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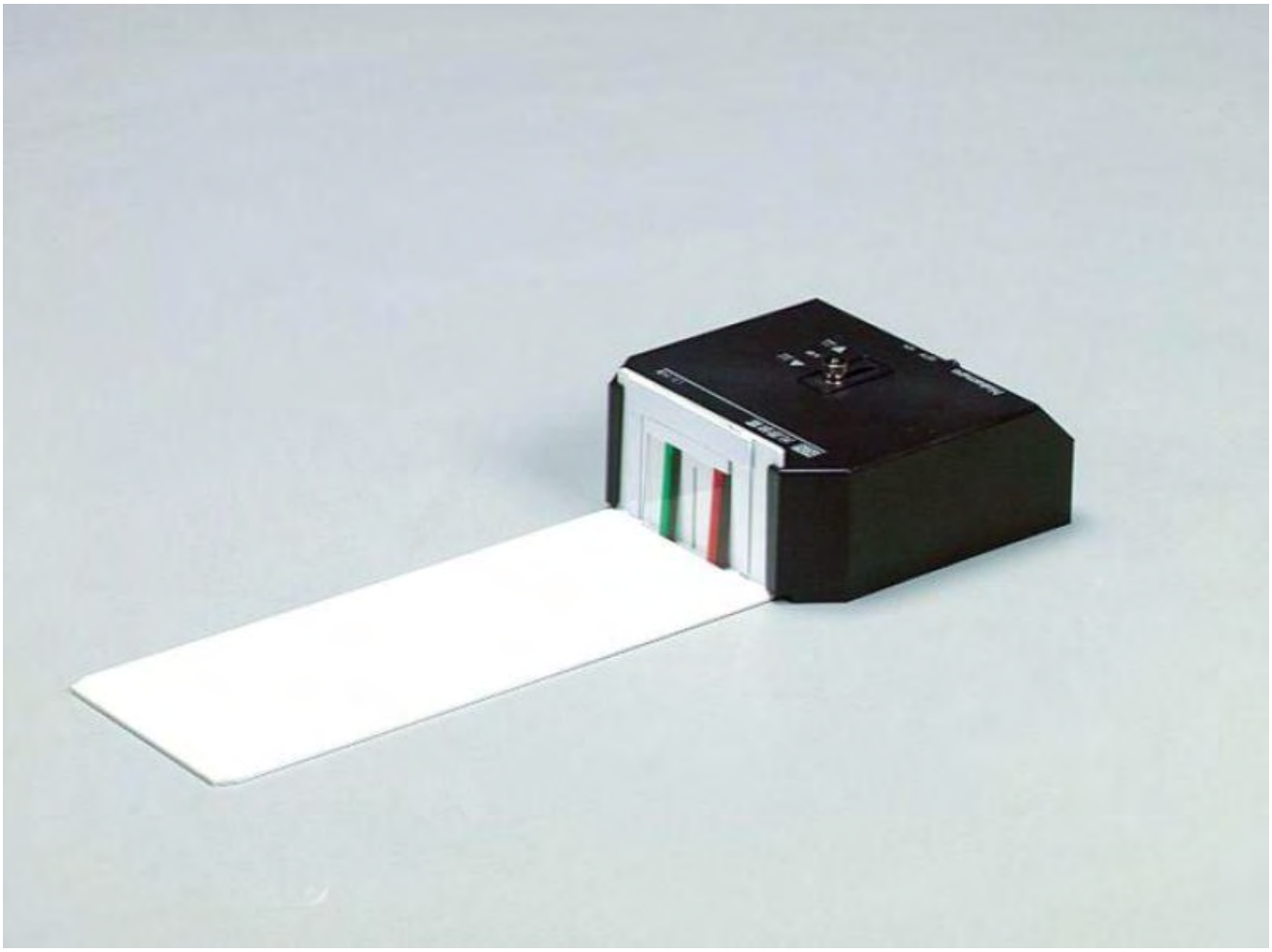
Manual of Operation

N99-D20-1502

RAY BOX



Important!

