OBSERVATORY

with a garden shed

GARDEN SHEDS ARROW MD1012, VD1012 and VR1012 (perhaps AR1012 and VM1012)

Based on an original idea by Alain Döring (www.astrolynx.com)

WARNING! Before you begin, I disclaim any responsibility for the construction of such equipment and the use that could be done by any natural or legal person. Everyone will manufacture its own way and thereby engage in the responsibility of its construction and its use.

You should know the wind should not and can not be underestimated, it can have serious power and farewell Observatory and worse. The opening of such an observatory can be done in calm or choppy. It is inconceivable to think, not even a second, to observe on windy days. Feel free to use an anemometer and set yourself a limit (low) for waive observation. Where the wind would begin to mount when you observe, do not ask you questions, close the observatory at earliest, for your security, the people nearby and of course survival your observatory and many hours spent to build it. I think I have stressed this point enough. Finally, never forget that you are legally responsible for your actions and to take necessary precautions, you will be designate as such.

The observation in astronomy calls for deployment of equipment, setup, preparation of materials with the connections of various electrical cords or computer, etc. ... Substantial time which sometimes repels most passionate of us and we return back when the weather is too cold. So I decided to build my observatory ... The criteria were: cost, size, ease of assembly, easy handling and especially a rapid implementation.

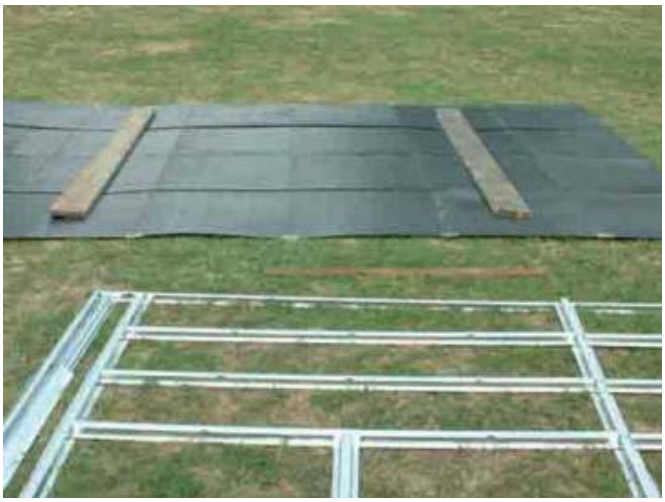
The price of a dome is prohibitive and not very easy to built, I decided to use a garden shed with a sunroof by failover. I had no opportunity to make an opening roof by sliding because I planned construction of a workshop in the back and this was not appropriate. I would have preferred a wooden shed for the beauty of the site for its warm feeling. But I quickly made a choice on a model of Arrow. Indeed, the wooden model had a major drawback, the weight of the roof panels of close to 80 kg making it difficult handling of a tilting roof. The model used is the American type GD 1012, made by ARROW brand and size 3.6 m X 3.10 m. It has the advantage of easy mounting in one day. Just follow the instructions. Moreover, I already had a shelter of this same brand and model a bit less high but whatever. In hindsight, I could slide the roof in the side, but I did not thinking at the time, so no regrets. I warn fans interested in this project because the cost of the springs is not negligible. Take the time to reflect on its implementation to avoid having to later regret. I identified the street lights to the west and north, I had to choose a place not too harmful and allowing access to the east horizon until Northeast South Southwest.

The site (view east) on which the observatory will be located.

WARNING! Do not confuse ... The garden shed visible on the photo above is not the observatory. It is mounted since over 15 years now and requires a simple coat of paint. Proof of life for those who are not convinced. Now here is in pictures, the main stages of construction of the Observatory ...

The work just started, already the guardian of the field has laid the first stone to the edifice. In this case, her hedgehog. But it is obviously for play ...

One of the two visible holes in the previous picture which will each receive a galvanized steel pole 125mm in diameter. The first will receive my mount tracking for taking photo and the other my EQ5 and perhaps an EQ6... It is not prohibited to dream.



You can seen in the foreground, the floor frame and the plastic sheets to isolate the building to the ground.

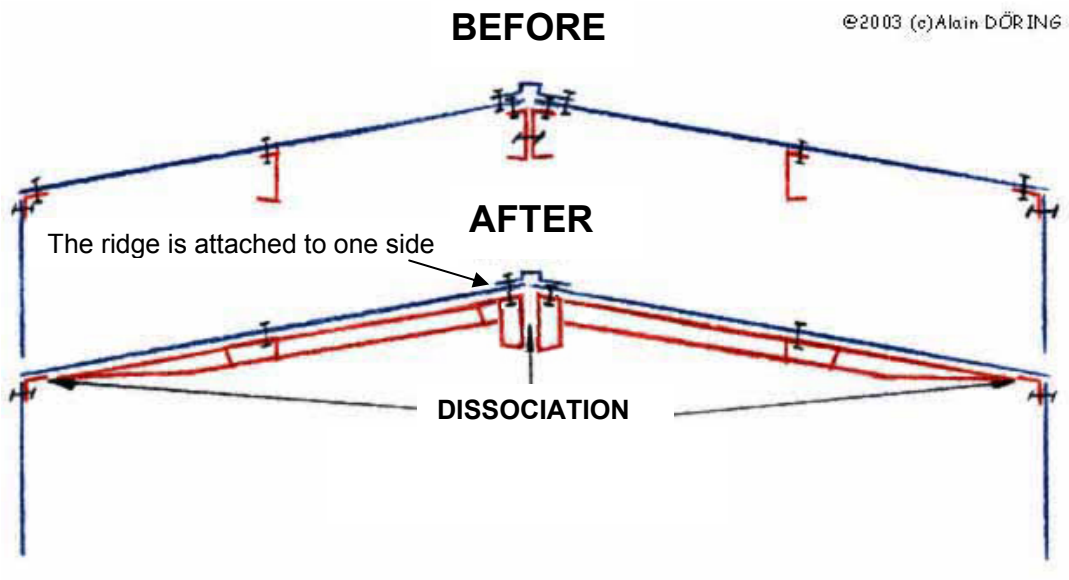
I used rafters to mark the perimeter of the area of the site and raise the shelter. See the rafters on this photo, frame reinforced concrete, soil tamped and the gravel.

Rear View. The plastic is placed on the ground followed by a sheet of insulating polymer fabric. Then the floor frame is assembled and bolted into the concrete with dowels. The polystyrene plates are cut and placed in the cells and then the wood floor is cut according to the manufacturer's specifications. We must think about making the cuts crossing of pole also accurately as possible (for me, the diameter of poles + 2 inches). We can if we have finished, filling this space with foam rubber (gasket car door).

