

OPTICS ASSEMBLY OF 130 cm TELESCOPE

(1.3m Devasthal Optical Telescope)



Prepared By

Jayshreekar Pant

- 1) **Cell structure:** Primary mirror cell is made of mild steel inner surface of the cell is painted with a special black paint to avoid any scattering of light. Use of any cleaning agent over this mirror cell is strictly prohibited. For cleaning one can use vacuum cleaner.



Figure 1: mirror cell placed on the mirror inserting trolley

- 2) **Radial Supports:** 16 radial support system having counter weights (3 pounds with screws) and a radial rod is attached to the mirror cell and supports the mirror in radial direction along its circumference. For adjusting the position of radial supports there is a rod having a brass nut and rod end is having a bearing arrangement (to prevent torque affecting the mirror). Both brass nut and that bearing arrangements can be adjusted. Brass nut for coarse and bearing arrangements for fine motion.



Figure 2: Radial support having a radial rod and counter weights



Figure 3: radial counter weight assembly placed in the cell inside (left) and outside (right) view

(2.1) four radial defining supports at 90° are there to define the radial position of the mirror. These are used to centre the mirror in the cell. Two dial indicators are provided so that readings can be noted down during the centering process and can be saved for future reference afterwards.



Figure4: radial defining support (left) radial counter weight covered outside view (right)

A through hole is there in the defining supports so as to view mirror and measure mirror position through dial indicators. A nylon pad is attached to the radial defining on top of a metal base. This structure provides temperature compensation.



Figure 5: dial indicators to be inserted at the time of centering and leveling

(2.2) 16 invar blocks are there already glued in the mirror edge and **16 clevis pins** to fix the radial rods in these invar blocks.



Figure 6: radial rods fixed in the invar blocks (left) clevis pins to fix the rods in invar blocks (right)

(3) Axial (back) supports: 36 axial supports with counter weight system are there at the back of the mirror. A drawing is attached to view the exact map of these back counter weighted supports on the mirror cell. Ref. Drawing 011. While putting these supports the orientation of each is very important and one should cross check it after fixing it carefully.



Figure7: axial (back) supports at the base of the mirror (left) map of the axial back supports (right)

(3.1) Tap pins (36 in no.) (Very delicate one) is putted in the head of each axial supports which eventually get fitted into the bore of the **set screw** (36 in no) placed at the bottom of cell. Ref. Drawing 156.



Figure 8: 36 tap pins to be placed on each of the axial support (left) drawing (right)

(3.2) Three set up supports at 120° are there at the cell body along with the back supports. They are used to provide initial loading to the mirror until it gets settled upon the back supports. Once the mirror is on the back supports set up supports gets disconnected with the back of the mirror and mirror becomes absolutely floating. So they are used only for initial loading at the time of putting the mirror inside the cell and not when the mirror (more precisely telescope) is in operation.



Figure 9: set up support placed on the base of the mirror cell.

(3.3) Three axial defining supports at 120° are there to define the mirror position in the axial direction. They have the bracket assembly (clamp) to be fixed in the mirror and invar rods with a spring connected to base of the clamp other end of which is connected to the cell. There is a plunger (white colour) at the bottom of the clamp having a spring action. These invar rods are stiff axially but there is a play in other direction so a slight adjustment can be done. A thermal compensation mechanism is provided.



Figure 10: axial defining supports (a bracket assembly plunger and spring at the end of the rod)

(4) Mirror Cell Lifting Assembly (MCLA): Using MCLA we can lift the mirror cell and can attach this to the centre section of the telescope. One end of MCLA can be attached to the north/ south of the centre section and the other end having a ratchet can be fixed to the north /south of the mirror cell.



Figure11 : MCLA tool for lifting the mirror cell.

(5) Mirror Cell Inserting Trolley (Tool): This trolley is having three rods at 120° and these three rods makes their way through the three holes provided at the bottom of the mirror cell (as shown in figure 1).



Figure 12: mirror cell inserting trolley (left) guiding rails (right)

(6) Guiding Rails: These are the rails on which trolley can run very smoothly. These rails have been made in Devasthal.

(7) Mirror Cover: This mirror cover can be used to protect the mirror when some maintenance operations are going on.

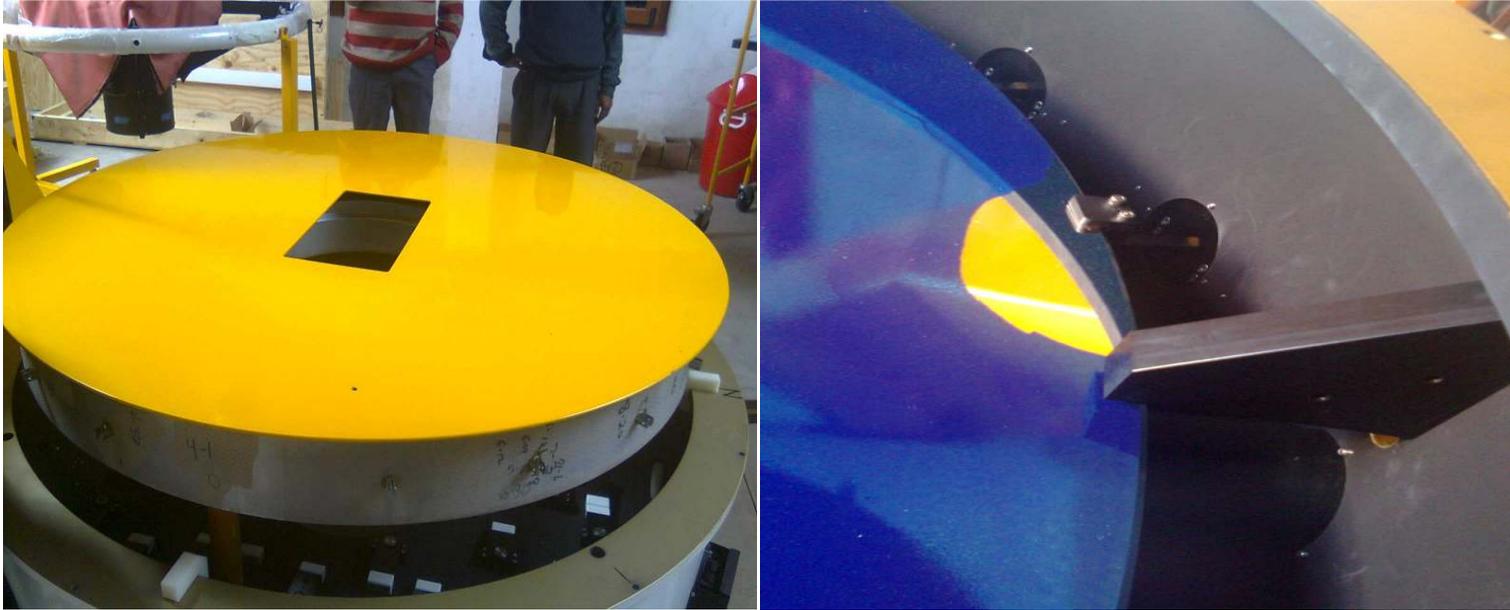


Figure13 : mirror cover (left) earthquake guards (right)

(8) Secondary Mirror Hexapod: M2 hexapod is used to mount the secondary mirror on a mirror back plate and control the finest motion of the secondary mirror.



Figure14 : Secondary mirror hexapod

