

INSTALLING A MAST LOWERING DEVICE ON A LEISURE 27

In the reference library a description is given for an A-frame for a Leisure 20.

Also Colin Shead describes a way to lower the mast on the smaller L17,L20,L22 and L23 without an A-frame or similar device.

I myself also have built an A-frame for my first Leisure , a Leisure23. From practice knowing the considerable weight of this mast (and probably also of the L22 mast) and the forces involved I think trying to lower a mast without the help of an A-frame or pole and block and tackle is a very risky job even with two people.

Any mistake can easily lead to a disaster or possibly injury!

In the Netherlands a mast lowering device is very common equipment on sailing yachts, also on large ones. Especially boats on the inland waters have (and need) one. Also elsewhere in Europe for instance in Germany such a device is very useful.

In the past when sailing freighters on the inland waters of Holland were common (up to the 1930's) a mast lowering device became necessary when fixed bridges appeared more and more because increased and motorized traffic coming up at the end of the 19th and the beginning of the 20th century. Therefore an A-frame was installed at almost every sailing freighter to make bridge passing possible also in case of fixed bridges. This is why most old sailing barges (now used as yachts or for charter) in Holland still have A-frames. An example can be seen here.



MAST LOWERED



MAST UPRIGHT

So Dutch skippers are quite familiar with mast lowering devices.

Here you can also see a lowered mast on a larger sailing yacht passing a fixed bridge somewhere in Holland.



In Holland and especially Germany there are several companies that can design and supply mast lowering device (e.g. www.edelstahl-haese.de , www.haase-edelstahl.de) Some of them are on boat shows. However such a device will be quite costly!

On my last year bought Leisure 27 a mast lowering device was installed which included a heavy pole , a special attaching point on the mast and devices to attach the lower shrouds and so realize swivel points in line with the mast pivot point.

Principally this functioned quite satisfactory. However the devices to make pivoting points in line with the mast pivot were in fact **not** installed in line, probably to compensate for the too long shrouds. However the lower shrouds still slackened when the mast was lowered. Also the pole had to be installed and disassembled again each time the mast had to be lowered or erected.

Having already built an A-frame for my Leisure23 I decided to also make one for my Leisure 27.

To avoid the risk of a too weak design I started with a computer modeling for such a device to calculate the forces involved.

I started to develop a model in excel to calculate the forces involved depending on the several parameters such as mast weight , A-frame length , number of blocks used etc.

This first model however became quite extended and may be a bit exaggerated for the average Leisure owner.

At the internet however I found a German site www.vesab.de (look under “ Segelyacht Wibo 930” and “ Bau Jüttvorrichtung”) where such a model was already described for well known Dutch built steel 9.3 meter yacht. However I found this model a bit simplified but I nevertheless could use it as a starting point.

So I also made a simplified version, also in excel, which can be used to calculate the forces involved in mast lowering devices for the Leisure range.

The modeling programs may be added (??) to the reference library for common use or ordered through Email.

Using the model I calculated the forces for an A-frame lowering device on my L27.

It turned out that the pulling force on the A-frame without block and tackle would be at least 240 KG without the friction losses involved (about 20%) so even a block and tackle with 6 sheaves hoisting would be almost impossible by one person who would have to pull

$240 * 1.2/5 = 56.7 \text{KG!}$. However because the L27 has 2speed genoa winches those could be used which eventually proved to be feasible. If available an anchor windlass would be ideal.

Because of the length of an optimal A-frame being about 3 meters (distance mast foot to stem head) the height of the boat with a lowered mast still would be about 4 meters which is too much for a lot of fixed bridges in Holland an Germany.

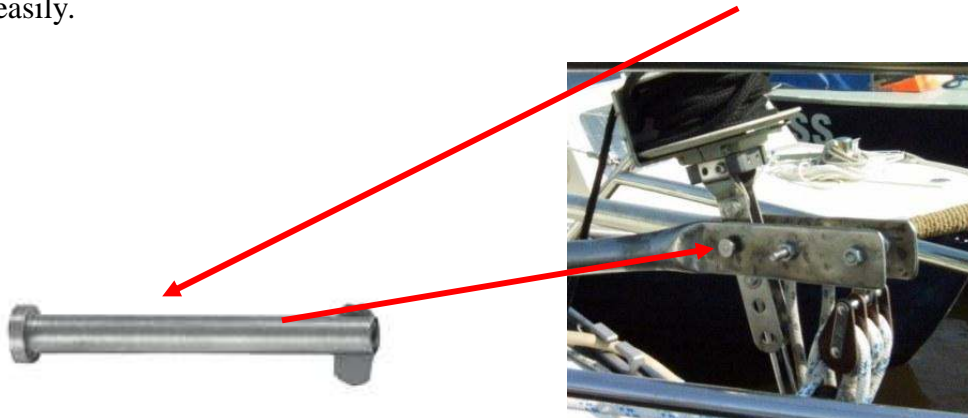
Therefore I made a shorter 2.5 meter A-frame with a pivoting point before the mast as can be seen on the following picture.