Front view, the four walls, the floor is installed. With using a cordless drill , it is easy to assemble. The rigidity of the construction is remarkable. I also planned to double walls with polystyrene and plywood. This will be next spring when the weather permits. But first, we must think about the final arrangement, and the passage of electric cables for supplying the telescope, lighting, computers and anything that may be necessary to spend the evenings.

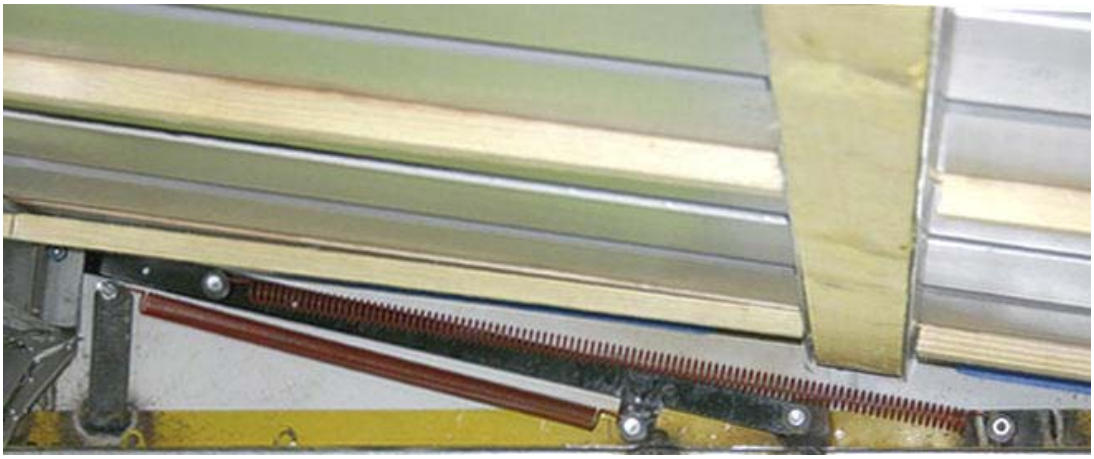
South view. The garden shed is assembled. The roof was mounted to protect the floor from the weather. It will be disassembled to be modified for quick opening

There is no doubt the guardian of the field is clearly identified. It apparently took possession of the future observatory.



Modification of the roof structure.

The roof will be modified to get 2 rigid panels that allow for rapid opening on the sky. In the upper part of the diagram above, we see the installation recommended by the manufacturer of the shelter, roof beams are mounted for to be fixed on the small side. And below, the modification that I propose for transform the shelter into an observatory. First, the roof beams in the middle of panel will be rotated 90 degrees. For this, it will be necessary to drill a series of holes on the large side of roof beams with the aid of another roof beam for the cons-drilling. The montage will be different and obviously there is provided a quick but effective locking of the roof on the shelter (lever locks for example). WARNING! The wind is a formidable enemy and we will be vigilant in the solution, the method and especially the closures. A single lever forgotten and is the disaster ... At the end of this document, I give you the schema that will serve the establishment of a mechanism for maneuver of the roof panels for operate without difficulty.



The failover mechanism of the roof

You note on the picture the presence of wooden boards that serve to stiffen the panels for easier handling. Despite the added weight of the wood, the compensating springs can easily maneuver the panels. I invite you to read the complete project before you begin the manufacture of the observatory.

The failover mechanism has been revised four times before finding a compromise. Then, it was necessary to reflect on a mooring system of roof panels. And the last problem, not least, the condensation under the roof which should be minimized. But we'll talk about this at the end of the project.

To begin the failover mechanism. It must be able to maneuver the panels with ease both at the opening and at the closing. It is the latter who given me the most concern. The weight in the down position (open roof) was greater than 25 kg. I had to find a solution to lighten the load. The springs have a limit of maximum extension, I had to play with mounting positions that determined the lever arms. I Did not want to get into a theoretical calculation, I planned a series of holes and attachment points of the springs for playing with settings. .. Do not forget that the configuration of the panels is not yet finished. Adding battens, boards of reinforcement in the beams of sheet metal, fixing a closing, the installing a vapor barrier panels, ventilation under the roof are all factors that increase the weight of the panel. It will be necessary to adjust the springs according to the final configuration. I finally found an acceptable solution. Yes, but I quickly realized another problem. The roof panels were not too rigid, it was necessary to strengthen them. So I modified the panels as follows:

Adding battens into the roof ribs used to fix the following.
Strengthening of roof beams (u profil) with boards.
Mounting of 2 cleats on each side attached to the lath and covered by a U-profil in galvanized sheet.
These brackets to facilitate the sliding of the panel on the upper side walls.

Okay, I obtained very rigid panels. But, the weight had increased at the opening but also in the down position, he was again greater than 25 kg. The weighing was done with a balance weighs person.

After careful thought, I decided to add compensating springs. After a very simple calculation and without fuss, I ordered four springs of most powerful retainer (25mm diameter, 550mm length and 3.2mm wire). The load problem in the low position was resolved. I decided to use four other springs to help lift the panel opening. Here is the final solution which gives me satisfaction.

The springs open and closed position.
Click on the pictures

You may notice that angle of 40mm x 40mm 2mm thick (painted yellow) served as a frame for maintain the mechanism. Everything depends on the position of the springs that were installed after several successive attempts. The exact location will depend on the springs in your possession. Simply follow the principle. I invite you to continue until the last page where you will found all the drawings and plans necessary to complete the mechanism. I have not yet been able to prove it but I do think the maneuver of the observatory is made in under three minutes ... COOL ... no!


Click on the pictures

To stiffen the sides of the observatory, I have dressed the interior walls of thin (20mm) polystyrene panels covered with plywood 5mm. I myself have cutted a door in the bottom of the observatory that will communicate with my future workshop (seen in the first animation). Following an animation showing the dressing of the sides.

Click on the picture

The security of attachment of the panels is provided by a set of homemade mooring cleats. Probably a remnant of youth. No kidding, the process is simple, efficient, for keeping a boat in a boat dock, this is not an easy task.


Click on the pictures

I have used flat iron 25 X 4 in which are cut the lengths of 12mm by 120mm long. I hope to convert you for using these bindings. Of course, any other method can be used to the extent it has all the necessary security. Here is how to make these parts:

Click on the picture

To facilitate the handling of the panels, it will be useful to add handles. They were made with aluminum tube (TV masts) and iron flat 25mmX4mm trained on a vise. See following pictures:



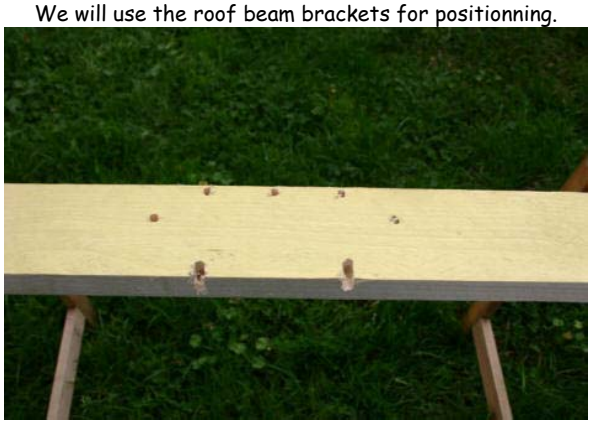
Click on the pictures

Finally some pictures commented to show some details.

