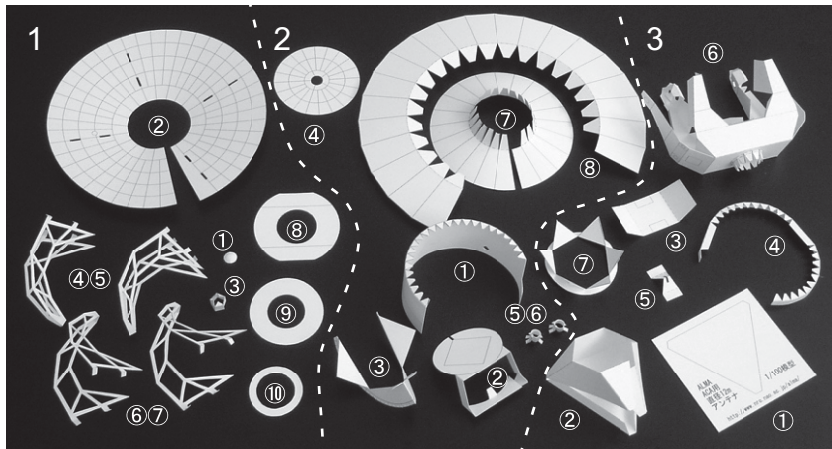


# Let's build a paper model of ALMA 12m antenna

Materials needed: scissors, paper cutter, white glue

1. Copy the design on a thick paper like Kent paper. The frame of the design should be 18cm x 26.5cm. Cut out all the parts (25 in total), and make slits and holes with a paper cutter along with the heavy lines. Make a mountain fold at the two-dot chain line and valley fold at the dashed line.



▲ All the 25 parts that are cut out and creased.

2. Subreflector -- Create a small box with subreflector driving mechanism [1-(3)]. Form subreflector [1-(1)] into a bowl-like shape by pressing it onto something small and round (pen cap etc.), and glue it to the lid of subreflector driving mechanism [1-(3)]. Glue quadripod [1-(4),(5),(6),(7)] on each side of subreflector driving mechanism to make a tower-like structure. Make ownward.

3. Main reflector -- Stick the both ends of the main reflector (outer) [1-(2)] together with the printed side up to form a shallow bowl.

Glue the main reflector (inner) [2-(4)] to the center of the main reflector (outer). Insert the ends of the quadripod into the 8 slots of the main reflector (outer) and stick them on the back side.

4. Sunshade -- Stick the both ends of the sunshade (outer) [2-(8)] with the printed side up, and construct the sunshade (inner) [2-(7)] in the same manner. Apply glue to the sunshade (outer)'s triangular flaps, and place the sunshade (inner) on them.

5. Receiver cabin -- Fold the elevation gear [2-(3)] in half. Stick the folded parts together excluding the squares and triangles that are shaped by folding it. Place the elevation gear's triangles on the receiver cabin (floor) [2-(2)]. Insert the gear into the slit of the receiver cabin (floor), and glue the triangles along with the square drawn on the cabin's floor. Roll the receiver cabin (side) [2-(1)] and glue its triangular flaps to the receiver cabin (floor). Make sure that the gear is sandwiched by the both ends of the receiver cabin (side). The sandwiched gear is supposed to be the front. Roll the elevation axes [2-(5),(6)] and insert them into the small holes on the side of the receiver cabin. Glue their flaps to the inside of the cabin.

