

OPTICAL BENCH - simple type

Cat: HL2240-001 Complete with 'Hodson' Light Box.

Cat: HL2241-001 Not including 'Hodson' Light Box

DESCRIPTION:

The IEC **Optical Bench** system is designed to be used with the IEC 'Hodson' Light Box. The 'Hodson' Light Box can be used as the light source for the Optical Bench and the lens and prism blocks from the Light Box kit can be used on the Optical Bench. The study of colours and shadows is performed from the mirror end of the light box and the study of light rays and the creation of images is performed from the front end of the light box.

The 1.2m long aluminium rail with the 1m adjustable scale holds all the components in a straight line for accurate experiments. The kit contains lenses, prisms, screen, prism table, targets and holders for lenses, slits, plates and targets. These are all the components required for basic optical experiments of focal lengths, images, diffraction and much more.

The extensive kit is detailed on the following page.

HL2240-001 or HL2241-001 optical bench



Physical size: 1420x110x110mm LxWxH kit

Weight: 2.25 kg

**COMPONENTS:**

The kit components are as follows:

- 1 pce Aluminium Bench, 1.2M long with 1M scale fitted.
- 1 pce Plastic pillar to clamp to bench to support light source.
- 1 pce Platform (tapered shape) to support 'Hodson' Light Box (presses tightly over plastic pillar clamped to bench).
- 3 pcs Tubular supports with circular clips for 50mm. Diam. lenses and mirrors. (accepts circular lens/mirrors)
- 1 set Prism table, circular, with tubular support.
- 4 pcs Grooved supports for square plates with centre hole.
- 4 pcs Square plates with centre hole (for lenses and devices). (these are pressed into the grooves of the supports).
- 1 pce White card screen. (this screen stands vertically held on any tubular support by slipping between the pins and the centre tube)
- 1 pce Photographic slide of a 3mm. diam. hole.
- 1 pce Photographic slide of a 5mm. diam. hole.
- 1 pce Photographic slide of an 8mm. diam. hole.
- 1 pce Photographic slide of the letter 'F'.
- 1 pce Photographic slide of a metric scale.
- 1 pce Photographic slide of circular targets (5 & 10mm. diam.).
- 2 pcs Convex lens, 50mm. diam. X 100mm focal length.
- 2 pcs Convex lens, 50mm. diam. X 200mm focal length.
- 2 pcs Convex lens, 50mm. diam. X 300mm focal length.
- 1 pce Concave lens, 50mm. diam. X 100mm focal length.
- 1 pce Concave lens, 50mm. diam. X 200mm focal length.
- 1 pce Concave lens, 50mm. diam. X 300mm focal length.
- 12 pc Rubber bands for holding lenses and devices to the square plates.
- 1 pce Triangular prism.
- 1 pce Light Box (HODSON type) - for **Cat: HL2240-001 ONLY**
- 1 pce Instruction sheet.

**FURTHER DESCRIPTION:**

If the aluminium bench has been supplied without the light source support pillar fitted, take the pillar (the one with the large screw through the centre) from the set of components and fit it at the extreme left hand end of the bench whilst the metric scale is facing towards you. Tighten the screw through the pillar very firmly. This vertical pillar is used to support the Light Box on the bench. The light box from the standard 'HODSON' Light Box and Optical Set is mounted to the end of the optical bench by fitting the stem of the light box support plate (tapered plate) over the support pillar at the left end of the bench. If the pointed end of the support plate points along the length of the bench, the light box will rest on the plate with the end without the mirrors providing the light. If the support plate is rotated so that the pointed end faces away from the bench, the mirror end of the light box will be the source of light for experiments. Note that the plate may be quite difficult to twist since it is a firm fit over the pillar.

The 1 metre long scale is adjustable for position by sliding it back and forth in its groove with the finger. This is used for measuring the relative positions of each component that forms the optical system on the bench.

USE OF THE EQUIPMENT:

IMPORTANT: It is important on an optical bench that all devices are exactly in line with each other during an experiment. When sliding the devices along to different positions along the bench, always press gently with the thumb against the side of the holder to ensure that the holder is running exactly parallel to the bench and that it cannot twist slightly whilst being moved.

