

Centre for Space Physics

Reflecting Telescope Construction

“NEVER LOOK AT THE SUN DIRECTLY, OR THROUGH THE TELESCOPE.”

The mechanical construction of the telescope is a simple project. The popular 5" f/8 reflector can be made with the parts listed below.

1. Main mirror -- 5-inch diameter, 40-inch focal length.
2. Diagonal mirror -- with required size.
3. Eyepieces – 25 mm f.l, 12.5 mm f.l. and Drawtube.
4. Finder scope and its mount.
5. Mirror mount.
6. Diagonal holder.
7. Tube – 6 inch inner diameter, 1/8 inch thick and 44-inches in length.
8. Cradle.
9. Mount.
10. Spring.
11. Black board paint.
12. Nuts, bolts and screws of different size.

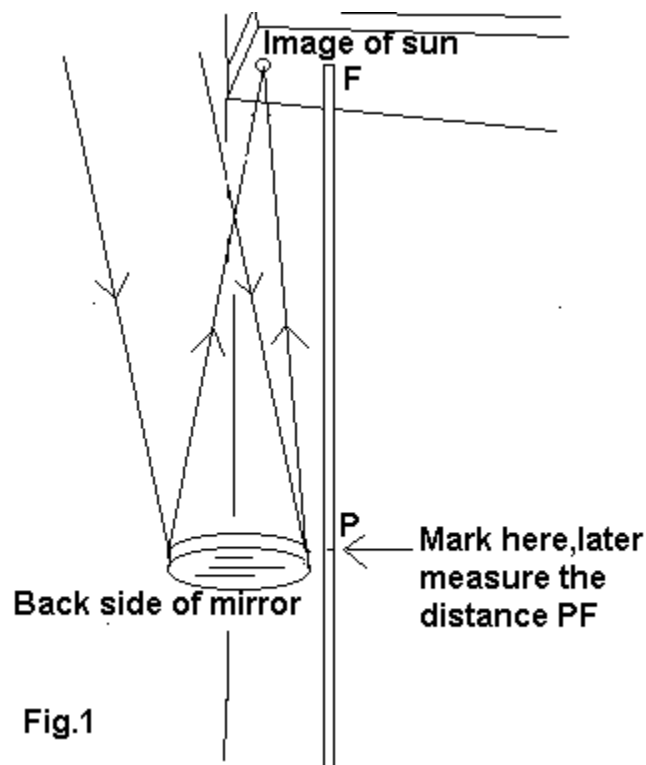
Description of the Parts:

1. The main mirror is a concave mirror, the diameter is 5-inches and focal length is 40-inches. So that the focal ratio is f/8.
2. The diagonal mirror is rectangular shaped; its position determines its size.
3. The eyepieces are Ramsden eyepiece. One is of 1-inch focal length (low power); other is of 0.5-inch (high power).
4. The finder scope is a refractor, which has an objective of 1-inch diameter. The magnification of the system is 10x. Its mount is a small pipe. The drawtube holds the eyepieces perpendicularly with the main telescope tube.
5. The mirror mount is a wooden circular piece of 5-inches diameter and $\frac{3}{4}$ -inch thick. The mirror is to be attached with it by thin three aluminium “L” shaped clamp. The clamp is held to the wood by wood-screw and washer. Then another 6-inches diameter circular wooden disk holds this wooden disk and mirror attachment by some arrangement of nut, bolt and spring.
6. The diagonal holder is a 1-inch wide metal plate. One portion of it lies along the optical axis, other portion is bent at an angle 45° .
7. The dimension of the tube is already given. The inner side of the tube would be painted black by blackboard paint (matt black).
8. The cradle joins the telescope tube with the mount. It is a rectangular piece of wood.
9. The mount is totally made of iron. It is the holder of the telescope tube. By this, the telescope can be pointed to any direction in the sky. Ours is an equatorial mounting system.

10. Three springs (½-inch dia. & 1½ inch in length) are used to collimate the mirror. The collimation is the method by which place the optical axis of the mirror is kept along the axis of the tube, by adjusting the height of the spring.
11. Nuts, bolts and screws of various sizes are needed to assemble the parts.