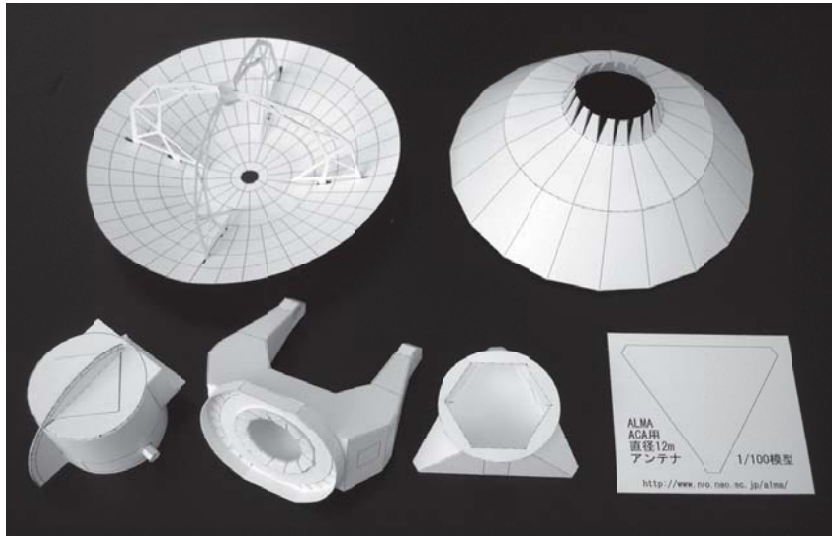
6. Pedestal -- The largest triangle of the pedestal [3-(2)] is supposed to be the base. Glue the rest of the part along with the triangle. Place the azimuth bearing on the pedestal [3-(7)] on pedestal [3-(2)], and glue its triangular flaps to the inside of pedestal.

7. Yoke -- Construct yoke [3-(6)] to form it into a "U" shape. Project the center of elevation drive [3-(5)] to create a stereoscopic triangle. Place it in the center of the inner wall of yoke [3-(3)] and glue it. Glue the inner wall in the center of the U-shaped yoke. Make a circle with the cover of azimuth bearing housing [3-(4)] and glue it on the backside of azimuth bearing housing [1-(8)]. Glue azimuth bearing housing to yoke bottom (Do not glue yoke's triangular flaps yet). Place bearing 1 [1-(9)] on the backside of the housing, and push the triangular flaps through the hole. Place

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# Let's build a paper model of ALMA 12m antenna

bearing 2 [1-(10)] in the same manner. Glue yoke's triangular flaps to bearing 2 so that bearing 1 can move freely.



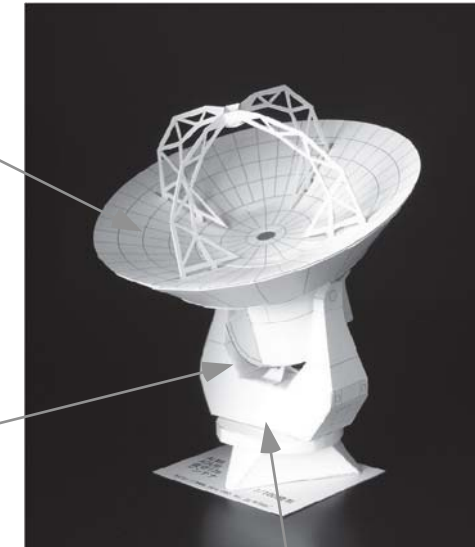
▲ Parts ready for complete construction.

Assembly -- Insert elevation axes [2-(5)(6)] of receiver cabin into the holes of yoke, with the projection of elevation gear facing the front which is identified by the cutouts on top of yoke. Set gear into the slit of elevation drive. Glue azimuth bearing on pedestal [3-(7)] to bearing 1 [1-(9)] carefully so as not to glue bearing 2 [1-(10)], and check pedestal and yoke move smoothly. Then, place sunshade on receiver cabin setting the seam of sunshade (outer) above elevation gear. Apply glue to sunshade (outer) and place main reflector on it, making sure that quadripod is in shape of a cross, that a small hole for the pointing telescope (a small circle on the main reflector) is on the left side, and that the seams of main reflector and sunshade (outer) are matched. Finally, place the

