Warning:

Never touch the surface of the grating.
Never hit or on the surface.
Never clean the surface.

Push-pull rod to see different regions of solar spectrum.

Slight on bottom of cover

Disk (60mm)
Approx. 2 3/8 dia.

Grating support

12 x 12 mm grating

Clamp

About 28° angle, not critical

Brackets pivot with clear tube facing sideways

X is front pivot.

Rotating platform

Fixed bottom platform

Cover

Black interior, does not have to be perfect

About 7 1/2" (195 mm)

Width of board about 10 1/4" (256 mm)

The cover for the grating does not have to be 100% light tight. The solar spectrum will be clear regardless.
You can make changes in the plans as you see fit.

The plans are a compromise (low cost) to introduce you to the solar spectrum.

- telescope 12" f.l. approx. (300mm)
- optical axis
- adjustable tube
- sponge foam around achromats to keep out stray light about 99%

If you want more spectral detail, use 25x25 mm area gratings and about six feet (2 meters) f.l. optics. Longer is better.

- collimator 12" f.l. approx. (300mm)
- fixed tube
- plastic tube 26 mm inside diameter, 33 mm outside diameter
- other diameters can be used

Some achromats 25mm dia and 1/4" can be stopped down to 15mm, giving about 1/8" spherical aberration.

- support board about 11"x21" and 3/8" thick plywood (275x550mm)
Solar Spectroscope

Frederick N. Veio, Calif.
July 2008

Scale:

25mm
50mm

Top view

Adjust entrance slit:
1. Pull out mount for slit.
2. One blade fixed, other barely moves with pressure.
3. Look through mount and slit at white background (never direct).
4. With slit closed, get no light.
5. Move one slit slightly.
6. Move slit more tiny bit. Narrow slit of light 25mm to 30mm. This is ideal.
<table>
<thead>
<tr>
<th>Edmund reflection gratings</th>
<th>12&quot; f/l. optics (300 mm) for spectroscope</th>
</tr>
</thead>
<tbody>
<tr>
<td>grooves/mm</td>
<td>1st order linear disp.</td>
</tr>
<tr>
<td>almost 1000 lines/mm</td>
<td>48 A/mm</td>
</tr>
<tr>
<td>6000 g/mm</td>
<td>24 A/mm</td>
</tr>
<tr>
<td>1200 g/mm</td>
<td>15 A/mm</td>
</tr>
<tr>
<td>about 2000 spectral lines/mm</td>
<td>9 A/mm</td>
</tr>
</tbody>
</table>

[Diagram showing a spectroscope setup with labeled parts: outer cover for optics and grating, rotating platform, fixed support, and grating support.]
Useful orders:

- Produce 2 orders, only 2 to 3 useful
- Full 1st order, no-go of 2nd

With medium short f/l optics, grating seems linear for dispersion, but only approx. With long f/l optics and high orders, nonlinearity negligible.

Spunge foam around front of plastic tube.

Collimator (make light parallel waves onto grating)

Optical Axis

The sun through the one inch tube will illuminate an area approx. 1/4" (12x12 mm) at the 2nd order.

A professional solar observatory can record about 24,000 spectral lines. Most are faint. A professional spectrophotoscope can visually see about 4000 lines. A compact spectroscope about 2000 lines.
Solar spectrum regions

1. 3660 Å, deep violet, eye not see
2. 3934 Å, violet, Hand Kelvin, can see
3. 4861 Å, blue, H-Beta
4. 5173 Å, green, Mg lines
5. 5890 Å, yellow, Na lines
6. 6563 Å, orange-red, H-X line
7. 6800 Å and 7600 Å, O2 atoms, lines of earth

Solar Spectroscope

Fredrick N. Veis, Calif.
July 2008

Scale:

![Graph showing scale]

Side view

Spectroscope setup:
1. Mount air column and telescope tubes so one can see grating in center of field; eye-piece and slit removed.
2. Focus telescope with eye-piece at infinity.
3. Set grating for black narrow line, not H-X line.
4. Focus slit mount, assume 25 µ slit.
5. Optics now in mutual focus, observe spectrum.