

The artificial horizon

The artificial horizon is an optional complement to the AstroMedia[®]Sextant (ISBN3-935364-01-6). It permits comparatively exact measurements of a point above the mathematical horizon even when the latter is not, as at the coast or high sea, visible in the form of the visual horizon, i.e. the line where the sky meets the sea.

Assembly instructions for the artificial horizon

The cardboard panel with slot-in support

Step 1: Push the large parts out of the cardboard panel and remove the punched slot from section K1 (front). Place the front and back sections (part K2) together with their unprinted sides facing inwards so that right-angled corners are flush. Draw round the contours of the slot and colour it in black on the unprinted side of the back section. Glue both sections together.

Step 2: Glue section K3 (slot-in support) to the corresponding blank white edge of the back section so that outer edge of the slot-in support and the edge of front section are flush. Check if gluing is exact as follows: mount the whole section on the white ridge which projects out above the viewing chamber of your sextant from the base plate. The front section of the artificial horizon must now be flush with the front edge of the base plate and touch the top cover of the viewing chamber.

The third mirror

Step 3: remove the protective film from the mirror and clean it with spirit if necessary to remove any melted film residues.

Step 4: push out the 4 K4 sections (mirror support) from the cardboard panel and glue the two unprinted sections together exactly. Then glue a printed section to each of the sides. The edges must all match exactly.

Step 5: glue the mirror and the support in the slot. On doing so, press the support against the back of the mirror until it touches the edge of its slot. The support is glued to the unpolished side of the mirror.

Step 6: glue sections K5 and K6 (bottom and top cover) in the corner between the mirror and support so that open slot behind the mirror is covered.

The spirit level

Step 7: mount the cardboard section with the mirror on the ridge above the viewing chamber of your sextant and place the spirit-level on the top cover of the viewing chamber. If you now wish to fix a point, your attention will be guided from the bottom part of the horizon mirror to the third mirror and from it to the spirit level. This allows you to check the horizontal position of the sextant.

Now proceed to step 8 to calibrate the artificial horizon.

The spirit-level may now already be glued by its long edge to the blank white area below the mirror for sufficient accuracy. The artificial horizon is thus complete. It may be mounted and removed from the sextant as required.

How to calibrate the artificial horizon

To achieve maximum precision with your artificial horizon the spirit-level display must be calibrated. This is performed as follows:

Step 8: place the spirit level fully on the bearing casing, do not glue it on yet.

Find a point as far away as possible that is on exactly the same elevation above sea-level as your position. If you happen to be at the sea, this may be the actual horizon. On a detailed map you may however also seek out a site that is far enough away and on the same elevation as your position.

Step 9: set the alidade (sight rule) to exactly 0° and fix the point mentioned in step 8 so that it appears on the marking line of the horizon mirror.

Ideally you should now see via the third mirror that the spirit-level air bubble is located exactly between its two black marking lines. In this case the artificial horizon of your sextant will already indicate precisely and requires no further calibration. You may now glue the spirit-level as described in step 7. Otherwise tilt the sextant a little until the spirit-level air bubble is exactly between the marking lines and move the alidade until the mirror image is level with the fixed point and the marking line. Now read off the result in the alidade window whereby taking care to note whether the value is positive or negative.

This value is the calibration correction. If you glue the spirit-level in this position, in future you must deduct this value from all the measuring results performed with the artificial horizon. If the value of the calibration correction is positive, the result arrived at with the artificial horizon must be reduced by this amount, if it is negative, the measuring result will be increased by this amount.

You may however also place small pieces of paper etc. between the spirit-level and the bearing casing until the calibration correction value is zero and then glue the spirit-level in this position. This requires a little more patience, which is rewarded however by an especially precise instrument.

How to use the artificial horizon

In order to determine the height of a point (star, mountain top) above the mathematical horizon, during gauging you must constantly check the horizontal stance of the sextant by looking at the spirit-level. You no longer need to regard the unmirrored image, instead fetch the mirrored image of the point the level of the marking line on the horizon mirror by swivelling the alidade. Then recheck the horizontal stance of the sextant and read the result.