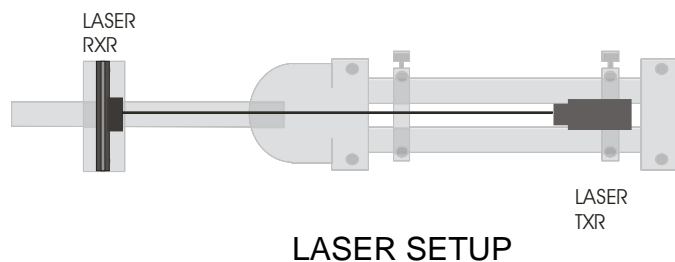
Set the Output of the 555-timer and see its behavior on the logic probes on Low Range so the transition between the Zero and Ones is clearly visible.

Set the knobs of 555-timer until 50% (Approx) duty cycle is achieved.

Now connect the output of timer (Q) to the TTL input of the Laser Transmitter Connector.

You should now see the laser turning ON on every low to high transition and turning off when Zero is available.

Disconnect the Probe wire so it is free again. It will be used by the laser receiver in next steps.



Align the laser with inserts until it falls on the centre of the Laser Rxr (Photo Sensor)

Connect the cable of the Laser receiver to the trainer on the laser input connector

Now using the circuit patching wire connect the TTL output of the laser Rxr to the input of logic Probe.

You should now see the Logic probe behaving exactly in the similar way as the input to the laser module was applied.



NOTE:

Incase the laser is not perfectly aligned you may not see this happening. Ensure laser is pointing exactly on the sensor

What have you achieved?

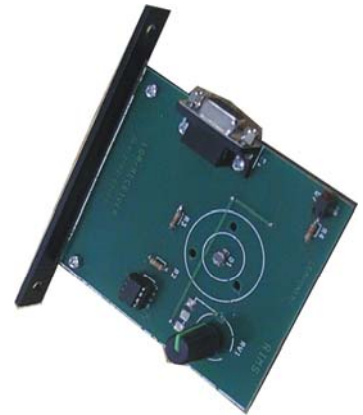
You are not sent the digital signal through an optical media. His signal has been modulated and then demodulated to a TTL data

3**LDRs****Aim**

This experiment aims at providing introduction to the concept of Light Dependent Resistors.

Apparatus

1. RIMS DEV-2783 Electro-optic Trainer
2. Laser Transmitter Module (DEV-2783-06)
3. 3-pin round to Male DB-9 Connector Cable (provided with the Laser Transmitter)
4. LDR Module (DEV-2783-08)
5. Male to Male DB-9 Connector Cable (provided with the Trainer)
6. Turn Table mount Assembly DEV-2729

**Setting up the Experiment**

Repeat the setup of the Experiment 2

Now Instead of Laser Receiver use LDR and see the results.

You can vary the Sensitivity of LDR using the potentiometer provide

4**Fiber Optics****Aim**

This experiment aims at providing introduction to the concept of Fiber optic Data Transmission

Apparatus

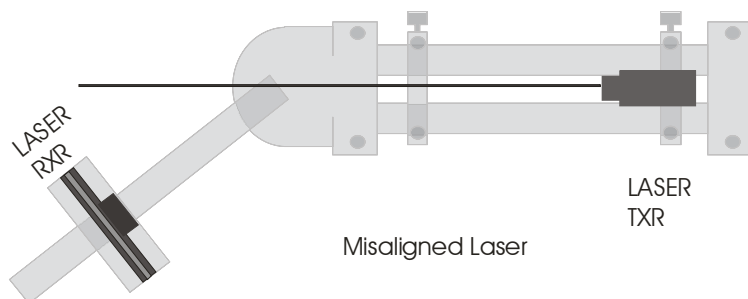
1. RIMS DEV-2783 Electro-optic Trainer
2. Laser Transmitter Module (DEV-2783-06)
3. 3-pin round to Male DB-9 Connector Cable (provided with the Laser Transmitter)
4. Laser Receiver Module (DEV-2783-07)
5. Male to Male DB-9 Connector Cable (provided with the Trainer)
6. Turn Table mount Assembly DEV-2729
7. Fiber Optic Cable Assembly

**Setting up the Experiment**

Repeat the setup of the Experiment 2

Now misalign the laser receiver using the turn table to almost 45 degree such that no chance of any laser light is there.

