

Procedure to Remove 2.5m Secondary Truss

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Cautionary Notes

- **This operation requires 5 people.**
 - **If the telescope runs away at any time, engage an e-stop button immediately.**
 - **The following weather conditions must be met:**
 - No threat of precipitation
 - Sustained wind speed < 35 MPH for 15 minutes
 - Wind gusts for instrument changes < 25 MPH
 - Dew point depression: $\geq 4^{\circ}\text{F}$ or 2°C
 - Dust count < 10,000 units
 - Check for condensation regularly when the dew point depression is less than 8°F or 6°C . Close the enclosure if condensation is found on rails, building skin, or the top of the doghouse.
 - Do not push the dust limit and the dew point limit at the same time. If the dust counts are near the stated limit, it is best to have a dew point depression of $> 18^{\circ}\text{F}$ or 20°C .
 - Safety wear (recommended): rubber-soled shoes, hard hat.
 - Only people trained by observatory staff may execute this procedure.
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Equipment Required

Wind Baffle Pendant Control; Location: 2.5m enclosure

Wheels; Location: 2.5m storage trailer

Support Brace; Location: 2.5m storage trailer

Spreader Bar (for wind baffle counterweights); Location: behind the Machine shop.

Wind Baffle Counterweight Mounting Blocks; Location: 2.5m enclosure cabinets.

Pallet Jack; Location: 3.5m enclosure ground level

Lumber (to stack counterweights); Location: Garage; Appearance: 4"x4"x24"

Scrap wood to protect the floor when setting down counterweights.

Primary Mirror Hard Covers; Location: 3.5m enclosure ground level

Initial State of Telescope

- All instruments removed (excluding the spectrographs) and safely stowed.
 - Spectrograph corrector removed and safely stowed.
 - [Wind baffle removed](#) and wind baffle support frame secured (tied down and supported with jackscrews).
 - [M2 removed](#) and safely stowed.
 - Engage at least one E-stop.
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Procedure

Note: stow all items mentioned in procedure in the plug plate lab.

1. Remove bottom five lower light baffles and store in the plug plate lab.
2. Attach three sets of wheels to the secondary truss. (Attach the best set of wheels.)
3. If any accessible wires run to the truss, detach them (we'll get the wires inside the truss later).
4. Remove the secondary truss alignment pins, as follows: run a nut down a few turns with a wrench to begin to pull the pin. Then back the nut off a bit and pry the nut and pin out with a marlinspike. This avoids tightening the nut so far that it jams on the pin.
5. Loosen the bolts holding the secondary truss.
6. Adjust the wheels to take the weight of the truss.
7. Remove the screws holding the truss.
8. Detach all wires running through the truss at the bottom.
9. With the overhead crane, move the truss far enough east to clear the wind baffle frame.
10. Attach the west wheel to the truss. Rotate the truss a bit if required, being careful not to hit the primary baffle or anything else.

11. Lower the truss onto its wheels and detach it from the crane.
12. Roll the truss out of the enclosure.
13. Remove the wind baffle counterweights:
 - a. Rig the overhead crane with the wind baffle counterweight spreader bar. If using the old spreader bar (an improved one is planned), use two doubled 8 foot straps (load capacity of 1500 lb minimum) to attach the bar to the crane. Suspend 6 foot straps from the ends of the spreader bar to attach to the counterweights.
 - b. Attach the wind baffle counterweight mounting blocks to the front of the wind baffle frame.
 - c. Remove the two thinnest blue wind baffle counterweights (40 lbs each) by hand and stow.
 - d. Remove the next thinnest blue wind baffle counterweights (70-80 lbs each) by hand or crane and stow.
 - e. Remove the remaining two pairs of blue wind baffle counterweights by crane. Set on 4x4s and stow with the pallet jack.
 - f. With the crane and spreader bar set-up, remove the outer white wind baffle counterweights. Set on 4x4s and stow with the pallet jack.
 - g. With the crane and spreader bar set-up, remove the middle white wind baffle counterweights. Set on 4x4s and stow with the pallet jack.
 - h. With the crane and spreader bar set-up, move the inner white wind baffle counterweights to the mounting blocks at the front of the wind baffle frame.
 - i. Remove all rigging from the crane and raise the crane out of the way.
14. Move all four telescope counterweights to the top of their range (approximately number 750).
15. Check the balance of the wind baffle plus telescope (the two are turnbuckled together and act as a unit):
 - a. Attach the wind baffle pendant control.
 - b. Station one person in the lower level to watch the torque reading on the wind baffle altitude motor amplifier.
 - c. Make sure the wind baffle tie-down strap allows about one foot of motion.
 - d. Remove the west jackscrew (the one preventing the wind baffle from going up).

- e. Release all E-stops.
 - f. Release the altitude brake.
 - g. Move the wind baffle slightly up and down. The torque reading (which is in percent) should be no higher than number 60 in both directions. If it is higher, press an E-stop and rebalance the telescope.
 - h. Engage an E-stop.
16. Remove the wind baffle tie-down strap and the jackscrews.
 17. Release all E-stops and raise the wind baffle and telescope to zenith. Monitor the torque as you go: if it exceeds number 80, engage an E-stop and rebalance the system.
 18. Pin the telescope at zenith. Pushing the pin in engages an E-stop, so if the pin jams you'll have to use the turnbuckles (not the pendant) to free it.
 19. Engage an E-stop.
 20. If you are done, set the hard covers on the primary mirror. If you are planning to remove M1 now, leave the covers off and proceed with [M1 removal](#).
 21. Later, when you are done working in the enclosure, store the truss sideways inside the enclosure.
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Document History

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2004-06-27 Downloaded to web site; archived old procedure; GVD