Assembling the telescope:

1. Carefully hold the mirror in front of you in direct sunlight as the reflected rays from the mirror are nearly towards the sun and be focused on wall or roof. Measure the distance between the mirror and the sharp focused image of the sun with a long stick (Fig 1). **Never look at the mirror directly. You will be totally blind if you do this.**
If you can, try to do this Foucault's Test : Reflect a bulb filament on an wall in the same direction as the bulb itself. Bring the image of the filament as sharp as possible by adjusting the mirror location. Measure the distance between the front face of the mirror and the wall. This distance is the radius of curvature of the mirror. Half of this distance is the focal length of your mirror (L_1).
2. Measure the height of the drawtube. Add half of the diameter of the main tube and a little extra distance with that. This is the distance (d) between the diagonal and the focal plane of your mirror (Fig 2).
3. Cut a hole of 1.5-inches diameter, centered at 4-inches away from the one end of the tube. Just below the hole, place the diagonal (Glued in the diagonal holder) by a 4-inch nut.
4. Place the main mirror on the mirror mount as shown in Fig.3. Keep the mirror face at the distance L from the diagonal. Then join the mirror mount clip to the tube by nuts & bolts. $L_1 = L + d$.



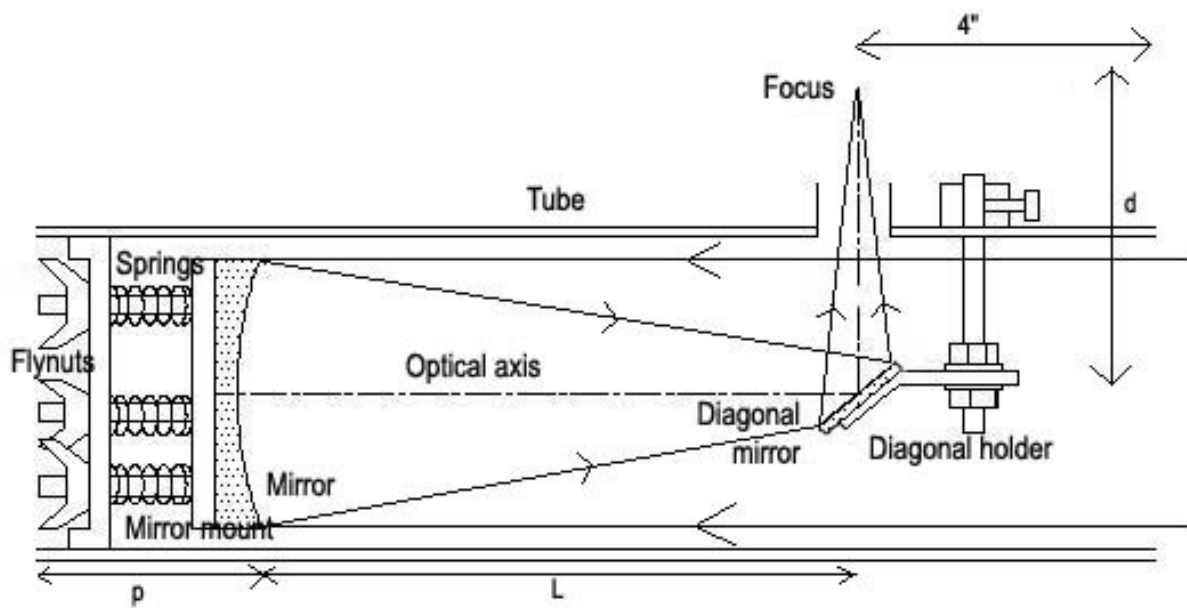


Fig.2

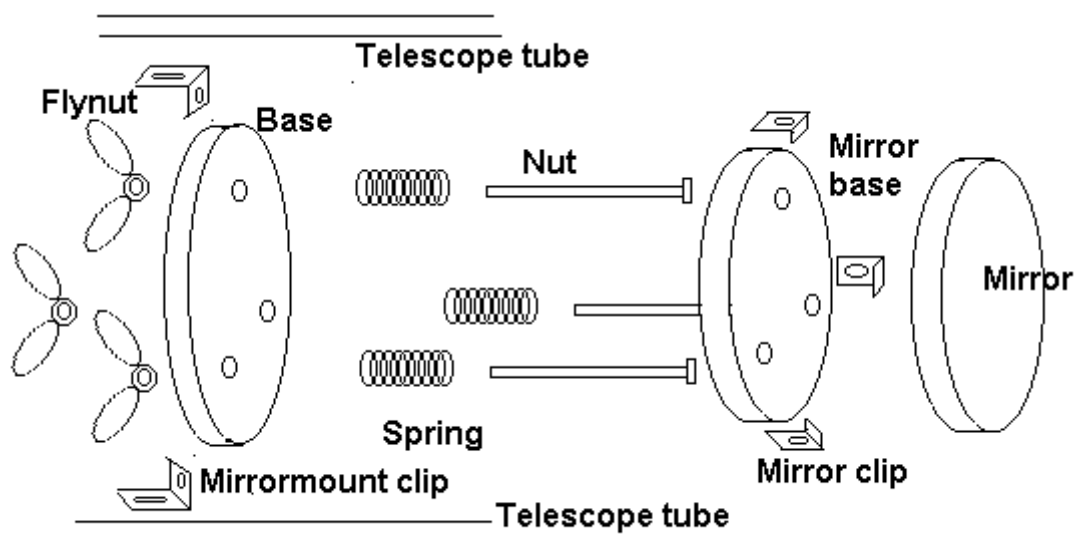
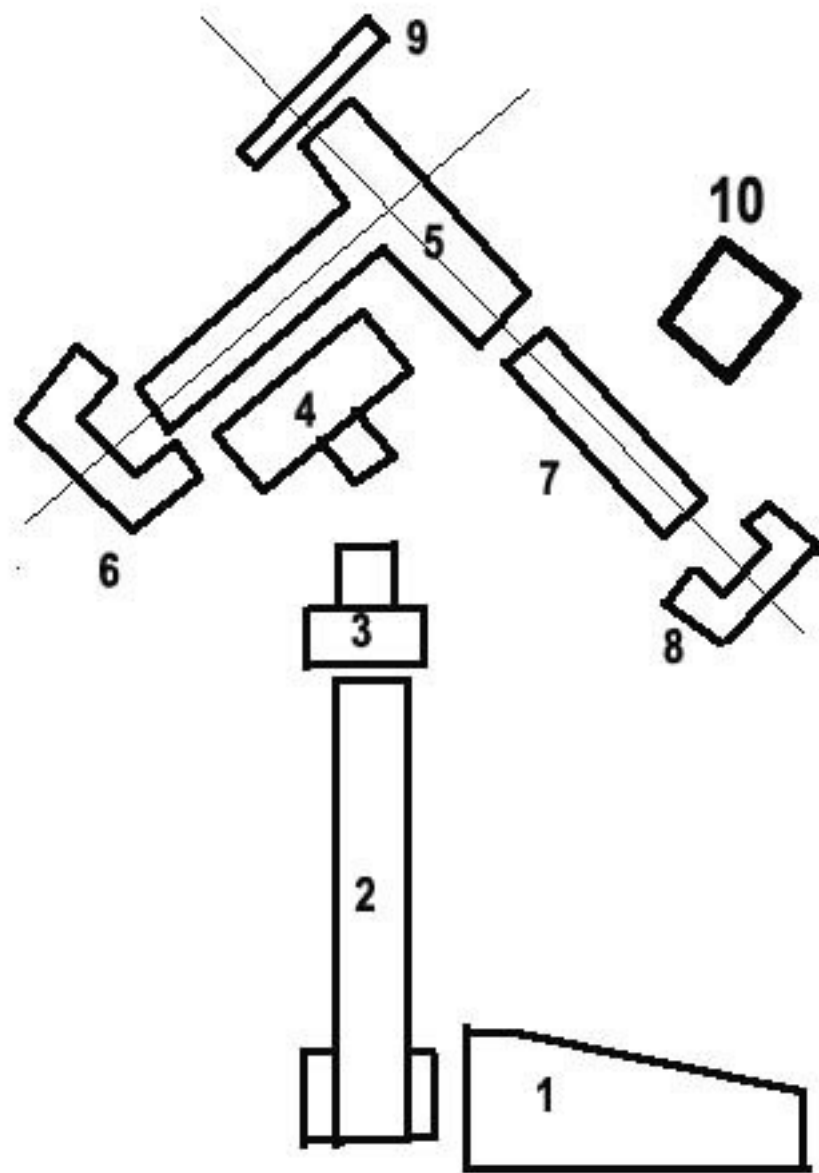


Fig.3

5. Add finder-scope beside the eyepiece about an inch away along the perimeter. The axis of the finder-scope should be parallel to the axis of the main tube.
6. Following Fig.4 & Fig.5, assemble the mount.
7. Find the center of gravity (C.G) of the complete telescope tube by hanging it with a rope.
8. Drill two holes 5-inches apart both side of the C.G. The telescope is firmly placed in the cradle by these two 4-inches screws.



