AMEL SUPER MARAMU 2000 ENGINE AND C-DRIVE MOUNT AND VETUS FLEXIBLE COUPLING REPLACEMENT AND RE-ALIGNMENT

5 July 2022

Contents

OVERVIEW

This is not meant as a generic instruction for all Amel Super Maramu 2000. It is valid for SV SeaBean SM2k #344 and is primarily written for my own benefit to make it easier next time. Use this instruction at your own risk. I don't claim this is the only way to do it and it may not even be the right way to do it but it worked for me.

When we first bought the boat in 2020, I hired a local "professional" to replace all four engine mounts. Despite being given the available instructions that I received from Bill Rouse and various other printouts from the Amel user group, the local talent decided to do it his own way. He managed to destroy one of the new engine mounts on installation and I now know he used some rather unorthodox ways. I have now lost confidence in outsourcing boat projects which means more time in the engine bay and less time sailing. The upside is that the job is done better and more accurately.

1. Complexity level

It took me a whole week. My excuse is that I'm not a mechanic and I also took the time to clean up the engine, repaint bits and pieces and fight a couple of rusted bolts. Some skilled people would surely be able to do it in a day if nothing is stuck and nothing needs to be painted or cleaned up.

The engine to C-Drive alignment took a while in its own right, but that was more due to inexperience than actual difficulty.

I used a chain and block to lift the engine which I highly recommend. It makes it very easy to control and the whole operation can be easily be done by one person. Apart from some minor "please hand me a spanner" type of requests, I did the whole thing alone. In that respect it was much easier than I expected.

In my case the hardest part was a rusted engine bolt. This will be different on every boat.

2. Resources

Most, if not everything, in this instruction is already available in the Amel forum. Example of a useful thread: https://amelyachtowners.groups.io/g/main/topic/71054549#50375

There's a lot written about the subject, but until I attempted to do this myself, there was a lot I didn't understand

3. Prerequisites

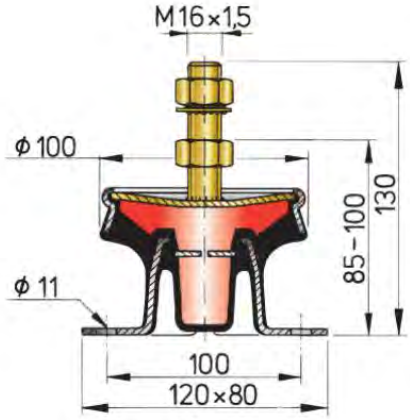
This job was done with the boat in the water. This was actually one of my big worries. I was worried the boat might take on water when I decouple the engine from the C-Drive and removed the C-Drive cross member and partly lifted the engine. It was totally fine to do this operation with the boat in the water. Some members on the forum even suggested it should be done with the boat in the water.

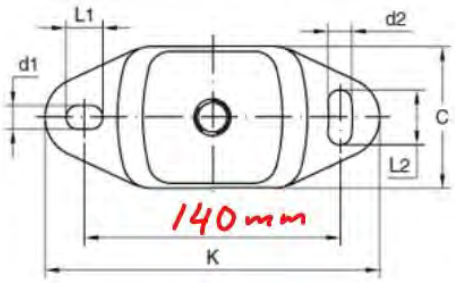
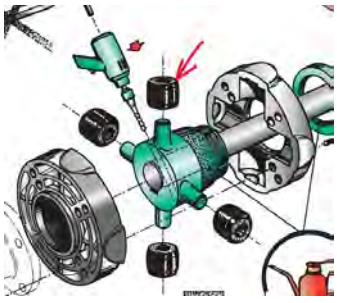
Make sure you have the replacement engine mounts, C-drive mounts and Vetus rubber doughnut replacements before you start. That's particularly important if you live somewhere at the bottom of the world where lead times for Vetus parts can be up to 12 weeks depending on various pandemics and supply chain shortages.

It really helps if you are not too far away from a place(s) to buy the odd tool, nuts and bolts, etc.

4. Spare Parts

This list obviously varies depending on the boat. I have only listed what I needed.

Part	Description	Qty	Comment
Vetus MISTEUN	**Engine Mount**  	4	These are the four engine mounts that hold the metal frame to the engine bay floor. The Vetus K50 engine mounts will also fit but I replaced like for like and different boats have been fitted with different versions. The important part is that the mounting holes/size will fit.

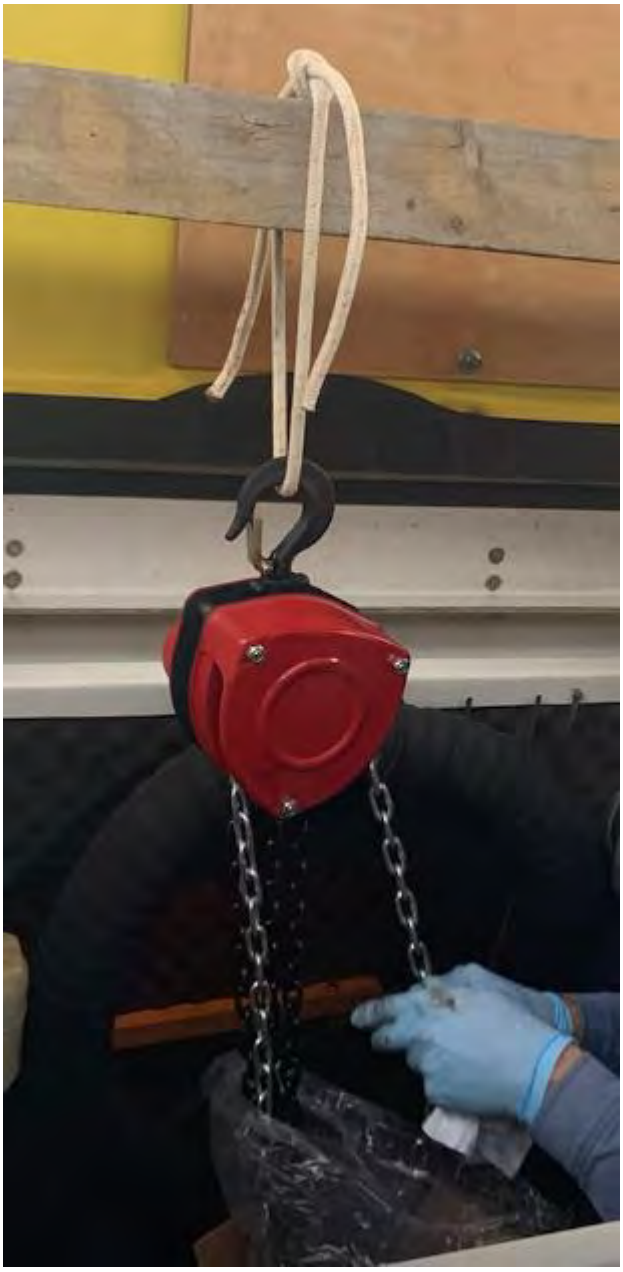
Trelleborg Metalastik Cushyfloat 10-00545	**C-Drive Engine mounts**  	2	I was incorrectly assuming the “engine mounts” for the C-Drive cross member was Vetus K50 and ordered a set of two while in lockdown. Unfortunately this turned out to be the incorrect engine mounts. The K50 will not fit on our boat, instead the C-Drive mounts turned out to be the Cushyfloat 45s by Trelleborg. The mounting holes are further apart at 140mm on the Cushyfloat whereas the holes on the K50s are only 120mm apart. I was lucky to find new Cushyfloat mounts locally. If you only see the images on-line they look the same as the Vetus hence my mistake.
Cushyfloat HA16/16 Height Adjuster		2	The Cushyfloat mounts come without the studs, so if you want to replace those you need to order them separately. My old ones were still in good nick but I still decided to replace them with shiny new ones.
Rubber Donuts, for Vetus Coupling Type:6	 	1	Comes in a set of 4 and are relatively inexpensive. In my case I didn’t have to replace the flexible coupling itself and the old doughnuts where in better shape than I expected. Anyway, I replaced them because it would be silly not to.

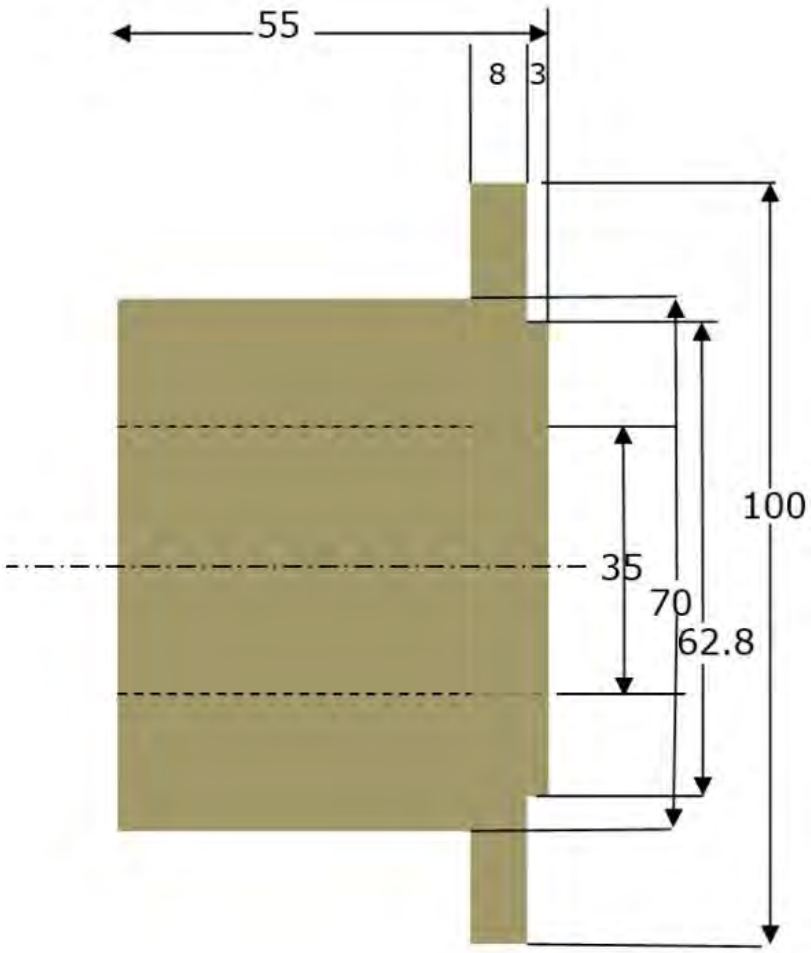
Threaded rod M10 x 1m		1m	Used to remove the flexible coupling and then also to replace the old bolts. Cut to length as needed.
M10 x 100mm Bolt		4	Used as “gear puller” together with the nuts below to remove the flexible coupling
M10 “normal” nuts		8	
M10 flat washer		4	
Various replacement bolts and nyloc nuts	Various sizes, mainly M16 and M10		I replaced almost everything

5. Tools

The more tools the better, these are some of the things I used:

Description	Image	Comment
Wooden lift beam to put across the cockpit seats (about 2m length)		I used 2 x 2 by 4”

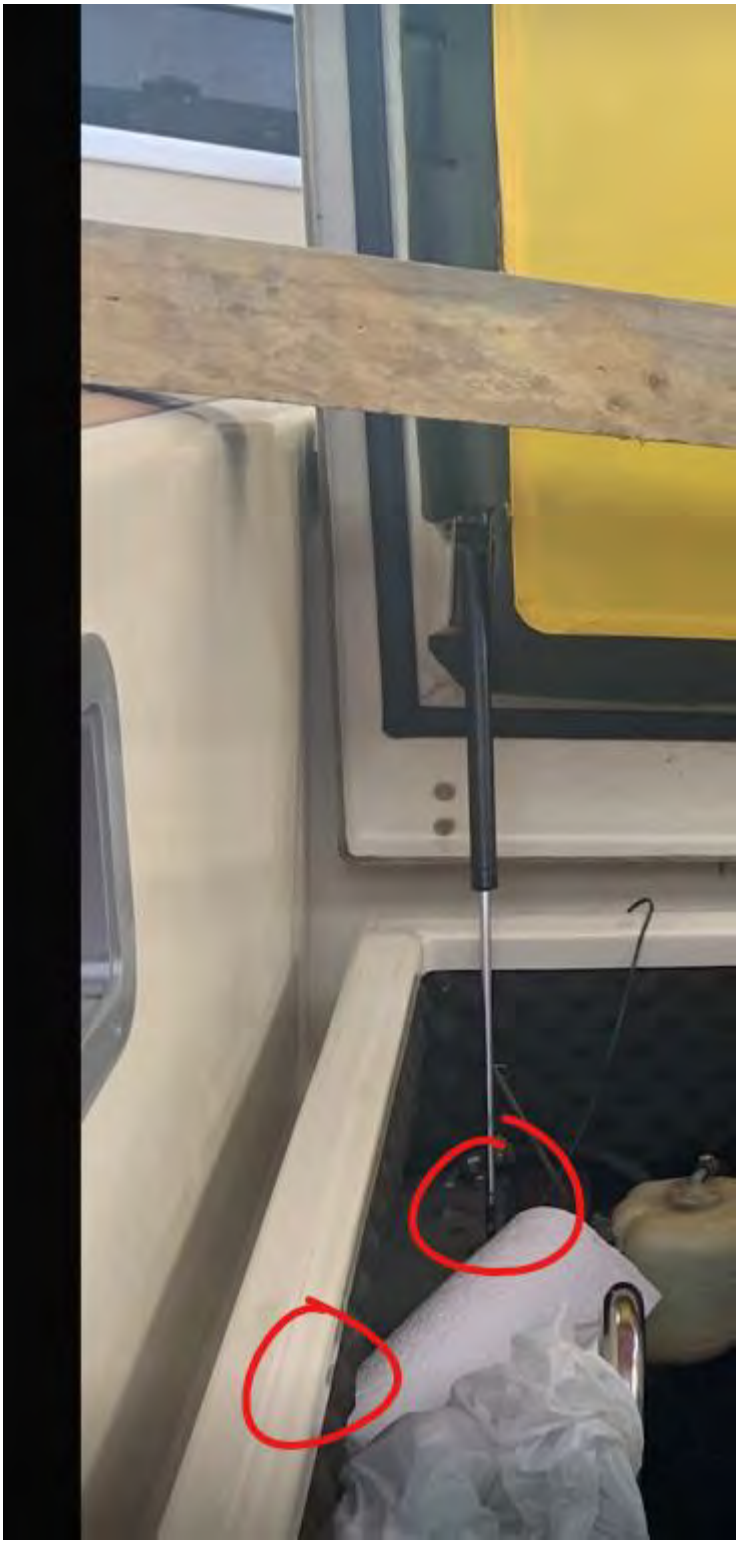
Block & Chain		It is suggested to use the mizzen halyard but boy am I glad I invested in this cheap Chinese Block & Chain gear. It took no effort to lift the motor and was super easy to control. I handled the whole thing alone and could control the lift in within a fraction of a millimeter at a time. Super smooth. I think I paid about NZ$80 brand new. It was the most useful tool of the whole project.

Fixed coupling		I had this made locally based on the measurements to the left. This tool is described in great detail in the Amel forum. I didn't quite understand exactly how this would work as you first align the engine and then move the engine to be able to remove the tool and then push the engine forward again. But once you do it it is easier to understand….
Spanners and socker wrenches	Various sizes. From memory mostly: 7mm & 8mm (for hose clamps) 16mm 17mm 18mm 19mm 22mm 24mm	
Blow torch		I used it to fight a rusted engine bolt
Penetrating oil like WD40, 5-56, Corrosion-X, etc		

PROCEDURE

This is the procedure replace the engine mounts, C-drive mounts and the rubber doughnuts Vetus flexible coupling in the order I executed it. Right or wrong, follow this at your own risk!

