

Standard Operating Procedure

for mounting the ADFOSC

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Scope

The document provides the standard operating procedure to be followed during the mounting of ARIES-Devasthal Faint Object Spectrograph (ADFOSC) on the axial port when TIRCAM 2 is mounted on side port 1 and SPIM on side port 2 with the 3.6m Devasthal Optical Telescope.

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1 Procedure

These are the steps to be followed while mounting ADFOSC to the axial port of the 3.6m Devasthal Optical Telescope.

1. Check that the altitude mechanical locks on both sides are engaged properly.
2. Clean the Telescope interface flange and remove any deposits of tape residues, etc..

Precautions:

Do not spray any cleaning agent over the flange; instead, if required, it can be put on a clean cotton cloth, and then the cloth can be used to wipe any residues sticking onto the flange.

Do not use any sharp objects or tools to clean the telescope interface flange.

3. Check that the cables of other instruments are well arranged and do not interfere in the way of the travel of the ADFOSC dummy.

Precautions:

All cables of the instrument should be tied to the structure in such a way that they don't come between during the transfer of the ADFOSC dummy below the telescope interface flange.

4. Check the helium pipes of the TIRCAM 2. They should be routed away and clamped far from the area that will be occupied by the dummy of ADFOSC.
5. Mount the ADFOSC transfer trolley over the AMOS motorized trolley at 11m.
6. The dummy of ADFOSC should be transported from the extension building (Fig. 1) onto the transfer trolley over the AMOS trolley (Fig. 2) using the extension building crane, ground motorized trolley, and dome crane.
7. Move the ADFOSC dummy in steps below the telescope interface flange. Four persons, two on each side of the AMOS trolley at the driving end and two persons at the receiving end (near the telescope interface flange), to keep a watch on the movement of the ADFOSC dummy inside the telescope interface flange (Fig. 3).

Precautions:

Before moving the AMOS trolley, one person should hold its motor cable so that it does not foul with any structure during trolley movement.

The AMOS trolley is to be moved slowly in steps with a stop before entering the telescope flange to check that the telescope cables are clear from the dummy entry. This has to be ensured by two persons standing and watching on either side of the AMOS trolley at the driving end.

The AMOS trolley is to be moved slowly in steps with a stop while coming below the telescope interface flange to check that telescope cables, SPIM cables, and Helium lines are clear from the dummy. This has to be ensured by two persons standing and watching on either side of the AMOS trolley at the receiving end.



Figure 1: The dummy of ADFOSC being carried to the telescope floor from the extension building.

