

TWP PROCEDURE: Author: W. Porch	MFRSR LEVELING AND ALIGNMENT PROCEDURE	PRO(RSR)-021.001 2 March 2005 Page 1 of 3
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MFRSR Leveling and Alignment Procedure

I. Purpose:

This document describes the method for Site Visit technician leveling and/or realignment of the Multi-Filter Rotating Shadowband Radiometer (MFRSR).

II. Cautions and Hazards:

- Perform this procedure only during safe weather conditions.

III. Requirements:

- Allen wrench set
- One bubble level
- Time of solar noon

IV. Procedure:

A. Steps:

1. **Leveling** – Observers can check leveling step but Site Visit technician may be necessary to perform the leveling depending on the experience of the observers.
 - a. Attach bubble a level to the top of the diffusing disk for leveling. Make sure the level is seated firmly in the diffusing disk. If the sensor head is not level, carefully adjust the three leveling screws until the bubble is centered in the circle.
 - b. Tighten the hold-down bolt that secures the instrument to the platform, once the instrument is level.
 - c. Check to make sure the bubble is still centered after tightening.
 - d. Level and tighten again until it is level.
2. **Alignment** – Observers can check alignment with this step but Site Visit technician may be necessary to perform the realignment depending on the experience of the observers.
 - a. Obtain the solar noon time for your location and date from Site Visit technicians or TWP office.
 - b. Check to see if there is no shadow on either side of the band motor at solar noon.
 - c. If there is a shadow, then inform Site Visit technician and proceed the next day to rotate the shadow-band instrument so that the

<p>TWP PROCEDURE:</p> <p>Author: W. Porch</p>	<p>MFRSR LEVELING AND ALIGNMENT PROCEDURE</p>	<p>PRO(RSR)-021.001</p> <p>2 March 2005 Page 2 of 3</p>
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motor bracket does not cast a shadow to either side of the band motor.

3. **Band Problems** – Site Visit technician or experienced observer with permission.

- a. If the band has slipped on its motor shaft, use the small Allen wrench to readjust band to center shadow over diffusing disk.
- b. Using the supplied shadow band alignment tool, ensure that the band is not bent out of alignment.
 - i) Slip the tool onto the motor shaft, and snug it up under the shadow band, taking care not to scratch the diffuser with the alignment tool's point.
 - ii) The tip of the tool should be near the center of the diffuser to ensure that the axis of the motor shaft bisects the diffuser.
 - iii) Watch for a helix effect in the arm and carefully straighten it if required.

4. **Latitude Adjustment:**

- a. The latitude adjustment should not change at the same site except through vandalism. It can be checked with machinist's protractor.
- b. The latitude is set correctly when a line drawn through the center of the band motor and the diffuser makes an angle with level equivalent to the latitude. For the TWP Facilities this means that the band motor shaft is almost level with the ground (Manus 2 and Nauru 0.5 degrees).

V. **References:**

1. Yankee Environmental Systems, Inc. *MAN(RSR)-009.000MFR-7* Rotating Shadow band Radiometer: Installation and User Guide.

VI. **Attachments:**

1. Diffusing Disk Diagram

Attachment 1: Diffusing Disk Diagram

Diagram showing the diffusing disk on which the leveling bubble should be placed.

At solar noon, the motor bracket should not cast a shadow to either side of the band motor when the instrument is properly aligned.