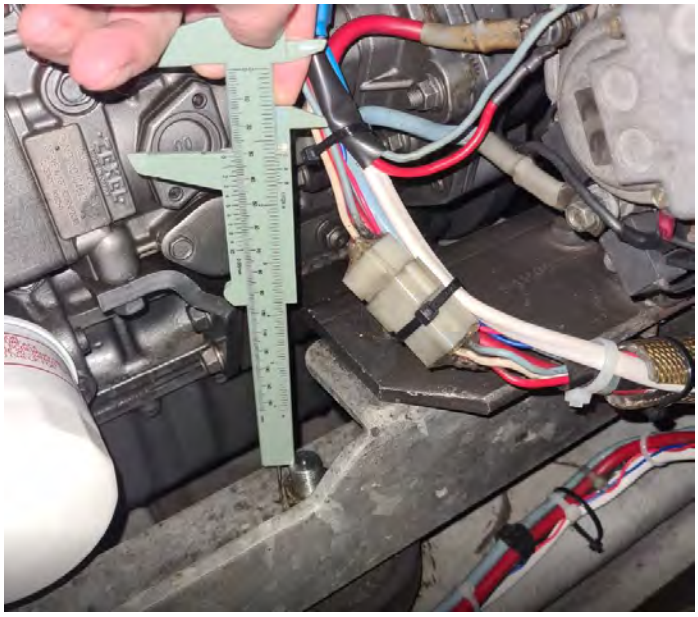
1. Disconnect the hydraulic hatch supports



I left these hanging and tied the hatch to the mizzen. Just make sure these don't get stuck somewhere at the diesel tank or Onan cooling tank if you want to close the hatch again

2. Measure old engine mounts and take as many photos that you can muster…and then some more

I wrote down the measurements and took heaps and heaps of photos and I was still missing a few when it was time to reassemble…..

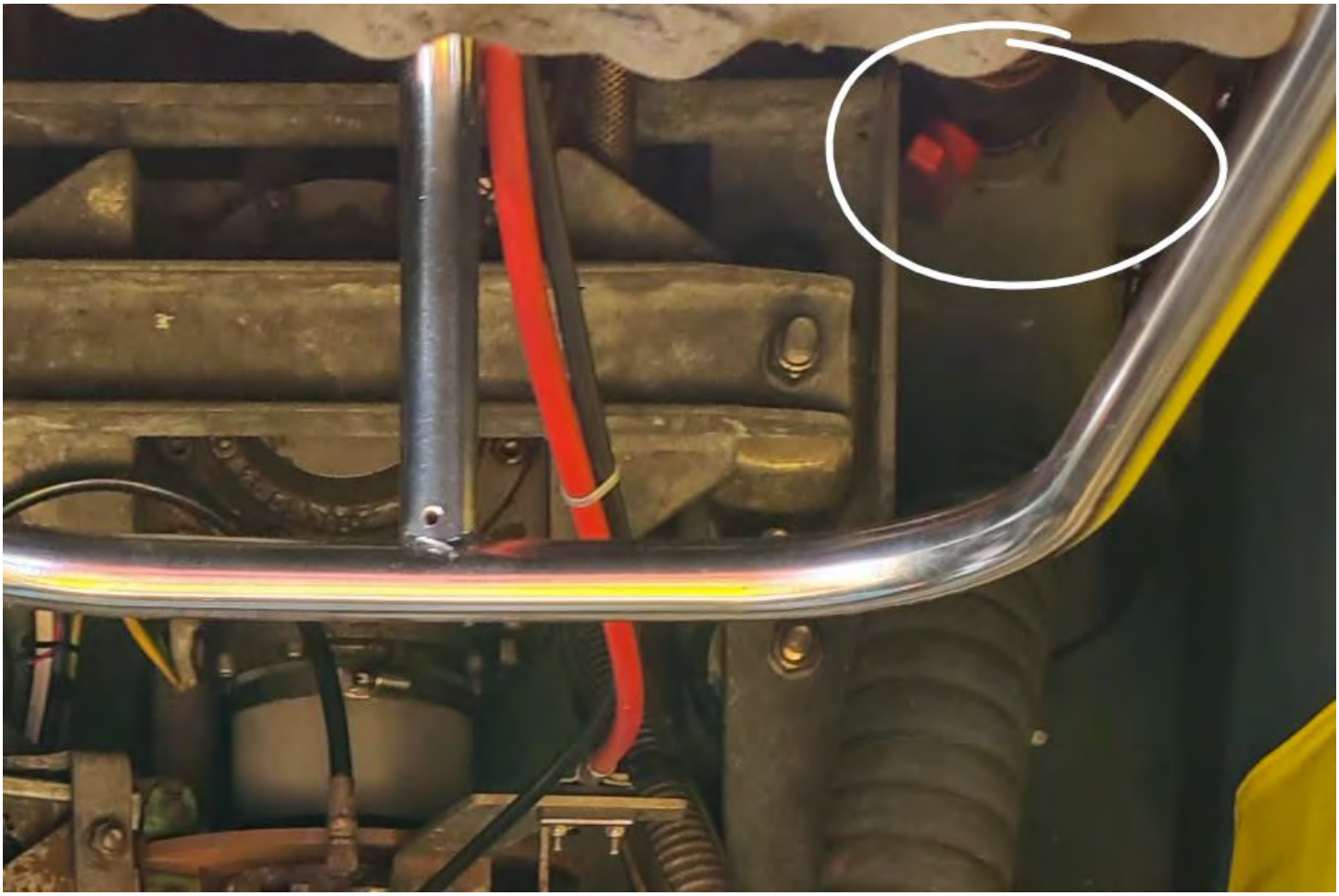


3. Remove the Disk brake caliper assembly

Measure and mark the position and then disconnect the hydraulic hose at the gearbox and unscrew the two bolts as indicated below. Cover the hydraulic connection with something to protect it.

4. Close the main seawater intake and empty the sea chest with a wet vacuum

Empty as much as you can and make sure you don't open the main intake until you are finished with the project.

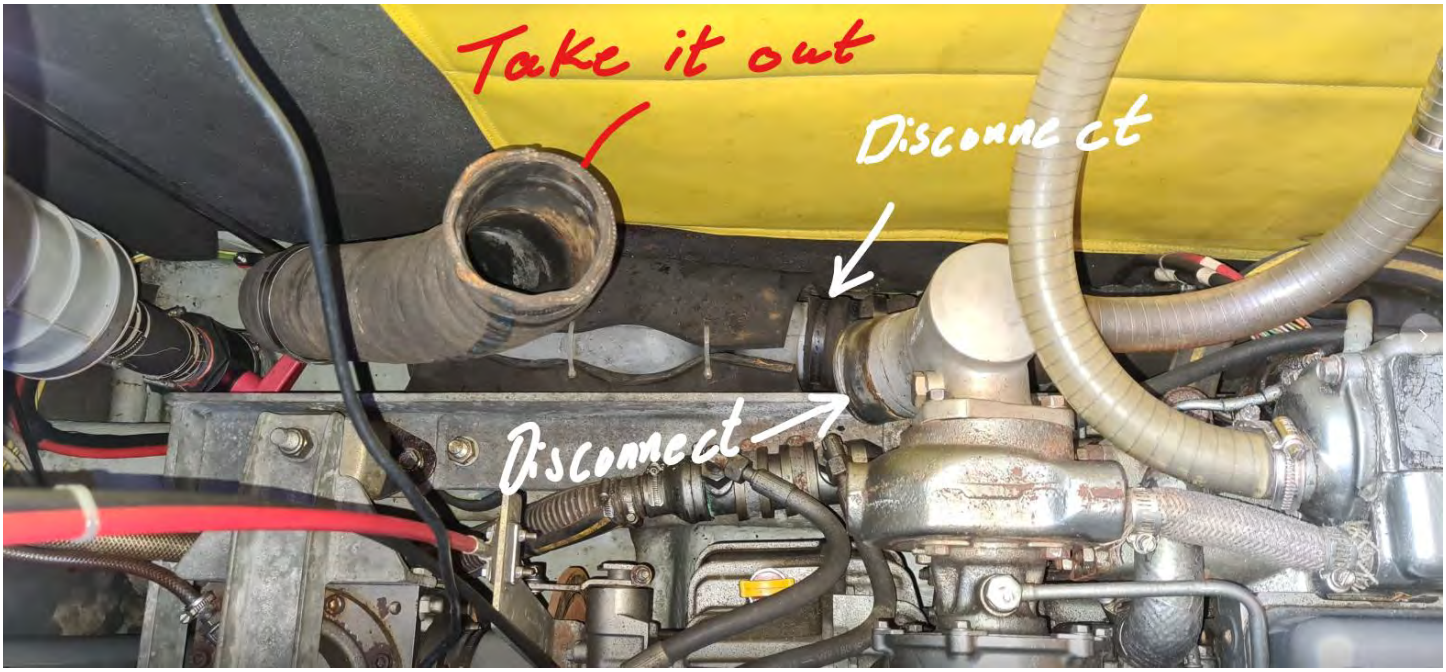


Close the main seawater intake

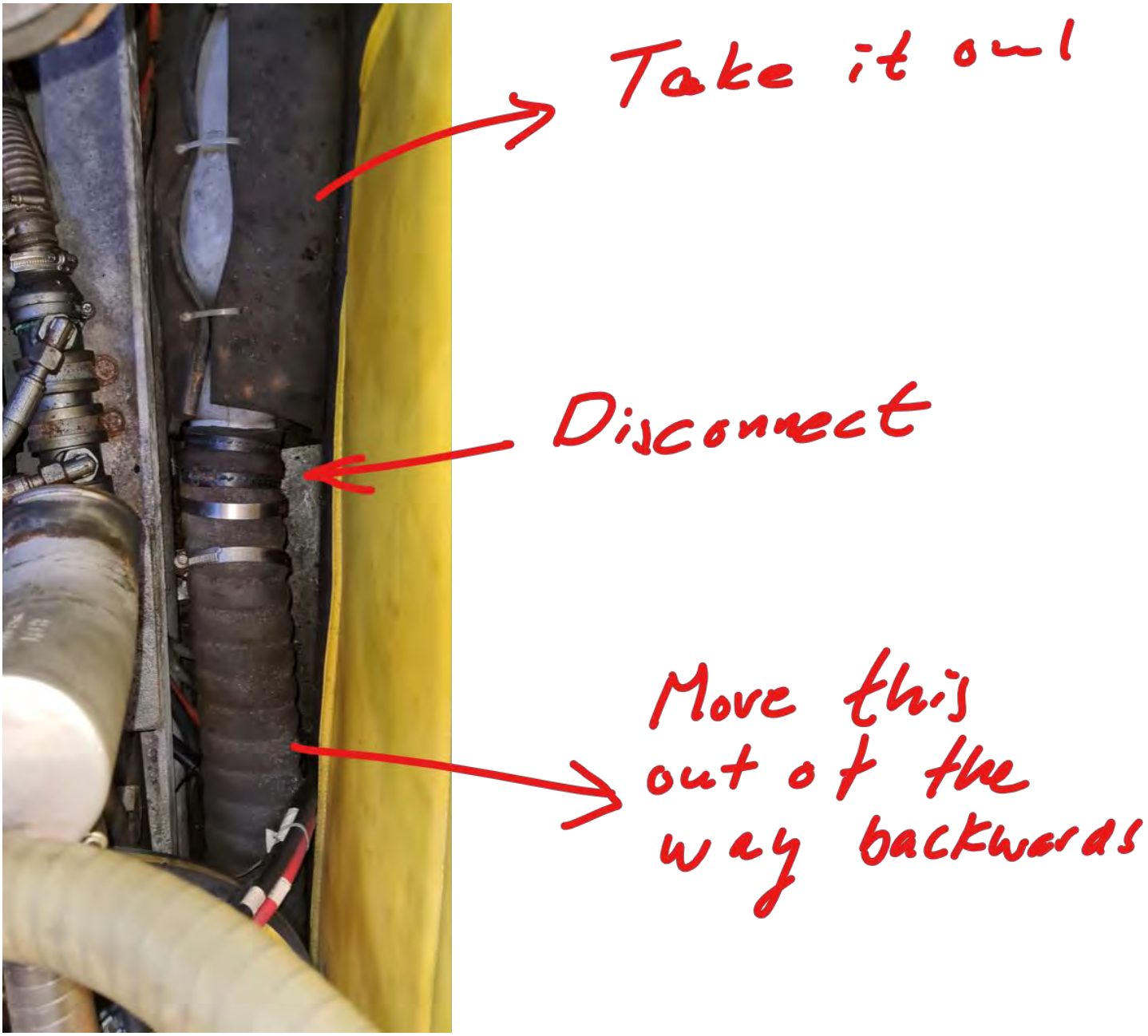
5. Disconnect and remove the main exhaust and Vetus muffler

Be prepared with a wet/dry vacuum to capture any water. The big exhaust pipe is pulled backwards and must be untied first. Obvious when you see it and not too difficult.

Some say it is possible to complete the project without removing the muffler and exhaust pipe but I don't think I could have managed.



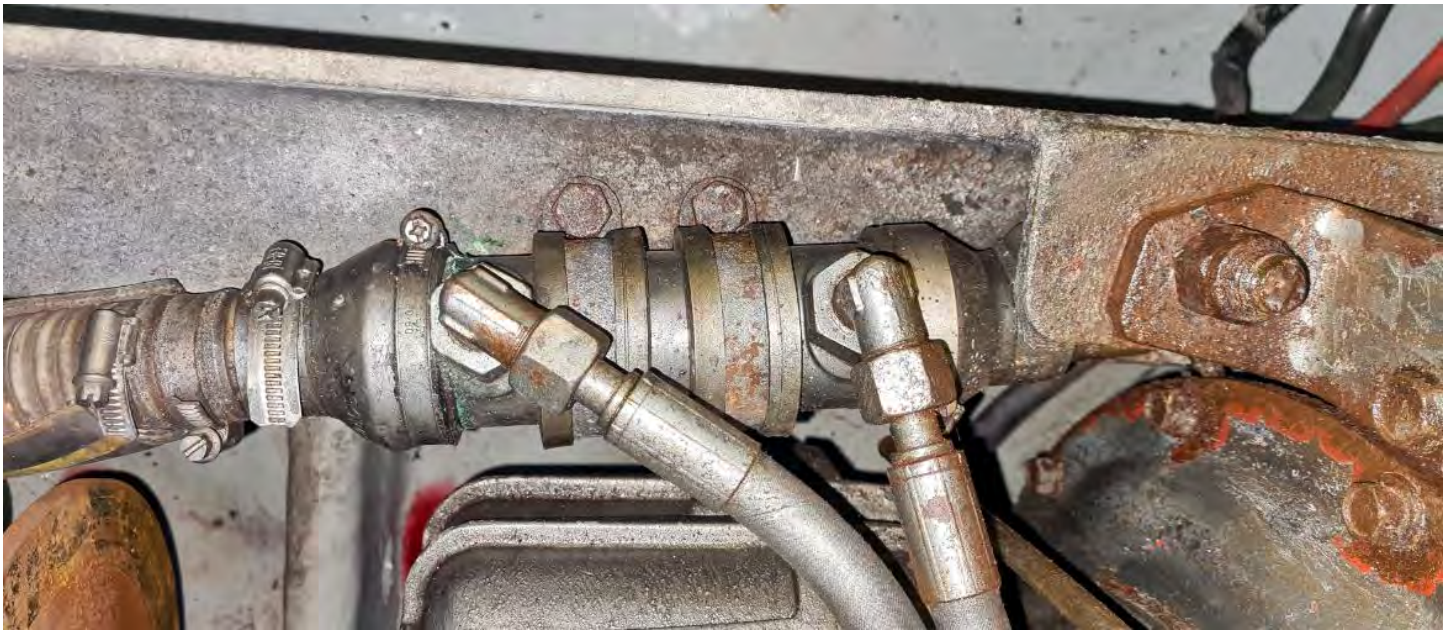
Remove the exhaust pipe and muffler to get better access to the back of the engine.