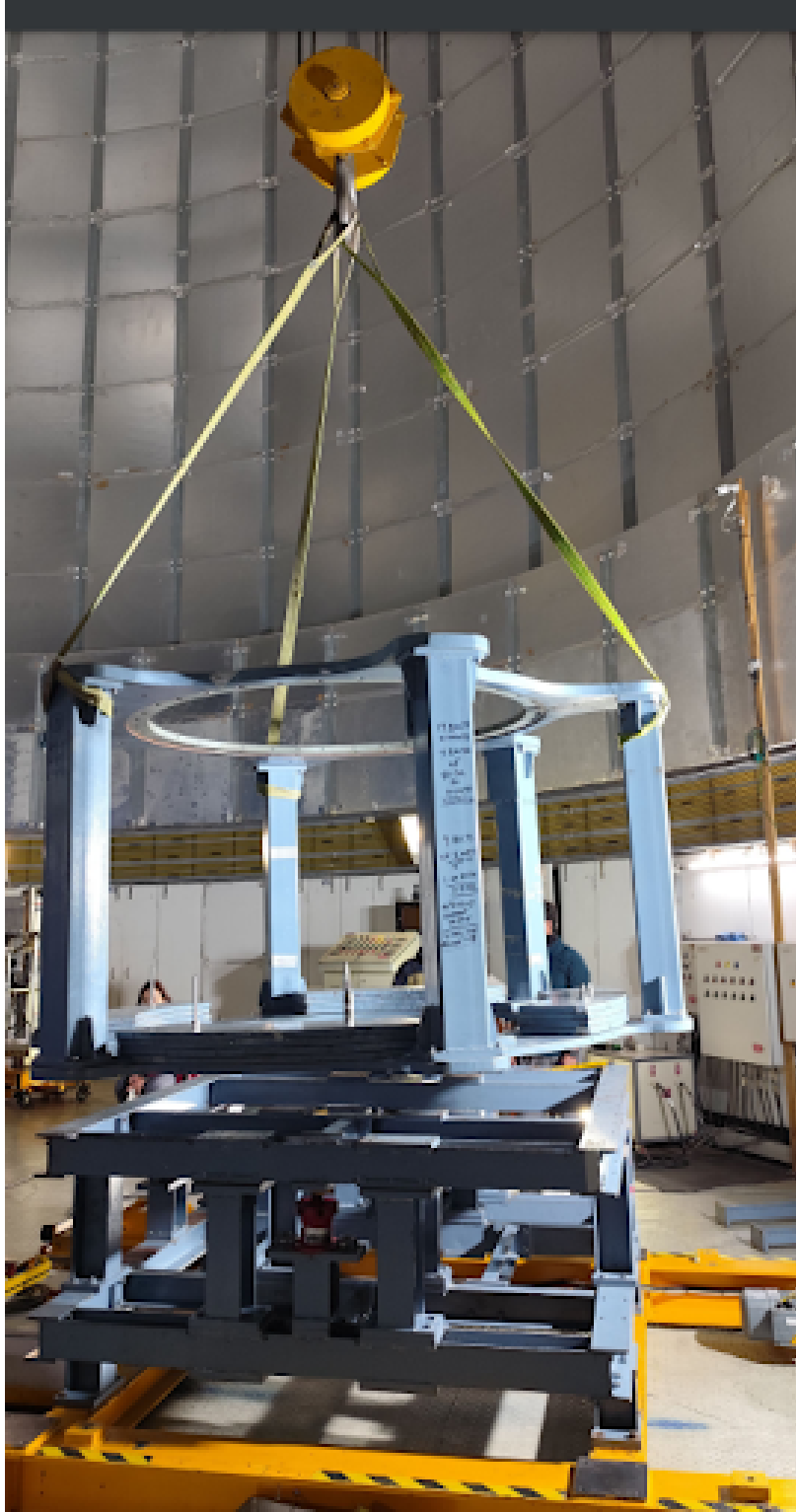


Figure 2: The ADFOSC dummy on the transfer trolley.



Figure 3: The ADFOSC dummy below the telescope.

8. Check and match the holes of the interface flange with those of the dummy. Lift the dummy using four jacks in the ADFOSC trolley. Stop at a distance of about 25 mm from the interface flange and again check for the alignment of flange holes. Bring the dummy flange to a distance of about 5mm, insert the bolts, and uniformly tighten the dummy to the telescope interface flange while maintaining support over trolley jacks.

Precautions:

Four people are positioned at four jacks and move each round of their jacks in coordination with others (stopping after every round) so that the dummy does not get tilted during its lifting. If any tilt in the dummy is observed in any lifting, then it needs to be corrected using the corresponding jacks.

Check for the cables and helium lines as the ADFOSC dummy is lifted to avoid any fouling or crushing of any cable between the decreasing gaps.

The bolts of the dummy should be tightened uniformly from all sides. If any bolt is having a problem, then it should be replaced.

9. Lower the four jacks and bring the AMOS trolley with the transfer trolley back to its parking position.
10. Place the hydraulic trolley below the ADFOSC dummy from the front side and unscrew its front detachable arm. The detachable arm is stored on one side at 11m.
11. Mount the stands of ADFOSC on two sides of the transfer trolley for placing the ADFOSC instrument and secure them with bolts.
12. Transport the ADFOSC instrument from the extension building (Fig. 4) to the telescope floor over its stands mounted on the transfer trolley. Place the instrument carefully over the stands and hold it with C-clamps on both sides (Fig. 5).