The unit is designed so that the light source and all the devices are at the correct heights for an experiment. The following devices may be assembled by connecting the various parts of the kit together:

Circular lens or circular mirror holder (clip type):

The circular clips are in two halves which, when held together at the thread with the fingers, will screw into any one of the three tubular supports in the kit. When the clip is screwed in, a 50mm. diameter lens or mirror etc. will fit into place by slightly stretching the two halves of the clip apart. Up to 3 circular lenses or mirrors can be held in this way and can be placed on the bench in a straight line.

NOTE: If clips are fully unscrewed, be sure to re-screw the same pair of clip halves into the tubular support, otherwise the two halves of the clip may not align correctly.

The mark on the outer edge of the tubular support is the pointer for the scale and indicates the mid position of the lens.

**Lens holder (plate type):**

These plates are designed to push into the grooved supports so that when the support is placed on the bench, the plate stands up vertically across the bench. The plate is large to prevent unwanted light from continuing beyond the plate.

The hole in the plate is designed to be on the same centre line as the 'clip type holder' described above. When fitted to the holder, the overhanging edge of the plate is used as the position indicator for the scale along the bench.

The square plastic plates can support either circular lenses or photographic slide mounts. The lens or photographic mount is placed against one side of the plate so that the edge of the lens or mount rests against the two ribs projecting from the face of the plate. These ribs ensure that a 50mm diameter or square device is positioned centrally across the hole in the plate. The devices are held in place by a rubber band around the plate on each edge of the device.

NOTE 1: If desired, two plates may be fitted to the same grooved holder so that they are very close together. Both plates may carry lenses or perhaps different devices may be fitted to the plates.

NOTE 2: Lenses smaller or larger than 50 mm diameter may be fitted to the plates, but, if this were done, the two guide ribs which project from the surface of the plate would then not assist in centralising the devices.

Prism Table:

The circular prism table with the circular grooves (to assist centralising of prisms) has a stem projecting from one side. This stem is to be inserted into the tubular support so that when the support is placed on the bench, the prism table is level with the lower face of the light box. A prism from the light box kit can be placed on the table and rays of light from the box can be sent through the prism. The table can easily be rotated with the fingertips thus altering the angle of the prism to the rays.

A spectrum can be created and seen on the screen. The light can be coloured by using the colour filters from the Light Box kit and the changes to the spectrum can be observed.

Projection screen:

The screen (white card) can be slipped vertically between the small pins and the centre stem of the tubular holder so that the screen is supported vertically. This is used for the observation of projected images from lenses etc..

The photographic slides of round 'holes':

These are fitted to the square plate to provide a 'collimated' beam of light. Some of the light from the mirror end of the light box passes through the hole and an approximately parallel beam emerges from the other side. This beam is used for the experiments with lenses etc.

**The photographic slide of the 20 mm. long scale:**

This is fitted to a square plate so that the image of the scale can be projected on to the screen. By measuring the size of the image on the screen with a ruler, the magnification in one dimension of a lens system can be established. Magnification by the flat lens blocks (from the light box kit) supported on the prism table can be measured.

The photographic slide of the letter 'F':

This is fitted to a square plate so that it can be projected on to the screen. The letter 'F' is not symmetrical, so both lateral and vertical inversion can be seen to occur with lens systems.

The photographic slide of the circular target:

This is fitted to a square plate so that it can be projected to the screen. Magnification in two dimensions using circular lenses can be measured (similar to the metric scale). Distortion of the image can be observed when the circular lenses are twisted in their holder clips.

Small solid objects such as pins etc. may be taped to the surface of a square plate so that it is visible through the centre hole. The image or shadow of the object may then be projected to the screen to study diffraction, umbra and penumbra.

This instruction sheet is not intended to provide all optics experiments to be performed on an optical bench. The information on the experiments must be obtained from the physics instructor or the optics text books used in the classroom.

Designed and manufactured in Australia

PARTS IDENTIFICATION