6. Disconnect and move the transmission heat exchanger out of the way

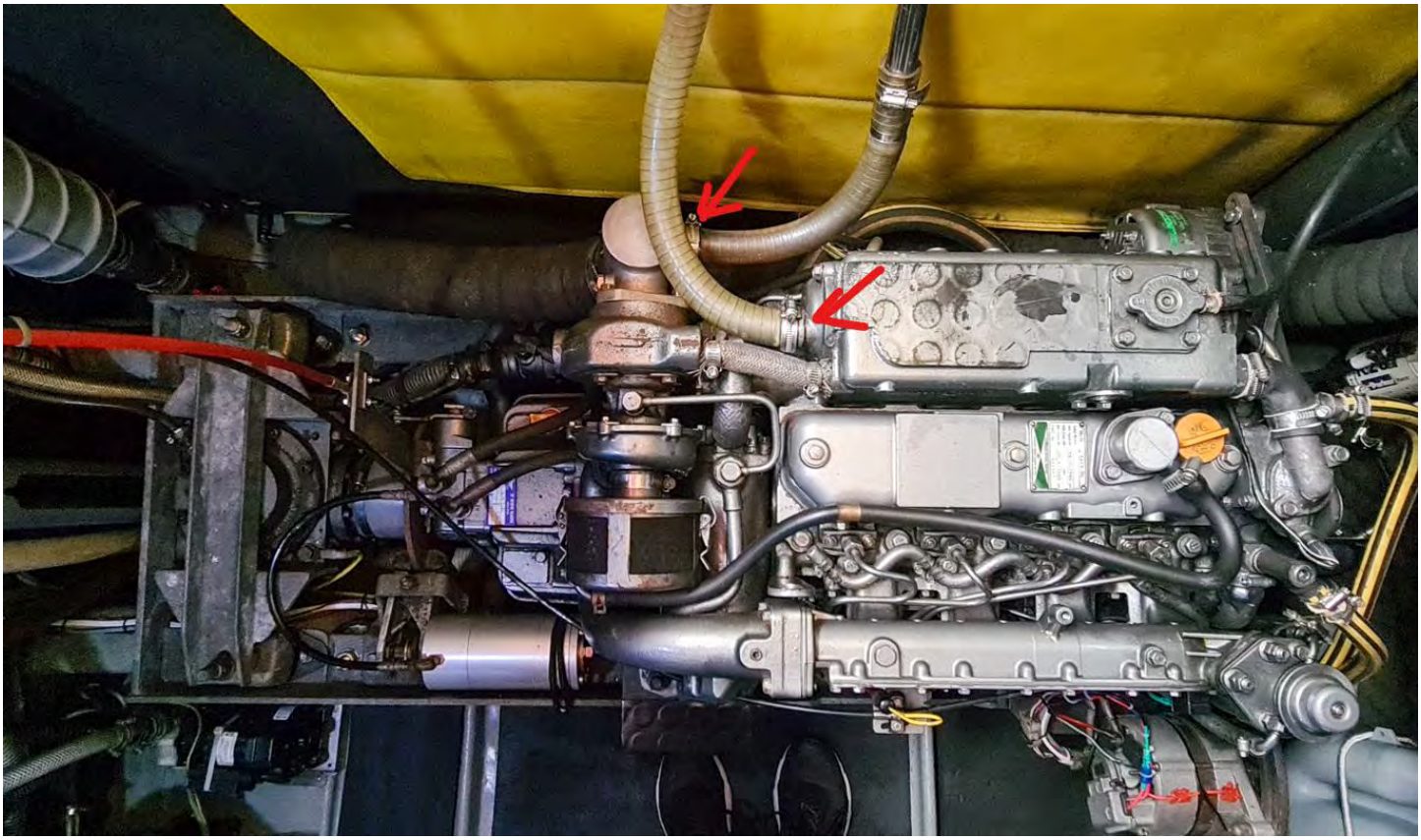
On SeaBean the heat exchanger had to be disconnected to allow the engine to move aft. Be prepared with a wet vacuum to capture any water. I let the hydraulic hoses remain connected and tied the heat exchanger to one of the lifting points with a piece of string to get it out of the way.

I also replaced the seawater hoses while I was at it.



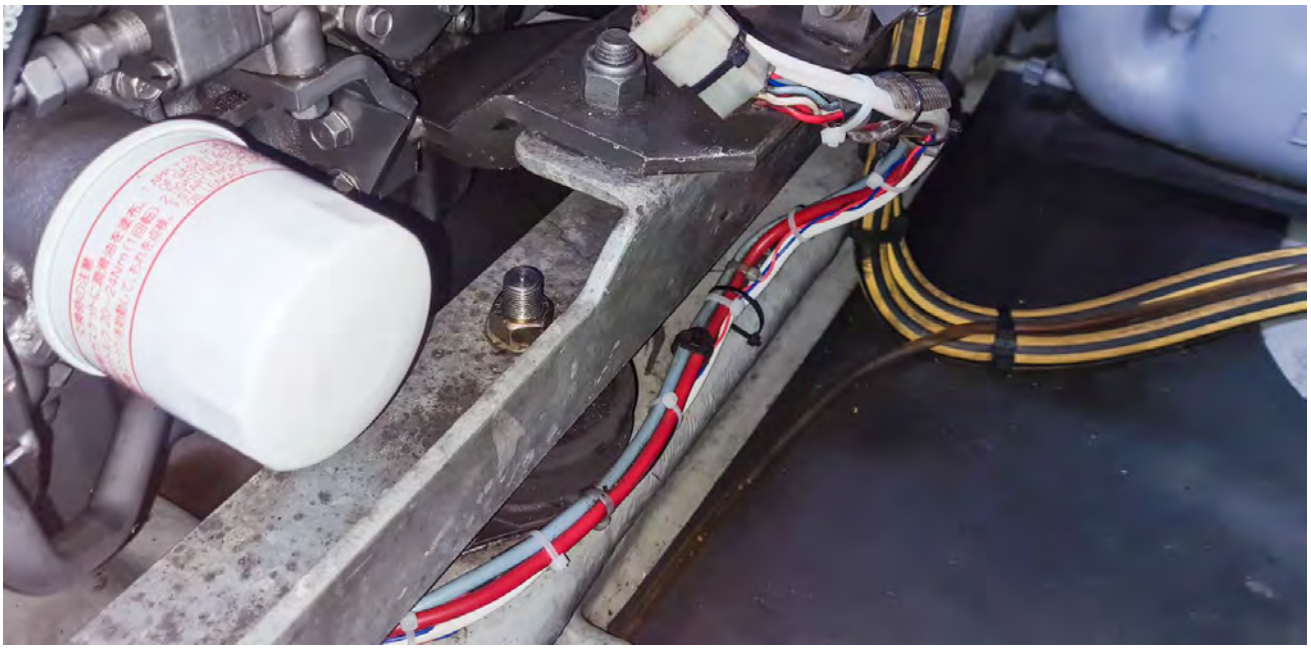
Tied the heat exchanger to the top of the engine to get it out of the way without disconnecting the hoses

7. Disconnect the rest of the cooling water hoses that would restrict movement of the engine



8. Untie/cut all cable ties to electrical cables

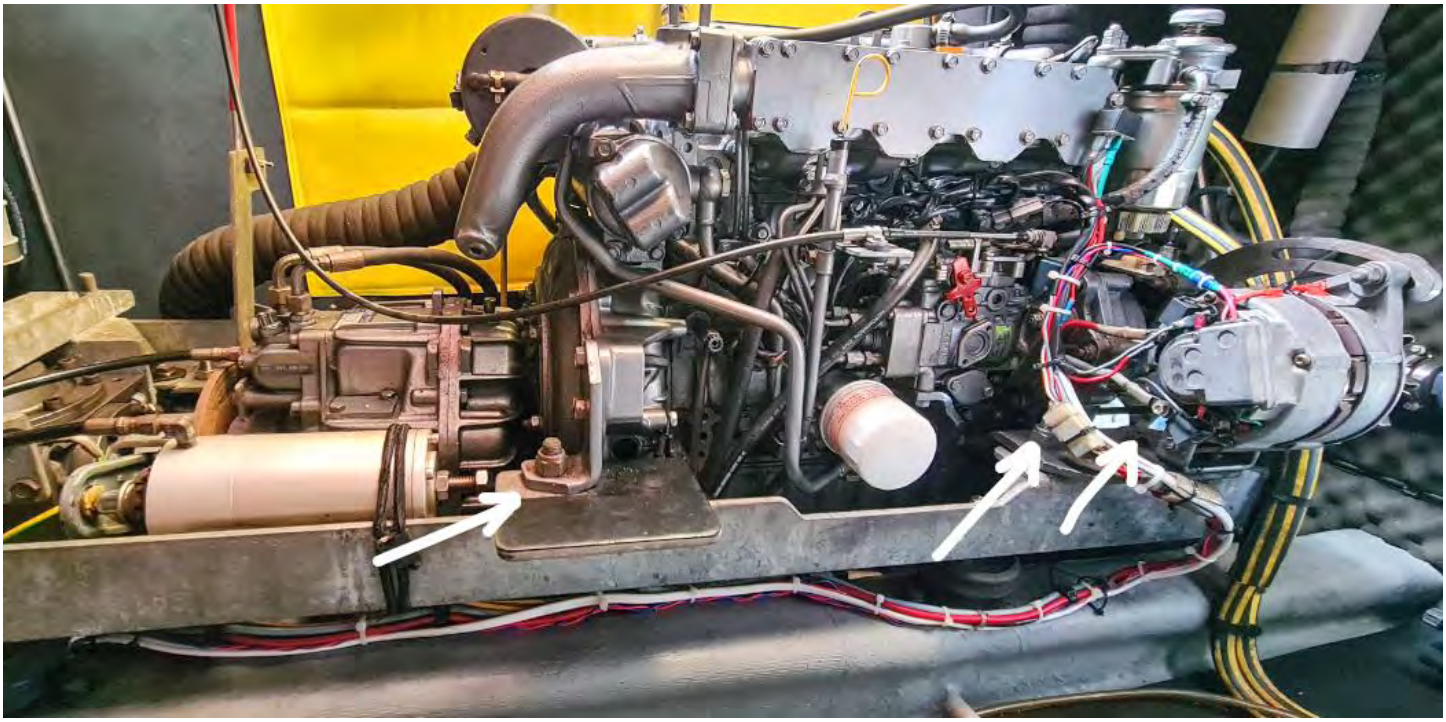
Look at the installation and make sure that there's nothing holding the engine when the time comes to move it. I had to cut a bunch of cable ties.

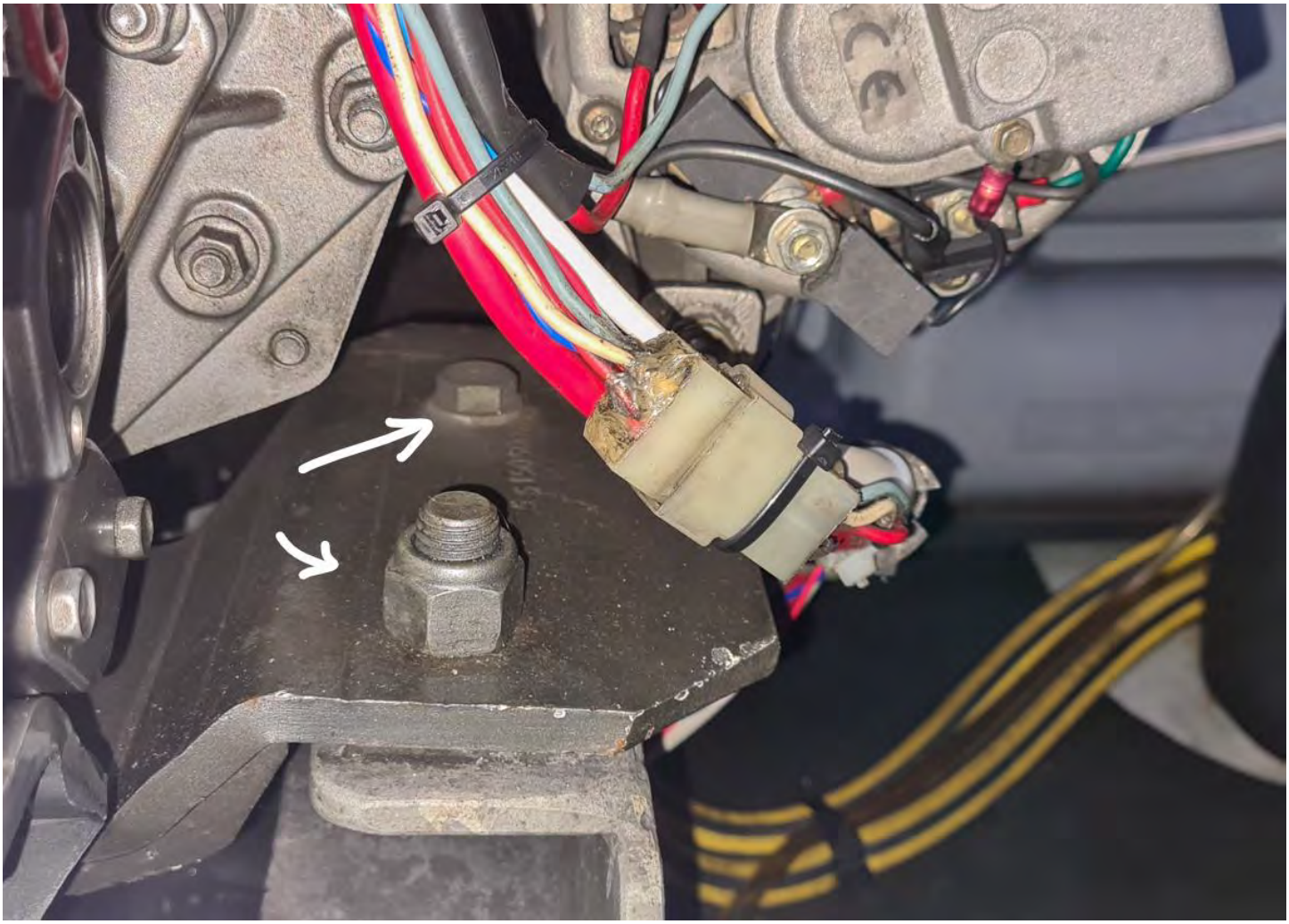


Make sure the motor can be lifted and moved without getting stuck

9. Unbolt the engine from the frame

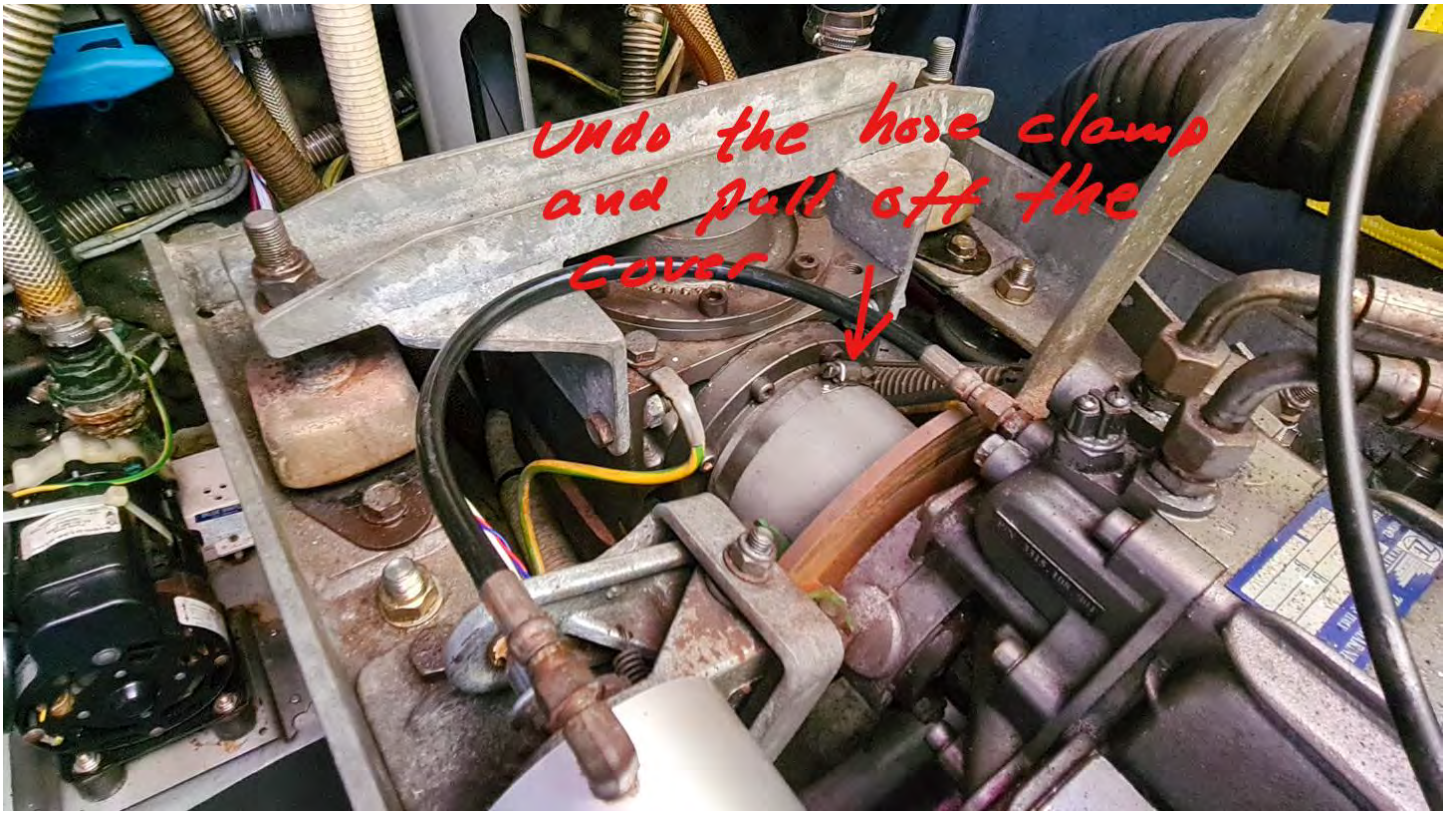
4 + 1 bolts using 24mm wrench. One of these was rusted and took me quite a while to get it off. Had to apply heat and lots of force to get it off.