Precautions:

Take care while placing the instrument over its two stands. Move the instrument slowly and two persons on either side should keep a watch to avoid fouling of the instrument accessories such as cables and screws etc.

13. Move the instrument over the transfer trolley near the telescope through the AMOS trolley. Remove the red cover (Fig. 6) over its window and position the instrument inside the telescope. Check and match the holes of the interface flange with those of the dummy. Lift the Instrument evenly using four jacks in the ADFOSC trolley. Stop at a distance of about 25 mm from the interface flange and again check for the alignment of flange holes. Bring the Instrument to a distance of about 5mm, insert the bolts, and uniformly tighten the instrument while maintaining support over jacks (Fig. 7).

Precautions:

Four people are positioned at four jacks and move the same round of their jacks in coordination with others (stopping after every round) so that the instrument does not get tilted during its lifting. If any tilt in the instrument is observed during any lifting, then it needs to be adjusted using the corresponding jacks.



Figure 4: The ADFOSC being carried to 11m.



Figure 5: The ADFOSC being carried below the telescope.



Figure 6: The ADFOSC cover on it.

Check for the cables and helium pipes as an instrument is lifted to avoid any fouling or crushing of any cable between the decreasing gaps.

The bolts of the instrument should be tightened uniformly from all sides. If any bolt is having a problem, then it should be replaced.

14. Lower the four jacks so that the stands on either side go down from the instrument (Fig. 11). Remove the horizontal beam and jack of the transfer trolley towards the side port 2 of the telescope to avoid fouling with the instrument.
15. Move the AMOS trolley with the transfer trolley back to its parking position.
16. Bring the electronics rack of ADFOSC over the trolley, carefully take it to the back of the instrument, and assemble it with the dummy (Fig. 9). Dummy, instrument, and electronics rack can be seen mounted in Fig. 13.

Precautions:

The electronics rack should always be held by two persons and moved slowly over the trolley so that it does not foul with the instrument or telescope during its movement and assembly.

Take care of Helium pipes and cables to avoid any fouling with the rack and trolley during movement and assembly.

17. Bring the four ADFOSC flexure rods and assemble them with the instrument at the top (left panel of Fig. 11) and bottom (right panel of Fig. 11).
18. Assemble back the detachable arm of the ADFOSC dummy.
19. Open the CCD port at the bottom of the instrument, bring the CCD, and mount it with the instrument through the base support from the jack (Fig. 7). Connect the CCD cables (Fig. 13).

Two people will handle the CCD. Place the jack below FOSC and put the CCD on the jack. Slowly move up the CCD till just before touching the FOSC with the shutter flange. Align them properly and insert bolts at the opposite corners, and tighten them. Insert remaining screws and tighten them.



Figure 7: The ADFOSC close to the telescope.

Precautions:

Handle the CCD with extreme care while transporting it to the instrument and while making various connections.

20. Bring the compressor. Remove the three bolts at the bottom side of the compressor. Connect the gas pipes between the compressor and the CCD for cooling (Fig. 14). Connect the return and supply at the CCD side first, and then return and supply at the Compressor side. Check the gas pressure. It should be at around 245 psi (ideal condition). 220 psi in current conditions (Feb 2025).
21. Connect all the cables for the instrument and complete cable routing (Fig. 15).

Precautions:

Cables should be routed to prevent entanglement or strain during telescope movements. Provide adequate cable loops to allow smooth motion. Keep cables clear of all the moving parts.

22. Put the required balancing weights at the A, B, C, and D positions of the rotator.
23. Disengage the altitude manual locks.
24. Check all around the instrument for any loose components and tie them properly. Remove any tools, tapes, ropes, etc., if left around the instrument.
25. Move the telescope to check the cable routing. If any issue is observed, then rectify the same.



Figure 8: The ADFOSC moved close to the telescope.

