A01-766P-Y02

Sonometer System

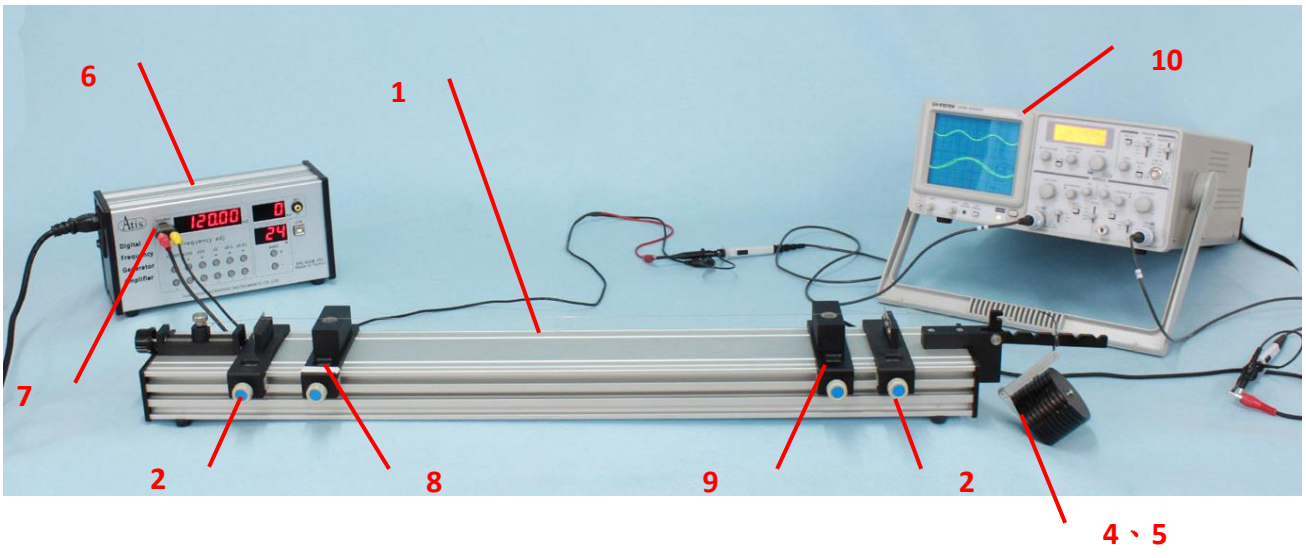
Experiments

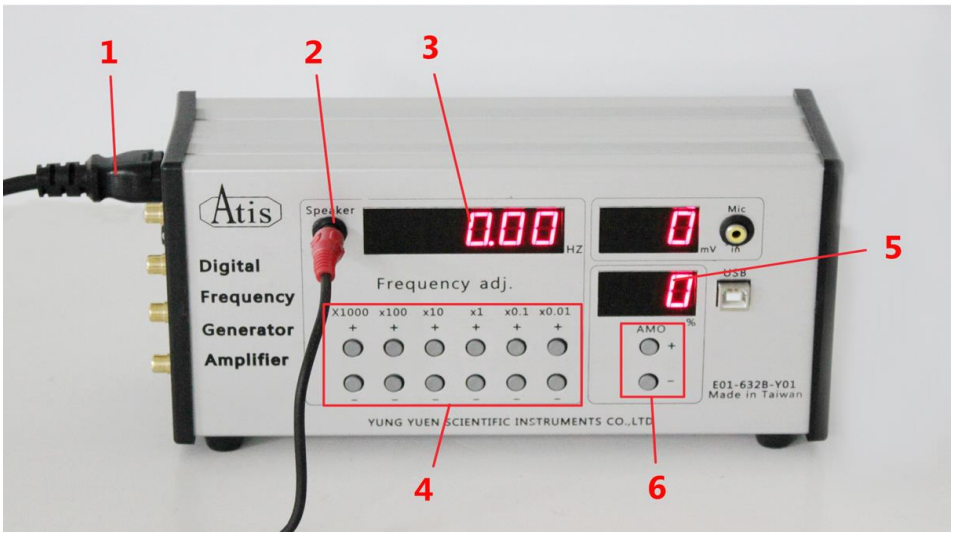
I. Measurement of wires' resonance frequency
II. Measurement of wave velocity