Read the following before using this equipment:
Follow all instructions and observe all precautions as shown in this manual.

Purpose

The Nakamura Ray Box is a ray box with dry cells that can be used as an optical education tool. You can change over between three slit-rays and one slit-ray with a one-touch operation. The “Refraction/Reflection Experiment Set B” is a set containing the Ray Box and several types of smoke lenses and a reflecting mirror for experiments.

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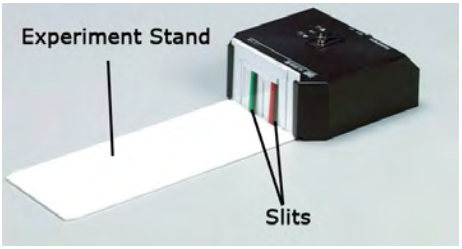
Construction

The Ray Box makes use of cylindrical type DC bulb as the light source. Parallel light rays can be obtained when light is passed through the cylindrical convex lens. The box contains two dry cells (UM-1) as shown in the figure below. Focus adjustments can be made by loosening the focus adjusting screw and moving the light source to the front or to the rear. The experimental stand is constructed so that if it is mounted in front of the convex lens, the light from the slit falls on the stand. By sliding the slide plate of the experimental stand to the left or to the right, you can obtain light from 3 slits (3 light rays of yellow color or 3 rays of red, yellow and green colors) or light from one slit (yellow) with a one-touch operation. Also, you can adjust the three slits for parallel, divergent or convergent rays.



Components in the set Refraction/Reflection Experiment Set "B"

Ray box (for students)(1 no.): Containing cylindrical type DC bulb (2.5V), 2 size D dry cells.
Semicircular Smoke Lens (1 no.): Smoked resin, radius 30mm, with full circle protractor (made of paper).
Convex Lens (1 no.): Smoked resin; F = 50mm
Trapezoidal Smoke Lens (1 no.): Longer side; 70mm, shorter side 40mm, acute angle 60 degrees.
Light reflection experiment mirror (1 no.): Plane mirror 80x60mm, protractor with 5-degree graduations, with plane mirror protective cover.

Experimental Methods

Insert the two dry cells in the dry cell holder, as shown in the figure. Set the experimental stand in front of the light source unit and turn on the power switch. Light from the slits will fall on the experimental stand. Loosen the focus adjusting screw and adjust the position of the light source so that the light rays from three slits become parallel to each other.
Note: Since the light source is powered by dry cells, if you darken the room and then perform the experiment, you will be able to observe the light rays distinctly.

1. Refraction of light
   - If you set the Trapezoidal Smoke Lens on the experimental stand perpendicular to the ray of light from one slit of the ray box, you will observe that the incident ray is refracted when it passes through the trapezoidal lens. From one Trapezoidal Smoke Lens, you can obtain angles of 90, 60, and 120 degrees and use the lens as a prism.
   - Similarly, if you perform the experiment by setting the Semicircular Smoke Lens, you can observe and test the angles of reflection, refraction and total reflection. In this case, place the full circle protractor (made of paper) provided with the set, under the Semicircular Smoke Lens.
   - Change the single slit to three slits, and place the Convex Lens on the experimental stand. You will observe a convergence of rays. If you change the slits to that red, yellow and green colors are obtained from the three slits, you will observe that the paths of the rays are laterally inverted.
2. Reflection of light
   - Set the ray box so that light passes through 1 slit, place the reflection experiment mirror on the stand so that the ray from the slit falls at the center of the mirror. I you change the angle of the mirror and observe the incident angle and reflected angle by reading the scale, you will find that these two angles are equal.
3. Experiment using the sun's rays
   - Remove the experimental stand and face the slits towards the sun. You will obtain bright, parallel rays of light through the slits.

Related items

Cat. No. D20-1605 Smoke Lenses with Holder. This consists of two types of convex lenses mounted in holders. Even if you set these lenses on the experimental stand and incline them, the lenses will not fall. The Smoke Lenses with Holder are convenient tools for experiments using the sun's rays.