Placing beams on the middle of panels.

We will use the roof beam brackets for positionning.

View of the central assemblage of the beams.



After marking the screws of the beam, drill the locations for mount the wood board.

Overview after reversal of the roof beams in the mid-panels.

Strengthening beams and panel.

Setting up the wood batten for making slide panel.

Cover the batten with a U galvanized steel.

Preparation of gables for setting up of the tilting mechanism.

Other views : See next pictures for understanding operation.

Rear view : First mount the internal springs and the levers.

Front panel : the levers and the internal springs mounted.

We start by opening one side. You need to be 2 for manoeuver.

Then you can hang the external springs on both sides of panel.

At this point, the panel is functional and can be operated alone. You have to perform the same operation on the other roof panel. To do this, let the first panel in the open position. Remember, open first the panel on which the ridge cap is attached. It will also closed in last to ensure proper placement of the ridge cap. For safety, I fixed a bunch of flexible plastic with 15cm width on the ridge cap along the side not attached to the panel. This addition secures the tightness of the roof.

Viewed on fixation of the roof with a mooring cleat.

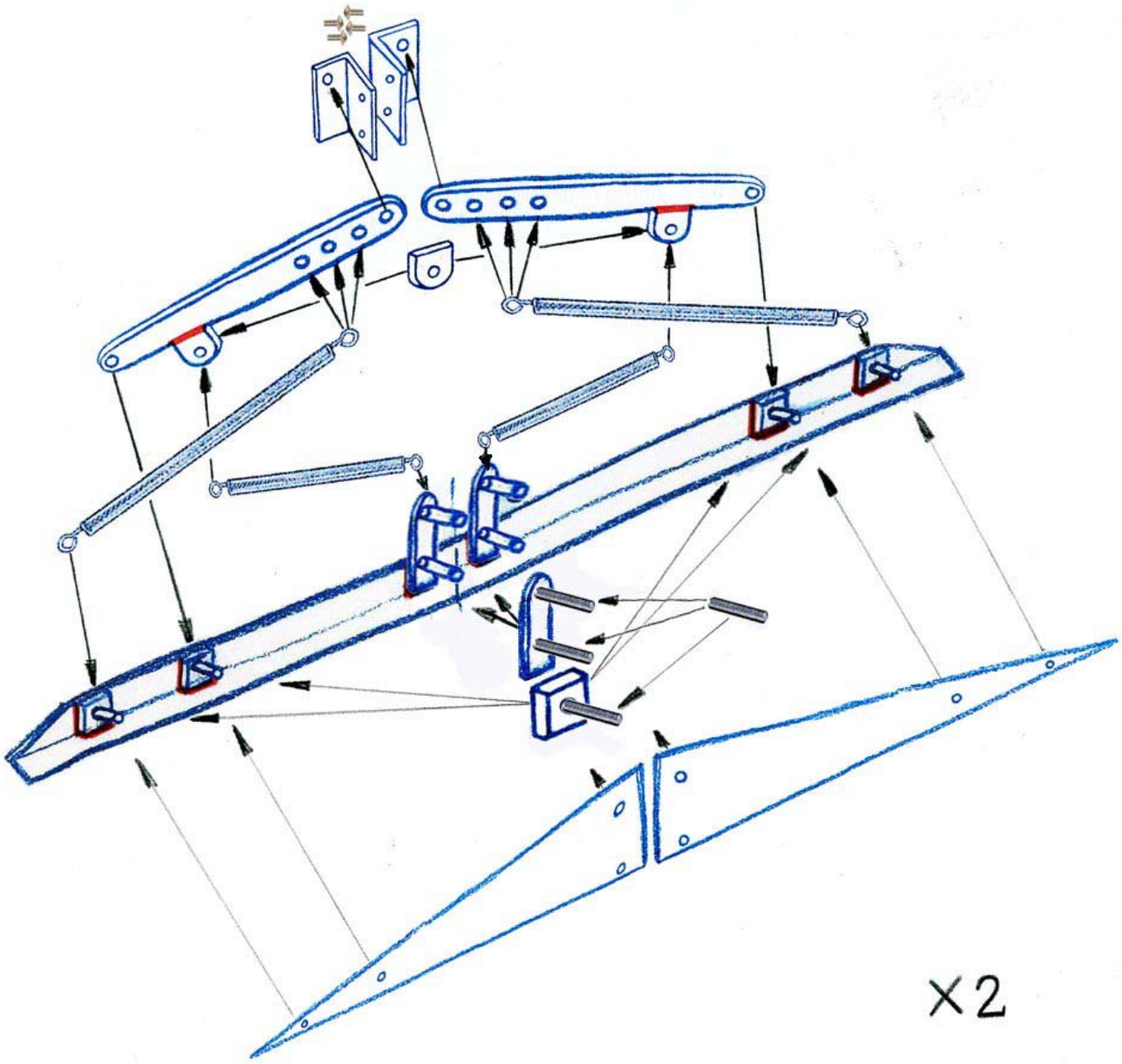
View on the nylon rope attached to an electrical terminal

Each nylon rope attached to a eyelet will be tested in tension to ensure the strength of fixation. To finish, the outside of observatory will be painted white and if necessary matt black inside.

