

# **The Logical Interface**

**TLI Wave Lab**

**INSTRUCTION MANUAL**

**A computer interface for experiments in Senior Physics**

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## Introduction

The **TLI Wave Lab** is made in Australia by The Logical Interface. It is designed to generate sine, square and triangle waves, which can be viewed with an oscilloscope, data logger, or TLI Virtual CRO. It behaves as a dual channel signal generator.

It consists of

- An interface, which plugs into the speaker output from your computer and
- Software to generate and control your waves.

The software can be used on its own, or with the interface.

Through the software you control

- Wave Type – Sine, Square or Triangle
- Frequency
- Amplitude and
- Phase

**Warning:** Never connect a voltage or current source to your Wave Lab Interface as this may result in damage to the interface and your computer.

To use the **TLI Wave Lab** you require Windows '95 or higher and a sound card.

Use the Table of Contents to obtain help on any of the listed topics.

## Getting Started

To start the Wave Lab software

1. Mouse click the Start button
2. Select Programs
3. Select and click Wave Lab

Two Wave Windows will open – Channel 1 and Channel 2. These two windows control the output to your computer's speakers and the Wave Lab's interface. Channel 1 controls output to one of your speakers and Channel 2 controls the other.

Select the wave type using one of the buttons on the Main Window button bar. Wave types available are Sine, Square or Triangle. By default, when you start the Wave Lab, sine waves will be selected. Adjust the frequency and amplitude of the waves in each channel as discussed in **Controlling Frequency and Amplitude**.

Once you have generated your waves you can output them to your speakers or Wave Lab Interface. See Installing the Wave Lab Interface for more help.

You can also save your file as a .wav file by selecting File -> Save.

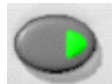
### Example: Demonstrating Beats

1. Start the Wave Lab software
2. With the Wave Type set to Sine set the following frequencies and amplitudes

Channel 1: Frequency : 710 Hz, Amplitude: 0.5

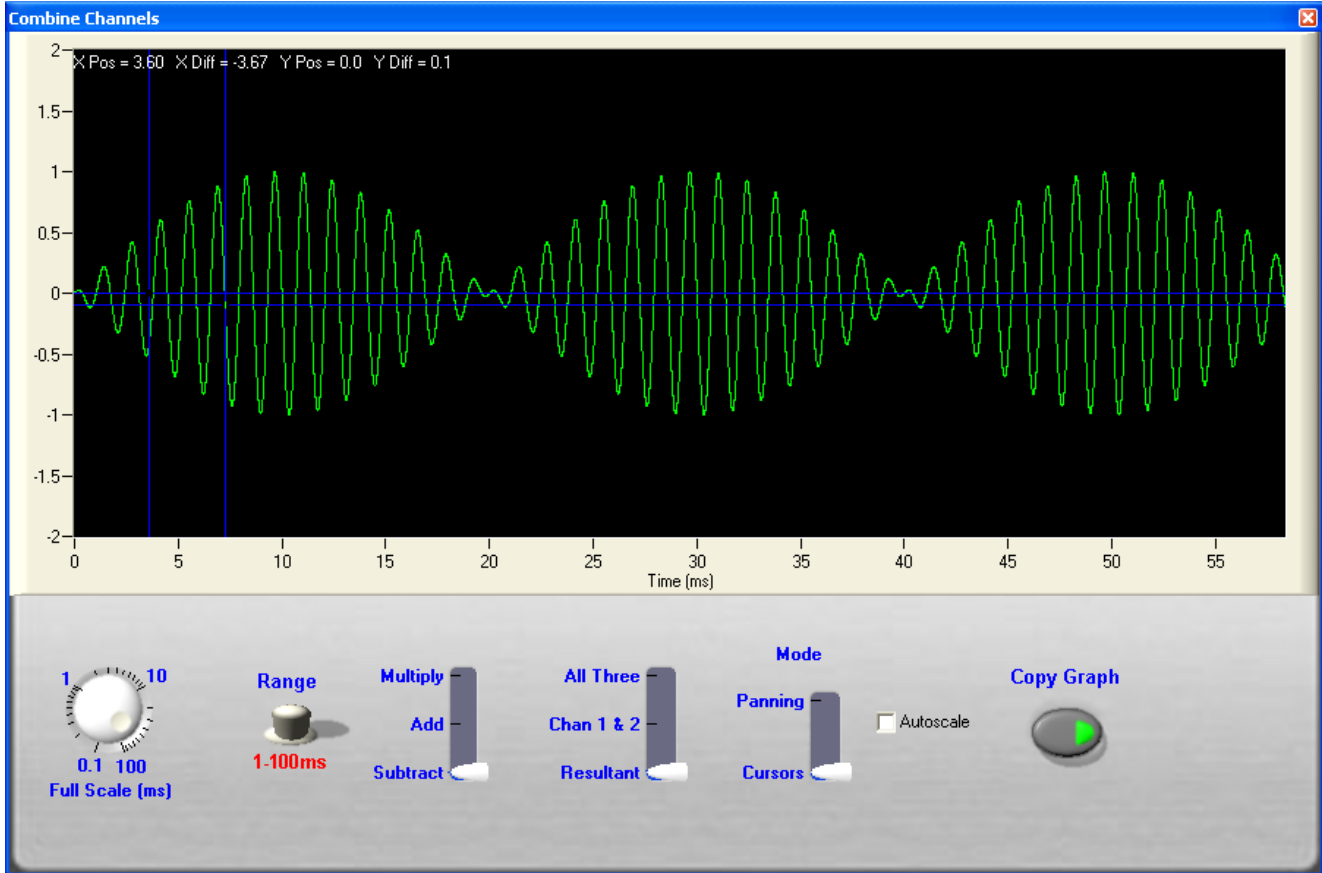
Channel 2: Frequency : 700 Hz, Amplitude: 0.5