Mount Assembly

Fig.4

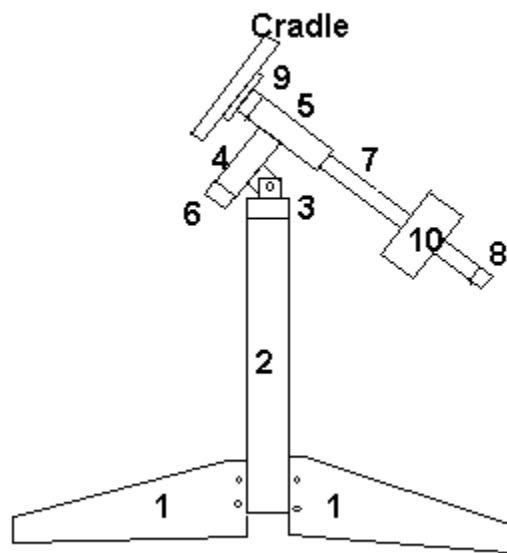


Fig.5

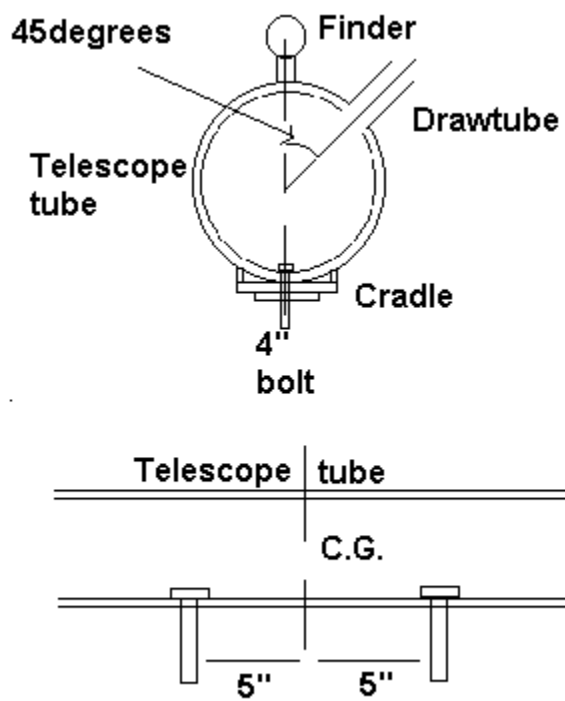
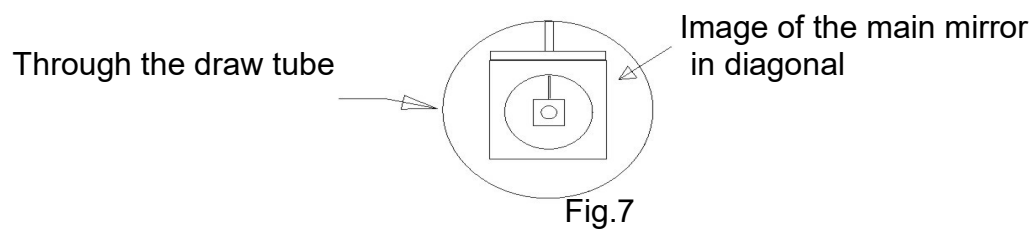


Fig.6

Collimation:

Perfect collimation is achieved by rotating the fly nuts behind the mirror mount.



Now Your Telescope is ready for Clear Night Sky.

Caution

1. Never touch the mirror or the diagonal with hand or anything.
2. Protect the telescope from dust, heat & direct sunlight.
3. **Do not try to look at the sun by the telescope. That will make you completely blind.**
4. Do not remove the lenses of the eyepieces or finder.
5. Contact nearby experienced observer in case of any difficulty.

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