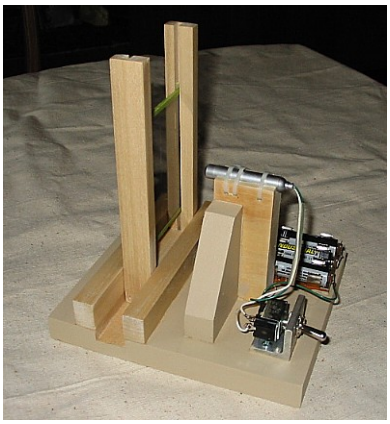
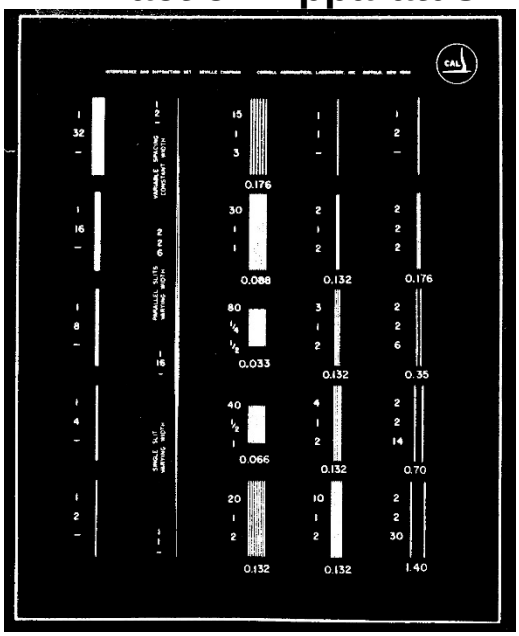
Diffraction



Diffraction Apparatus



Diffraction Mask

Pin-hole Pattern

Purpose: Demonstrates some interference/diffraction patterns.

Using a mounted laser pointer (l = 650 nm), you can show the various interference/diffraction patterns possible from a standard mask. There is also a card with a diffraction grating.

Additionally, circular patterns can be shown using the foil mask, which has several pin holes poked into it. This is important in discussing the limit of resolution in optical systems.

Finally, the laser pointer came with an assortment of ‘lenses’ to make cute smiley faces and heart patterns. In fact, these are complicated diffraction gratings. You can demonstrate this to the class by unscrewing the ‘plain lens’ and attaching one of the others. In dim light shine the laser onto the whiteboard at a distance of a yard or so; You will see the higher order images.

Note: For fun, you can try measuring the line spacing, d, of the diffraction grating using the usual

$$Nl = 2d \sin q.$$

Or, you can try to measure the diameter of a pin hole: Recall that the angular separation from the center to the first minimum is given by

$$q = 1.22\, l / D.$$

The holes were poked with a standard sewing pin, so $D \sim 0.025$ in.

Extra Equipment: A meter stick, if you want to get analytical.

Location: Shelf C4