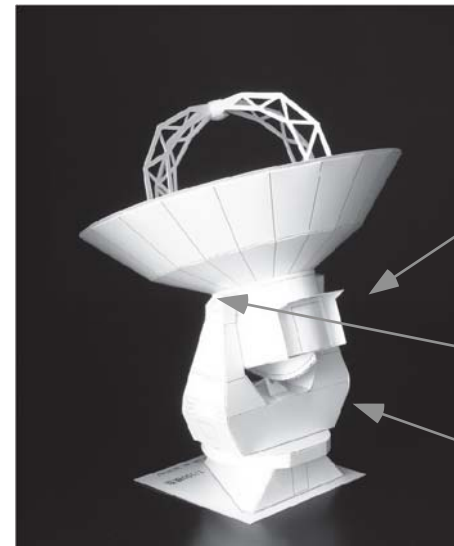
antenna on foundation [3-(1)]. You should now have a finished model shown in the picture.

Quadripod is in shape of a cross when viewed from the front. Optical pointing telescope is on the left side.

Elevation gear is facing the front.



Yoke's flat side is facing the front.



Entrance of receiver cabin is on the rear side.

The cutout of yoke is identified as the front side.

The backside of yoke is slightly bent.

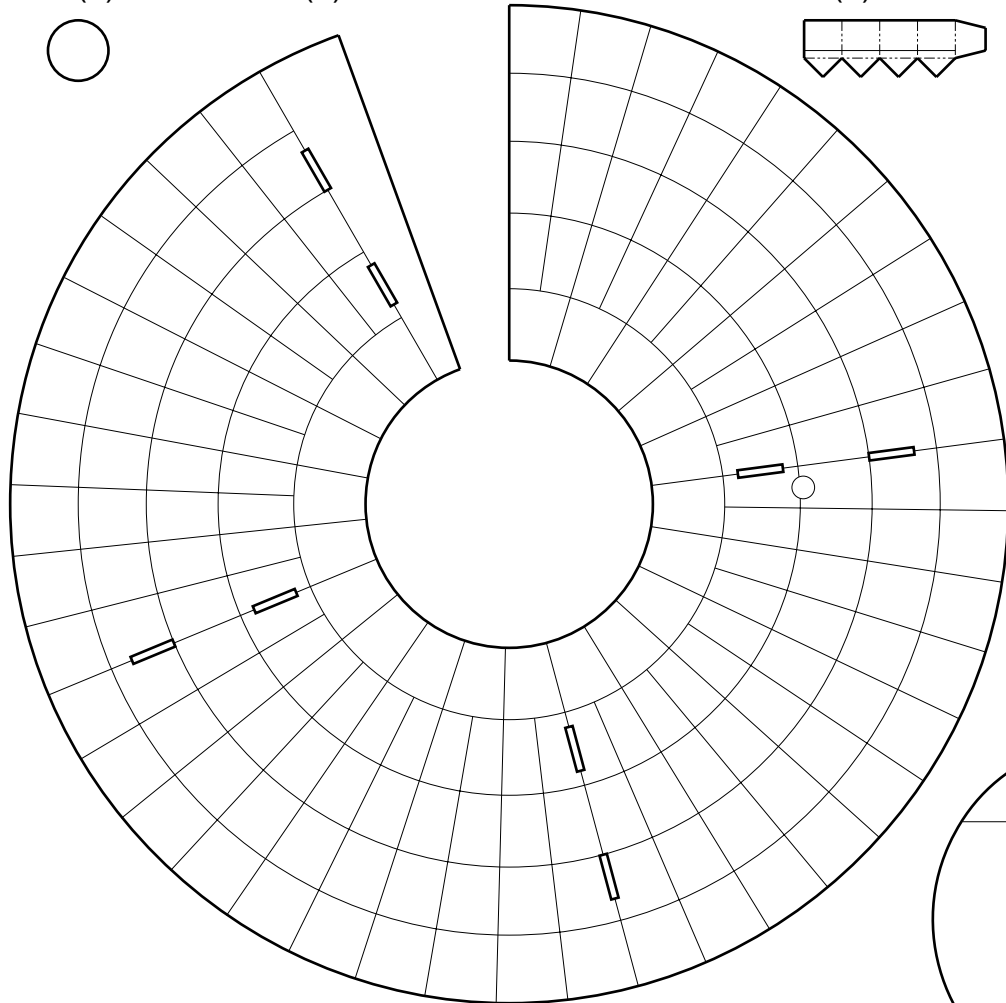
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# Let's build a paper model of ALMA 12m antenna