3. Click the Combine Graphs button



4. In the Combine Channels Window move the central slide to Add and view the result. Adjust the two cursors to measure the period of the wave envelope – it should be close to 20 ms.
5. Output the two waves to your computer's speakers and listen for the beats.

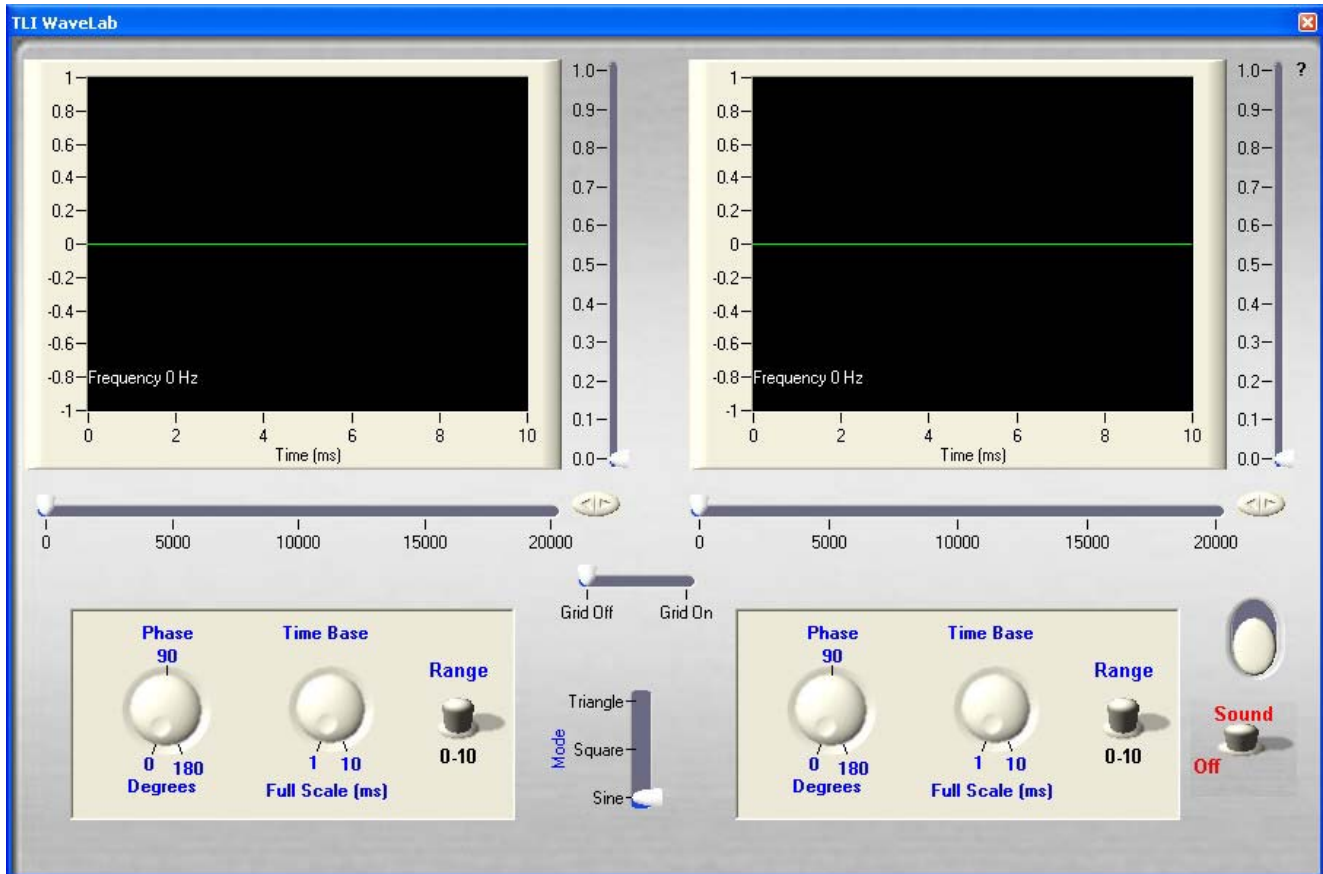




- With your interface connected output your two waves to an oscilloscope, data logger, or TLI Virtual CRO – note that the quality of the waves will depend upon your computer's sound card.

## Controlling Frequency and Amplitude

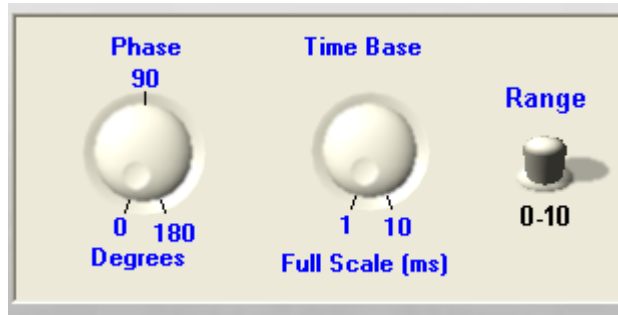
The slide bar and step buttons at the bottom of a Wave Window adjust the frequency. Simply slide the bar until the desired frequency is obtained. Fine adjustments are made with the Step Buttons at the right of the slide bar.



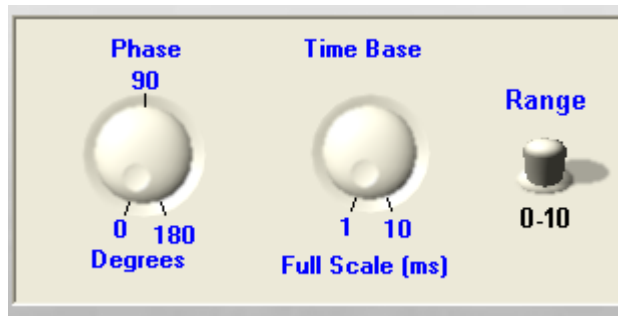
Amplitude is controlled in the same way as frequency by using the slide bar to the right of a Wave Window. Amplitude is measured in arbitrary units, as the intensity of the wave generated by the Wave Lab will depend upon the sound card of your computer.

## Adjusting Phase and Time Base

To change the phase of an individual wave simply Rotate the Phase knob with your mouse until you have the desired phase.



To change the time base of an individual wave window simply rotate, or click on the Time Base knob with your mouse until you have the desired time base. Use the Range switch to change between time base ranges.



## Installing the Interface

The Wave Lab Interface plugs into the speaker output of your computer using the cable provided.

Identify the speaker output from your computer. If speakers are currently connected unplug them and connect the interface. Reconnect the speakers to the output from the Interface.

The BNC connectors can be used to connect your Interface to an oscilloscope. The banana plug sockets can be used to connect to a data logger or oscilloscope.

You can connect either channel or both.

Once installed the waves generated by the Wave Lab can be output to the interface by the “Play” button. To stop output simply relick this button.