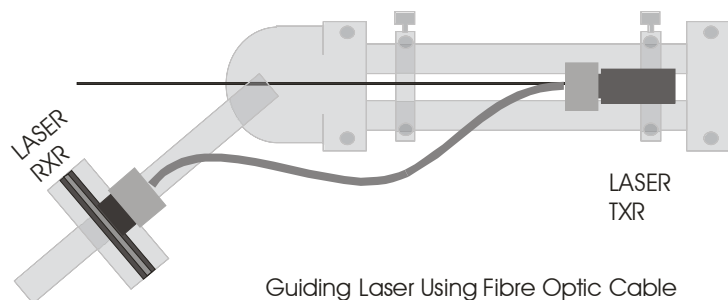
There would be no output observed at the logic probe



Now by using the fiber optic cable connect the two blocks i.e., the laser transmitter and the Laser receiver Module.

If properly installed, you should see the probe now again showing the data being communicated through a fiber optic.

In order to ensure that the laser reaches the sensor, please ensure that the fiber optic head on the transmitter and receiver assembly are aligned and well connected.



5

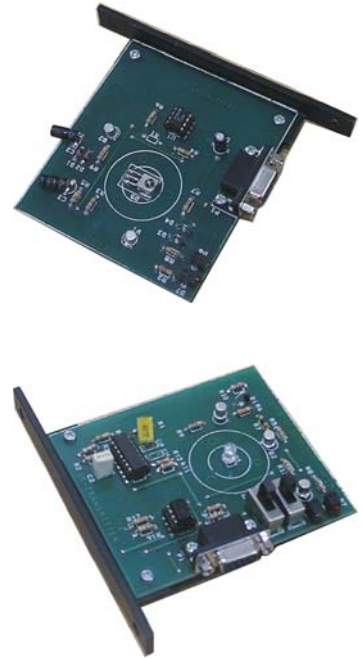
IR TRANSMITTER & RECEIVER

Aim

This experiment aims at providing introduction to the concept of IR based Data Transmission

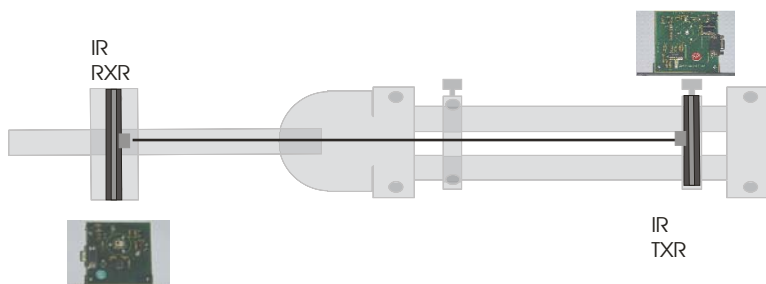
Apparatus

1. RIMS DEV-2783 Electro-optic Trainer
2. IR Transmitter Module (DEV-2783-08)
3. 3-pin round to Male DB-9 Connector Cable (provided with the Laser Transmitter)
4. IR Receiver Module (DEV-2783-09)
5. Two Male to Male DB-9 Connector Cables (provided with the Trainer)
6. Turn Table mount Assembly DEV-2729

**Setting up the Experiment**

Repeat the setup of the Experiment 2 other than that this time instead on laser transmitter connect the IR transmitter module on the IR input and output connectors on the main board.

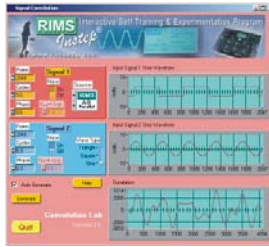
Now repeat the steps of the experiment such that the desired signal is available and visible at the output of the probe

**IR COMM SETUP**

IR transmitter has two inputs the modulating frequency and the signal to be modulated. Normally the Iris modulated on 10K – 100K frequency range in order to

ensure that it is not disrupted by the atmospheric IR noise and partly because that more devices at various frequency can operate. This also limits to rms power but the instantaneous power is kept to maximum to attain maximum range.

Two switches are made available on the IR transmitter that allows the user to select between the internal modulating frequency or external signal. Also the internal or external input signal can be chosen. This is only used in this case for turn devices on the existence or reception of any IR signal in that frequency range.



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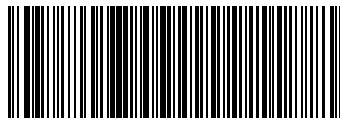
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