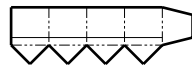
1-(1)



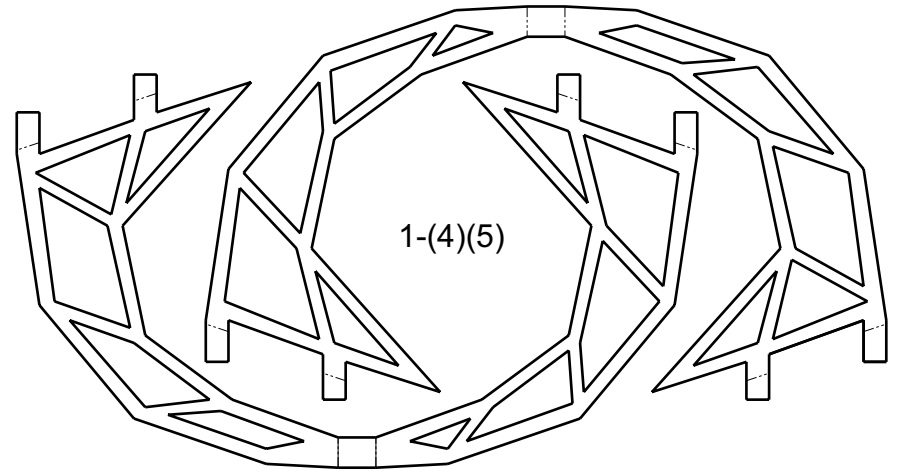
1-(2)



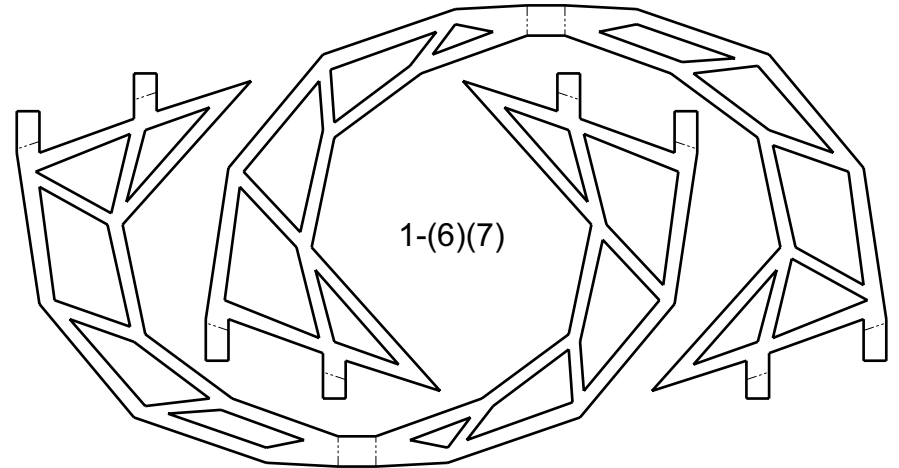
1-(3)



1-(4)(5)

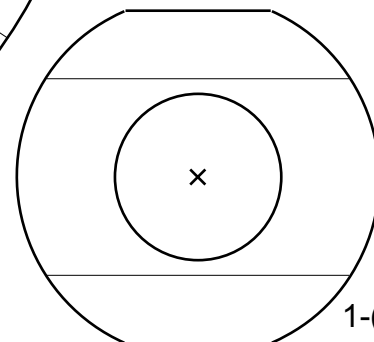


1-(6)(7)