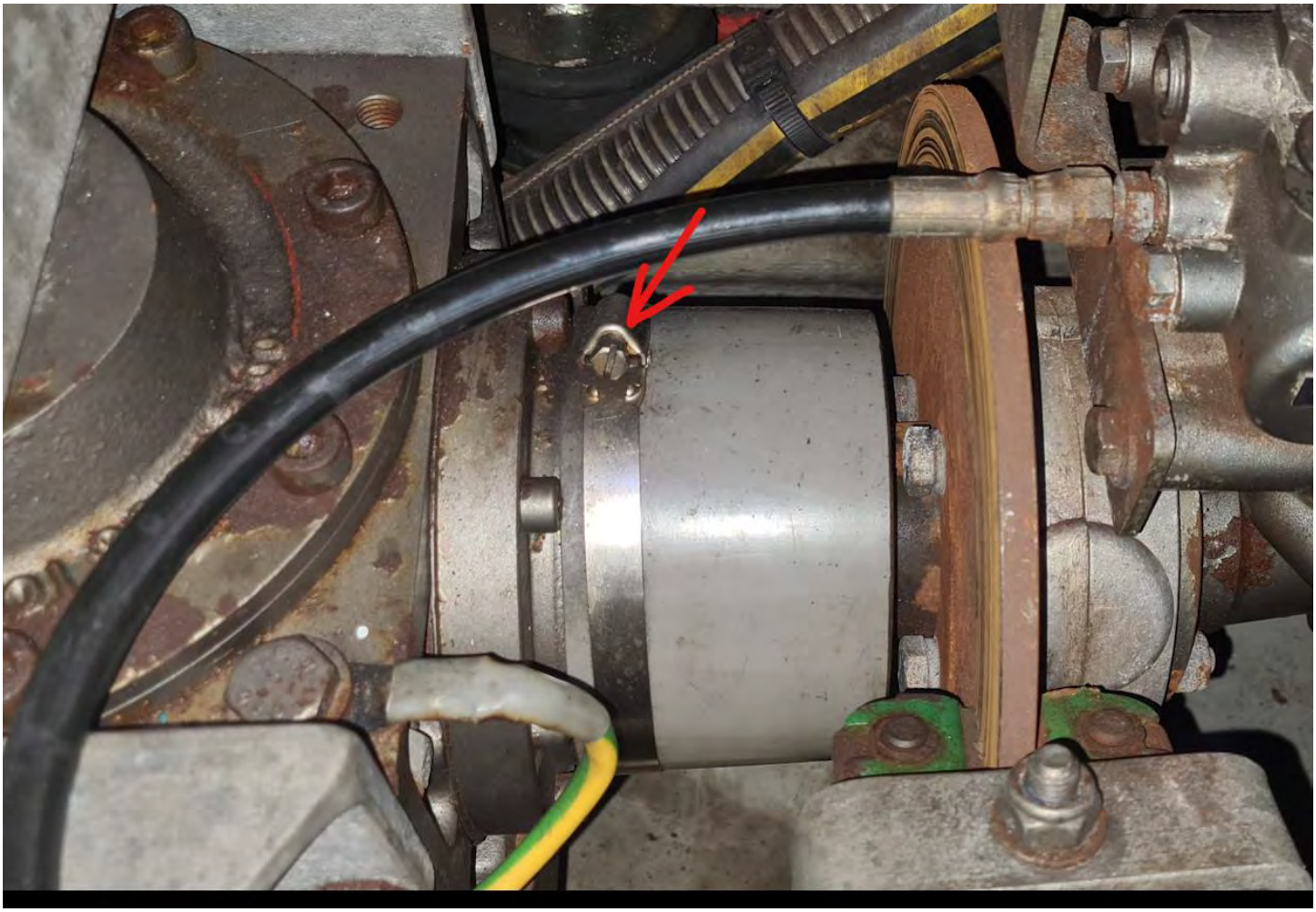




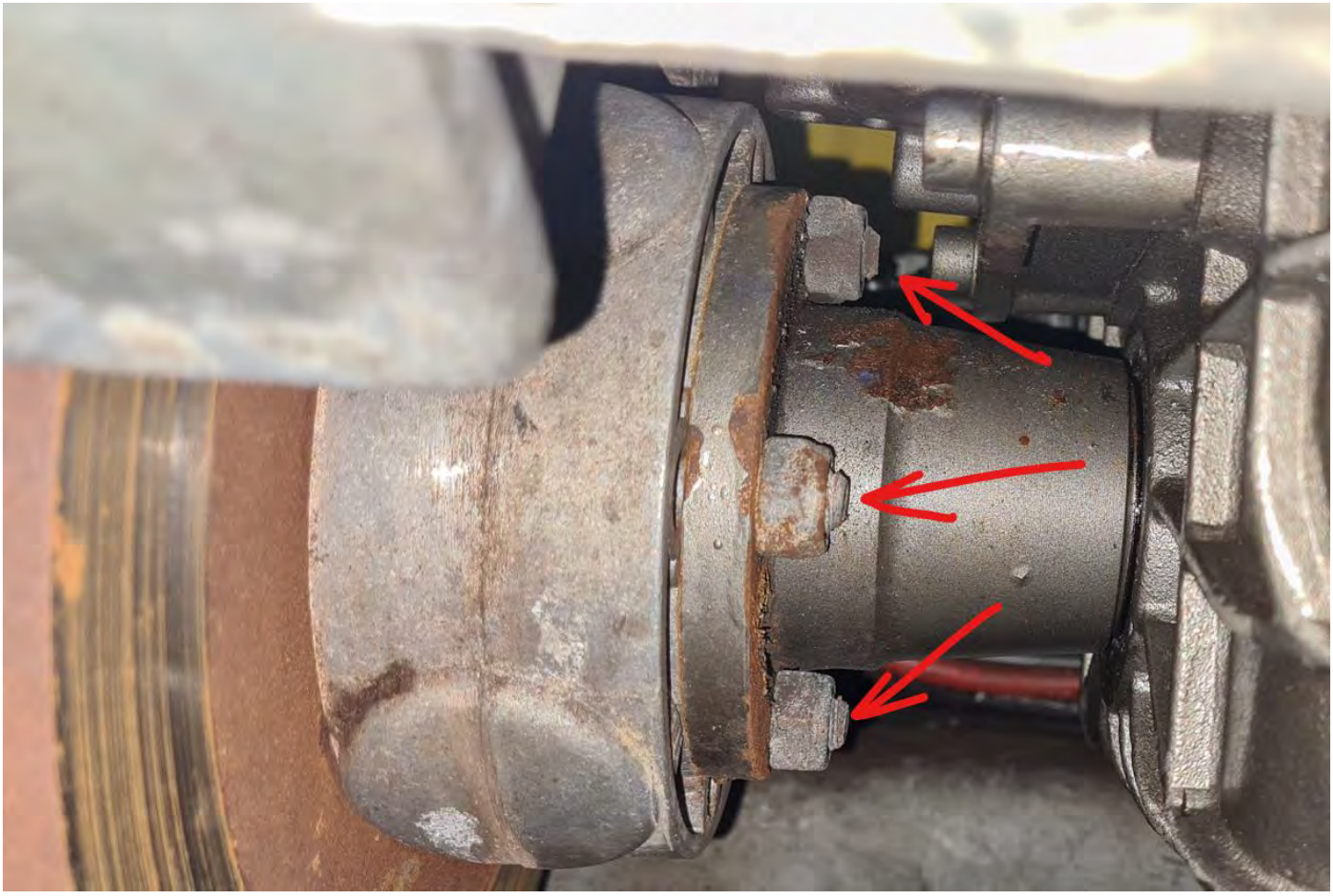
Aft port bolts that hold the engine to the steel frame

10. Remove the cover over the Vetus Flexible Coupling



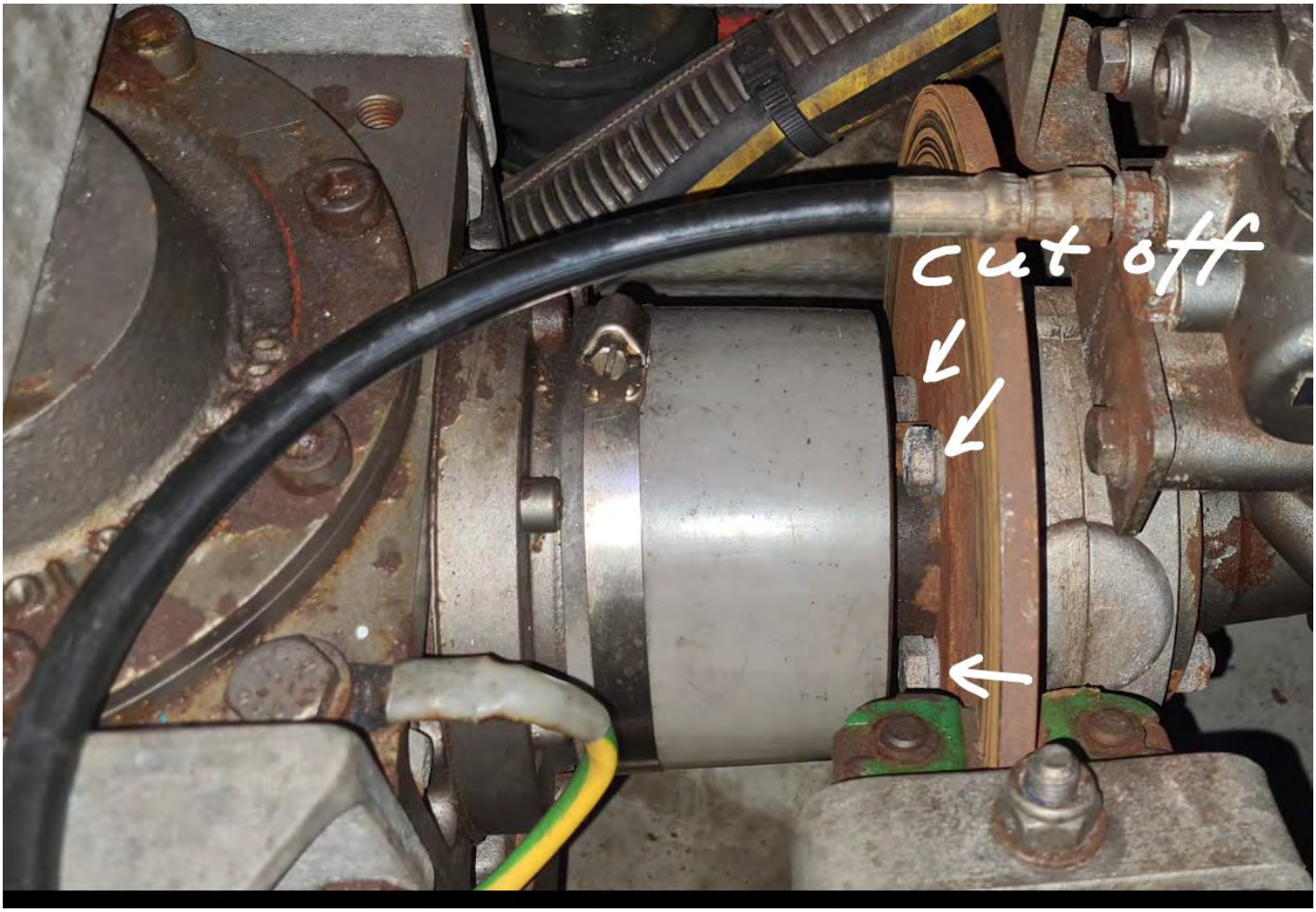


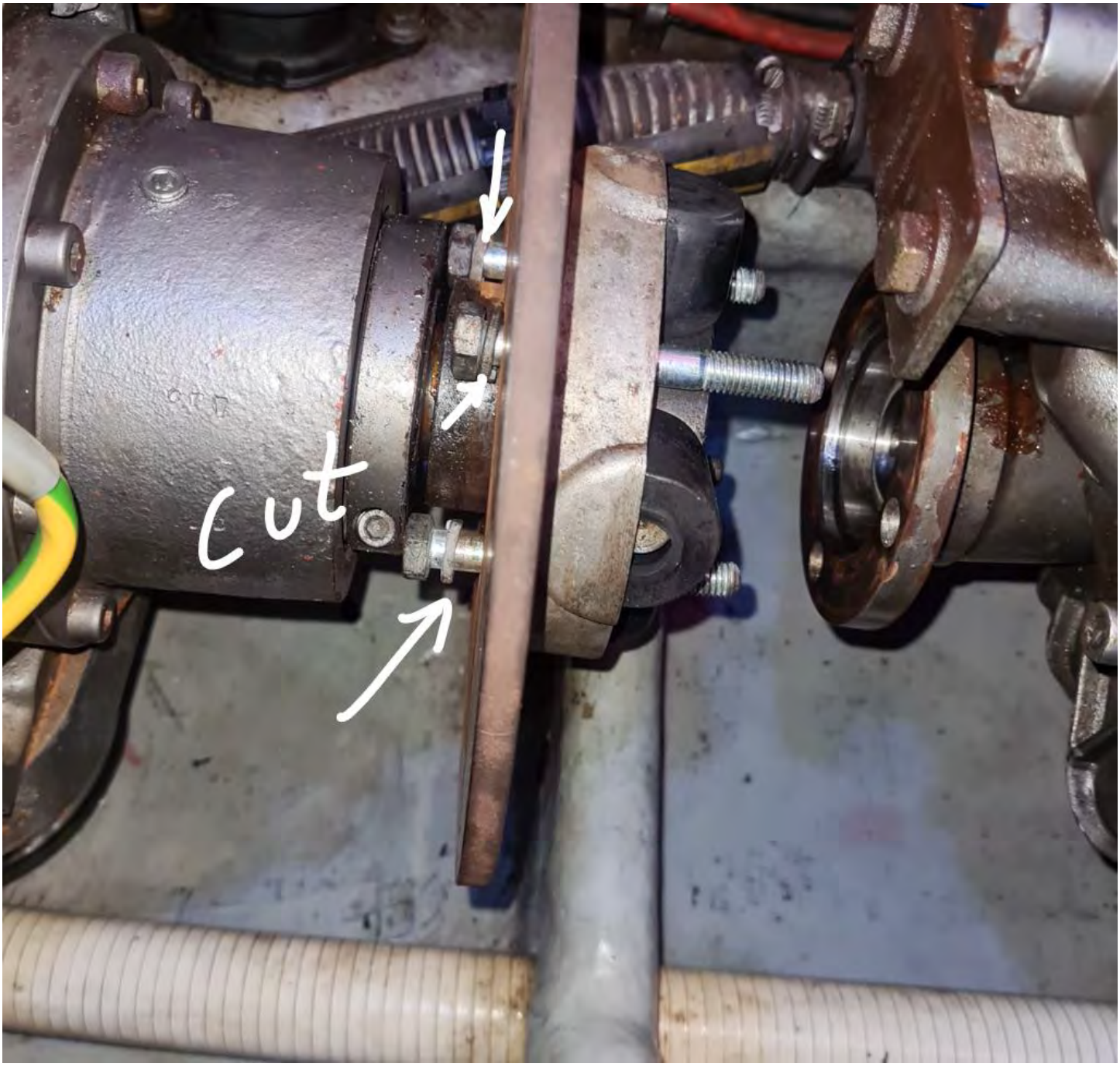
11. Unscrew the 4 nuts for the Vetus flexible coupling bolts



