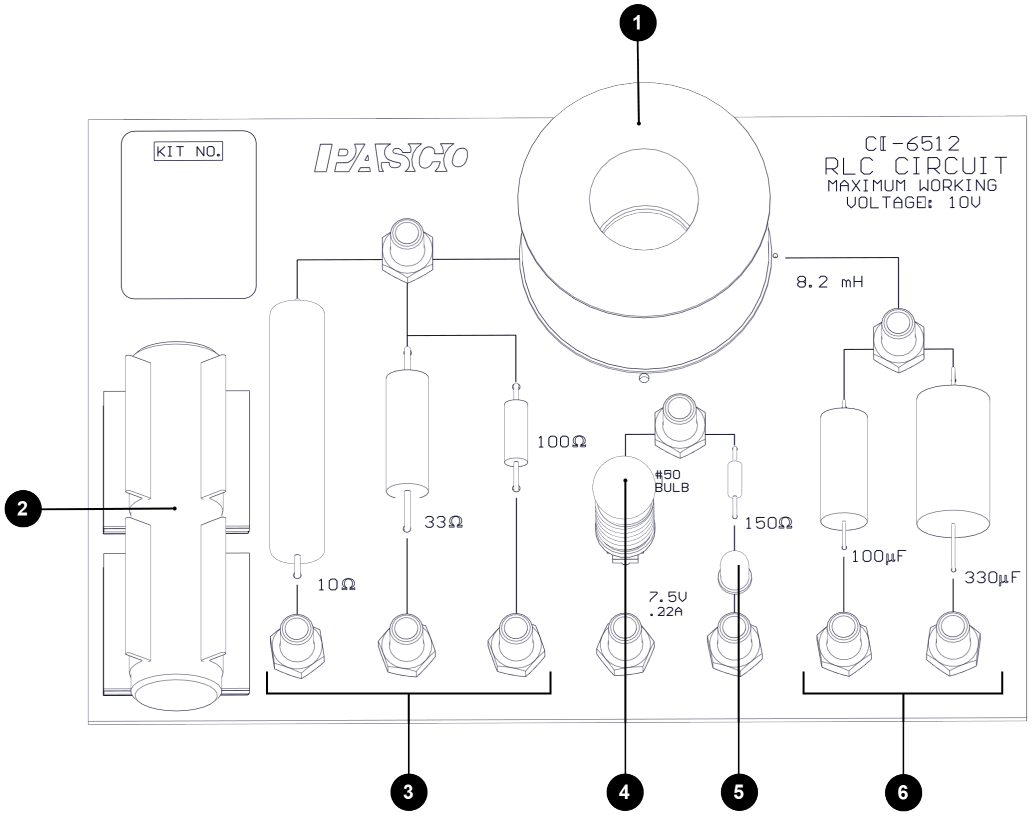
RLC Circuit



1 Inductor

An air core inductor with an inductance of 8.2 mH.

2 Steel Rod

For placing inside the inductor to increase the inductance.

3 Resistors

Includes three resistors with a resistance of 100 Ω, 33 Ω, and 10 Ω.

4 Lamp

A replaceable #50 miniature screw base lamp.

5 LED

A bi-color LED in series with a 150 Ω resistor. The illuminated color is dependent on the polarity of the connection.

6 Capacitors

Includes two electrolytic capacitors with a capacitance of 330 µF and 100 µF.

Introduction

The RLC Circuit board is designed to be used with a PASCO 850 or 550 Universal Interface to study the behavior of resistors, inductors, and capacitors in an AC circuit. The board includes three resistors, two capacitors, an air-core inductor, a #50 miniature screw lamp, and a bi-color LED. The included steel rod can be used to increase the inductance of the inductor by placing the rod inside the coil.

NOTE: Prior to the first use, remove the bolt that secures the inductor during shipping.

Required Equipment

The equipment listed below is required for performing experiments with the CI-6512 RLC Circuit.

PASCO Universal Interface

The UI-5000 850 Universal Interface or the UI-5001 550 Universal Interface supplies a power to the circuit using its integrated signal generator and connections for sensors. The signal generator is capable of reporting the output voltage, current, and frequency of the signal.

Voltage Sensor

A voltage sensor is required to measure the voltage across a single component in the circuit. Use either the UI-5100 Unshrouded Voltage Sensor or the UI-5110 Shrouded Voltage Sensor.

Banana Plug Patch Cords

Cords are required to connect the RLC Circuit to the Universal Interface. Patch cords are available from PASCO in the following lengths:

- 15 cm (EM-9737)
- 30 cm (SE-7123)
- 75 cm (SE-9750, SE-9751, EM-9740, EM-9745)
- 200 cm (SE-9415A)

PASCO Data Collection Software

PASCO Capstone or SPARKvue software is required for data collection and to control the signal output of the Universal Interfaces. The 850 Universal Interface can only be used with PASCO Capstone.

Circuit Setups

Though the name of this product is called "RLC Circuit," it is possible to also create RC and LR circuits with the apparatus. Additionally, it is possible to apply signals to each component individually on the board.

RLC Circuit Setup

The resistors, capacitors, and inductor are connected in series on the RLC Circuit board. To create an RLC circuit:

1. Connect the ground port of the signal generator to the banana jack of a resistor.
2. Connect the signal generator port to the banana jack of a capacitor.

Below is an example RLC circuit which contains a 10 Ω resistor, a 330 µF capacitor, and the inductor.

