

Assembly Instructions for Gard Clock Hybrid Sundial

1. Construction

The construction of this sundial is relatively simple, making use of M2, M3 & M4 Stainless Steel Button Head Screws and Nuts. A list of assembly material is provided below, along with where it's used. All parts can be easily disassembled and reassembled to facilitate transportation.

Table 1: List of Hardware

Qty	Description	Where Used
9	M2-14	Main Dial & Main Gear Crescent Attachment
2	M3-6	Main Dial & Latitude Crescent Support
2	M2-12	Nodus Tilt Knob
2	M4-16	Analemma & Alidade Vertical Arms
2	M2-10	Alidade to Gear Holder
1	M2-16	Alidade Pivot
1	M2-7	Main Dial Knob
1	M3-30	Main & Latitude Crescent Clamp
2	M3-10	Main & Latitude Crescent Clamp
3	M4-20	Pedestal/Latitude Dial Retention
3	M4 Nuts	Pedestal/Latitude Dial Retention
2	M4-20	Pedestal to Base

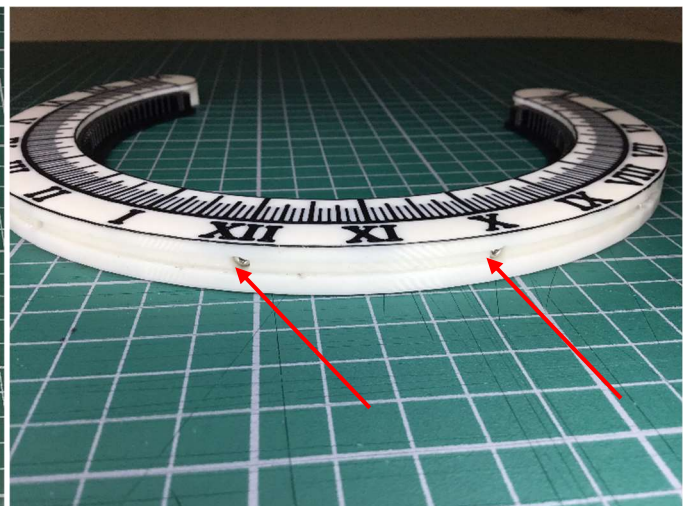
2. Post Processing Tools

1. Deburring tool for removing excess plastic from printed parts
2. Hand Drill or Drill Press (optional)
3. All holes requiring M4 hardware requires to be drilled out with a 3.3mm or 1/8" drill bit and tapped at M4.

3. Main Dial & Gear Crescent Assembly

- (1x) Main Dial Crescent,
- (1x) Main Gear Crescent.

- 1) Place the main dial crescent overtop the main dial gear making sure the gear portion is facing the same side as the numerals. With the side holes on both dial & gear aligned, place (9x) M2-14 screws. Do not overtighten;



- 2) Place the main dial & gear assembly into the main dial & latitude crescent support. Add two (2x) M3-6 screws into each side of the support but do not tighten past the inside edge of the support;



4. Planetary Gear & Minute Dial Assembly

- (1x) Planet Gear,
- (1x) Planet Gear Holder,
- (1x) Sun Gear,
- (1x) Minute Dial.

