The Nelson Telescope

Cardboard kit for a collapsible terrestrial telescope with 6x magnification.
217.NLT

Admiral Viscount Horatio Nelson (1758-1805) is the one of the best known British naval officers. His victories in the sea battles of Aboukir Bay, Egypt (1798) and Trafalgar, Spain (1805) established the superiority of the British Empire at sea and made him a national hero. Nelson had a reputation of being an exemplary leader. Even though he was seriously wounded several times – he lost an eye and an arm – he always stood on the front line. He was killed in the battle of Trafalgar on the 21st October 1805. In 1801 he was vice-commander of the British fleet during the battle of Copenhagen. As the Danes were about to take the victory, a flag signal was sent to him from the commander's ship ordering him to retreat. Nelson, who still believed in a British victory, was not exactly pleased with this order. He put the telescope to his eye and allowed the attack to continue with the words: "I really do not see the signal". The battle ended with a victory for the British fleet. It was true that he had not seen any signal. He had put the telescope up to his blind eye (This coined the term "turning a blind eye").
Nelson's personal telescope was, of course, made of brass and glass lenses, and was waterproof. However, it is certainly comparable with our Nelson Telescope in regard to its dimensions and its optical features. It has a large convex (outward-curved) lens with 360 mm focal length and a small concave (inward-curved) eyepiece lens with 65 mm focal length which, in combination, produce a 6x magnification. This combination of a concave and a convex lens produces an upright image. Such a telescope is also known as a Galilean or Dutch telescope.

Assembly Instructions

Tips for successful construction
Please read before commencing!

- The assembly itself is quite straight forward. All parts are die-cut to fit exactly together. Each component is marked with a part number ([A1], [A2], [B1], etc.) and its (German) name on the cardboard next to the part. Only remove the parts as you need them.
- We recommend using a sharp knife to remove the parts from the cardboard sheet. You'll need a few paper clips to hold the parts together while they are drying and also a good all-purpose glue.
- Use a standard solvent based all purpose glue, e.g. UHU or Evo-Stik Impact. **Do not use water-based glue**: it softens and warps the cardboard, and doesn't stick properly to the printed surfaces. Solvent based glues also dry much faster.
- All folding lines are prepared by grooves. If they are to be bent "forwards", you have to fold them towards you when looking at the printed side of the part. If they are to be bent "backwards", you need to fold them away from you. You get a straighter fold if you position the folding line over a sharp edge.
- This is how to accelerate the setting of the glue: put a suitably thick layer of glue onto one of the parts to be glued and press the parts together so that the glue spreads out on both sides. Then pull the parts apart, blow 2 or 3 times over the surfaces and press the parts together again. Take care that they fit exactly, as the glue binds immediately. Do not use this method when you are glueing the lenses to avoid glue threads on the lens surfaces.

The telescope consists of five interlinked tubes that can be pushed into each other, but are secured from separating by tags that are folded inwards. The ends carry the lens holders with their respective lenses.

Eyepiece tube and small intermediate tube

Step 1: Separate the eyepiece tube [A1] (Okular-Tubus) from the cardboard sheet, fold the 6 tags with the small arrows forwards so that the arrows are covered, but do not glue them. Then fold the part to form a hexagonal tube and glue the long tag behind the opposite side. The 6 flaps for the eyepiece lens holder are folded backwards (into the inside of the tube). They will be dealt with later.

Step 2: Separate the small intermediate tube [B1] (Zwischen-Tubus) from the cardboard sheet, fold and glue this part to form a hexagonal tube. Fold the 6 white tags with the arrows forwards, without gluing them. Fold the 6 gold-printed tags backwards into the interior of the tube and glue them in place.

Step 3: Now the eyepiece lens tube [A1] with its tags folded outwards must be fitted inside the intermediate tube [B1], between the glued tags. The two sides of the eyepiece lens tube with the small printed screws, should be in line with the sides of the small intermediate tube with the printed brass plates.
The best way to proceed is as follows: place the intermediate tube onto your worktop with the glued tags facing upwards. Push all 6 outwards-folded tags of the eyepiece lens tube tightly against the tube by placing one finger on each. This way, the diameter of the eyepiece lens tube is reduced slightly and it can be pushed into the intermediate tube. Push it in so that its folded tags engage behind the glued tags of the intermediate tube and then draw it out again. When the tags of the two tubes meet, you cannot draw it out any further.

Step 4: In order to reduce stray light inside the telescope, a diaphragm is installed inside the inner end of the eyepiece lens tube. Remove the diaphragm [A2] (Blende vor Okular-Tubus) from the cardboard, discard the die-cut disk from its centre and fold the 6 black tags forwards. Push the two tubes together so that their forward pointing ends are flush. Now glue the 6 tags of the diaphragm into the inner end of the eyepiece lens tube so that the diaphragm and the edge of the tube are flush. The black printed side of the diaphragm is now facing towards the inside of the eyepiece lens tube.

