

Procedure for checking and replacing the internal standard lamp inside a Mk IV Brewer spectrophotometer

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Introduction

The Mk IV Brewer spectrophotometer is equipped with an internal standard lamp (SL) powered by circuitry within the instrument. The SL bulb is used on a daily basis as a light source for several of the instrument diagnostic tests. As the instruments age the measured counts of the lamp generally decrease and on occasion the bulb filament may break. If the output of the lamp becomes too low or the filament breaks the bulb should be replaced before further atmospheric data is collected with the Brewer.

Equipment

Mk IV Brewer spectrophotometer
Hex wrench set (English sizes)
Replacement standard lamp bulb
Kimwipes or tissues
Cleaning alcohol

Purpose

This Standard Operating Procedure (SOP) outlines the NUVMC technique for checking and replacing the internal standard lamp inside a Mk IV Brewer spectrophotometer.

Procedure

1. If the Brewer is still running in schedule exit the schedule by pressing the Home key when the message "Press Home to abort schedule" appears on the computer screen.
2. At the Brewer command line give the command "PNSL" to perform a standard lamp measurement. The PN will ensure that the results are printed to paper. Otherwise the data can be viewed in the daily B-file.
3. For the next few steps leave the power to the Brewer in the on position.
4. Place a protective cover on the quartz dome on the top of the Brewer outer cover.
5. Remove the Brewer outer cover by loosening the four latches and lifting the cover up. Never remove the cover during inclement weather and try to pick the driest, wind free day possible.
6. Locate the zenith prism assembly, which is mounted in the area of the instrument under the quartz window when the outer case is on. Refer to Figure 1 below (Figure 2-3 "Spectrometer Targets for Various Zenith

Angles" from page 6 of the Brewer Operators Manual OM-BA-C231 REV B, August 15, 1999).

7. Locate the SL lamp base, inside which the SL bulb is mounted, directly under the zenith prism. Refer to Figure 1. The SL lamp lies in the horizontal plane and is hidden from view inside the zenith prism assembly. Only the base that the bulb is mounted in is visible. When looking from the direction of the slanted quartz window, the base plate is located in the plane of the long edge of the Brewer and it has two wires for power leading into it.
8. Locate the hex head screw, or screws, that secures the SL lamp base to the zenith prism assembly. The screws may vary in size and number for each particular instrument but generally there are one or two with 1/16" hex heads. Loosen and remove the screw(s).
9. The lamp base can now be removed from the zenith prism assembly. Use only a clean Kim-Wipe or other similar textile to touch the bulb. **DO NOT TOUCH THE BULB WITH BARE FINGERS.** If the bulb is touched by accident with skin, use some alcohol to clean it as quickly as possible.
10. At the Brewer Home screen command line give the command "B2" to turn on the SL lamp ("B0" turns the lamp off). If the lamp is firing the filament will emit intense visible light. **CAUTION; THE SL LAMP EMITS UV RADIATION WHICH IS HARMFUL TO EYES AND SKIN. AVOID OVEREXPOSURE OR DIRECTLY LOOKING AT THE LAMP WHILE ON.**
11. If the lamp is firing proceed to step 19, otherwise continue on to step 12.
12. If it is visually determined that the SL bulb is not firing turn off the Brewer power by pressing the push button on the side of the instrument before continuing. Also unscrew the AC power cable from the tracker to avoid electrocution.
13. Remove the old SL bulb from the pin socket by firmly pulling on the envelope of the bulb. Insert the replacement bulb and clean the envelope with Kimwipe and alcohol. Be sure to handle the new bulb only with a tissue or Kimwipe.
14. Replace the AC power cable to the tracker and turn on the Brewer power by pushing the push button on the side of the instrument.

15. Check the computer to see if communication with the instrument is being established. The message "Brewer failed to respond 5 times. Check power and cables and press Enter when ready" may appear on the screen. Press Enter and the Brewer initialization process should be enacted. Once the Brewer has reinitialized the Home screen will appear on the computer monitor.
16. Give the command "B2" at the Home screen command line.
17. Observe if the SL bulb is firing as described in step 10.
18. If the bulb appears to be operating normally, continue to step 19. If the bulb is still not firing after replacement there is likely a problem with the lamp circuitry. These problems will not be addressed in this procedure.
19. If it is visually determined that the SL lamp is firing, turn it off by giving the command "B0" at the command line.
20. Carefully place the lamp base back into the zenith prism assembly. Note the small pin located on the side of the bulb base. Insert the pin into the hole in the zenith prism assembly to be sure the base is seated properly so that the orientation of the SL lamp will be optimized. Be sure not to touch the bulb envelope with your skin. If you touch the lamp it is necessary to clean it with alcohol. Make sure the Brewer does not have power during this step.
21. Tighten the hex bolt(s) which fasten(s) the SL base to the zenith prism assembly.
22. Check the desiccant and breather tube for signs of saturation and replace if necessary. This can be determined before beginning the procedure.
23. Replace the Brewer outer cover and secure the four latches, ensuring that the outer cover is mounted evenly all the way around the Brewer case. Remove the quartz dome protector.
24. Give the "PNSL" command at the Brewer Home screen command line. Compare the new results to the previous results and note changes in the measured lamp intensity and the R5 and R6 ratios in the log book.
25. Perform the SR/SI tests if possible before returning the Brewer to schedule.

26. Enter an electronic comment (CM or CO command) describing briefly if the bulb was replaced or and any other observations made. Also enter a brief entry in the paper station log form.
27. Place the Brewer back into schedule by giving the command "skc" at the command line. When prompted for schedule, enter the name of the current network schedule (epa96d for the US EPA/UGA network as of September 2002).

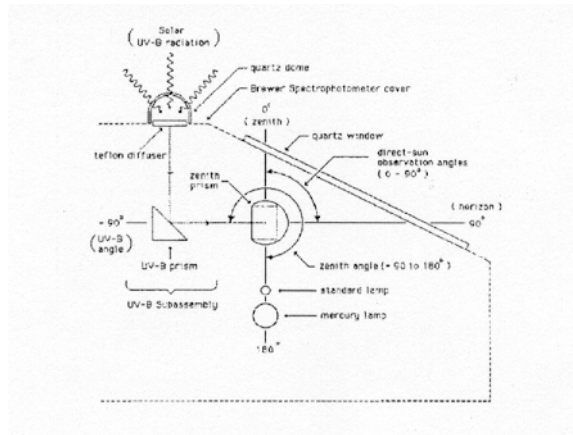


Figure 1: Spectrometer Targets for Various Zenith Angles

For further information or advice concerning this SOP please contact the NUVMC at the University of Georgia at <http://oz.physast.uga.edu>