Instrument

Instrument list					
No.	**Accessory**	**Qty**	**No.**	**Accessory**	**Qty**
1.	Experiment base	1	**2.**	Support stand	2
3.	Set of steel strings	4	**4.**	L-shaped weight holder	1
5.	Weight 100g	10	**6.**	Digital frequency generator amplifier (including Three-prong plug power cord)	1
7.	Power plug adapter (1 pin to 2 pin)	1	**8.**	Driver coil	1
9.	Detector coil	1	**10.**	Oscilloscope Note: Additional Purchase	

Instrument picture





Picture of Digital Frequency Generator Amplifier

Digital frequency generator amplifier			
No.	**Accessory**	**No.**	**Accessory**
1	Power	**2**	Speaker
3	Frequency display	**4**	Frequency adjust knob (Decimal)
5	Amplitude display	**6**	AMO amplitude adjustable knob

Experiment I: Measurement of Wires' Resonance Frequency

Purpose

1. Observe causes of standing waves.

2. Discuss the relationship between the length of wire and wavelength when resonance occurs.

Procedure

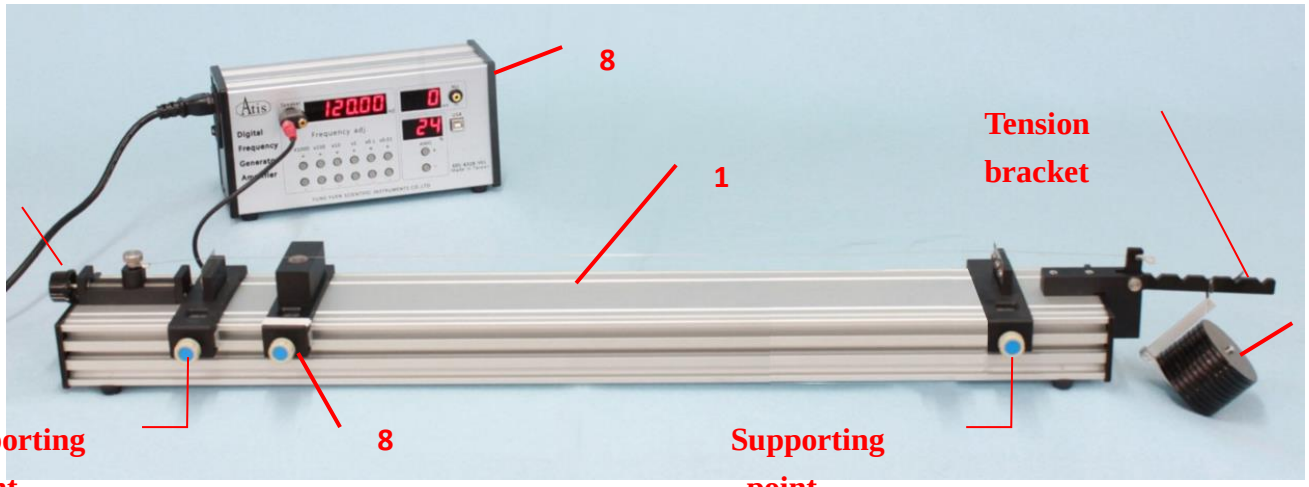


Figure 1-1

1. The experiment setup is shown in **Figure 1-1**. Keep the distance between two supporting points in 60cm. Adjust the knob to keep the tension bracket horizontal. Place the **driver coil** between two supporting points. Keep the coil 5cm away from one of the supporting pints. Connect the coil to the speaker of **digital frequency generator amplifier**.

Note: The position of weight will affect the extension of string so we need to readjust the level of tension bracket.

2. Record the string length L, tension T, linear density μ. Keep the record on **recording sheet 1-1**.

3. Turn on the power and adjust the signal (AMO) of digital frequency generator amplifier. Adjust AMO to 30%.

4. Increase the frequency of signal. Listen and observer the sound of sonometer.

5. Or put the **detector coil** under the wire. Connect the coil to the oscilloscope. Observe the increasing signal, as shown in **Figure 1-2**.

