



THEORY OF MACHINES

Vibration: • ATM16 Universal Vibration Apparatus

Basic and advanced principles

An awareness of the way machines work is fundamental to most engineering courses. Students need to understand the principles of mechanical advantage, cams, vibration and mechanical movement to give them a solid foundation of knowledge about mechanical system behaviour. This knowledge will serve them throughout their academic and future engineering careers.

Advance Instrument offers an outstanding selection of quality products to teach the principles and theory of machines. The strong designs clearly teach a comprehensive range of basic and advanced principles used in engineering throughout the world.

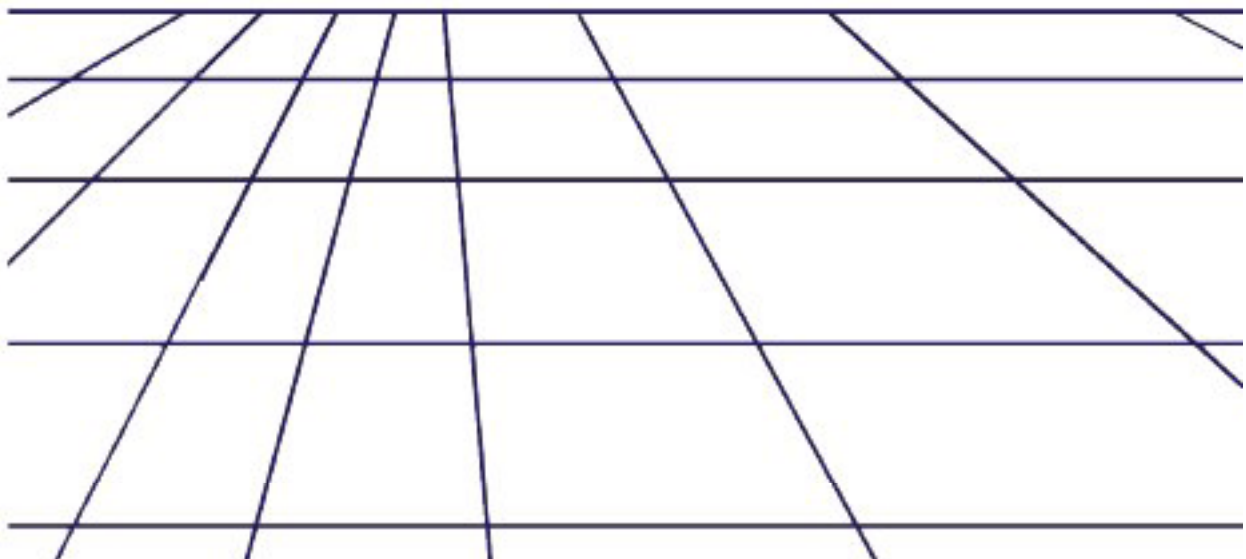
Classroom, group or individual use

For maximum teaching efficiency, the equipment is equally effective whether it's used for classroom demonstrations, or by students on their own or in groups. This versatility is a great benefit when teaching different academic levels. It's easy to show basic principles to groups of students. For more advanced investigations, the straightforward controls, instrumentation and built-in safety allow students to progress through the experiments with minimum supervision.

Easy to install and completely safe to use

At Advance Instrument we build all our products to exceptionally high safety standards. Even though some products in this range include fast-moving parts, our engineers have developed imaginative ways to make the equipment safe to use without compromising its educational value.

The products are easy to work and need only minimal installation and maintenance. This keeps running costs low and makes efficient use of staff and student time.





ATM16 Universal Vibration Apparatus



A range of products that fit onto a sturdy steel frame.

The range gives different experiments in vibrations, oscillations and simple harmonic motion.

Picture shows the Frame and Cupboard (ATM16a) and the forced vibration experiment

Features:

- Supplied with comprehensive user guide
- Three-year warranty
- Manufactured in accordance with the latest European Union directives

- Cost-effective range of precision-engineered products for experiments in vibration in different mechanical systems
 - Economical modular system –you only need to buy the products which match your course
 - Fully mobile frame for easy use including storage cupboard to store additional products
 - Only needs few simple tools (included) to set up each experiment
- Optional products accurately locate in fixing positions on the frame for easy setup
- Gives experiments with many different systems, including pendulums, mass-spring systems, beams and shafts

Description:

The ATM16 range is a series of products that teach different aspects of vibrations and oscillations in mechanical systems. These include pendulums, mass-spring systems and shafts and beams. The ATM16 range is a modular system, based around the Frame and Cupboard (ATM16a).

Advance Instrument supplies the products as packages which match a range of experiments.

Refer to the selection matrix 4 to choose the correct product packages to match the experiments you need.

You need the Frame and Cupboard (ATM16a) for all experiments, then you choose the other products you need. Alternatively, you may select the complete package (ATM16), which includes everything you need (except the 2 Channel digital storage oscilloscopes) to do all the experiments.