12. Cut the heads off all 4 bolts

I used a multi tool with a Bi-metal steel cutting blade but it can probably be done with a hacksaw too.


cut off

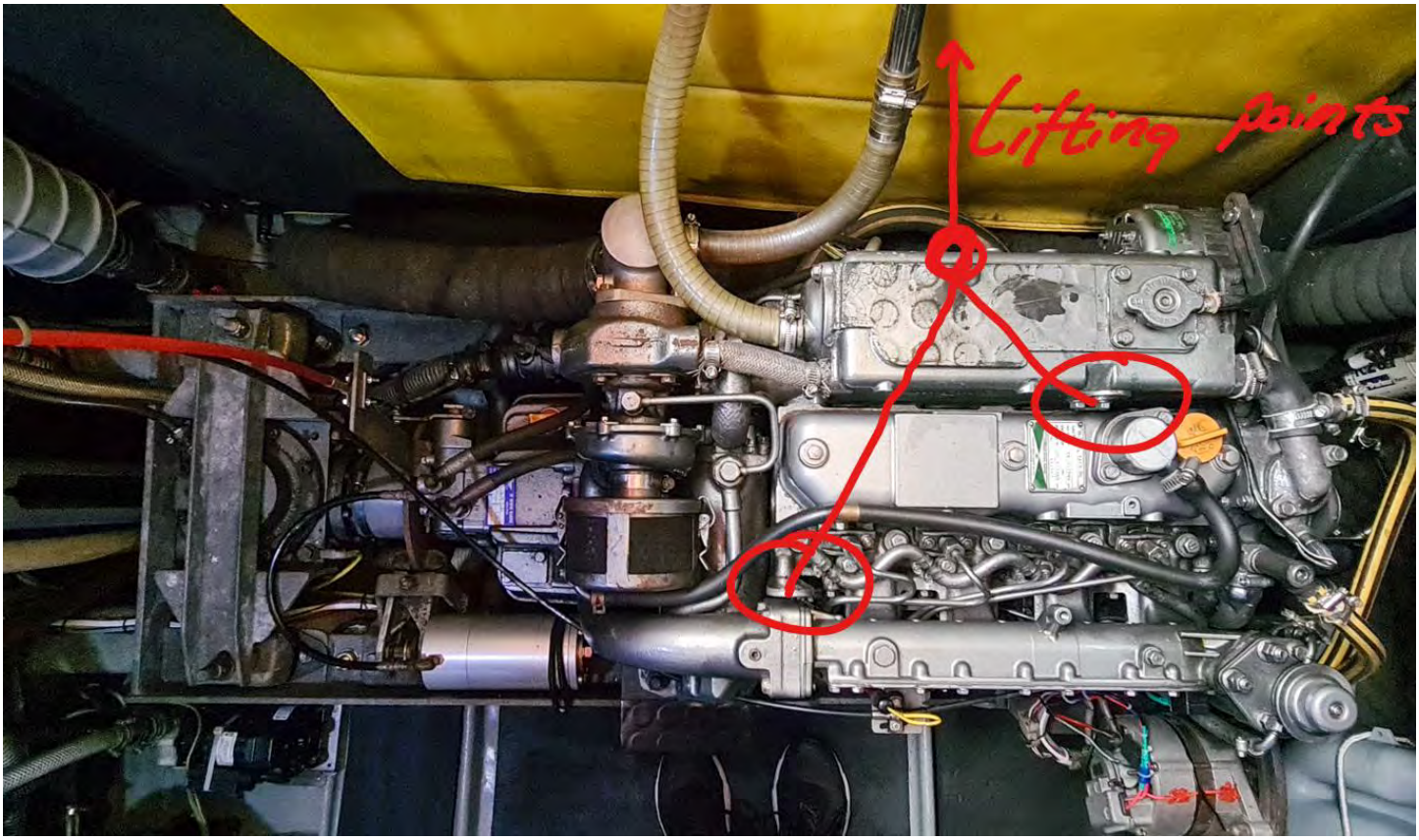

cut

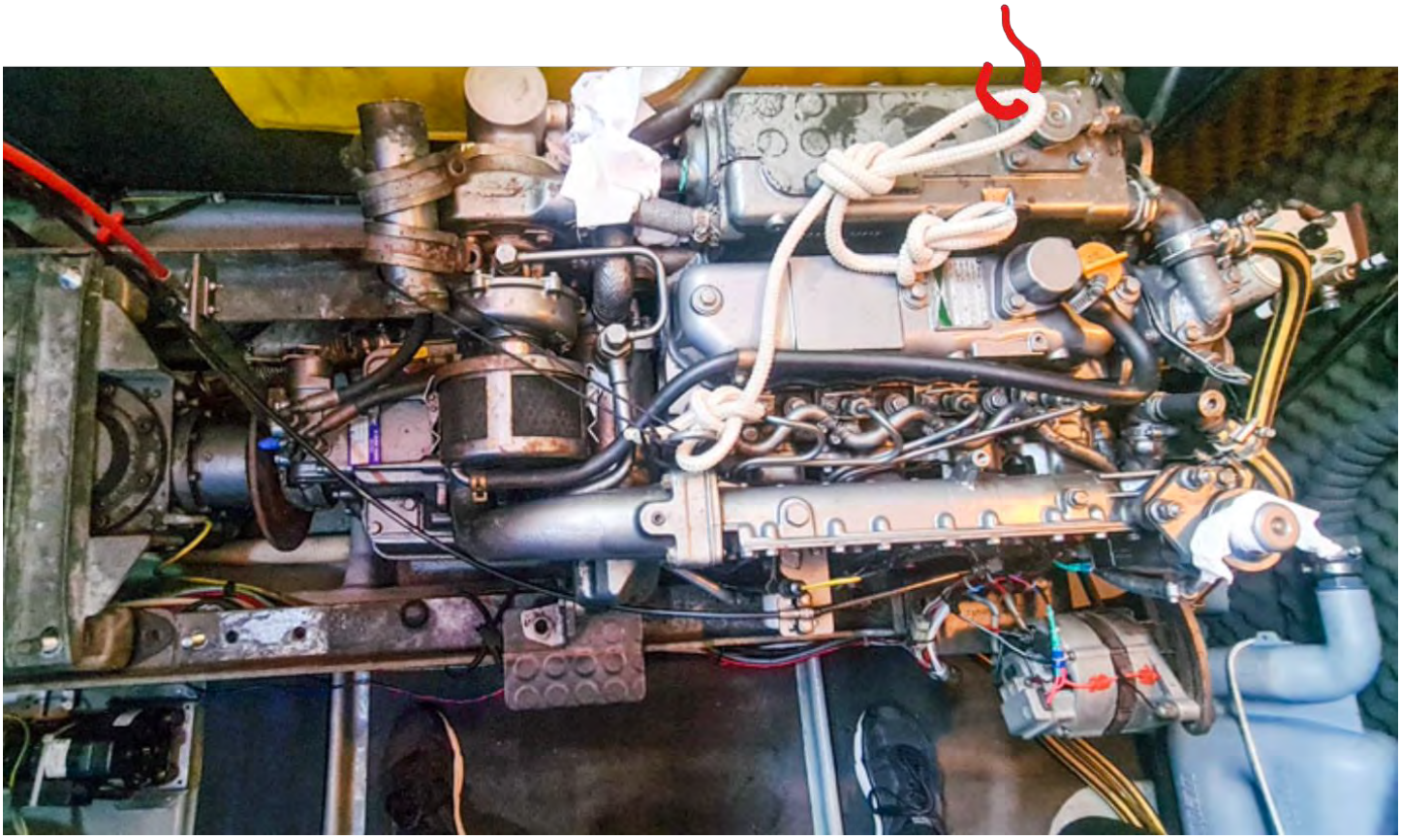
Cut bolts

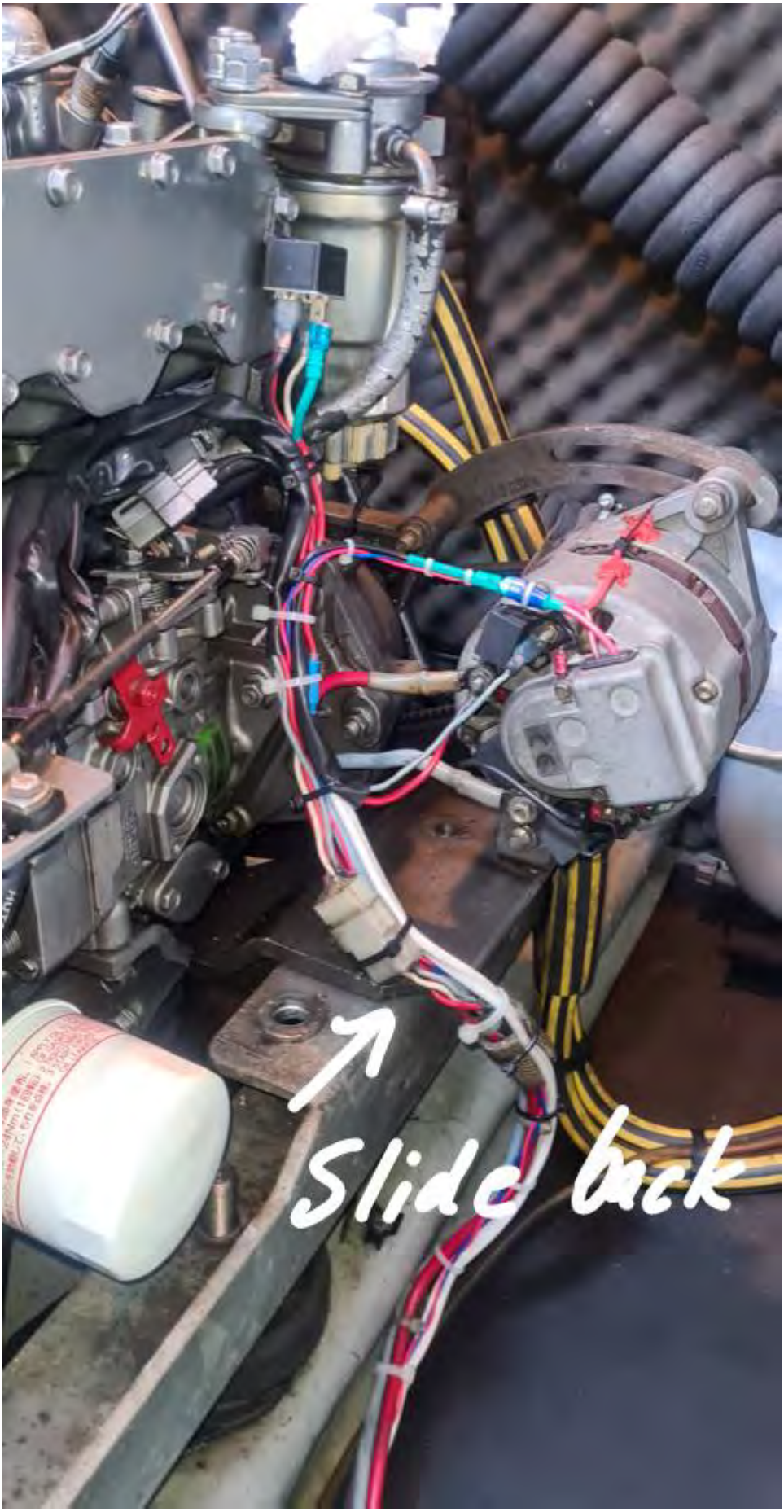
You can also wait to cut the bolts until you have moved the engine aft as per the next step.

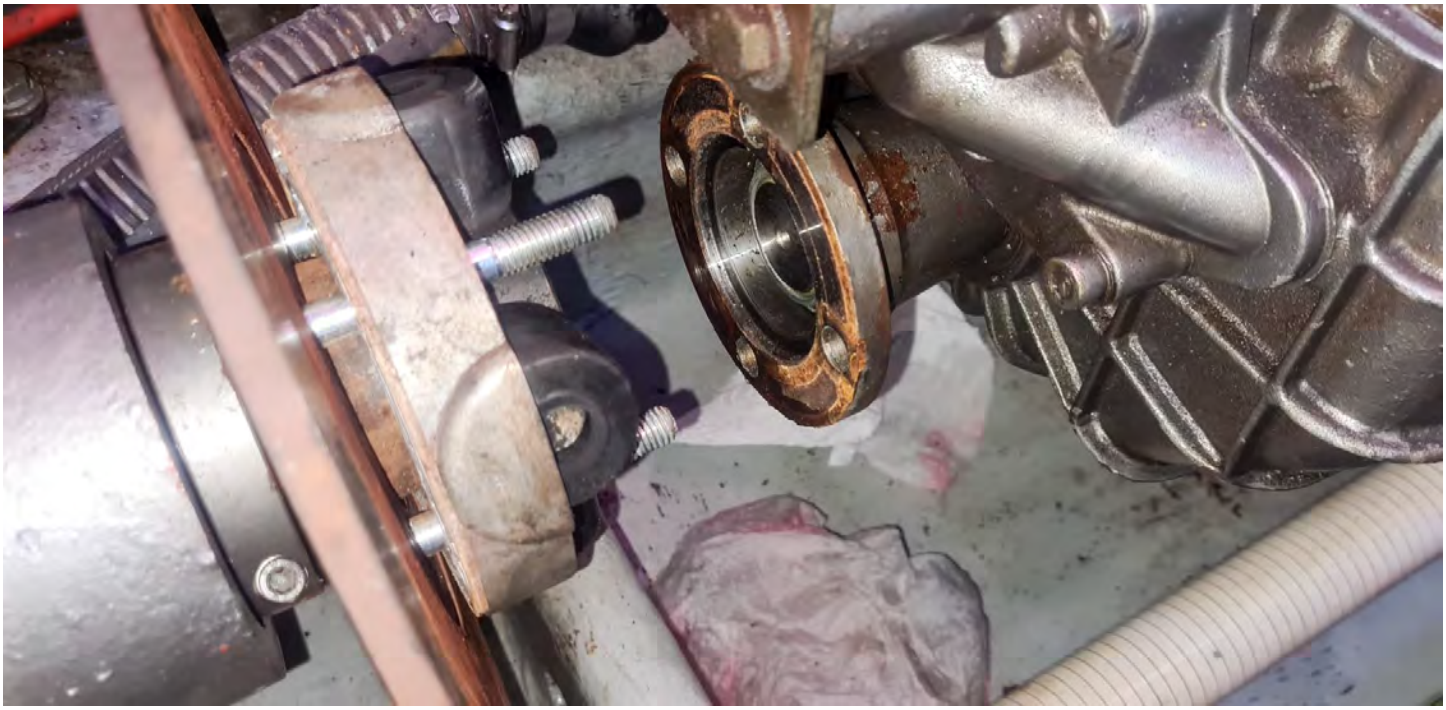
13. Lift the engine and slide it a few inches towards the aft

It is really easy to lift and push the motor if you have a chain & block as described under the Tools section above. I was able to do this alone with ease. It probably wouldn't have been as easy to control had I used a halyard.