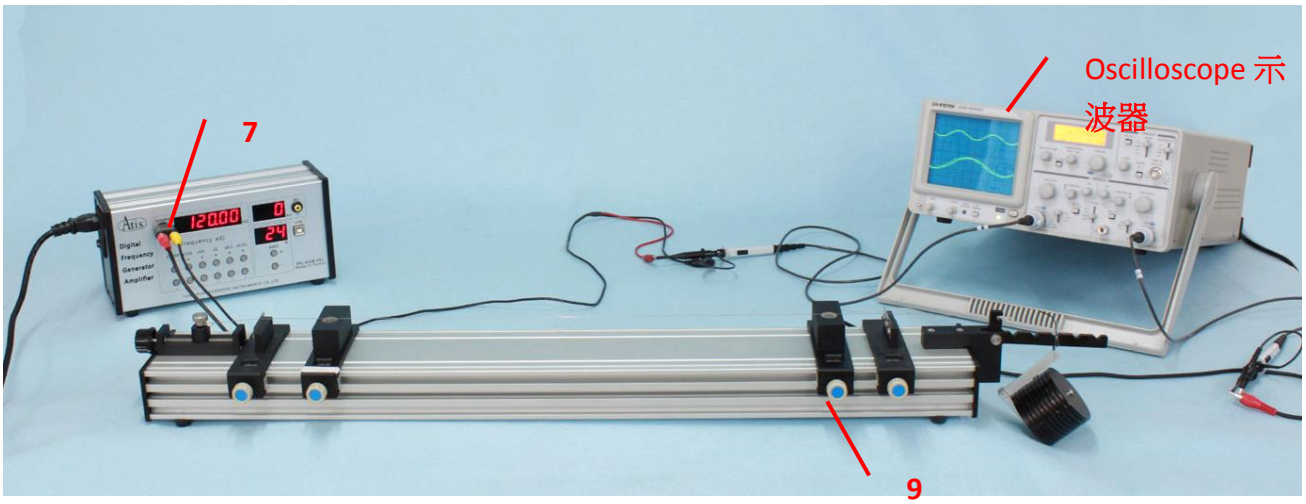


Figure 1-2

6. In the experiment process, the maximum oscillation of the string is the resonance frequency. The minimal resonance frequency is the resonance baseband. Record the measured results to experiment recording sheet I.

7. Detector coil moves slowly from one supporting point. Observe the oscilloscope and record every node and antinode.

Note: To prevent the electromagnetic interference of detector coil and driver coil, keep their distance in 10 cm.

8. Increase the frequency and locate 5 resonance frequencies.

9. Based on the results, record the wavelength of every resonance.

10. Change the distance of two supporting points. Redo the experiment to complete the experiment recording sheet.

Note: The frequency of **driver coil** may not be the oscillation frequency of wire. Use the **power plug adapter** to share **the signal of digital frequency generator amplifier** with the oscilloscope. We can then observe that the frequency may be an integral multiple of the wire's oscillation frequency, as shown in **Figure 1-2**.

Experiment Recording Sheet 1-1

String length L =_____

Tension T =_____ Tension =Mass of hanging object x Groove number of tension bracket

Linear density μ=_____

Number of antinode	Resonance frequency	Location of antinode	Location of node	Wavelength

Experiment Recording Sheet 1-2				
String length L =_____ Tension T =_____ Tension = Mass of hanging object x Groove number of tension bracket Linear density μ=_____				
Number of antinode	Resonance frequency	Location of antinode	Location of node	Wavelength

Questions and discussion

1. Use the experiment data to check the resonance wave shape when the frequency increased. Discuss its relationship with the string length.

2. Draw the wave shape of string when resonance occurs.

3. What is the relationship between wavelength and string length?

Note: In the experiment, when the resonance frequency is an integral multiple (n) of baseband, there are n antinodes and n+1 nodes.

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