That way, standing on deck near the mast foot I will be able to detach the A-frame from the headsail roller/forestay and lower the both to deck level.

So a minimum height is realized of under 2.5 meter which is all right for virtually all fixed bridges.

To facilitate an easy job I used a 60 mm long 10 mm dropnose pin which can be withdrawn easily.



For the A-frame at my L23 originally 20 mm stainless tube was used which turned out to be too weak. Later I changed it to 1" (27mm) tube which has a 2.45 times higher bending stiffness (3d power to diameter!).

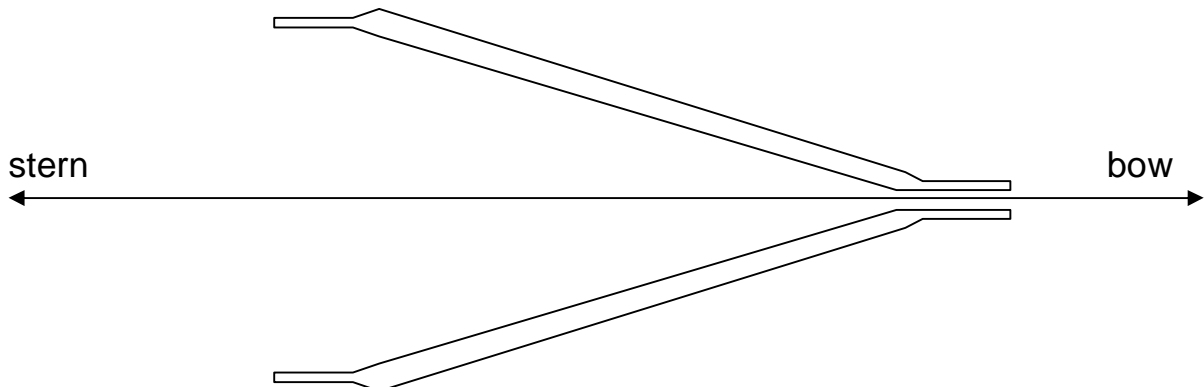
Because the mast weight of a L27 off course is much higher (about 60KG) than a L23 mast (weight about 35-40 KG) I decided to use 40 mm pipe (2 mm wall thickness) which is over 3 times stronger than the on my L23.

The finished A-frame can be seen on the following picture.

At the pictures you can also see that the A frame is made of two pipes which are flattened (with a sledgehammer on a big vice I have in my garage.

That way no welding was necessary which also eliminate the risk of fracture because of a bad weld.

After the flattening the flattened ends must be bend in such a way that after installation the ends are in line with the bow-stern line to avoid bending stresses during mast lowering.



At the front end both pipes are bolted together with two 10 mm bolts. One is needed to attach the block and tackle; the other takes care of a rigid connection between the two pipes.

At the next picture you can also see the upper 3 sheave block.



At the other end the A-frame swivels on a U shaped stainless support bolted to the deck with 10 mm bolts.



Those supports could be ordered at a German company, specialized in stainless parts for yachts (www.edelstahl-haese.de) who, by the way, can also supply complete mast lowering devices. The next picture shows the complete finished A-frame.



The final job which had to be done was adapting the lower shrouds attaching points to bring them in line with the mast pivot point.

Because the lower shrouds were too long I could have them shortened but I rather decided another approach.

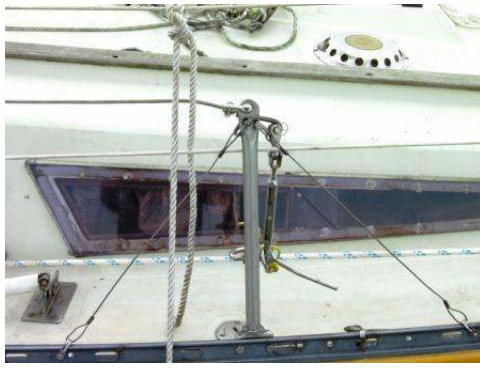
I used standard rope grips as on following picture to clamp 6mm D shackles to the shrouds



That way the shroud length needed for mast lowering can be adapted at any time.

The pipe used has 25mm diameter and is fixed with 4mm cable.

At the next pictures the final construction can be seen.



Of course the lowered mast also has to be supported at the stern. The existing lowering device already had its mast support which stands on the cockpit floor just after the rudder stock. I changed this support and added a roller on top to facilitate an easy moving of the mast after lowering to the bow in case of a longer time with a lowered mast. During doing so the A-frame can be used as a hoist. I also added some pipes to make a firm fix to the stern guardrail. Next picture shows the mast support in position.



Finally the “moment of truth” had come! Lowering the mast was “a piece of cake” with the new device but the real thing was of course erecting it again! Using the low gear of the genoa winch this turned out to be a very feasible job. The forces are comparable to close hauled sheeting in the genoa in a force 4. Finally you can see everything working in the next picture sequence.

