

KUNDT'S APPARATUS (with speaker & mic)

Cat: SW1996-001 Kundt's apparatus

DESCRIPTION: This apparatus is used to reproduce Kundt's experiments to study wave motion inside a tube by using sound and by creating 'standing waves'.

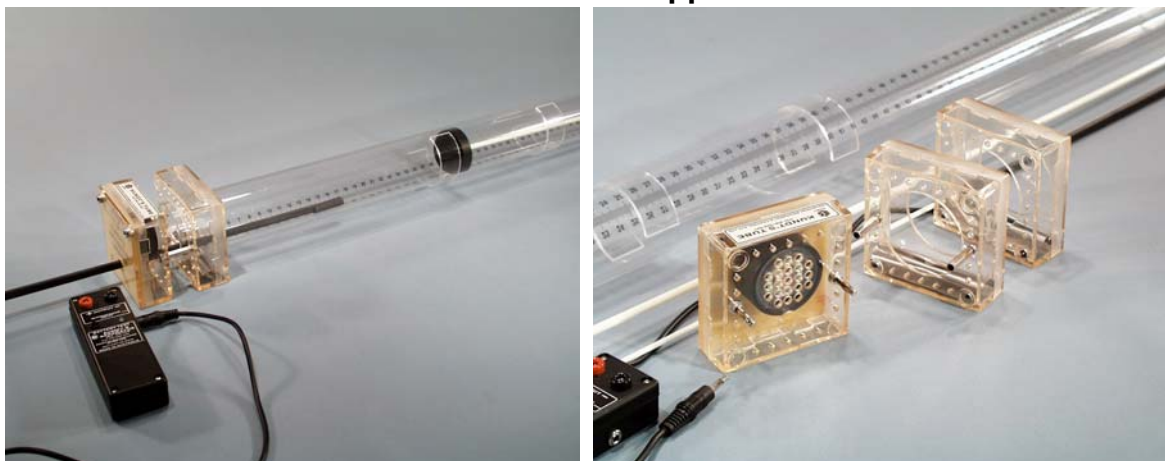
COMPONENT PARTS:

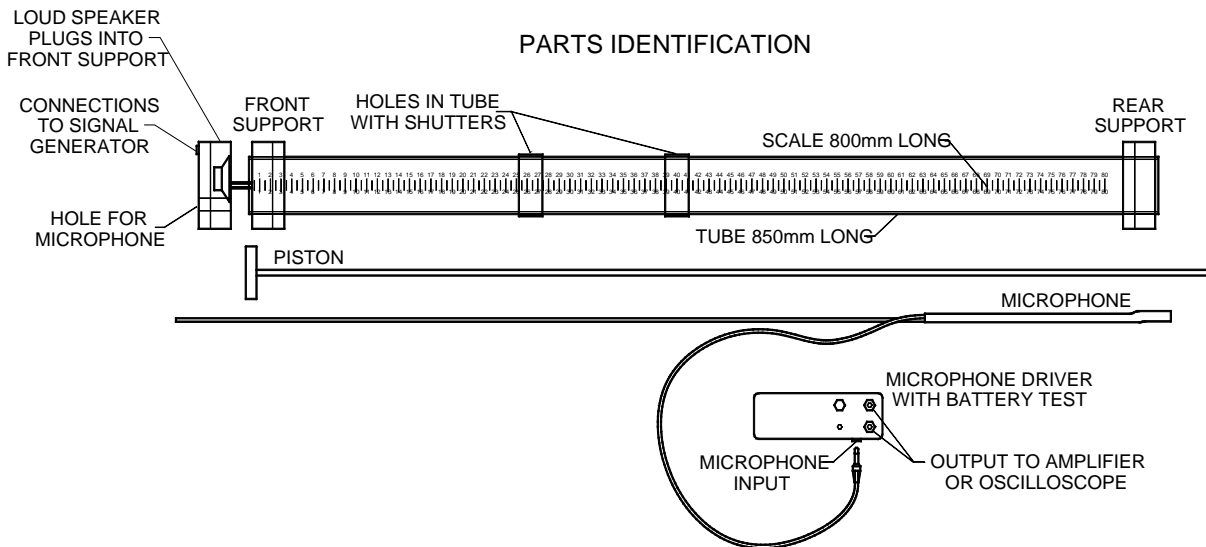
- 1x Transparent tube, 50mm dia.x 850mm long with transparent scale fitted. Tube is complete with 2 holes and sliding covers for work on resonance.
- 2x Support blocks to hold the tube horizontally up from the work bench.
- 1x End housing containing a small speaker for creating the sound waves.
- 1x Piston on a long rod to create various length closed tubes.
- 1x Microphone and cable on long rod to pass up the tube.
- 1x Driver unit to interface the microphone to an amplifier or oscilloscope.

ADVANCED FEATURES OF THE 'IEC' UNIT:

- The 2x holes provided in the tube can be covered by transparent sliding covers.
- The scale can be read when either on the upper side of the tube or the lower side of the tube (for measuring the microphone position). The tube can easily be twisted to move the scale as required.
- The parts are quickly and easily fitted and cannot easily be broken. The parts remove easily from the tube to be easily re-packed for storage in the classroom.
- The speaker is fitted with protection circuit to avoid damage to the speaker if too much power is applied from the signal source. **NOTE:: small speakers can easily be destroyed by too much power, so this feature is very important.**
- The microphone is sensitive and strong. The microphone support rod is fibreglass.
- The strong piston is a good fit in the tube and the piston support rod is fibreglass.
- The Microphone driver with standard 9V battery with very long life (several years) and, for reliability, a small button permits a battery test to check battery before use.