ATM16 Universal Vibration Apparatus

Description:

Essential Ancillary

- (ST1) - needed for some experiments. include :
- Digital Strain Gage Conditioning Amplifier (all products)
- 2 Channel digital storage oscilloscopes (all products)

Experiments (with the optional products)

- Simple pendulum
- Compound pendulum
- Centre of percussion
- Determination of the acceleration due to gravity by means of a Kater (reversible) pendulum
- Bifilar suspension

Mass-spring systems

- Torsional oscillations of a single rotor
- Torsional oscillations of a single rotor with viscous damping
- Torsional oscillations of a two rotor system
- Transverse vibration of a beam with one or more bodies attached
- Undamped vibration absorber
- Forced vibration of a rigid body-spring system with negligible damping
- Free damped vibrations of a rigid body-spring system
- Forced damped vibration of a rigid body-spring system

Selection Matrix	Products Needed									
	AMT16a	AMT16b	AMT16c	AMT16d	AMT16e	AMT16f	AMT16g	AMT16h/i	AMT16k	ST1
Experiments										
• Simple pendulum										
• Compound pendulum										
• Centre of percussion										
• Determination of the acceleration due to gravity by means of a Kater (reversible) pendulum										
• Bifilar suspension										
Mass-spring systems										
• Forced vibration of a rigid body-spring system with negligible damping"										
• Free damped vibrations of a rigid body-spring system										
• Forced damped vibration of a rigid body-spring system										
Transverse vibration of a beam with one or more bodies attached"										
Undamped Vibration Absorber										
• Torsional oscillations of a single rotor										
• Torsional oscillations of a two rotor system										
Torsional oscillations of a single rotor with viscous damping"										

Note: The ATM16 (Complete Package) includes the ATM16a, b, c, d, e, f, g, h/i and k, but not the ST1



ATM16 Universal Vibration Apparatus

Description:

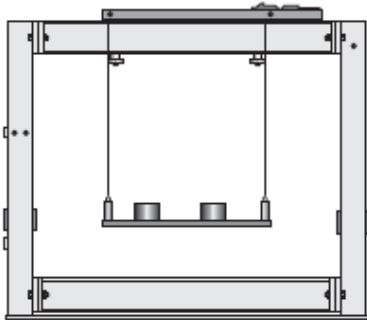
Frame and Cupboard (ATM16a)

A heavy, sturdy steel frame with small wheels and a useful cupboard to store your optional products. The top of the cupboard is a useful work area. The bottom of the frame has adjustable feet to help you level and steady the frame. The upper part of the frame is the 'window,' where you fit most of the other (optional) experiments. Some experiments fit to the side of the frame.

Pendulum Experiments (ATM16b)

Fits in the window of the frame. Studies different pendulums, their characteristics and behaviour. Includes:

- Simple wooden and steel pendulums.
- A Bob pendulum and a Kater pendulum
- A wooden compound pendulum
- A bifilar suspension bar



A typical pendulum experiment

Mass-Spring System (ATM16c)

Fits in the window of the frame. Studies different springs with different loads to find periodic time and deflection and spring stiffness. Includes masses and three different springs.

Free and Forced Vibrations (ATM16d)

Fits in the window of the frame. Studies free and forced vibrations in a beam and spring system. Includes:

- A long steel beam and supports
- Different springs and masses

Lateral Vibrations (ATM16e)

Fits in the window of the frame. Studies lateral (transverse) vibrations in a beam. Includes:

- A long steel beam and supports
- A spring and masses

Motor and Speed Control (ATM16f)

The motor fits onto other ancillaries to give controlled, forced vibrations at a known frequency. The Speed Control sits on the top of the cupboard. The Speed Control adjusts the speed of the motor and gives power for the drum recorder of the ATM16d. It also gives an output to help trigger the optional storage oscilloscopes.

Vibration Absorber (ATM16g)

Fits under the motor of the Motor and Speed Control, and onto the beam of the Lateral Vibrations ancillary (ATM16e) to study how to tune two bodies to absorb vibrations. It is two masses fitted at equal distances on a leaf spring assembly.

Torsional Oscillations (ATM16h/i)

Fits in the window of the frame. Studies oscillations (simple harmonic angular motion) in a twisting shaft. Includes:

- Three different shafts
- Two different flywheels and inertia weights
- Shaft clamps

Damped Torsional Oscillations (ATM16k)

Fits on the side of the frame. Studies how oil can dampen the angular oscillations of a twisting shaft (viscous damping). Includes:

- A pen recorder and dashpot
- Three different shafts
- An oil reservoir assembly and oil
- Clamps to hold the parts to the frame



A typical damped torsional oscillations experiment



ATM16 Universal Vibration Apparatus

1-1

Strain Indicators-Static Strain Indicator

Description:

Essential Services

Electrical supply (for the optional ATM16f Motor and Speed Control):

Single-phase, 230 V/110 V, 50/60 Hz
(specify on order)

Floor space needed for the frame and cupboard:
3 m x 3 m of solid, level floor

Operating Conditions

- Operating environment: Laboratory environment
- 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
- Digital Strain Gage Conditioning Amplifier
(all products)
- 2 Channel digital storage oscilloscopes
(all products)

• Specifications

- Frame and Cupboard (ATM16a)
- Nett dimensions and weight:
 - 1120 mm x 960 mm x 1830 mm
 - 280 kg
- Packed dimensions and weight: 3 m³ and 300 kg
- Cupboard: Hinged doors and shelf.
Total size approximately
355 mm x 700 mm x 1060 mm.
- Tools included:
 - Metric allen keys (hexagon tools)
 - Metric spanners
 - Ancillaries Included
 - A stopwatch and a rule
- ATM16b:
 - Packed volume and weight: 0.16 m³ and 45 kg
- ATM16c, ATM16d, ATM16e and ATM16f:
 - Packed volume and weight: 0.18 m³ and 20 kg
- ATM16g:
 - Packed volume and weight: 0.03 m³ and 4.5 kg
- ATM16h/i:
 - Packed volume and weight: 0.16 m³ and 45 kg
- ATM16k:
 - Packed volume and weight: 0.16 m³ and 45 kg
- Complete Product (ATM16)
 - Packed volume and weight: 3.4 m³ and 450 kg