

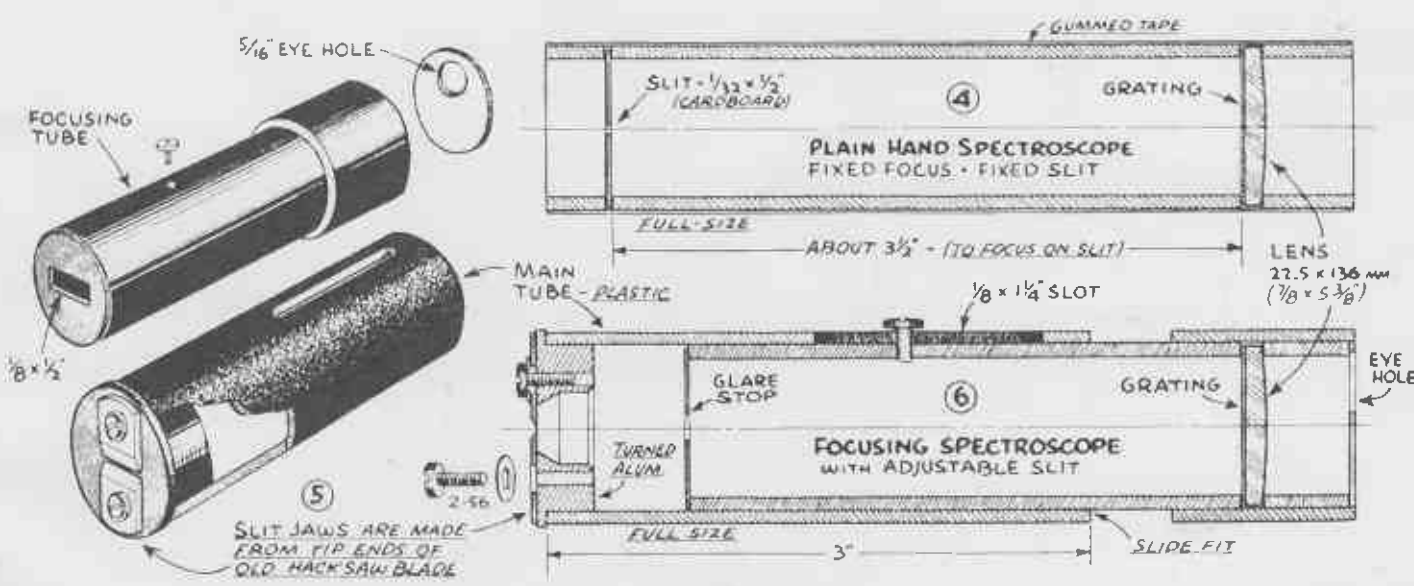
FEW OPTICAL instruments can be made as cheaply as a grating spectroscope--all it takes is a plywood or cardboard box and a 50c piece of diffraction grating in cardboard redi-mount. Although low-cost, the performance is excellent, surpassing in some respects the more expensive prism spectroscope.

A lensless spectroscope needs a box or tube 12 or 13 inches long, as shown in Fig. 1, with the grating taped or tacked to one end and the slit similarly mounted at the other end. A good slit width is about .015 inch, equal to the thickness of three or four sheets of paper. Fit the grating last; a quick look-and-see will tell you if the grating lines are parallel with the slit as they should be.

By far the best object to look at with your homemade spectroscope is a fluorescent lamp. This will show a continuous color spectrum from the light of the lamp itself, while mercury and argon inside the tube reveal their presence with

characteristic bright lines in green, orange and blue-violet. Salts of many elements are readily available and their spectra observed by vaporizing solutions in the flame of a torch. Sodium, Fig. 3, is popular since sodium chloride is ordinary table salt.