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HOW IT WORKS: Look at the drawing above to see the various parts of the Kundt's Apparatus. Variable length air column with loud speaker to create the sound waves and miniature microphone to detect the nodes and antinodes inside the tube.

ASSEMBLY FOR AN EXPERIMENT:

- Take the plain support block (without the 2 sockets) and slide it on the end of the tube where the scale has finished at 800mm. While sliding the tube into the hole in the support block, allow the tube to slightly deflect the metal curve inside the block so there is a gentle sliding friction between the block and the tube.
- Take the other support block with the 2 sockets and slide it on the other end of the tube where the scale begins at zero. The sockets should be pointing away from the tube.
- Take the Speaker box and fully plug the 2 banana plugs into the 2 sockets on the support block so the two units are firmly connected together.
- Adjust the position of the support block on the tube so the face of the speaker is about 12mm away from the end of the tube. For normal experiments, the end of the tube must NOT touch against the speaker.

REASON:: The experiments are performed on either an open tube (open both ends) or on a closed tube (tube closed at the end opposite the speaker). When the piston is slid inside the tube, the piston forms the closed end at any position along the tube.

- Rotate the speaker and block assembly so the label is uppermost and the hole for the microphone is under the speaker. Let the assembly rest firmly on the work bench.
- Connect the 2 sockets on the speaker housing to a sine wave signal source (oscillator or similar) with standard 4mm banana plug cables.

SIGNAL SOURCE: Set your oscillator to about 500Hz and check that the speaker works. The speaker is protected against too much power from the signal source, but the sine wave signal should be about 1 to 2 volts peak. If your oscillator cannot provide enough power, an amplifier may be required to drive the speaker.

IMPORTANT NOTE: If the voltage to the speaker is too high, the wave will be distorted and will no longer be a sine wave shape. If this occurs, the sound from the speaker will be distorted and will not sound 'clean'.

- During an experiment, the sound wave will be detected by the microphone. Slide the mini microphone through the hole under the speaker so that it slides inside the tube. The tube can be rotated so the scale is at the bottom and close to the microphone for accurate measurements. Special scale markings are provided so it can be read with the scale on the top or the bottom of the tube.
- During an experiment, the piston can be slid into the other end of the tube to make the closed tube any length desired.
- During certain experiments, the two transparent shutters can be slid from the holes in the tube to open the tube at these places.

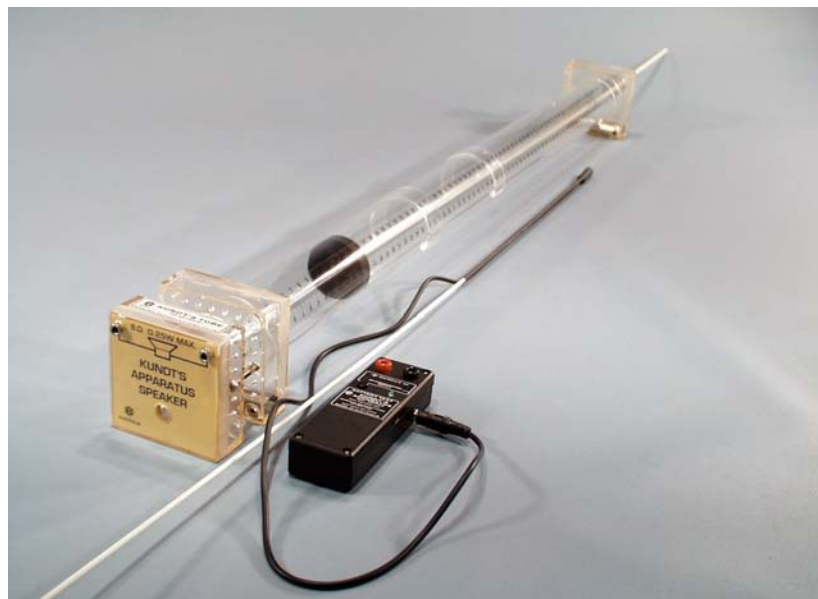
MICROPHONE DRIVER: Plug the small plug on the microphone cable into the socket provided on the side of the 'Microphone Driver' and, using standard 4mm banana plug cables, connect the 'Driver' to an oscilloscope to see the microphone signal or into an amplifier to hear the microphone signal. The battery can be tested by pressing the button provided. If battery is OK, the small LED will light.

BATTERY: To replace the standard 9V battery, remove the 4 screws from the housing. The battery has a very long life and will last several years providing the microphone is disconnected from the 'Driver' when storing the instrument.

WAVELENGTH AND FREQUENCY CONVERSION: To convert Frequency to Wavelength or to convert Wavelength to Frequency, the following formula must be used:

$V = \lambda / f$ where V is speed of sound in air in metres/sec, λ is wavelength in metres and f is frequency in Hz. For school experiments, the speed of sound can be considered to be close to 333 metres per second at sea level.

**Speaker end of
the Kundt's tube**



Designed and manufactured in Australia