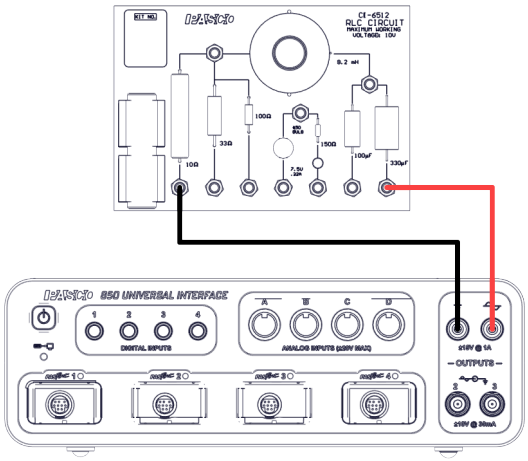


Figure 1. An RLC circuit example

RC Circuit Setup

The resistors, capacitors, and inductor are connected in series on the RLC Circuit board. In order to create an RC circuit, a cable must be connected across the inductor to bypass the inductor. To create an RC circuit:

1. Connect the ground port of the signal generator to the banana jack of a resistor.
2. Connect the signal generator port to the banana jack of a capacitor.
3. Connect a banana cable to each jack of the inductor.

Below is an example RC circuit which contains a 10 Ω resistor and 330 µF capacitor.

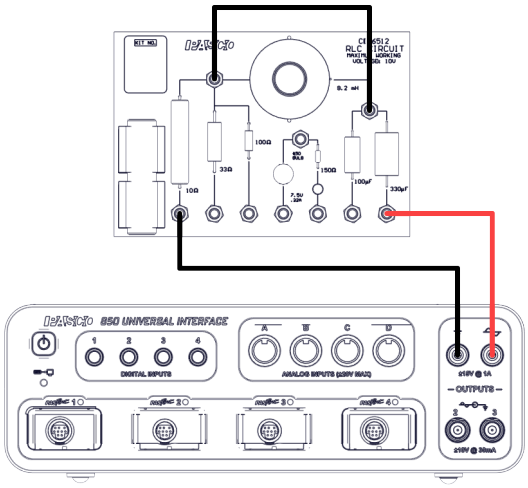


Figure 2. An RC circuit example

LR Circuit Setup

Each resistor is connected in series with the inductor on the RLC Circuit board. To create an LR circuit:

1. Connect the ground port of the signal generator to the banana jack of a resistor.
2. Connect the signal generator port to the banana jack shared by the inductor and capacitors.

Below is an example LR circuit which contains a 10 Ω resistor in series with the inductor.

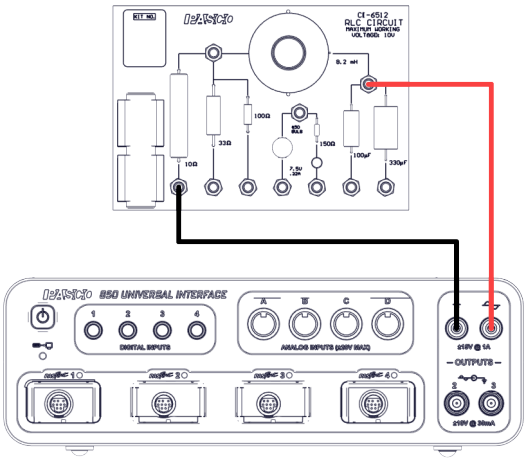


Figure 3. An LR circuit example

Single Component Setup

It is possible to connect a single component to the signal generator on the Universal Interface. This can be useful for performing an Ohm's Law experiment where the current through a single resistor is measured as the voltage across it is changed. To connect a single component:

1. Connect the ground port of the signal generator to the banana jack of a component.
2. Connect the signal generator port to the banana jack on the opposite end of the component.

The below example shows a single 10 Ω resistor connected to the signal generator.

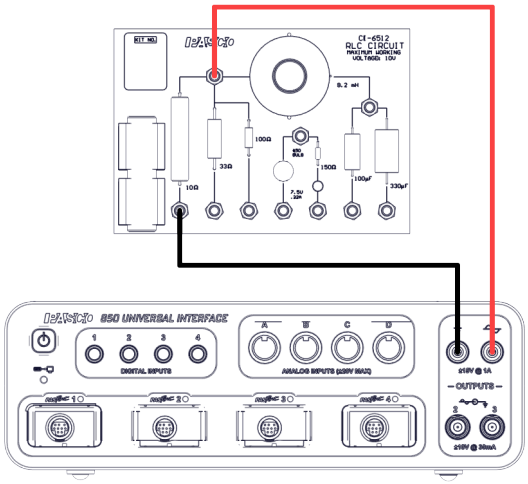


Figure 4. A single component connection example

Specifications

Maximum Working Voltage	10 V
Resistors	100 Ω ± 5%, 1 W 33 Ω ± 5%, 5 W 10 Ω ± 5%, 10 W
Capacitors	100 µF ± 20 %, 16 V 330 µF ± 20 %, 16 V
Inductor	8.2 mH @ 1 kHz 6.5 Ω maximum DC resistance 0.8 A current rating RMS 0.75" ID X 1.75" OD
Lamp	7.5 V, 0.22 A, #50 miniature screw style
LED	red (655 nm)/green (565 nm) 1.7–2.1 V typical forward voltage 1.5 mcd average brightness @ 20 mA

Technical Support

For assistance with any PASCO product, contact PASCO Technical Support.

Address	PASCO scientific 10101 Foothills Blvd. Roseville, CA 95747-7100
Phone	1-800-772-8700 (USA) 1-916-462-8384 (International)
Chat	www.pasco.com
email	support@pasco.com

Product End of Life Disposal Instructions

This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle or disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol and on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

Warranty, Copyright, and Trademarks

Limited Warranty: For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.