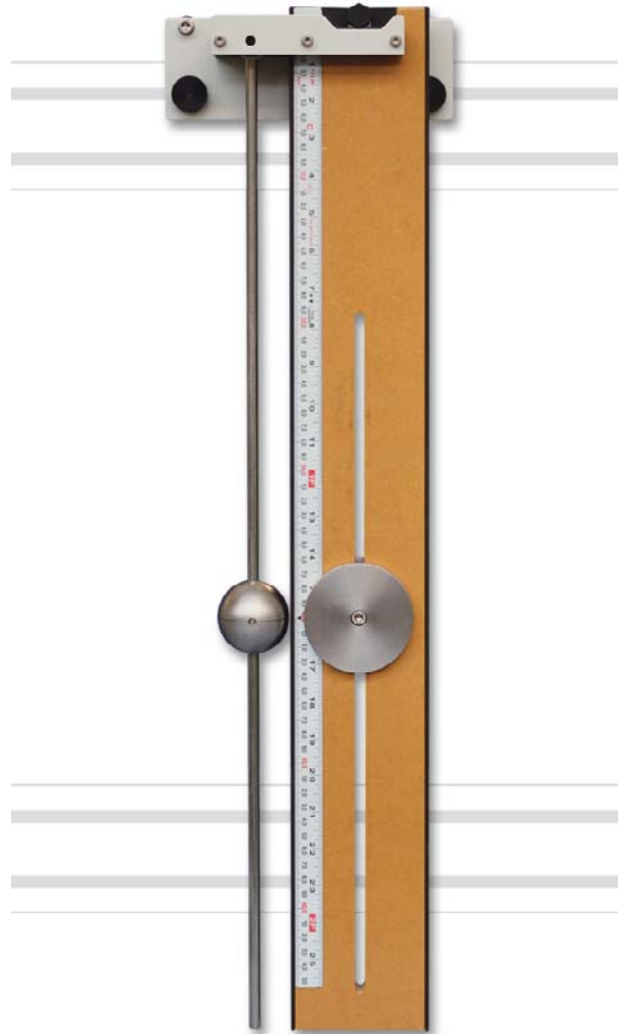




## ≡ CENTRE OF PERCUSSION

TM163

Experiment that illustrates how to calculate and find a compound centre of percussion pendulums. Fits on to the Free Vibrations test frame.



### KEY FEATURES

- One of a series of modular experiments that explore free vibrations in simple systems
- Quick, safe and easy for students to use, needing minimal laboratory supervision
- Integral scale to save time and improve measurement accuracy
- Realistic scale for highly visual and accurate experiments in complete safety
- Contains all parts needed for the experiments, including a stopwatch and simple tools



# ≡ CENTRE OF PERCUSSION

TM163

## DESCRIPTION

This product is part of a range that explores free vibrations in simple 'one degree of freedom' systems.

It introduces students to key scientific terms such as:

- Simple harmonic motion (SHM) and period of oscillation
- Radius of gyration
- Centre of gravity
- Centre of percussion (CoP) and the 'sweet spot'
- Impact reactions

This product fits to the sturdy test frame (TM160) for study or demonstration.

A centre of percussion may also be termed the 'sweet spot' of the impact of a ball against a bat or racquet. It is the impact position which allows no reaction in the hand of the user, which would otherwise create uncomfortable shocks in their arm and wrist.

This product includes a metal pendulum to provide the percussion force (a ball) and a wooden pendulum to absorb the impact. The wooden pendulum forms a suspended mass, similar to a bat held underhand.

A cradle fixes to the top of the test frame. The cradle suspends the fixed metal rod pendulum and heavy sphere beside the wooden pendulum.

Self aligning bearings hold the metal pendulum to allow rotational movement only.

Hardened steel knife edges rest on a smooth surface on the cradle suspending the wooden pendulum. They allow the wooden pendulum to pivot freely while also allowing some visible horizontal movement, necessary to see any reactions.

Students find the centre of gravity of the wooden (compound) pendulum to calculate its radius of gyration and centre of percussion. They then use the sphere of the metal pendulum to simulate a ball hitting the wooden pendulum at positions above, below and at the centre of percussion, noting any reaction. The wooden pendulum has a mass with adjustable position. This allows students to change its centre of gravity position for a range of tests.

TecEquipment made this product to a realistic scale. This means that it produces highly visual results for demonstrations, yet the masses and inertia are still low enough for safe student use.

## STANDARD FEATURES

- Supplied with lecturer guide and student guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- ISO9001 certified manufacturer

## LEARNING OUTCOMES

- Centre of gravity, period of oscillation and radius of gyration of a compound pendulum
- Demonstration of centre of percussion of a compound pendulum

## ESSENTIAL BASE UNIT

- Free Vibrations Test Frame (TM160)

## OPERATING CONDITIONS

### OPERATING ENVIRONMENT:

Laboratory

### STORAGE TEMPERATURE RANGE:

-25°C to +55°C (when packed for transport)

### OPERATING TEMPERATURE RANGE:

+5°C to +40°C

### OPERATING RELATIVE HUMIDITY RANGE:

80% at temperatures < 31°C decreasing linearly to 50% at 40°C

## SPECIFICATIONS

TecEquipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specification without prior notice.

### NETT DIMENSIONS AND WEIGHT:

(Assembled) 700 mm high x 200 mm wide x 115 mm front to back and 5 kg

### APPROXIMATE PACKED VOLUME AND WEIGHT:

0.05 m<sup>3</sup> and 7 kg

### TOOLS AND OTHER PARTS INCLUDED:

- Hexagon tools
- Stopwatch



SHOWN WITH THE TEST FRAME (TM160)