

Apparatus for Demonstrating Waves along a Cord U8431776

Instruction Sheet

07/08 ALF



- 1 Base-plate
- 2 Dynamometer
- 3 Stand rods
- 4 Elastic cord

- 5 Universal clamps
- 6 Axle rods
- 7 Axle clip
- 8 Pulley

1. Description

The apparatus for demonstrating waves along a cord shows how transverse standing waves can be induced on a cord or string, and can be used to investigate how their wavelength at a constant frequency depends on the tension.

The stretched cord is induced to vibrate by a DC motor driven by a sine-wave generator.

The instrument and accessories can be used to show that the wavelength λ of a vibrating cord under a tension F is halved when the tension is increased by a factor of four.

2. Equipment supplied

- 1 Base-plate for apparatus
- 1 Elastic cord
- 2 Axle rods
- 1 Pulley
- 1 Axle clip
- 2 Universal clamps
- 2 Stand rods, 400 mm
- 1 Dynamometer, 5 N

3. Operation

The following additional equipment is needed to carry out the experiments:

1 DC motor	U8552330
1 Sine-wave generator	U8533550
1 Transformer, 12 V, 25 VA	U8475430-230
or	
1 Transformer, 12 V, 25 VA	U8475430-115
Experiment leads	

3.1 Setting up

- Set up the experiment as shown in Figure 1.
- Insert the DC motor into the left-hand rod socket and secure it.
- Screw the two stand rods together, insert into the right-hand socket, and secure them.
- Fix the two universal clamps to the rods.
- Push the pulley onto an axle-rod, secure it with the axle clip, and fix it in the lower universal clamp.
- Fix the second axle rod in the upper universal clamp and suspend the dynamometer from it.
- Attach the elastic cord to the DC motor, pass it under the pulley then up to attach it to the dynamometer.
- Adjust the height of the pulley so that the elastic cord runs parallel to the base-plate.

- Connect the DC motor to the sine-wave generator and connect the latter to the transformer.

3.2 Experiment procedure

- Set switches S2 and S3 of the sine-wave generator to the “generator” position (right).
- Apply no tension to the cord other than by means of the dynamometer.
- Adjust the frequency of the sine-wave generator until a standing-wave vibration with four peaks and troughs (two each) settles in. Use the amplitude control to make fine adjustments.

The wavelength is now half the length of the cord.

- Move the dynamometer higher up the rod until the tension is four times the previous value.

The band now vibrates with just one peak and one trough. The wavelength is therefore equal to the length of the band.

The following parameters are found to give good results:

Frequency: 42-43 Hz, initial cord tension: 0.5N.



Fig. 1 Experiment set-up