MECHANISM OF THE OBSERVATORY

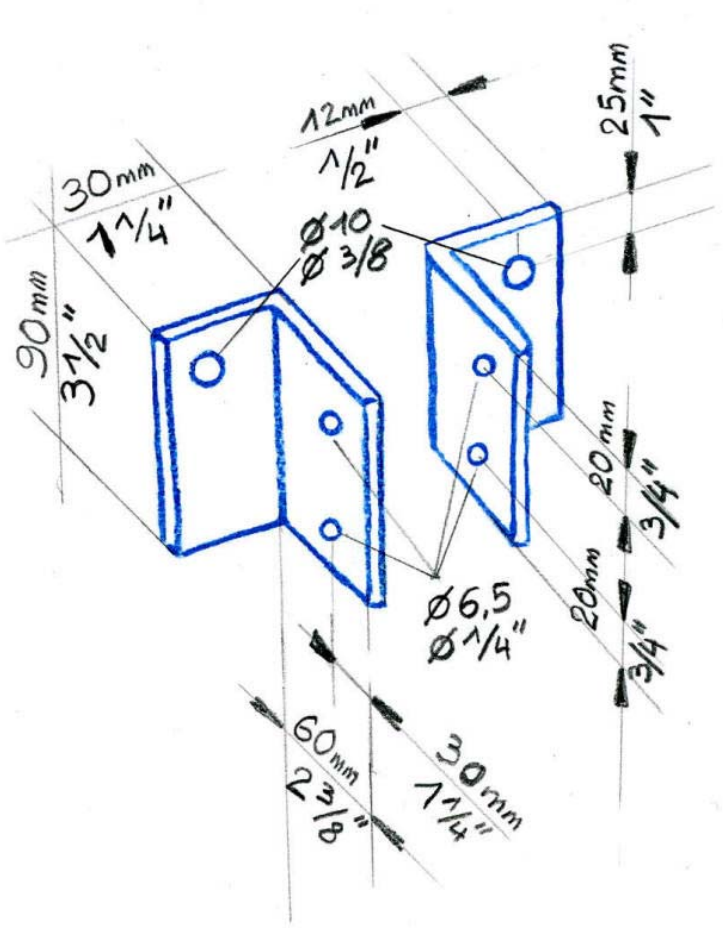
Click on each parts

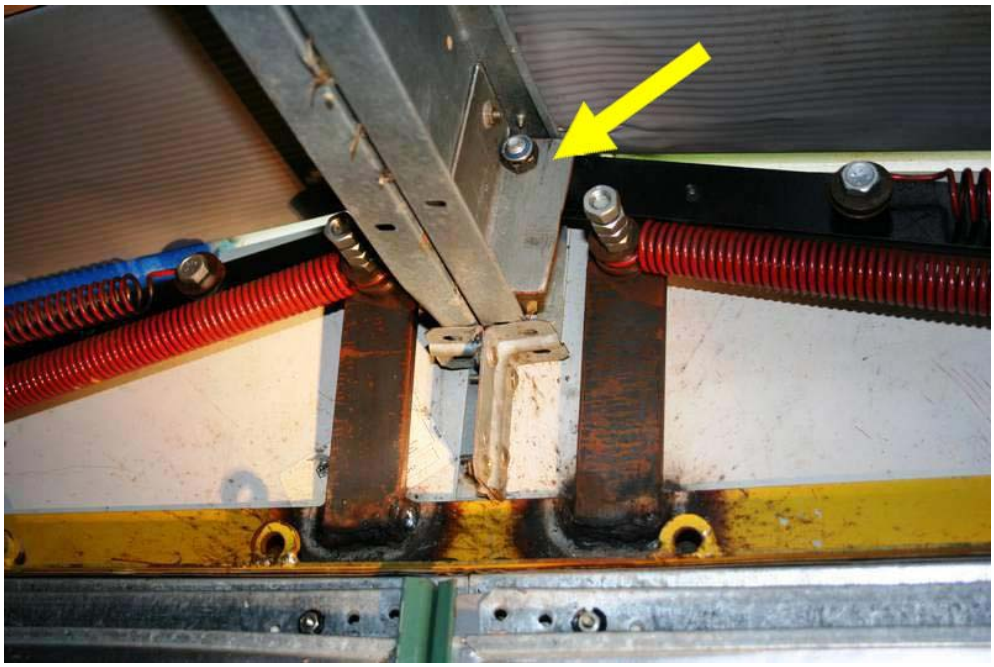
The coasts, except mistake on my part, corresponding to models ARROW SHED MD 1012, VD 1012 and VR 1012.



Angle liaison

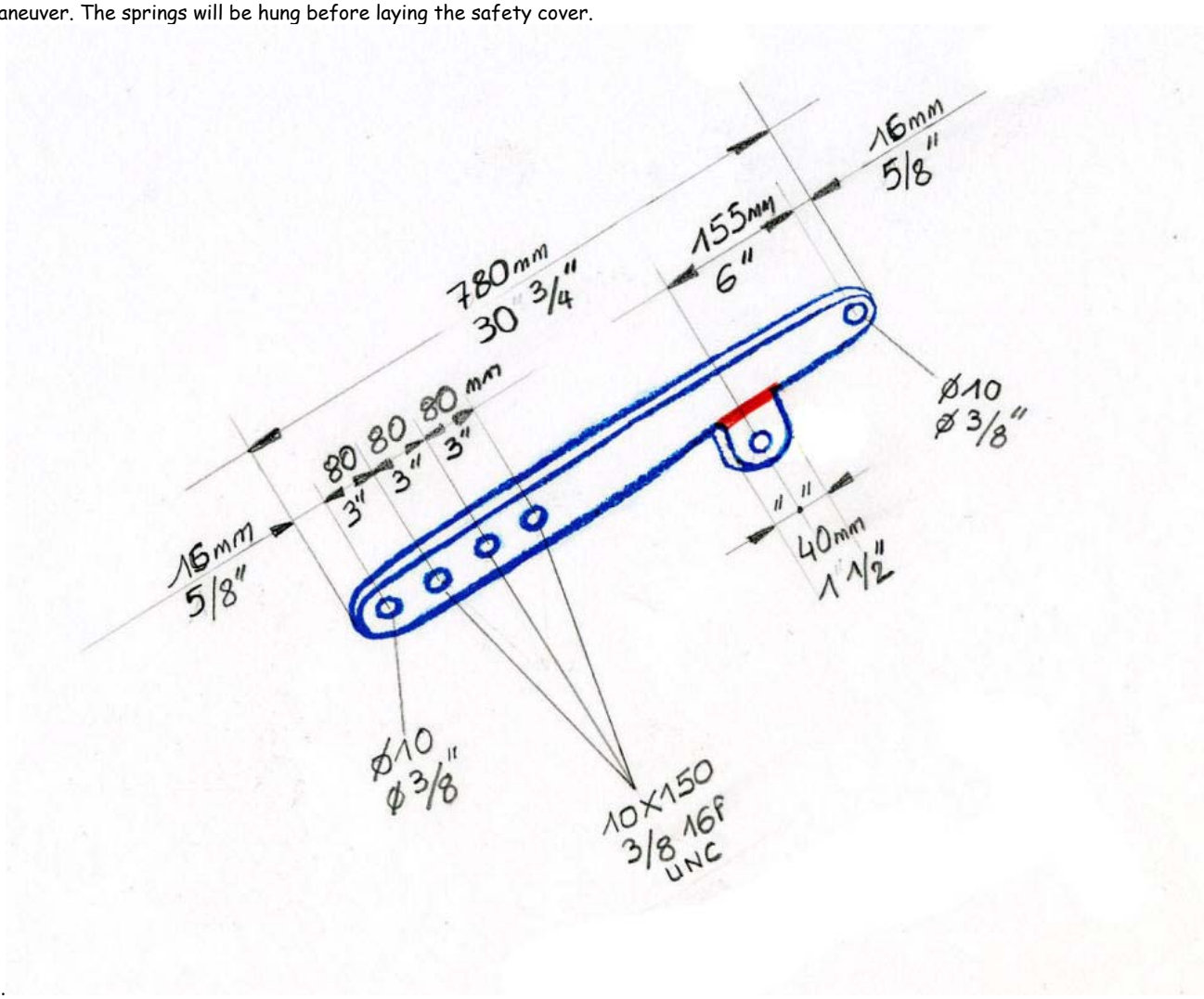
2 angles liaison will be attached to each side beams roof using 2 truss screws (see photo below). You can move the holes on each bracket to avoid to catch the screw heads. In this case, the coast 30mm of the holes of 6.5 (1/4") is 25mm (1") on the first angle and 35mm (1 3/8") on the second. The holes will be drilled on the roof beam after mounting the lever on the main support for alignment. This should allow a natural movement. You can also adopt this solution for drilling the hole of 10 (3/8") in the right place.