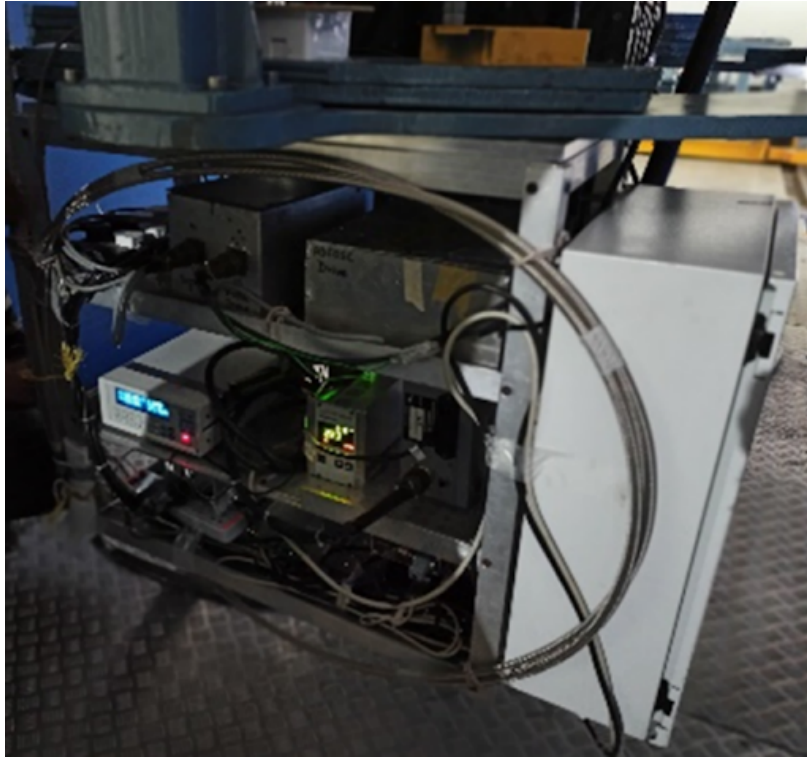


Figure 9: The electronic rack of ADFOSC.



Figure 10: The ADFOSC moved close to the telescope.



Figure 11: The flexure rods of ADFOSC.



Figure 12: Place the jack below the CCD



Figure 13: The mounting position of the CCD below the instrument.