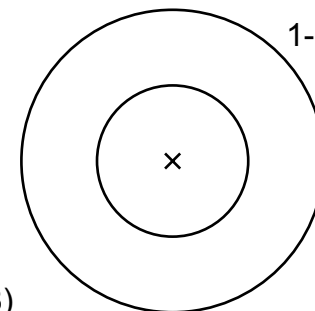


1-(9)

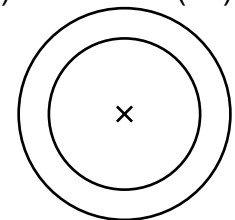
1-(10)



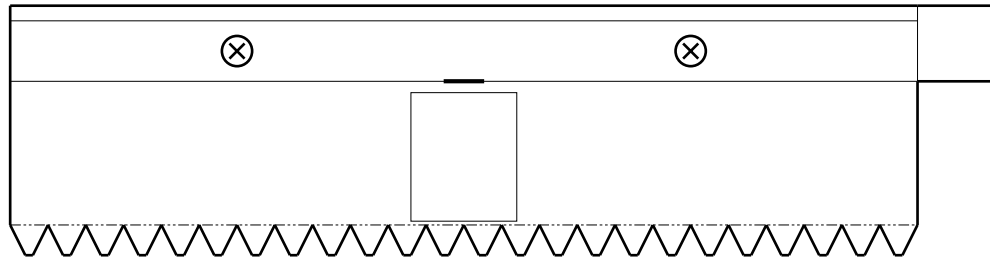
1-(8)



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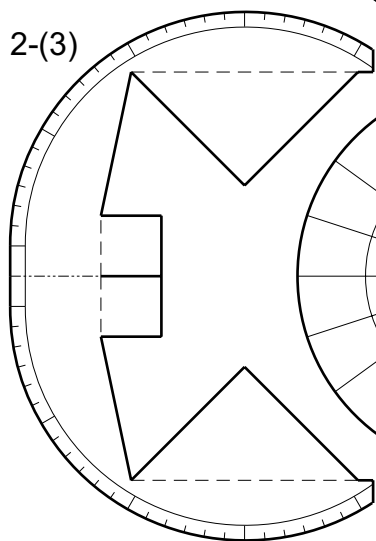
# Let's build a paper model of ALMA 12m antenna



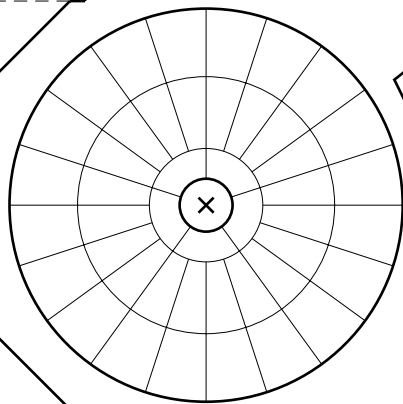
2-(1)



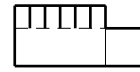
2-(2)



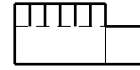
2-(3)



