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Kodansha Color Slides of Physical Phenomena

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FILM REVIEWS

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Kodansha Color Slides of Physical Phenomena.

Produced under the supervision of Seishi Kaya, Yoshio Fujioka, Shinichiro Tomonoga, and Akira Harashima, with the cooperation of Donald C. Worth, 1968; 360 35mm color slides; Kodansha Co. Ltd., Otowa, Bunkyo, Tokyo, Japan; most recently available in the U. S. for \$125 from Fisher Scientific, 1259 N. Wood Street, Chicago, Illinois 60622. (Reviewed by Thomas B. Green-slade, Jr.)

If a teacher of physics finds himself using the hold button on a cartridge projector while showing a film, he might be better off presenting the material with a series of slides. The slide projector is much quieter than the movie projector, and the teacher can present material at his own pace, instead of being forced to adapt himself to the pace set by the maker of the film.

The series of 360 slides in 35-mm format, produced by Kodansha of Japan, provides a good basis for a slide library for use in high school and college physics courses. The price of about \$0.40 per slide is a bargain compared to the dollar or more cost of other slides.

The slides are packaged in dustproof containers which make the locating of a needed slide relatively easy. Twenty slides are held in individual pockets in a translucent white page from which the slides can be easily removed without getting fingerprints on them. Three such pages are held in a three-ring binder which is stored inside a slipcase. A booklet containing a black and white reproduction and an explanatory paragraph for each slide is provided for each volume of 60 slides. An index of the slide titles is printed on the binder and in the booklet; unfortunately, the outside of the slipcases gives no hint of the subjects of the slides inside.

The uses of the slides are limited only by the imagination of the user. For evaluation, they have been arbitrarily divided into four categories.

Demonstrations: Ultimately, all of the slides are demonstrations of physical phenomena. Some of the outstanding slides in this category are:

(1) a series of nine slides showing the reflection and refraction of light rays, using the glass shapes from a Hartl disc apparatus;

(2) multiple images seen in two angled mirrors (normally, only one student at a time can see this demonstration);

(3) continuous spectra produced by a tungsten light-bulb filament heated to three different temperatures (the filament and the resulting spectrum are both shown on the same slide);

(4) diffusion of gases (bromine vapor in air) and liquids (copper sulphate solution in water) (these two series of slides each give the effect of time-lapse photography; of special interest are the differences in the time scales of the two processes);

(5) a series of eleven slides showing the properties of cathode rays (included are demonstrations of rectilinear propagation, fluorescence produced in glass, transference of linear momentum, and deflection by electric and magnetic fields).

Experiments: Some of the slides contain data which can be used by projecting the enlarged image onto a sheet of paper and marking the locations of the multiple images. Numerical data can be obtained from the images of other slides by reading the scales or dials shown. The slides should not replace regular experimentation, but should supplement it to allow more phenomena to be examined in the laboratory. In this category the most useful slides are:

(1) Hooke's law (a series of three slides which show that the extension of a rubber ring is proportional to the applied force);

(2) Coulomb's law (a series of three slides which show that the electrostatic force varies as $1/r^2$);

(3) simple harmonic motion (multiple flash photography is used to illustrate simple

harmonic motion in conical and simple pendula, vibrating bars, and objects suspended from springs);

(4) charging and discharging of a capacitor (these pictures of an oscilloscope trace can be analyzed to obtain the time constant and can be used together to show that the curves are of the forms $1 - e^{-t/T}$ and $e^{-t/T}$).

Problems: Some of the slides could be used as the basis for assigned problems to be discussed later in class or could be used as examples done in class. Of note are:

(1) statics (this is an excellent series of twenty-seven slides showing the forces or torques acting on bodies in equilibrium: the set-ups and adjustments for the original demonstrations are so tedious and time consuming that many teachers use blackboard diagrams instead);

(2) buoyancy (a solid body on a string is lowered into a beaker of water placed on a scale).

Art: Many phenomena in physics can be appreciated for their beauty as well as for their scientific interest. The slides most likely to be borrowed by the art department are:

(1) six pictures of a milk splash;

(2) a multiple exposure of the flight of a bird;

(3) polarization phenomena with plastic under strain, cellophane triangles, and mica of non-uniform thickness, all observed between crossed polarizing filters;

(4) crossed diffraction gratings illuminated with white light.

The slides can fit smoothly into the natural flow of a lecture, in much the same way that single-concept films, transparencies and three-dimensional objects on the overhead projector, shadow projection, live demonstrations, and the

blackboard can be used. The slides might be used in the hallway carrels available in many schools, in which a cartridge projector and a stock of films are freely available to the students.

In general, the color balance of the slides is excellent. The color is definitely off, however, in slides of Newton's rings seen by transmitted and reflected monochromatic light, and an air wedge illuminated by monochromatic light. The yellow sodium vapor light is dull orange in the slides. More serious is a statement in the discussion of a multi-flash picture of a ball rotating in a horizontal plane at the end of a spring, "We may also say that the tension of the spring is in equilibrium with the centrifugal force which we assume to be exerted upon the ball." The battle against this sort of statement should have been won long ago.

The historical side of physics has not been included in the Kodansha slides. It would be very useful to those who teach physics from the historical viewpoint to have available a series of slides showing portraits of physicists of the past and more candid pictures of living physicists and historical apparatus such as the first cyclotron and J. J. Thomson's e/m apparatus. This gap can perhaps be filled by additions to the slide repository set up under the auspices of the Committee on Visual Aids.

Dr. Thomas B. Greenslade, Jr. is associate professor of physics at Kenyon College where he has taught since 1964. He is currently on sabbatical leave, serving in the department of physics of the University of the West Indies, Kingston, Jamaica for the 1972-73 academic year. He earned his A. B. degree at Amherst, and his M.S. and Ph.D. degrees at Rutgers in the field of low temperature and solid state physics. He has served as a member of the AAPT Committee on Visual Aids and was its chairman from 1970 to 1972.