Failing over Lever

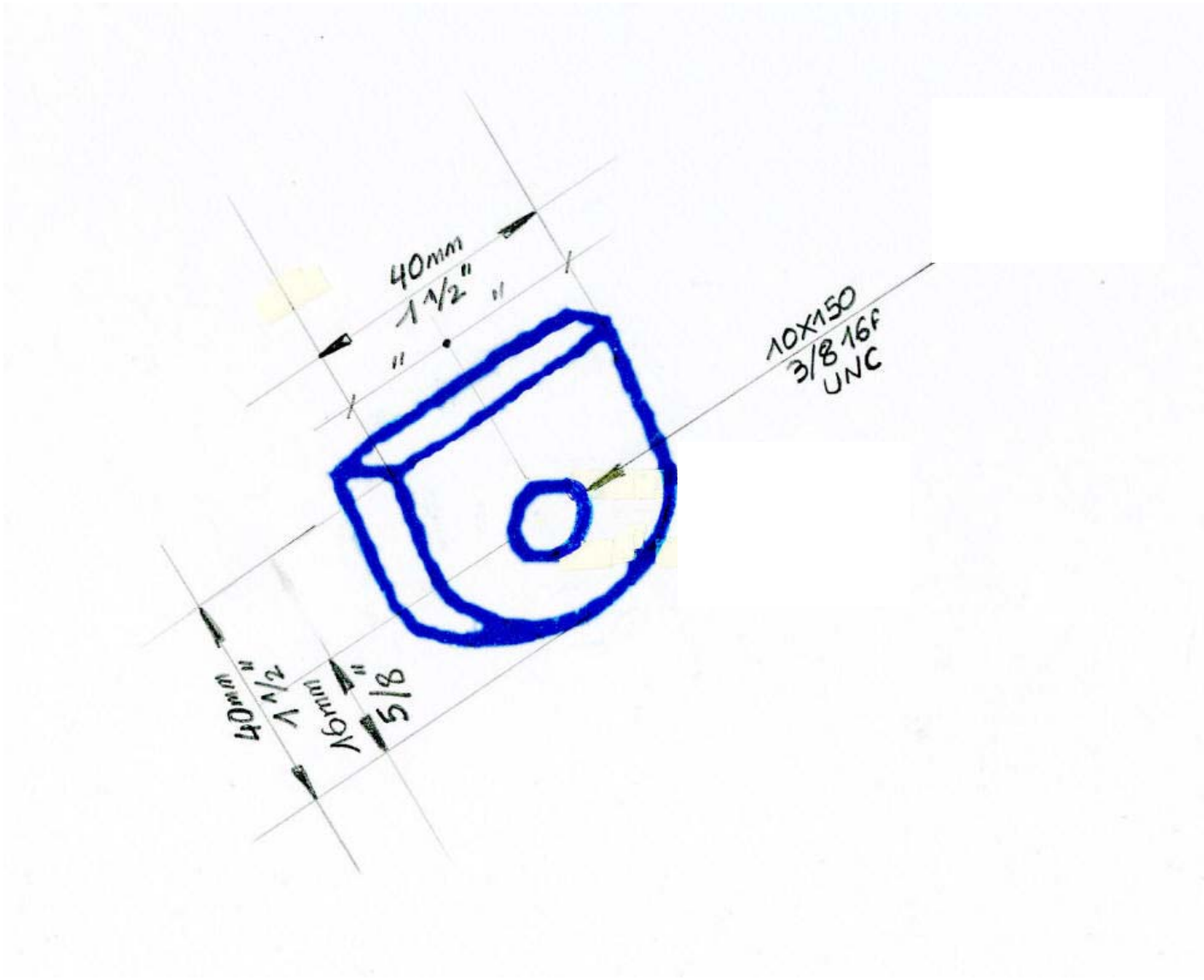
4 levers for provide the tilting of the panels. These are the main parts of the opening mechanism. They will be manufactured from flat steel 40 x 8 mm (1 1/2"X 5/16"). One side will be attached to the main support and will be settled using steel and nylon washers held by a brake nut to be tightened, to obtain a zero backlash (see photo below). A little grease will be deposited during assembly to facilitate the maneuver. The springs will be hung before laying the safety cover.



guard.