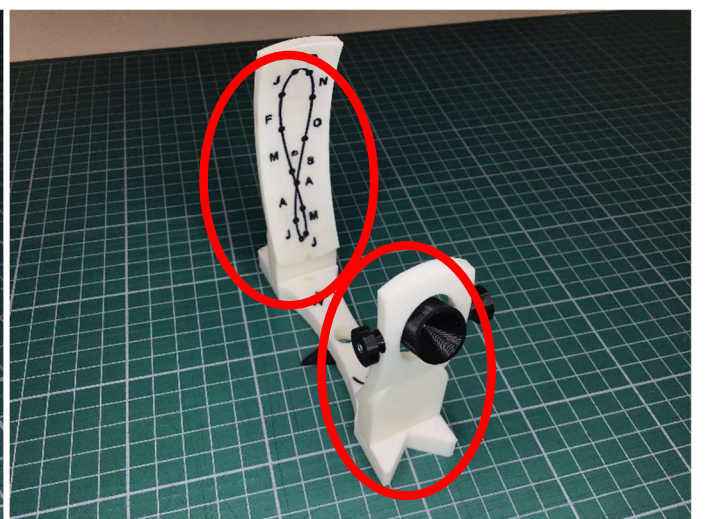
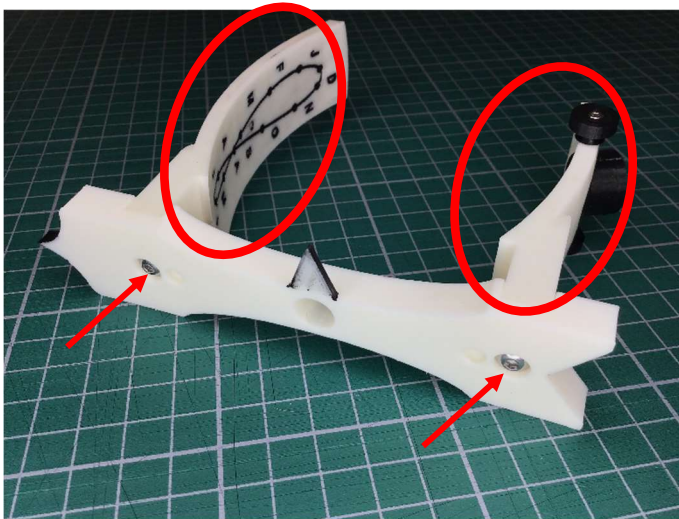
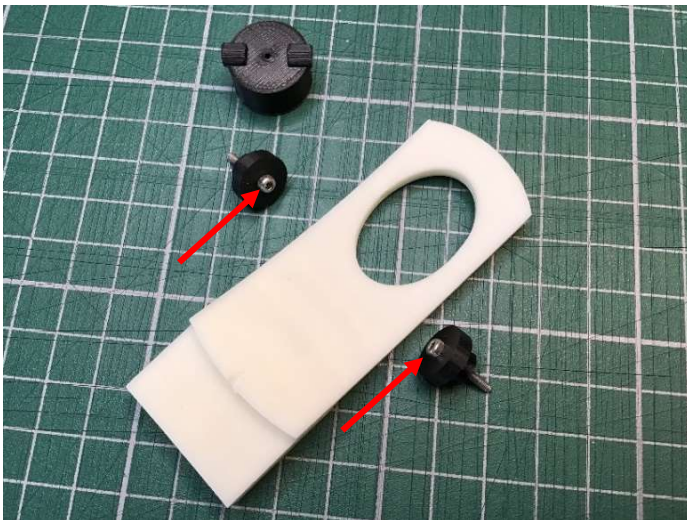
- 1) Assemble the planet gear & minute dial onto the gear mount, along with the sun gear. The simplest way to achieve this is to mate the planetary gear into the sun gear, then slide the sun gear shaft into the center hole of the gear mount, then slide the planetary gear into one of the shafts on the gear mount. It doesn't matter which gear mount shaft you use. When assembled, it should look like the picture shown below;