Figure 14: The compressor used for cooling the CCD

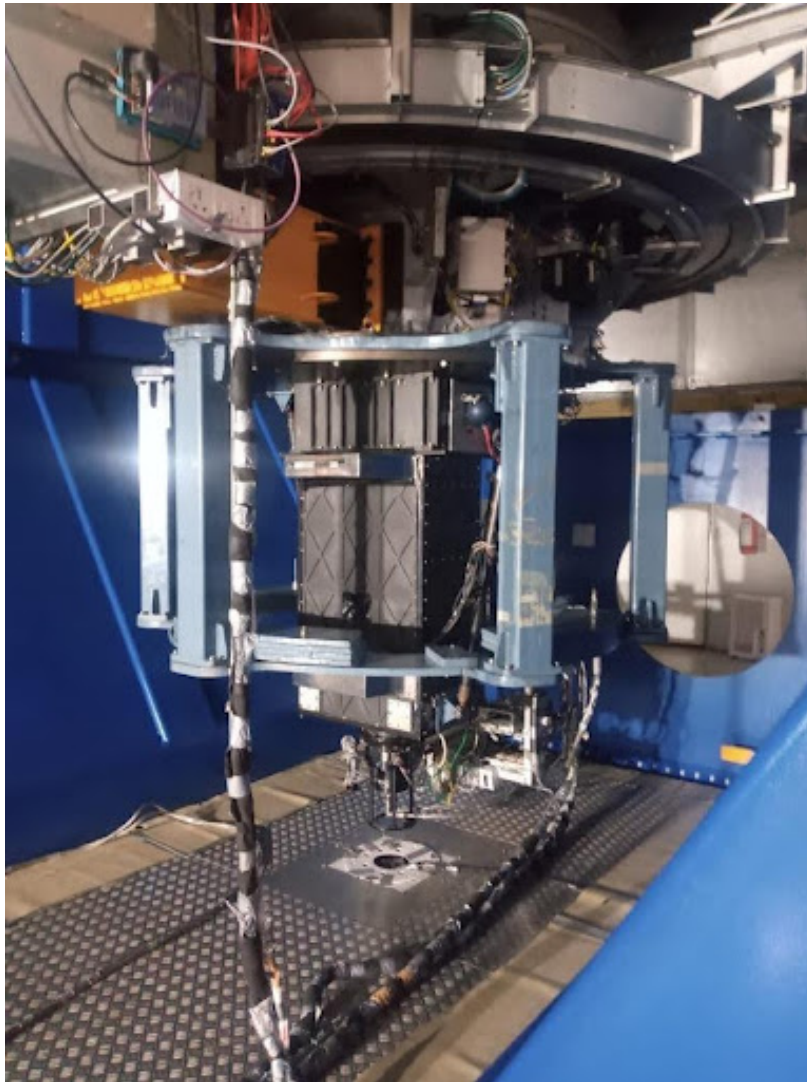


Figure 15: The instrument mounted on the axial port of the telescope with routed cables.

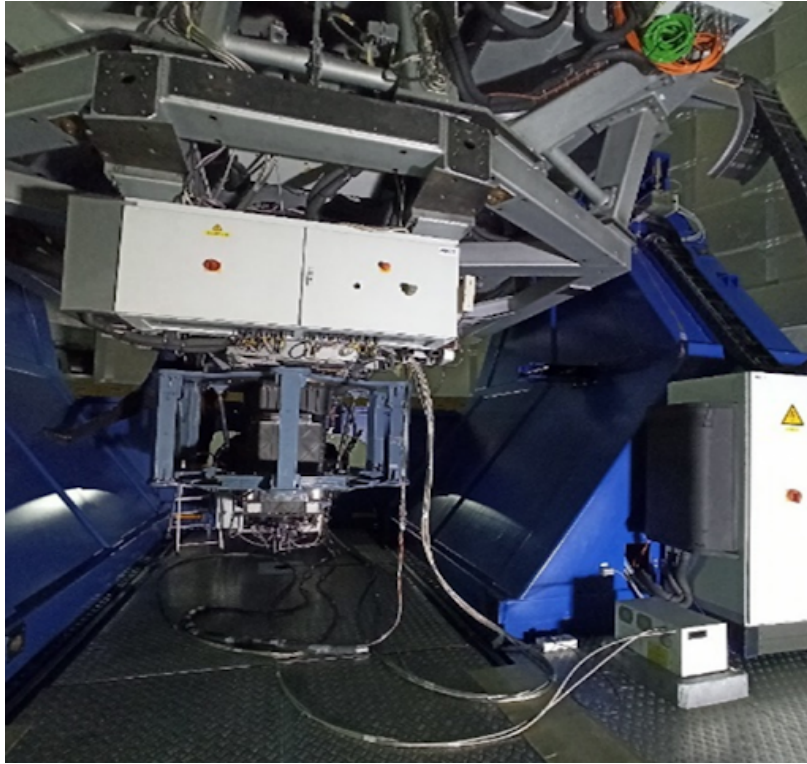


Figure 16: The ADFOSC mounted on the axial port of the telescope.

26. Generate rotator and altitude logs and complete fine balancing.
27. Connect the vacuum pump to the CCD. Evacuate the dewar to 4×10^{-5} mbar and switch on the cooling. Close the dewar valve at -20 °C and remove the vacuum pump. CCD cools to -120 °C in three hours. Heater power reaches 44% - 35%, depending on the weather conditions. Compressor pressure should be around 10- 30 psi in running conditions.
28. Note: This step can be performed before balancing, depending on the time. In general, vacuum reaches 4×10^{-5} mbar within one day.
29. Release the telescope for instrument tests after achieving cooling and fine balancing of altitude and rotator (Fig. 17).