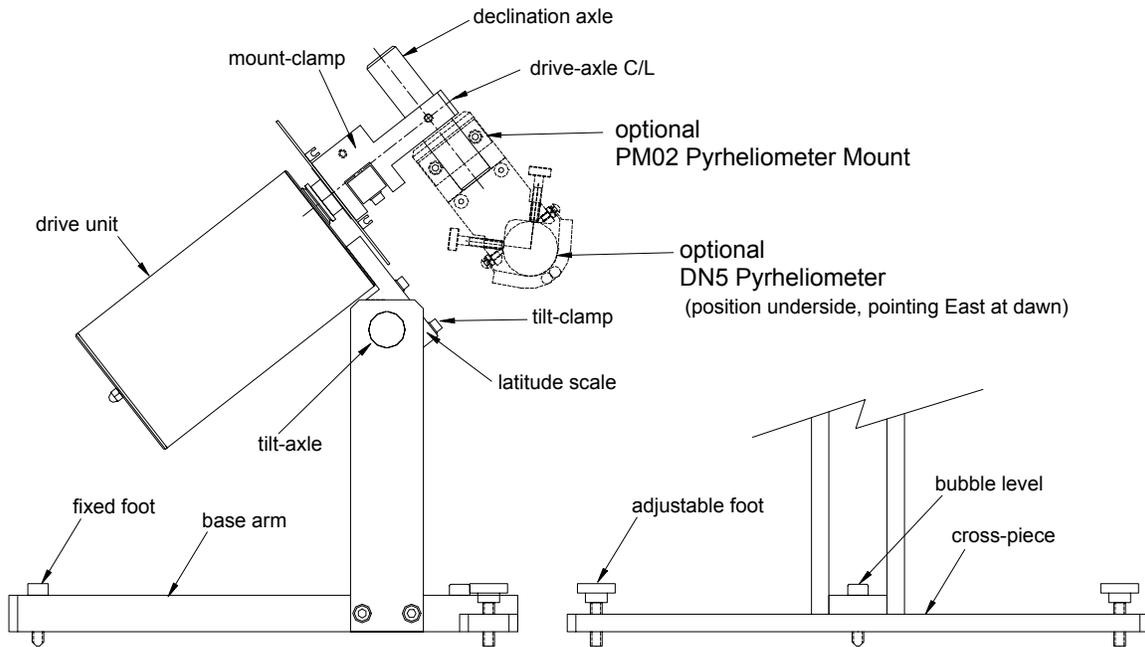




MIDDLETON SOLAR PST-01 PASSIVE SOLAR TRACKER USER'S GUIDE

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The PST-01 Tracker is a single-axis equatorial mount designed to point pyrheliometers and sunphotometers continuously at the sun¹. To function correctly the tracker must be positioned so that the drive-axle is aligned parallel with the axis of rotation of the earth.

Assembly Procedure

5mm AF hex-key required

- 1) Remove the PST-01 from its packaging.
- 2) Bolt the cross-piece to the base arm.

Setup Procedure

- 1) Choose a level site that is clear of shadow at all times and has an unobstructed view of the horizon to east and west. An instrumentation platform located in an open field, or on the roof of a tall building, is a suitable choice.
- 2) Establish true geographical North and mark a N-S line on the instrumentation platform. Note that true North is usually somewhat east of magnetic North (as determined by a compass).
- 3) Align the base-arm of the Tracker along the N-S line such that:
Northern Hemisphere: fixed foot points to South;
Southern Hemisphere: fixed foot points to North.
- 4) Position the two adjustable feet so that the bubble-level is central.
- 5) Secure the base arm to the instrumentation platform.

¹ PST-01 is suitable for use with Middleton Solar DN5/E Pyrheliometer and SP02 Sunphotometer.

- 6) Align the latitude scale on the tilt axis to 0° and use a separate spirit level to verify that the drive-axle is level. Re-adjust feet if required.
- 7) Adjust the tilt-clamp position so the latitude scale is set at the site latitude (e.g. 38° for Melbourne, 60° for Helsinki, etc.).
- 8) Attach the mount-clamp to the drive-axle.
- 9) Attach a DN5 Pyrheliometer to the declination axle using an suitable pyrheliometer mount² (alternatively attach a SP02 Sunphotometer directly to the declination axle). To counteract drive backlash position the payload on the underside, pointing East at dawn.
- 10) Clip the pyrheliometer (or sunphotometer) lead to the plate on the mount-clamp. The lead will wind up around the mount-clamp as the Tracker rotates.
- 11) Set the Tracker wiring for direction of rotation:
Northern Hemisphere: clear and yellow wires shorted;
Southern Hemisphere: clear and yellow wires separate
(the yellow wire is +5V and should be isolated if not used).
- 12) Connect the Tracker lead to a power supply:
red wire to +12VDC ±10%, 5W
blue wire to 0V
- 13) Let the Tracker operate for 1 hour to allow any backlash in the drive train to be taken up.
- 14) Slacken the mount-clamp and slacken the pyrheliometer mount. Align the pyrheliometer so that it is aimed directly at the sun (use the diopter on pyrheliometer to assist aiming). Alternatively aim a SP02 Sunphotometer in a similar manner.
- 15) Check tracking alignment every hour or so and fine-tune as required
- 16) After one day correct any tracking error, at Solar Noon, in this order:
 - a) Remove half any 'horizontal' error by adjusting the North-South axis alignment.
 - b) Then remove any remaining 'horizontal' error by rotating the mount-clamp on the drive-axle.
 - c) Then remove half any 'vertical' error by adjusting the latitude setting (tilt-clamp).
 - d) Then remove any remaining 'vertical' error by adjusting the declination setting (rotate pyrheliometer mount).

Routine Checks

- 1) Check tracking alignment daily, and correct by adjusting the pyrheliometer mount (for declination setting), or by adjusting the mount-clamp on the drive-axle (for motor timing error)³.
- 2) Unwind the pyrheliometer or sunphotometer lead every two days.

² The PM02 Pyrheliometer Mount is available for the DN5/E Pyrheliometer.

³ Daily declination change is <0.35°; daily motor timing error is <±0.1°.