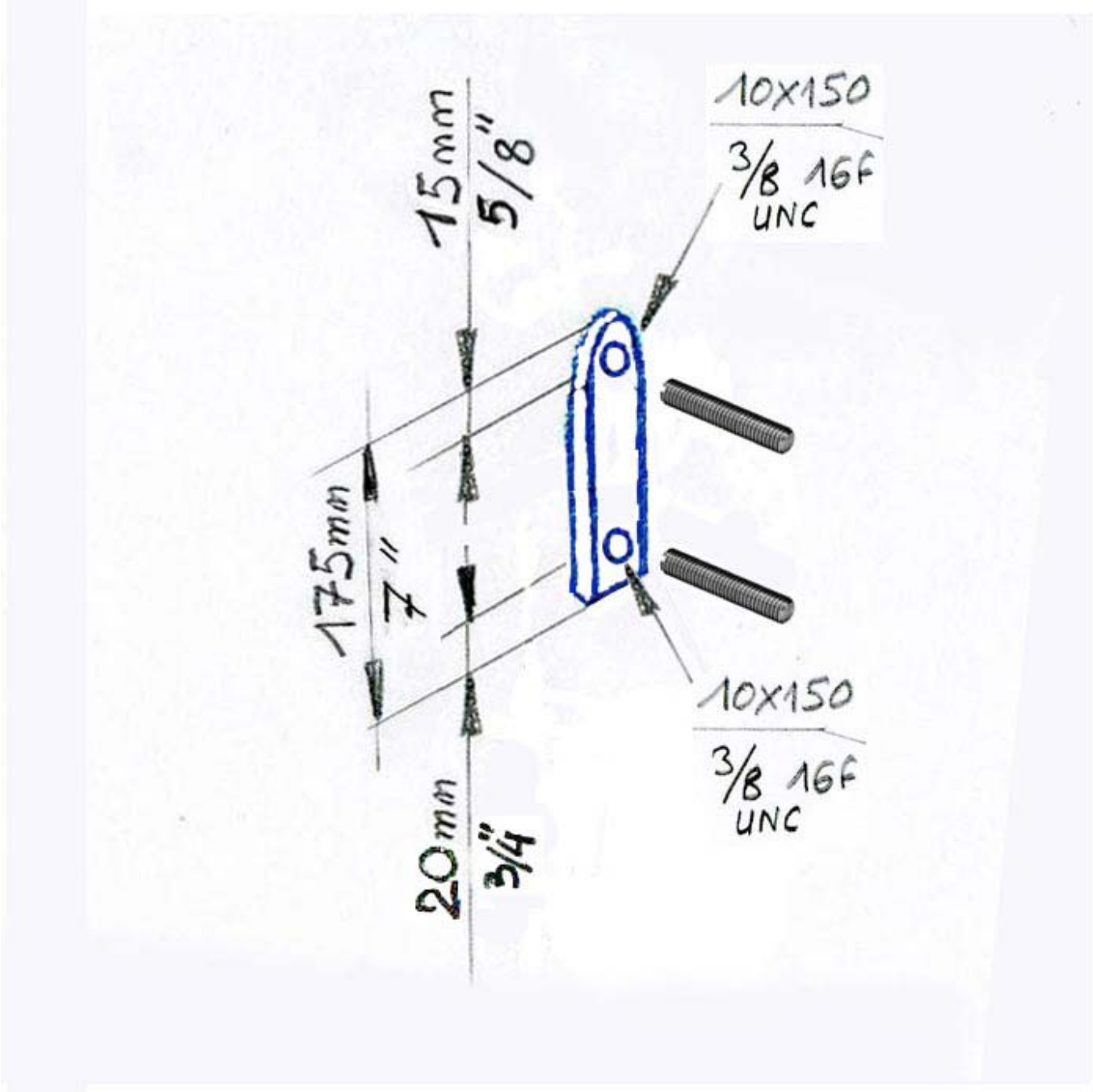
Offset Paw

The paws will be welded to the 4 levers for the offset required to move the springs. They will be manufactured in the flat steel 40x8 mm (1 1/2"X5/16"). The spring will be fixed by a screw 10 IF (3/8 UNC) and positioned using large washers. The screw must not block the spring. Let the minimum game with a little grease and block with a nut and a locknut.



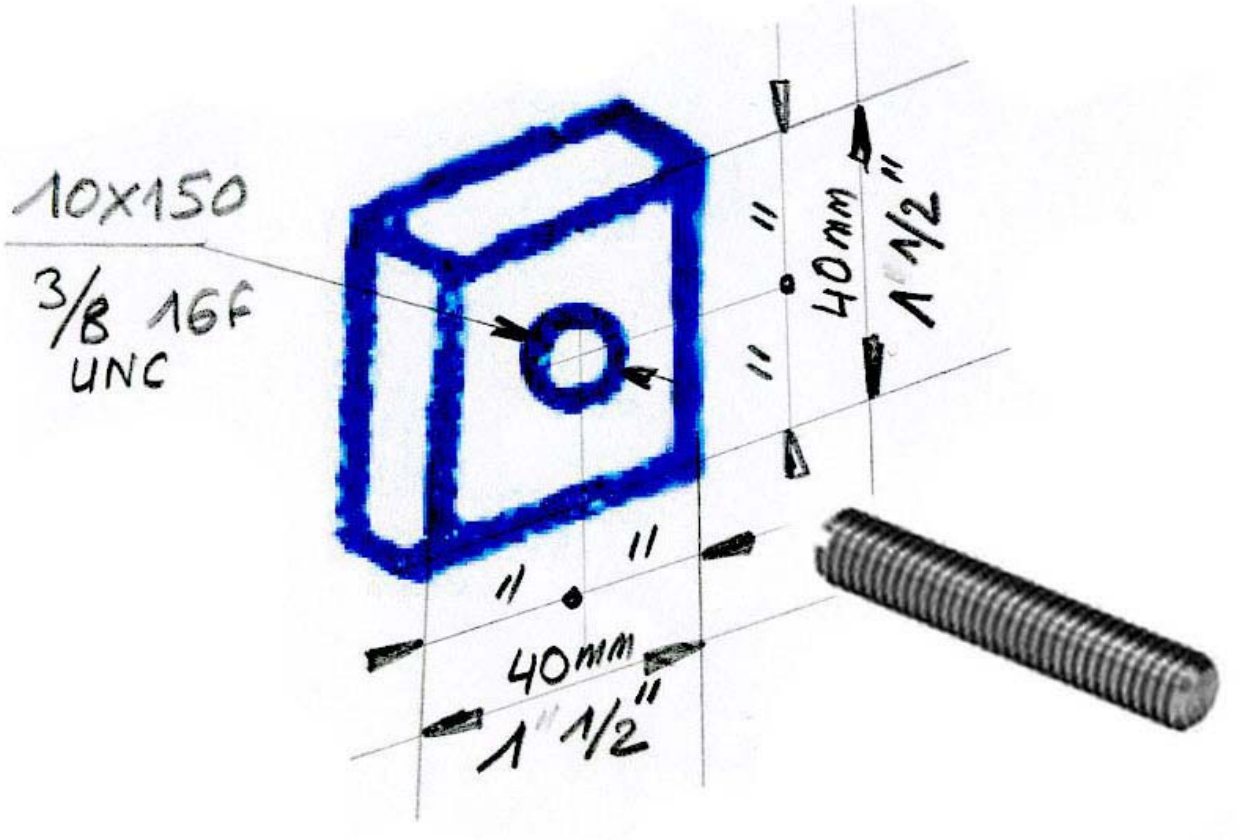
Fixing tabs springs

The fixing tabs will be welded to the main support for maintain and align the springs. They will be manufactured in the flat steel 40 x 8 mm (1 1 / 2 "X 5 / 16"). A threaded rod 10 IF X 75mm (3/8 UNC X 3") will be screwed and welded on each reinforcement and then correctly buffed before the soldering on the main support.