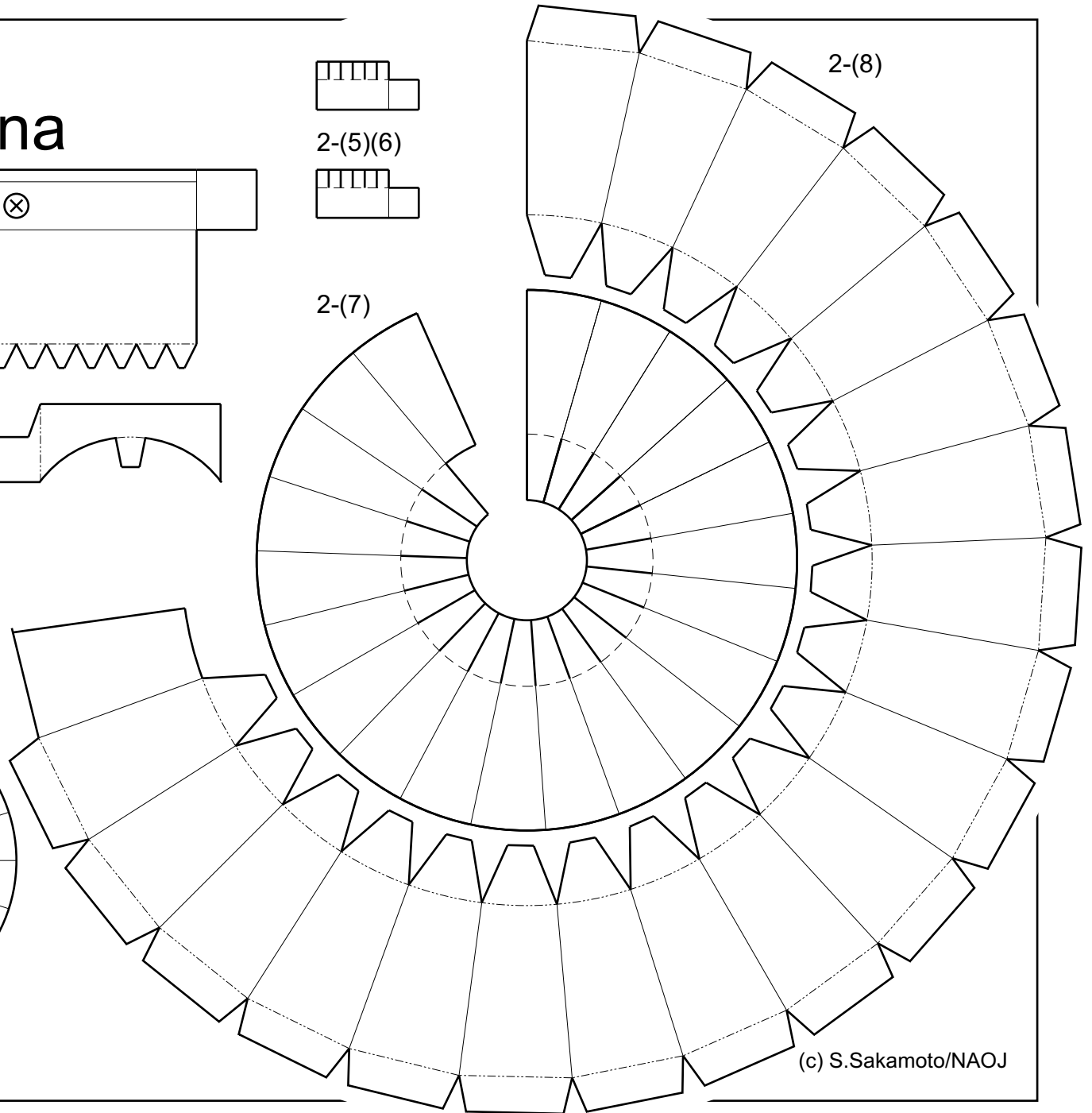
2-(4)



2-(5)(6)

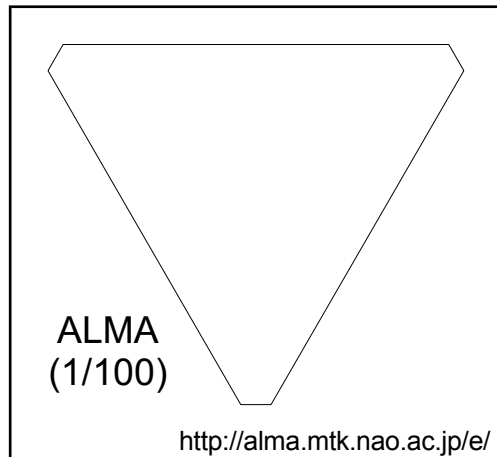


2-(7)



2-(8)

# Let's build a paper model of ALMA 12m antenna



3-(1)

3-(5)