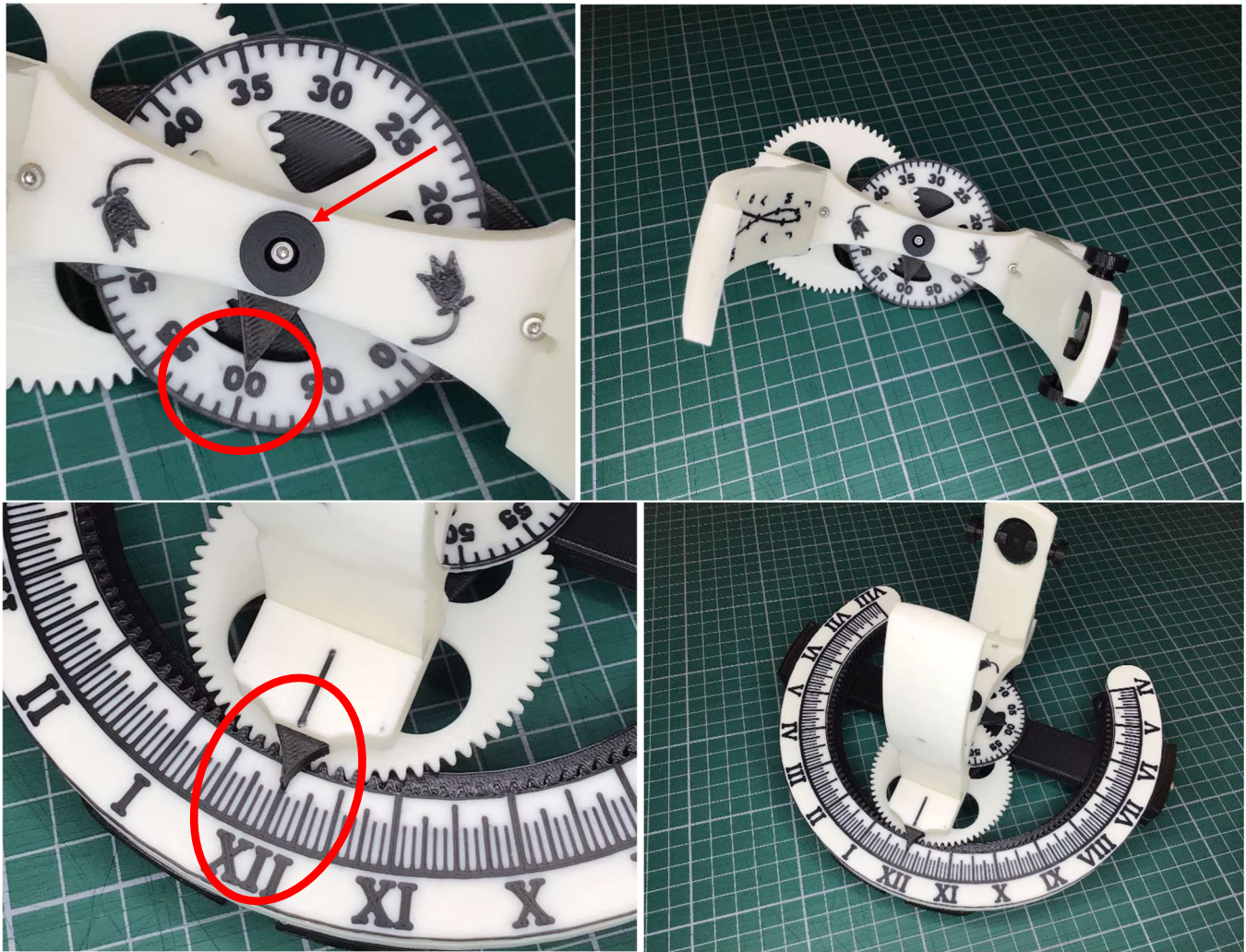


5. Nodus, Analemma & Alidade Assembly

- (1x) Nodus Vertical Arm,
- (1x) Analemma Vertical Arm,
- (1x) Nodus,
- (2x) Nodus Tilt Knobs,
- (1x) Alidade,
- (1x) Gear Assembly
- (1x) Alidade Pivot Bushing

- 1) Screw (2x) M2x12mm screws all the way into each Nodus tilt knob;
- 2) Place the Nodus into the oval vertical opening of the vertical Nodus arm such that the Nodus cone is pointing inwards, as shown in the photos;
- 3) Push each knob into the allocated side holes in the vertical Nodus arm & align them with the Nodus mounting holes. Screw the knobs all the way in allowing the Nodus to turn freely using the tilt knobs;
- 4) Using (2x) M4x16mm screws, install both Nodus & Analemma vertical arms onto the Alidade. Note the positions in the photos; i.e. the Nodus arm should be curving into the Alidade, with the Nodus cone portion pointing outwards & the arm mounted on the opposite end of the Alidade arrow. The Analemma vertical place must have the curve with the text pointing inwards & mounted on the side with the Alidade arrow;
- 5) Align the two holes at the bottom of the Alidade with the two mounting tabs on the planetary gear holder. Use (2x) M2x10mm screws to secure the Alidade to the gear holder;
- 6) Use (1x) M2x16mm screw to secure the Alidade pivot bushing. The assembly should be able to rotate freely from the bottom of the gear assembly by turning the sun gear shaft;
- 7) Rotate the sun gear in the Alidade assembly until the side center pointer on the Alidade is pointing to "00" on the minute dial. Insert the sun gear shaft into the center hole of the main dial & latitude crescent support & align the gear teeth on both main & planetary gears so that the Alidade pointer is at "XII"; i.e. 12 o'clock, but making sure to keep the minute dial at "00". Refer to photos below;