Middle and large intermediate tube

Step 5: Remove the middle intermediate tube [C1] (Zwischen-Tubus) from the cardboard, fold the 6 white tags forwards and fold and glue the part into a tube. As before, the 6 gold printed tags are folded into the inside of the tube and glued in place.

Step 6: Draw the two already connected tubes [A1+B2] apart as far as possible. As in Step 3, push each of the 6 white tags firmly against the body of the small intermediate tube so that you can push them between the glued golden tags of the middle intermediate tube [C1]. Again, the printed brass plates and the small screws should be in line with each other. Push the tubes together until the tags have slipped past each other, and then draw them apart again until they interlock.

Step 7: Proceed with the large intermediate tube [D1] (Zwischen-Tubus) in the same way: fold the 6 white tags, glue the part to form a tube, fold the 6 printed tags into the interior of the tube and glue them in place.

Step 8: As described in Step 6, insert the end of the middle intermediate tube into the large intermediate tube between the tags which are glued to the inside. Again make sure that you insert the tube with the printed screws and brass plates in line.

Objective tube, objective lens and eyepiece lens

Step 9: Fold and glue the objective tube [E1] (Objektiv-Tubus) into a tube. Fold the 12 small triangular glue tags back so that they are pointing inwards at right angles. Then fold and glue the 6 printed tags on the other end into the tube.

Step 10: As described in Steps 6 and 8, insert the end of the large intermediate tube between the tags of the objective tube that are folded and glued to the inside. Again, the printed screws and brass plates should be in line. Now the tubes of the telescope are assembled, one inside the other.

Step 11: Remove the eyepiece lens holder [A3] (Okular-Linsenhalter) from the cardboard and discard the die-cut disk in the middle. Glue the small eyepiece lens onto the non-printed side of the eyepiece lens holder. The lens can be glued on with either side. Proceed as follows: Apply some glue onto the cardboard around the hole, but not too close to the rim to keep it from spreading onto the visible area of the lens. Then place the lens centrally over the hole. Let dry thoroughly.

Step 12: Remove the objective lens holder [E2] (Obkektiv-Linsenhalter) from the cardboard and discard the die-cut disk in the middle. The large objective lens is glued centrally over the hole onto the non-printed side of the lens holder, with the curved side facing downwards. This way, only the protruding rim surrounding the lens comes into contact with the glue. Make sure that the rest of the lens stays clean.

Step 13: Glue the eyepiece lens holder onto the 6 tags at the opening of the eyepiece tube so that the lens is inside the tube. Push the lens holder with the tube onto the worktop so that it is pressed against the tags.

Step 14: Glue the objective lens holder onto the 12 small triangular gluing tags of the objective tube so that the lens is inside the tube.

The ornamental bands

Step 15: Remove the eyepiece ornamental band [A4] (Okular-Zierband) from the cardboard. Fold the 6 long narrow tags (separated from each other by cuts) completely over and glue them flat onto the back of the ornamental band. Press them together with the help of paper clips. After the glue has set, fold the eyepiece ornamental band to form a hexagonal ring with the narrow glued flaps on the inside, and glue it around the end of the eyepiece tube so that the edges of the narrow tags are seated on the eyepiece lens holder.

Step 16: Proceed with the objective lens ornamental band [E3] (Objektiv-Zierband) in the same way and glue it around the end of the objective tube in the same manner.

Step 17: The remaining four tube ornamental bands [E4], [B2], [C2], and [D2] (Tubus-Zierband) are folded into hexagonal rings and glued onto the marked locations of the tubes so that they are flush with the upper edge of each tube. The bands have different lengths and will only fit onto the tube they are designated for. Take care that no glue squeezes out and gets between the tubes.

The telescope case

Step 18: Fold and glue the case body [F1] (Köcher-Mantel) to form a hexagonal tube.

Step 19: Fold the 6 tags of the case bottom [F2] (Köcher-Boden) backwards, place it on your worktop with the printed side facing downwards and place the case body onto it. Glue the 6 tags of the bottom onto the designated glue areas on the body.

Step 20: Fold the 6 tags of the case cover [F3] (Köcher-Deckel) backwards and the 2 tag extensions (the one with the slot and the one with “Made in Germany”) forwards. Fold and glue each of the small non-printed tabs behind their tag to form a rim around the inside of the cover.

Step 21: Place the cover onto the case body and glue the tag extension with the lettering “Made in Germany” onto the designated glue area of the case body. Now the cover is attached to the case by a hinge. Check that it can be opened and shut.

Step 22: Open the two holes in the case lock [F4] (Köcher-Verschluss) and fold the tags on the ends forwards. Fold the lock backwards along the centre, so that the two holes lie on top of each other and glue the inner parts together. The two tags are glued onto the designated glue area on the case body. Check that the slot in the extended cover tag slides over the lock.

Step 23: Glue the tube ornamental band [F5] (Köcher-Zierband) onto its designated glue mark.

Now your telescope is complete, congratulations! In order to focus your telescope, slowly draw it apart or push it together until you see a sharp picture.

Very important: Never look at the Sun through the telescope! This can cause irreparable eye damage.

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