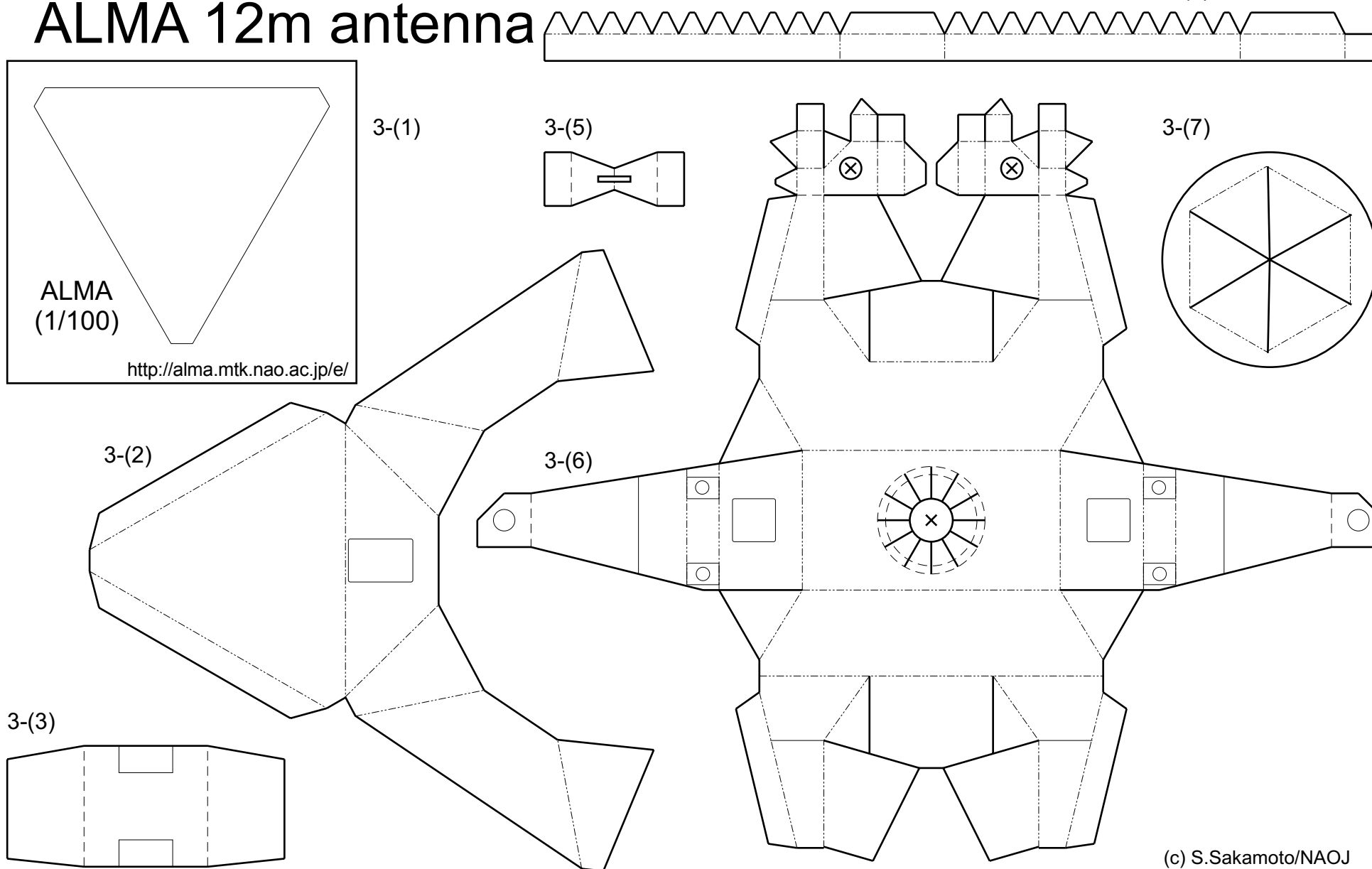
3-(4)

3-(7)

3-(2)

3-(6)

3-(3)



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