What you see in any spectroscope is a multiple image of the slit. This means the slit itself must be in sharp focus, hence the 12-13 inch length of the lensless model. If you want a shorter spectroscope, all you have to do is use a lens to shorten the viewing distance. Any simple lens from about 4 to 6 inches focal length will do nicely. Fig. 4 shows a simple type of construction with fixed slit and fixed focus. Figs. 5 and 6 detail an improved pocket spectroscope which provides for focusing and adjustment of slit width. Optional in either model is a glare stop to eliminate stray light; the offset eye hole is for same purpose. Slot in focusing tube is needed to keep grating lines parallel with slit.

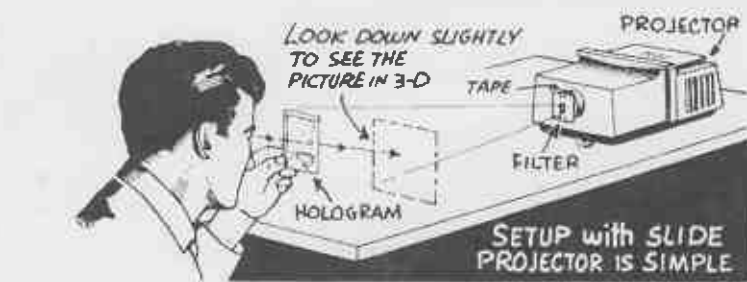


TRANSMISSION-TYPE HOLOGRAM ON FILM

HOW TO VIEW Holograms



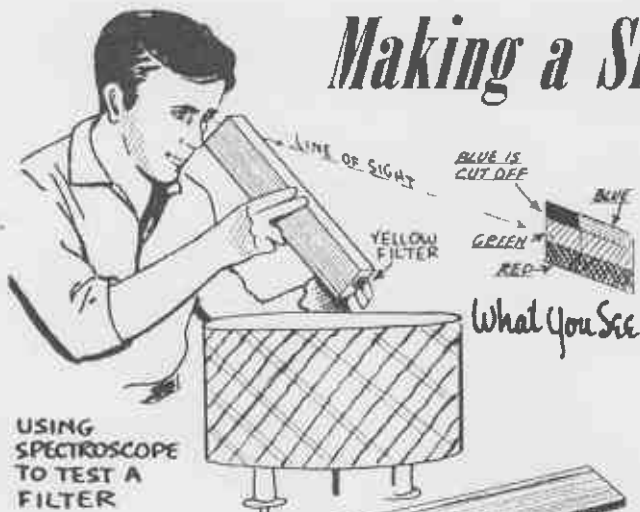
A VIEWING BOX can be made



HOLOGRAMS are pictures on film formed by interference fringes scattered by the object. They bear no resemblance whatsoever to the object. To see one of these strange pictures, you must use a monochromatic filter and a fairly bright light. A plywood viewing box can be made housing a hi-intensity lamp, as shown. A simple viewing method requires the use of a slide projector. Over the lens of this you tape the monochromatic filter which is supplied in a 2 x 2 inch cardboard mount. The hologram film is held 2 to 3 ft. from the filter--looking down slightly you will see the picture suspended in air in three dimensions. Looking up slightly, you can see a similar picture but upside down.

Only the simple transmission type of hologram is described here; available also are reflection type, double scene and projected image holograms.

Making a Simple SPECTROSCOPE



USING SPECTROSCOPE TO TEST A FILTER

THE SIMPLE spectroscope made with a single prism is a useful and instructive instrument. The construction is simply a wood or cardboard tube with a prism at one end and a slit at the other end. The slit is made by taping two razor blades over a wider slit cut in the cardboard end, as shown in the drawing.

When you use the spectroscope, you point the tube at the object or toward a light, but you look somewhat higher. If you look at a lamp bulb, you will see the full visible spectrum from blue to red, appearing as a band of color about 1/2 in. wide. To test a filter, hold it in front of the slit and note what colors it blocks off. What you see when testing a yellow filter is shown in the drawing--the blue rays are cut off and that area of the spectrum is black. Colored cellophane can be used for demonstrations.