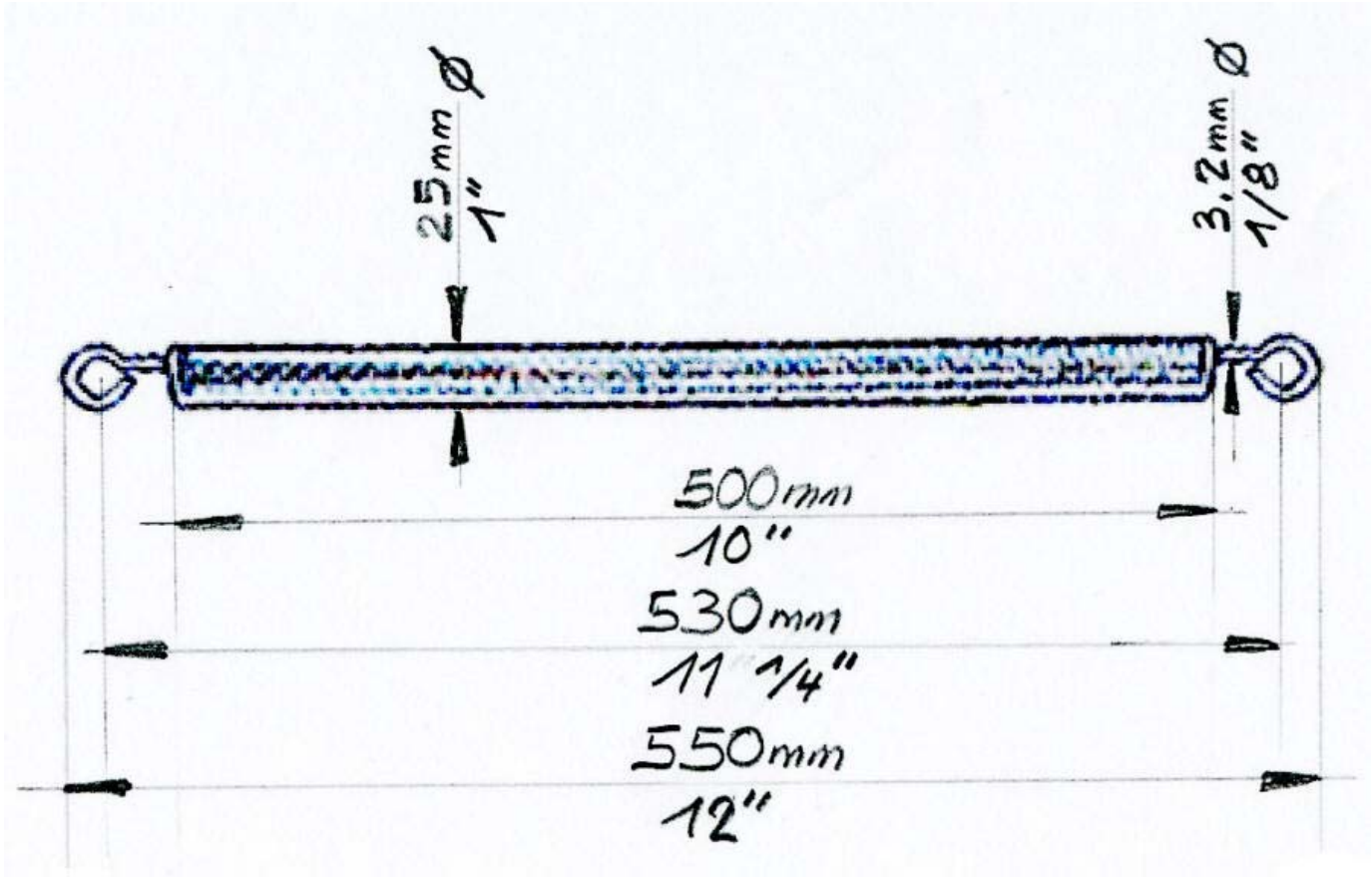
Support spacer

The spacers will be welded to the support mechanism to ensure rigidity and alignment of the failing over levers and springs. They will be manufactured from flat steel 40 x 8 mm (1" 1/2 X 5/16"). A threaded rod 10 IF X 75mm (3/8 UNC X 3") will be screwed and welded on each spacer and then correctly buffed before the soldering on the main support.