Lifting points



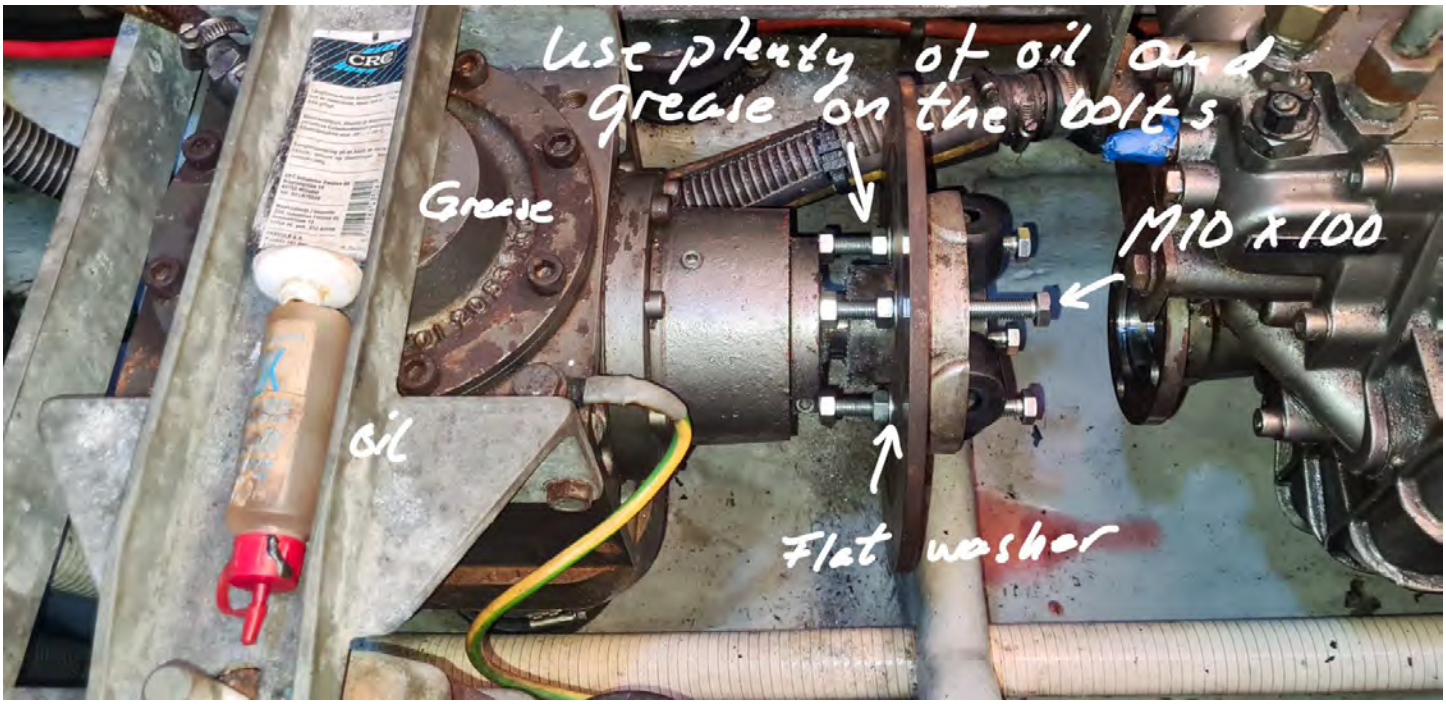

Slide back

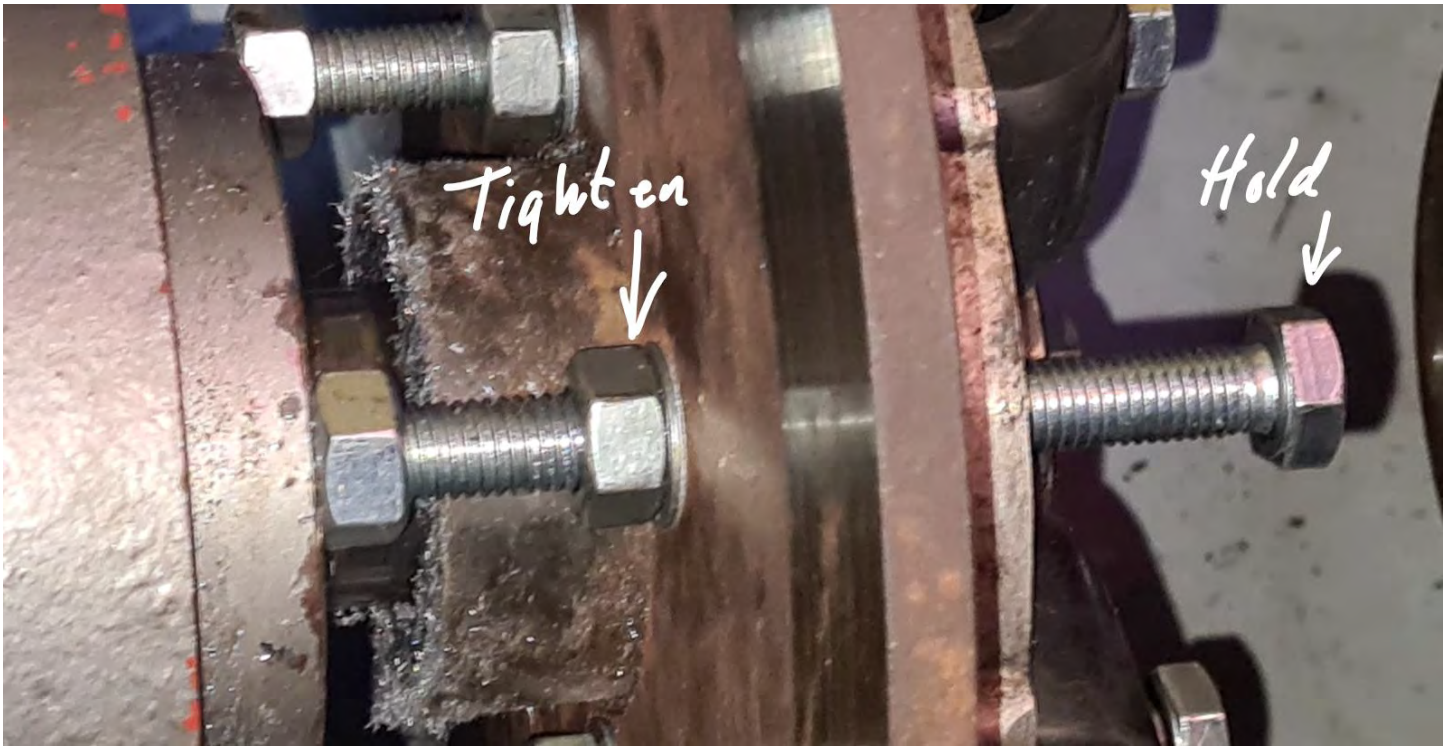


Once the engine has been moved aft you can remove the end cap of the Vetus flexible coupling

14. Insert the four M10 x 100mm bolts in the flexible coupling and use as a “gear puller”

Insert the bolts pointing forward followed by a flat M10 washer against the disk and then followed by the two “normal” nuts. Use plenty of oil and grease to prevent the nut from seizing





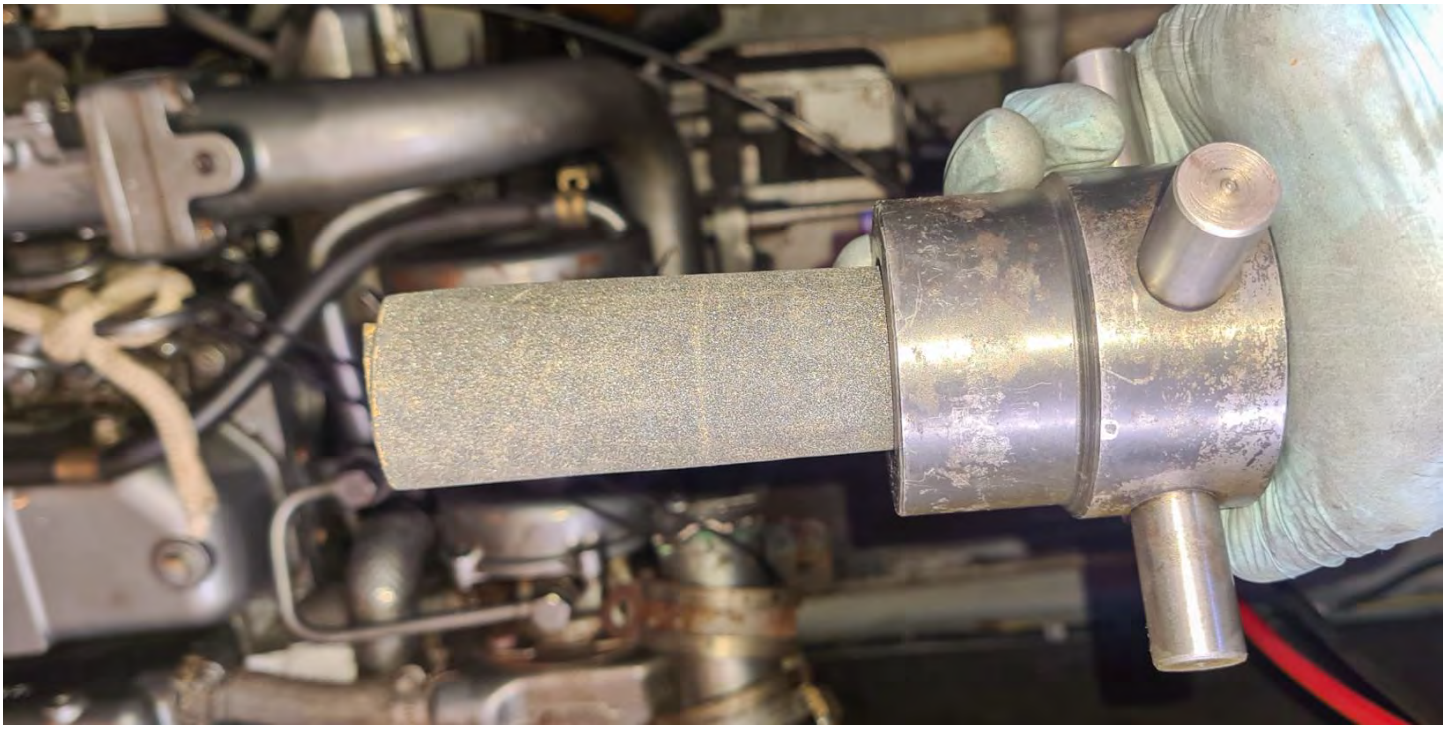
Preferably use a X pattern when you tighten the middle nuts little by little. 12 o'clock – 6 – 3 – 9 and so on. After a while it is enough with just 12 and 6.

This worked for me but it may not work for you. I used some penetrating WD40 on the shaft and left it overnight before I started. I didn't have to use hammer and brute force as described in many of the other instructions that I read.

I did however have to use the nuts and bolts to force the flexible coupling almost all the way out. It never got to the point where I could just pull it out by hand.

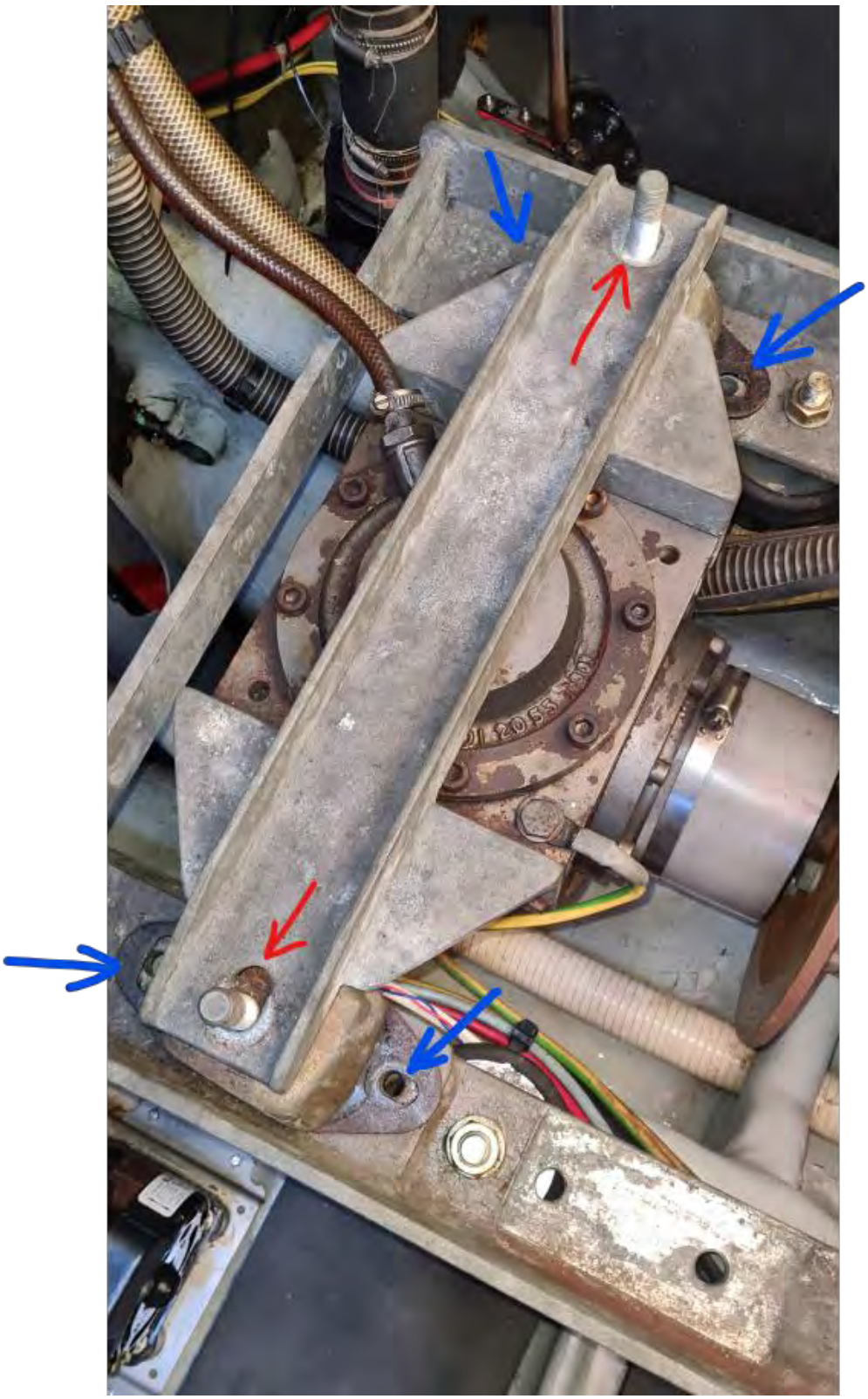
15. In preparation for assembly I suggest using emery cloth on the inside of the flexible coupling and shaft.