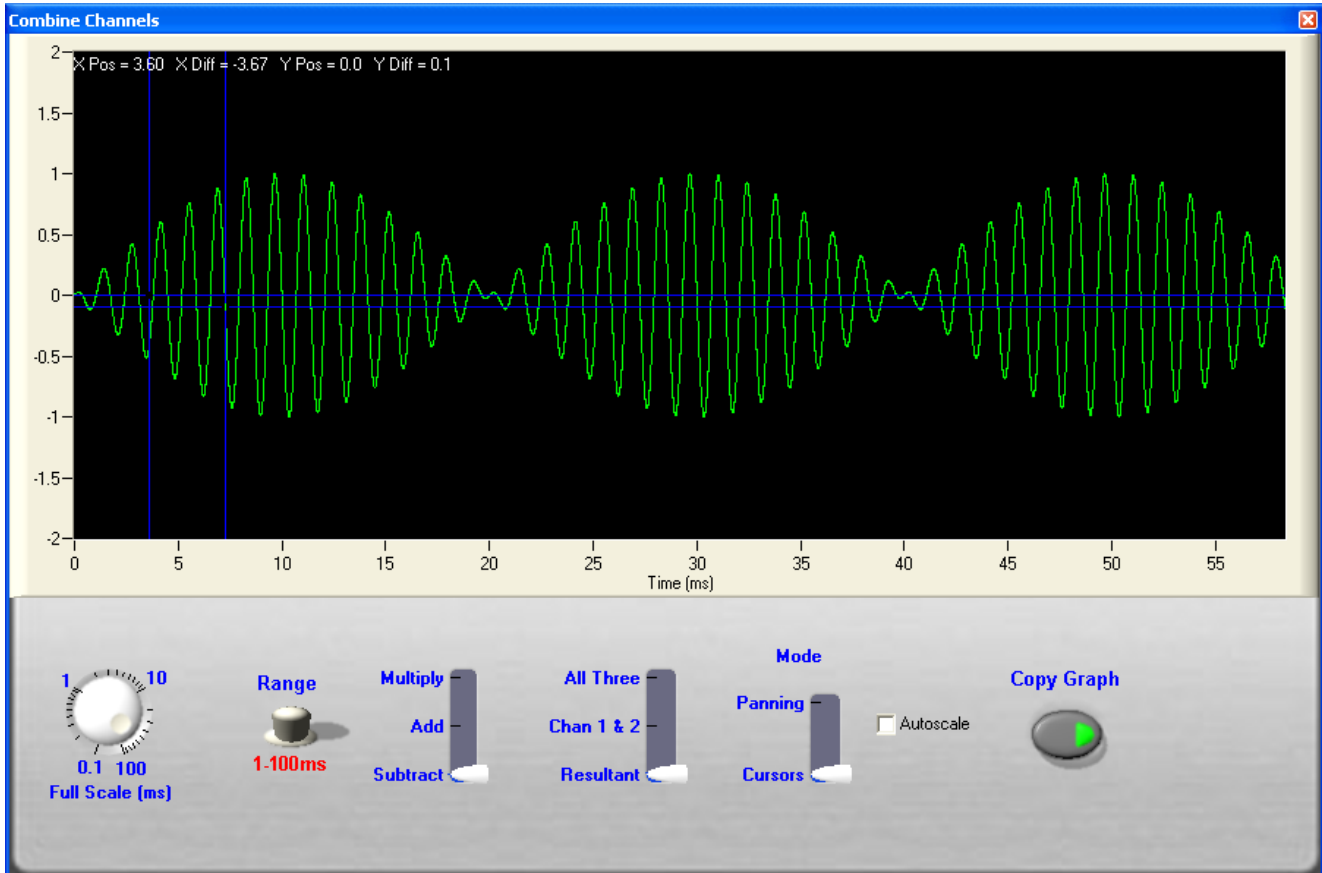
Once playing the frequency, amplitude changes will have no effect on the output. You must change these prior to outputting to the speakers or interface.

Note that the interface does not have to be connected to output to the computer’s speakers.

**Important:** Never connect a voltage, or current source to your Wave Lab Interface as this may result in damage to the interface and your computer.

## Combining Waves

Waves generated by the Wave Lab can be analysed with an oscilloscope, or data logger, or by using the combine waves function of the Wave Lab. This option is accessed from the “Combine Waves” button at the top left of the main button bar. The screen and operation resemble an oscilloscope. You can view the individual waves, the resultant wave and all three.



The panel below the wave screen controls the appearance of the waves. The left most dial and switch control the Time Base. The left slide controls the resultant wave as the addition, subtraction or product of the two waves. The right most slide controls the wave display – you can view the two waves, the resultant or all three.

Measurements can be made by using the two cursors on the screen. Simply move either cursor to a point to determine the x and y values and the difference between the two cursors. These values are displayed at the top left of the screen

The Autoscale mode automatically scales the Y-axis to best fit the display.

## **Getting Help**

Limited support is available for the Computer Wave Lab by contacting

**The Logical Interface**

**Phone (612) 9541 0367 Fax: (612) 954 10535**

**Email: [info@logint.com.au](mailto:info@logint.com.au)**

**<http://www.logint.com.au/>**