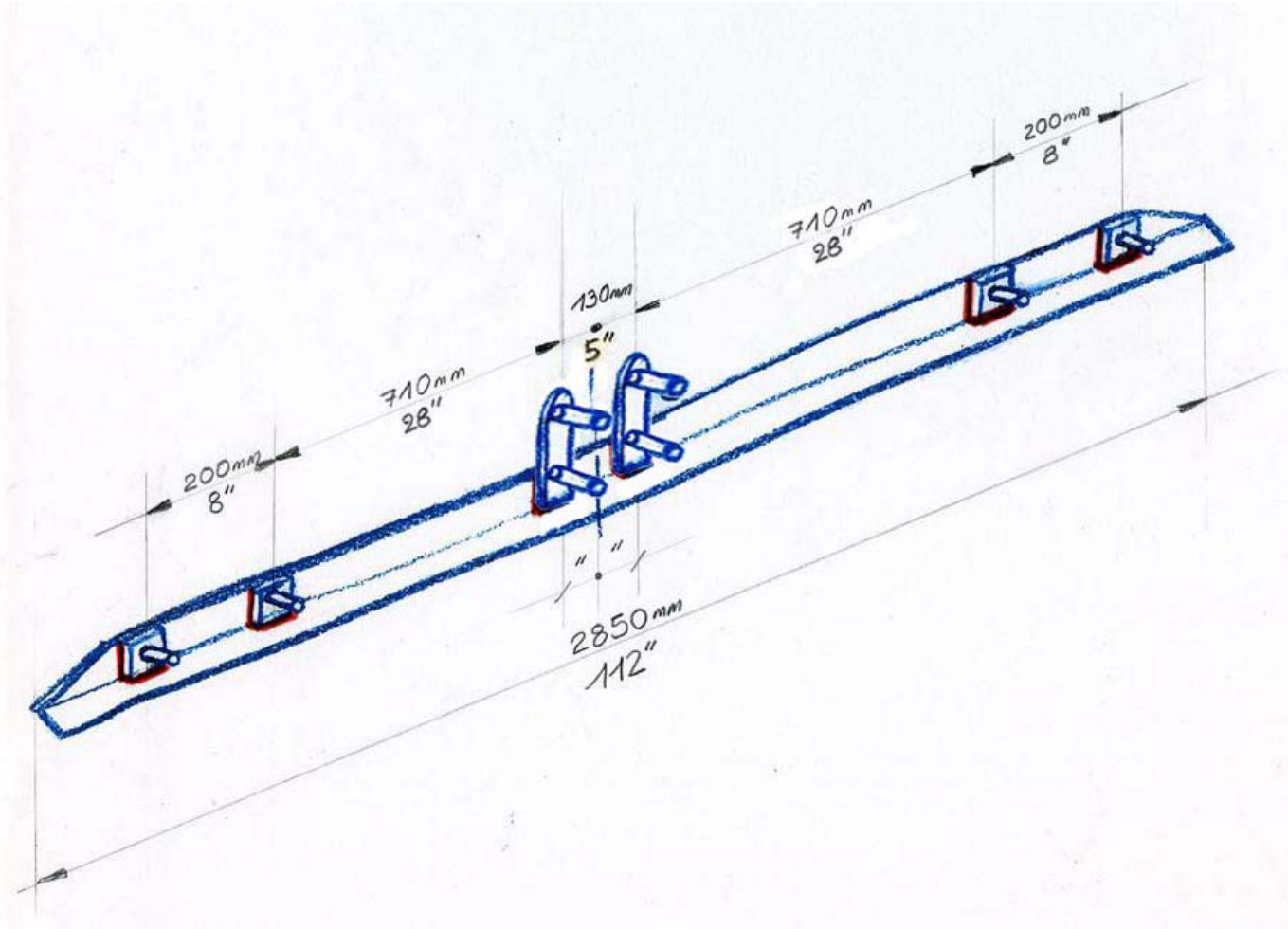
Springs

8 springs will be manufactured by a specialist of the spring. The open length of the spring may reach 850 to 900mm (34 to 36"). We must give good information to the manufacturer of the spring and do not hesitate to introduce competition in calling for a quote. WARNING! The price of the 8 springs is very expensive. YOU SHOULD KNOW: There are the classic spring wire or stainless, this is not the same price. See for yourself according to your means.



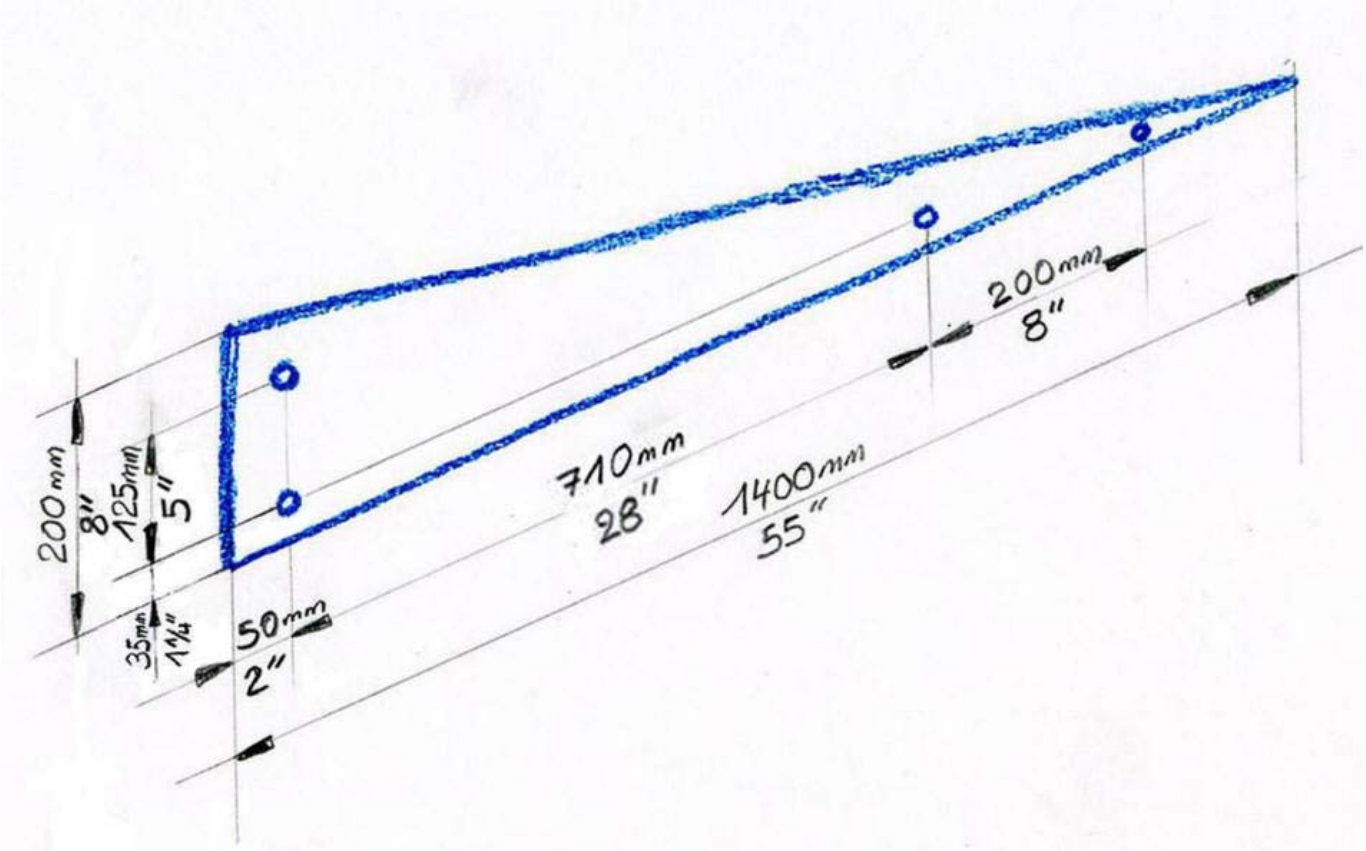
Main support

The support is made in an angle of 40X40mm (1" 1/2 X 1" 1/2) plate thickness of 2mm (1/12"). The angles in standard metal frame a little thicker can also be used. All parts are properly soldered. View the details of each parts.



Safety cover

Made in steel sheet of 1,5 mm (1 / 16 ") thick, 4 safety covers are put in place to counter the possibility of a broken spring. They will be fixed on the threaded rods exceeding from the mechanism with nuts. This should be sufficient to ensure the safety mechanism. If you have any comments please let me know.



CONCLUSION

I hope I have given you the desire to build this observatory. It is not expensive compared to traditional domes. If you have the opportunity to make a sliding roof, so do not do this. This observatory is very interesting for areas where there is no available space to the east, north or west for place the poles for holding the rails for a sliding roof. You will be mindful that the South must always be free.

Reminder: All construction will be done by carefully following the installation manual ARROW. This is for your safety. This construction is a real pleasure. The modification is relatively simple. If there were enough requests, I am sure that Arrow might consider amending especially for amateur astronomers.

Warning! I can not enough stress that the wind can be fatal to your observatory. In strong winds, we do not mastering the opening of an observatory (cupola, sliding roof or sunroof).

I wish you good construction, good observation and good skies.

You can help me for a best translation.

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