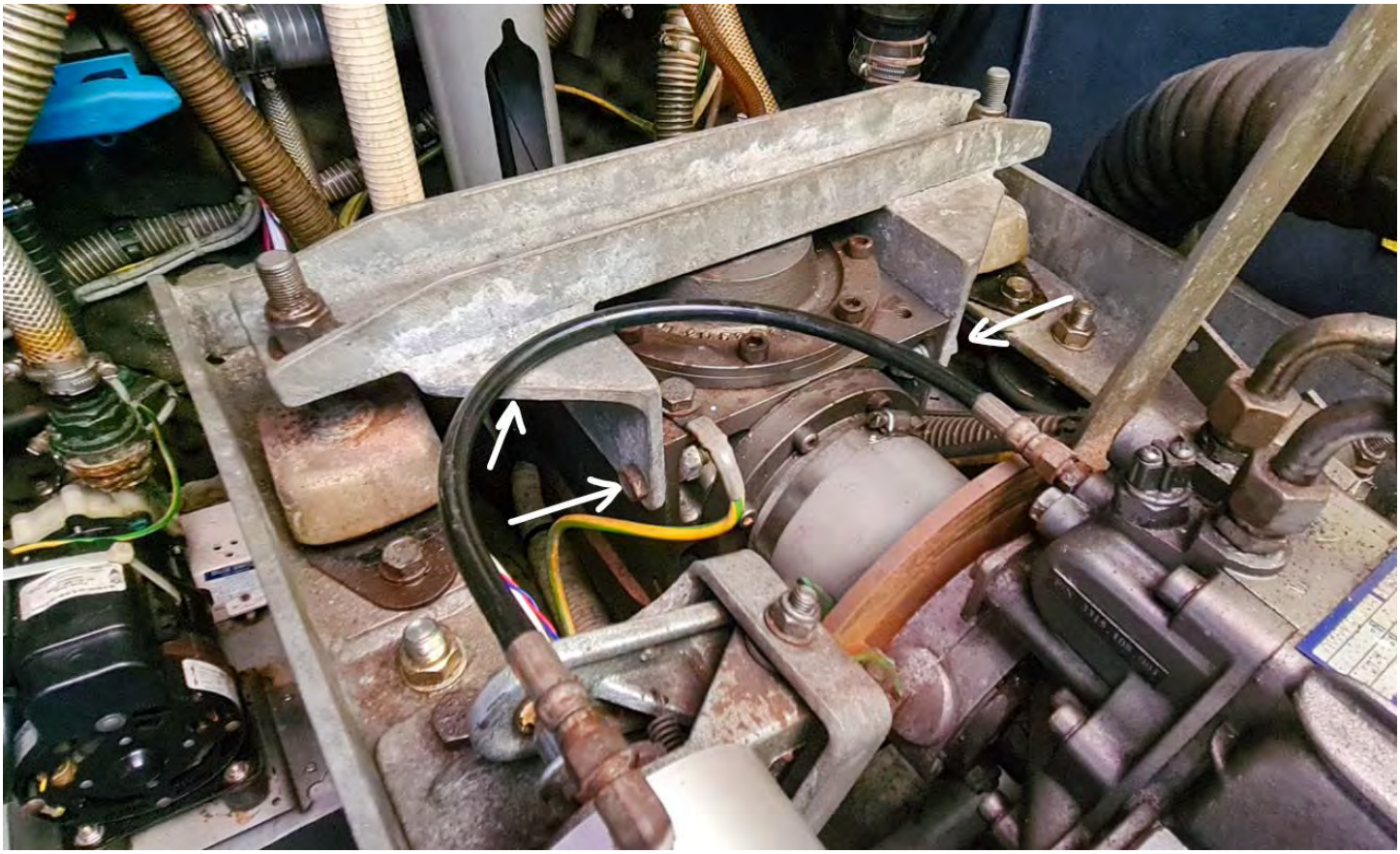
After using fine emery cloth, I followed by using some valve grinding paste to get a really smooth fit. Now it's a perfect smooth fit and putting it back was a breeze. No need to leave the flexible coupling to a machine shop to enlarge the hole. I have trust issues with some local talent after the debacle with the initial engine mount replacement.



Final step of the honing done with valve grinding paste directly on the shaft. Super smooth fit.

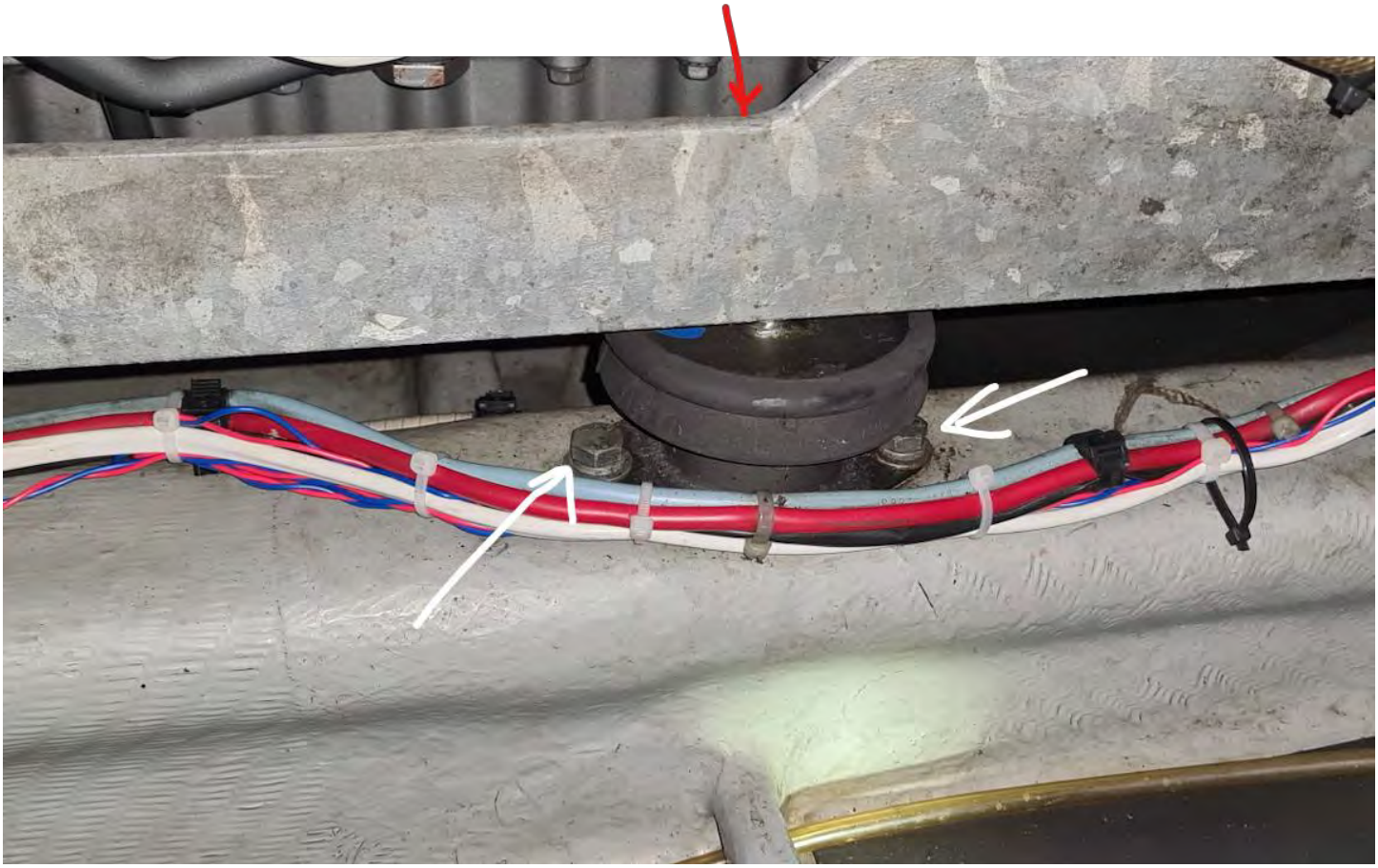
16. Unbolt the C-drive mounts and cross member





Once you have unscrewed the C-drive mounts and the four bolts that hold the crossmember to the C-Drive you can lift the crossmember and it gives you easier access to replace the mounts and lift the frame.

17. Unscrew the Vetus MISTEUN engine mounts (or K50 or whatever is installed on your boat)



Because the engine is already free from the frame you can lift as required. Then start with the top bolt (red arrow above). Once the top bolt is off you can lift the steel frame by hand to get better access. I lifted it by hand and put some wooden blocks under to get better access to unscrew the engine mounts.

Adjust the new engine mounts roughly to the same height as the old ones as a starting point. These will have to be adjusted later anyway.

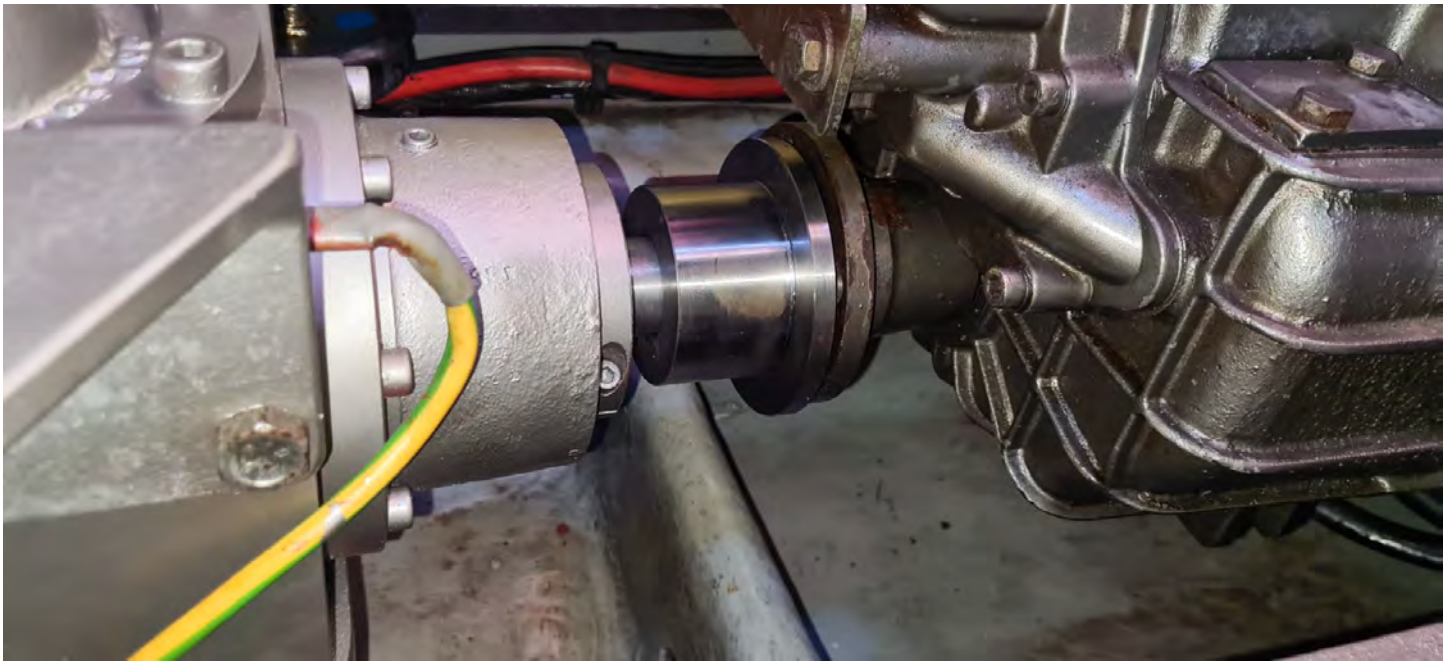
18. Replace the C-drive mounts

The studs on the new Cushyfloat mounts are mounted manually and you decide how far in they go.

19. Mount the cross member

Reverse order of point 16 Unbolt the C-drive mounts and cross member on page 29

20. Slide the fixed coupling alignment tool on to the C-Drive axis

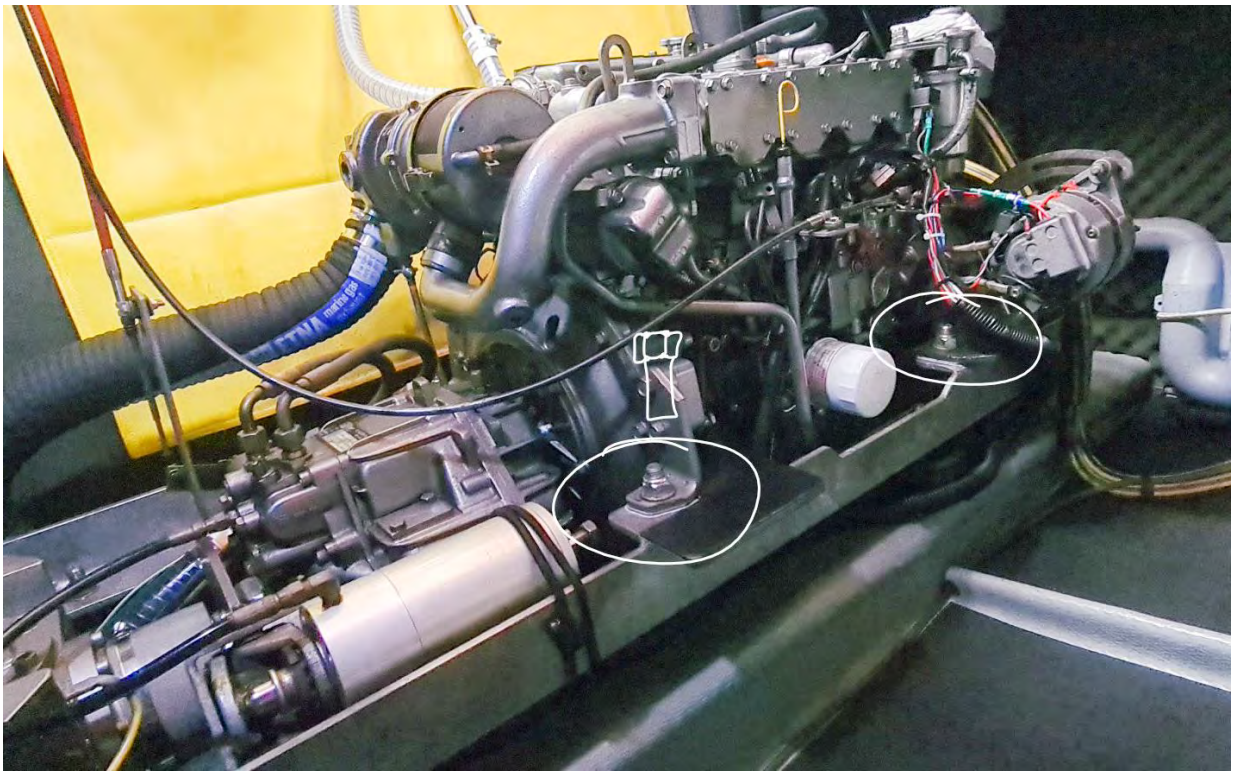


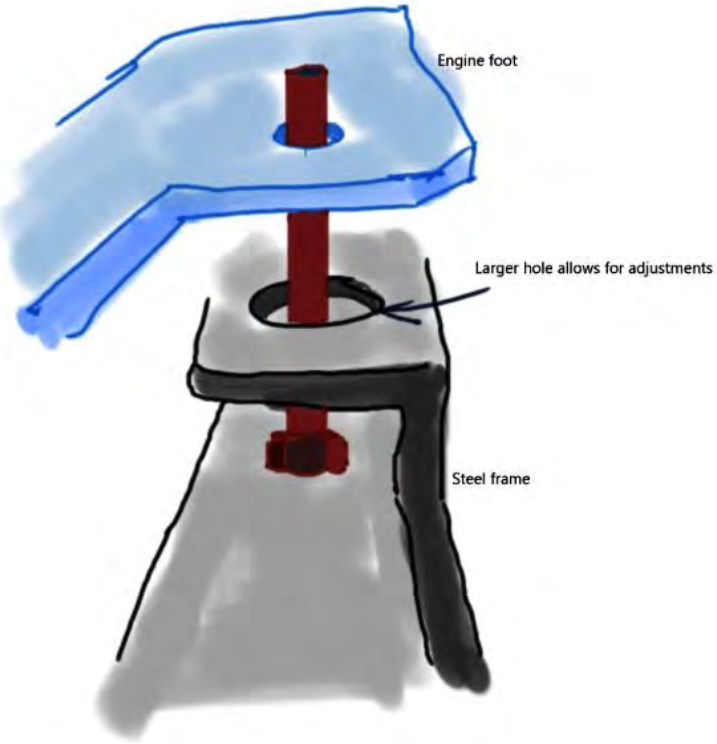
Then lower the engine and slide it forward so that the engine mounts are roughly aligned with the existing holes in the steel frame.

The image above shows my starting point. It is painfully obvious that the engine and the C-Drive are misaligned in all three axis

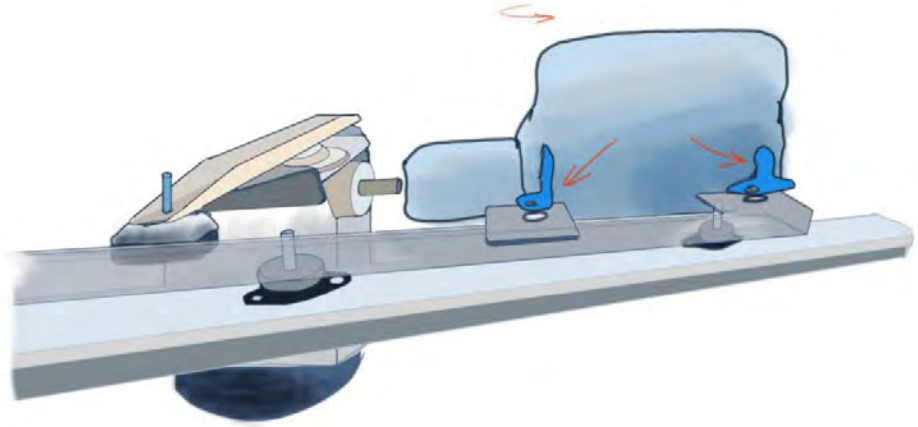
21. Align the engine with the C-Drive

It's difficult to explain exactly how to adjust the different engine mounts but I would suggest dropping the four engine bolts in place from above without a nut to ensure that you don't move the engine to a point where you can't get the bolts back in again.