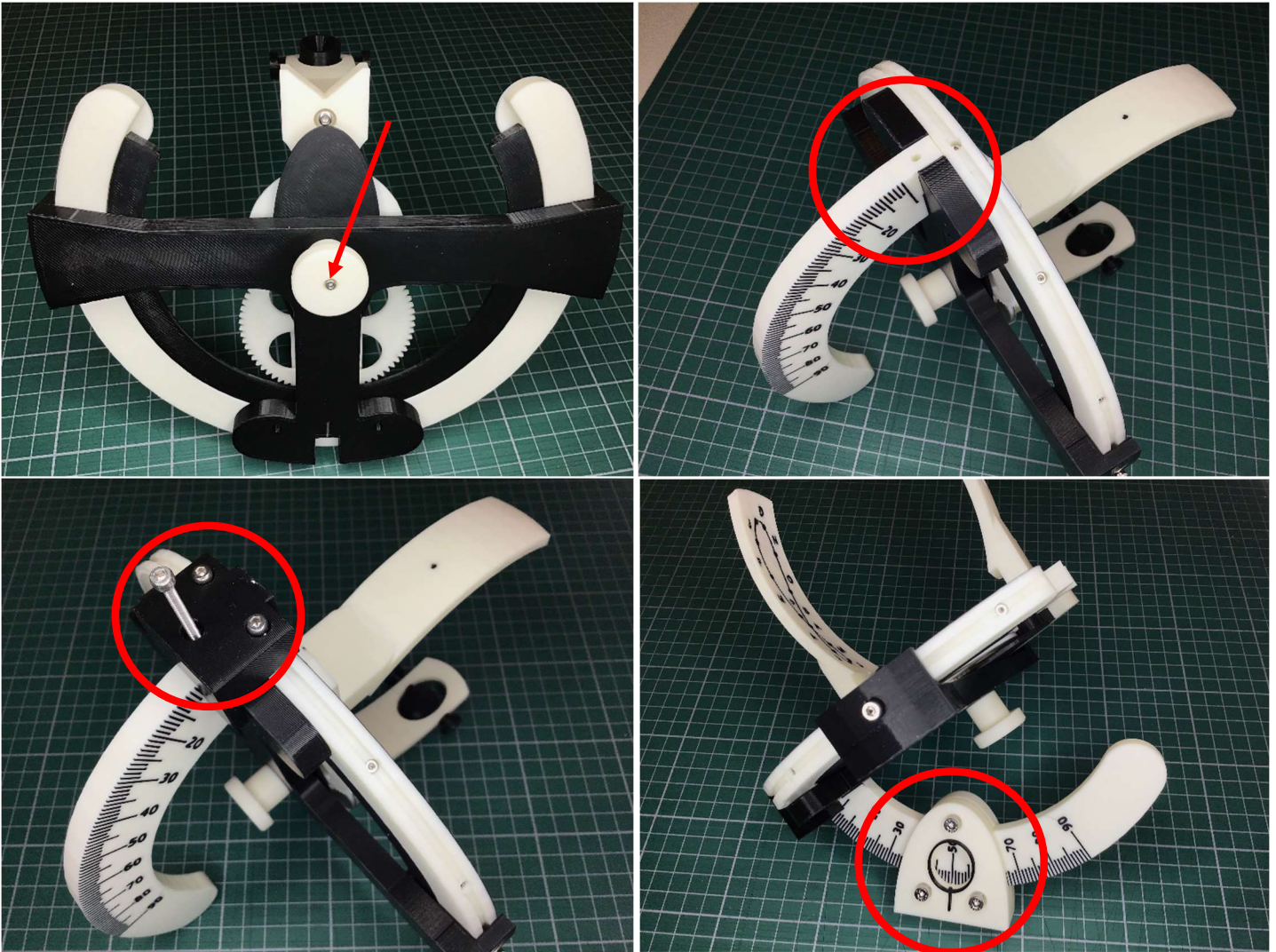


6. Latitude Scale, Pedestal, Base & Main Dial Assembly

- (1x) Main Dial Knob
- (1x) Main & Latitude Clamp
- (1x) Latitude Crescent
- (1x) Pedestal
- (1x) Original Base

- 1) With the sun gear shaft protruding through the center hole of the main & latitude crescent support, place the main dial knob over the sun gear shaft, aligning the notch on the shaft with the inside notch of the knob. Tighten the knob onto the sun gear shaft with a (1x) M2x7mm screw. Make sure that the entire Alidade & minute dial assembly is able to rotate freely by turning the main dial knob;
- 2) Slide the latitude crescent into the slot located on the bottom of the main & latitude crescent support;
- 3) Slide the main & latitude crescent clamp over the main & latitude crescents. Screw in a (1x) M3-30 screw into the bottom hole of the clamp, securing the latitude crescent. Screw in (2x) M3-10 screws at the top of the clamp but do not tighten at this time. These screws will be used later to secure the main dial crescent;
- 4) Slide the Latitude crescent through the opening of the Pedestal such that the numbers are showing through the portal situated on the Pedestal. Make sure that the latitude scale is able to slide back & forth easily into pedestal channel. If it is too stiff, slightly bevel the corners of the latitude crescent to facilitate sliding into the pedestal opening;
- 5) Attach the (3x) M4x20mm screws & nuts onto the Pedestal, adjust the latitude scale to 90 degrees for now, then tighten the screws;

6) Attach the Pedestal to the Base using (2x) M4-20 screws.



7. Finished Assembly

Rotate the entire main dial crescent assembly clockwise or counter-clockwise within the support so that the bottom pointer indicator on the clamp is pointing at "XII", then tighten the 4 screws on the support to secure. Tighten just enough to prevent the main dial from rotating, do not overtighten. Further adjustments for prime meridian offsets & daylight savings will need to be done also but this procedure is covered elsewhere. Please refer to: [***How_to_Setup_your_Gard_Clock_Hybrid_Heliochronometer_Sundial-Detailed-Instructions-v1***](#)