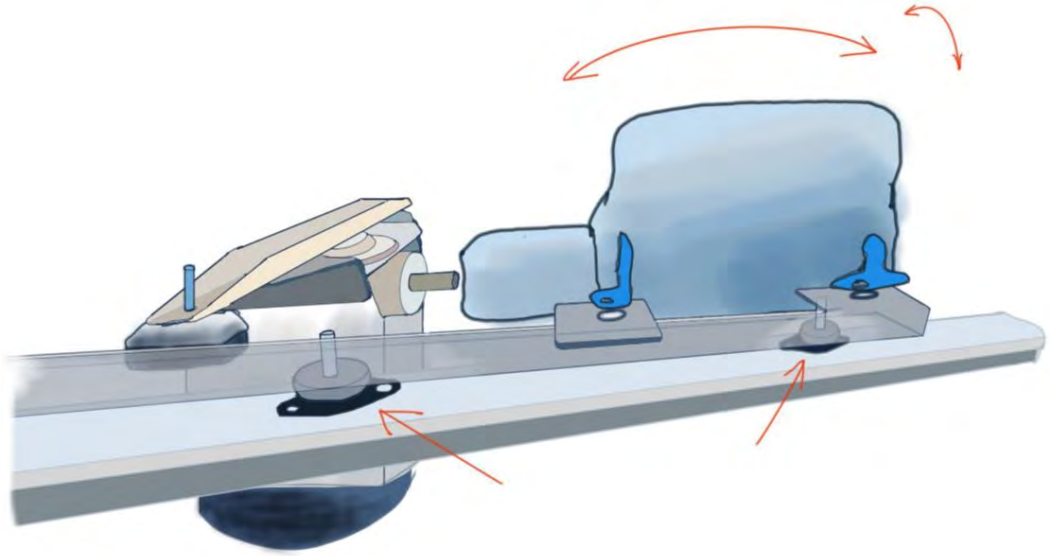




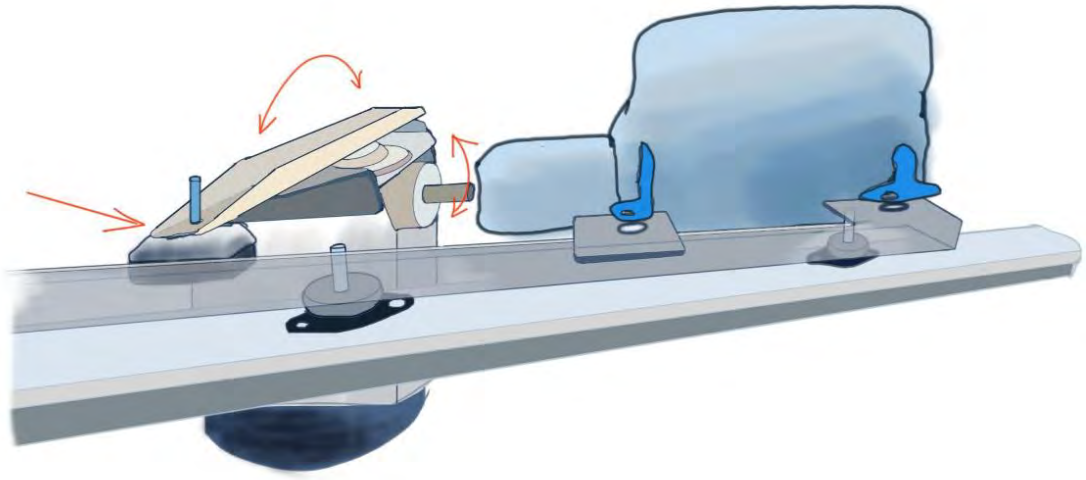
Before I started, it wasn't quite clear to me what options were available to adjust the position of the engine.
Once you've come this far, the sketch to the left becomes quite superfluous as it becomes clear that the bolt holes in the steel frame are quite a bit bigger than the bolt itself and thereby allowing for repositioning of the engine foot in relation to the steel frame.



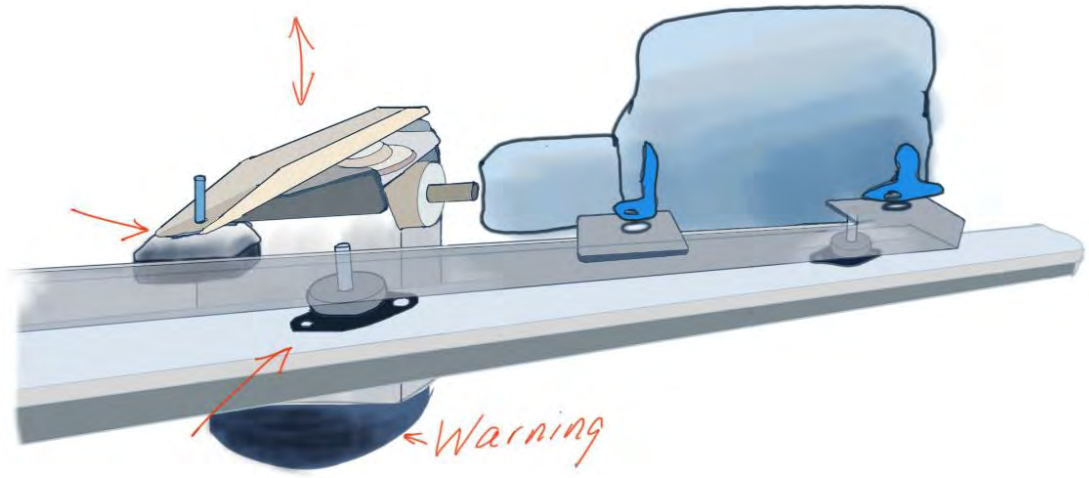
You have some wriggle room to move / rotate the engine sideways a fraction of a degree or so. Make sure to drop the 4 bolts in the holes without the nut to ensure you don't align it only to discover that the bolts won't fit.



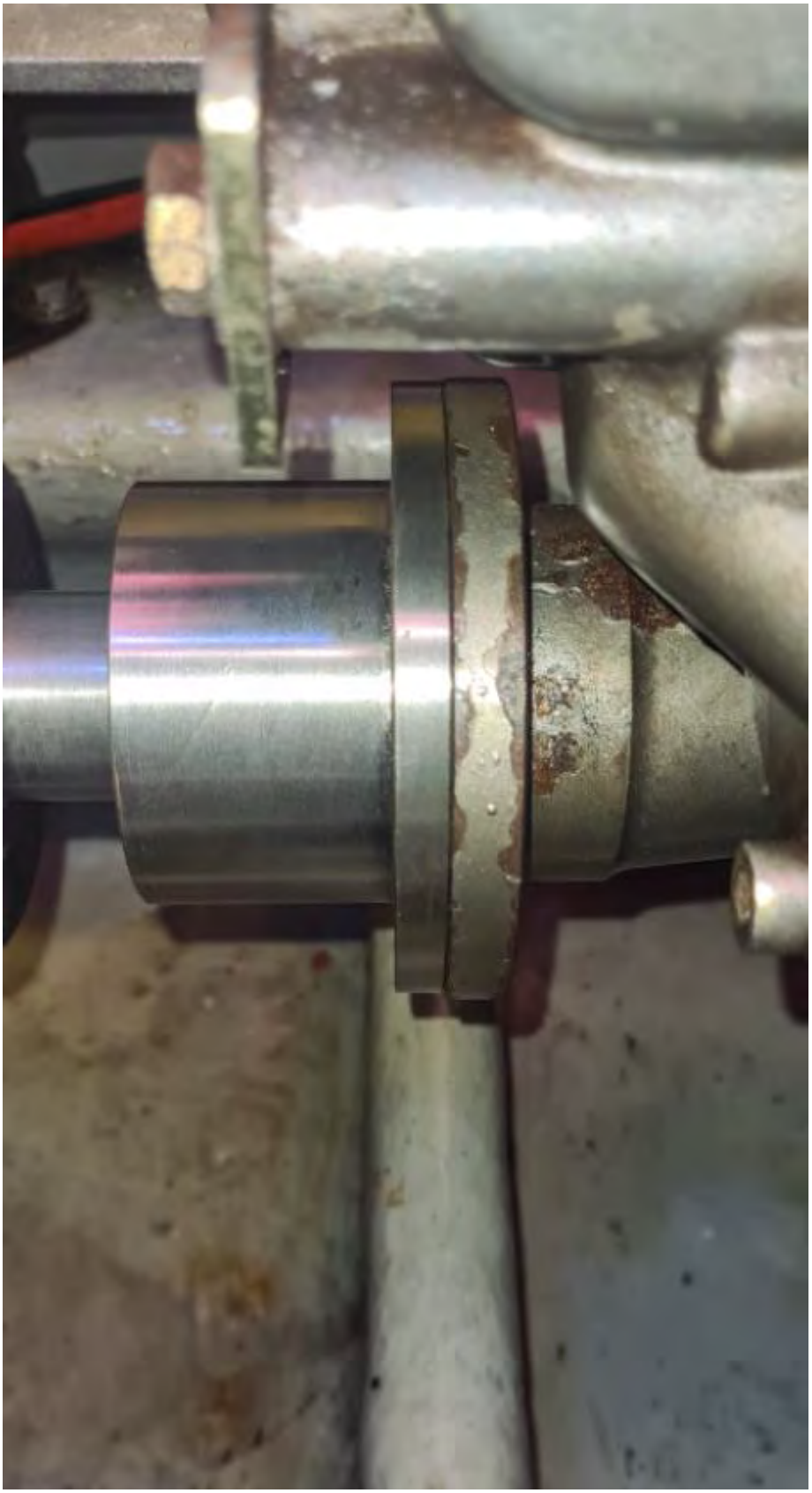
Adjust the engine in the axis's as shown with the four engine mounts.



The C-Drive tilt can be adjusted using the separate C-drive Engine mounts.



Both of the forward engine mounts will affect the total height adjustment of the C-Drive.
Make sure you don't rise it too high and put too much tension on the big black rubber seal/hose that differentiates your boat from a submarine.
According to other users, the C-drive shouldn't be raised much at all. Just enough to get the C-drive Cushyfloat mounts to take some of the weight off the drive.
The large hose clamps should be inspected/replaced and the top two clamps loosened slightly to ensure there is no unnecessary tension on the large rubber hose. This adjustment may result in a tiny amount of seawater seeping in.



I managed to get a very exact alignment after some mucking around. …but it took a while….

22. Mark the position

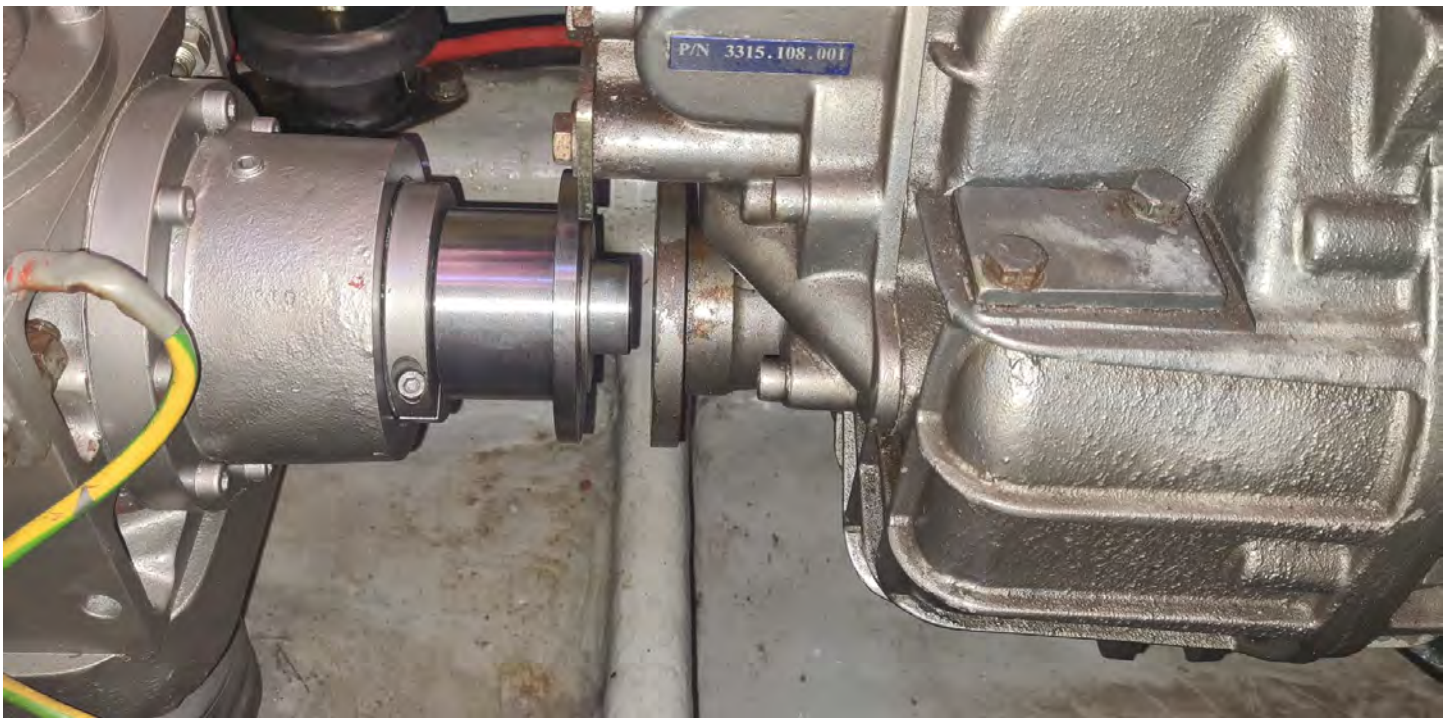
Mark the exact position of the engine once you're happy with the alignment.

Other instructions say you should drill a hole through the engine mount and steel frame to help with the realignment after you remove the fixed coupling. I didn't do that. I drew a line with a white marker and a sharp screwdriver. I figure you may have to drill a new hole every time and your steel frame will look like a swiss cheese after a while.

23. Loosely fix the engine Vetus and Cushyfloat mounts with the nuts

I very loosely put the four Vetus and the two Cushyfloat mount washers and nuts back only using my fingers.

24. Move/push the engine aft and remove the fixed coupling



Just move the engine aft until there's enough room to remove the fixed coupling / alignment tool.

25. Insert the Vetus flexible coupling

I didn't need to replace the Vetus flexible coupling, just the rubber doughnuts. It wouldn't make much sense not to replace the rubber doughnuts. Apparently, you have to machine the coupling if you get a new one. Read other threads and instructions on the forum for details. Use some grease or tef-gel or similar on the axis to ensure it doesn't stick. I wouldn't use LanoCote as it tends to melt away as soon as the temperature rises above body temperature.

New rubber doughnuts

26. Move the engine forward to the exact markings

In my case the engine slid straight back onto the Vetus coupling and to the exact markings.

27. Attach the Vetus flexible coupling with rods

Attach the Vetus coupling with M10 rods with nyloc nuts and lock washers and possibly Loctite.

Make sure to inspect the nuts regularly. At the very least initially. I can see the advantage of replacing the original bolts with rods, as it will help with extraction next time but rods nuts in both ends and thus doubling the chance of a nut unwinding.

Preferably measure and cut the rods shorter than I did in the image below.

28. Tighten all engine mounts and put everything back together

- Replace hoses and other “consumables”
- Treat rust and re-paint as necessary
- Check for water leaks
- Check exhaust pipe for cracks and wear – replace if necessary
- Change ATF fluid in gearbox? Check for leaks
- Check electrical connections and bonding
- Clean shaft brake disk
- Double and triple check that everything is tightened and fastened.