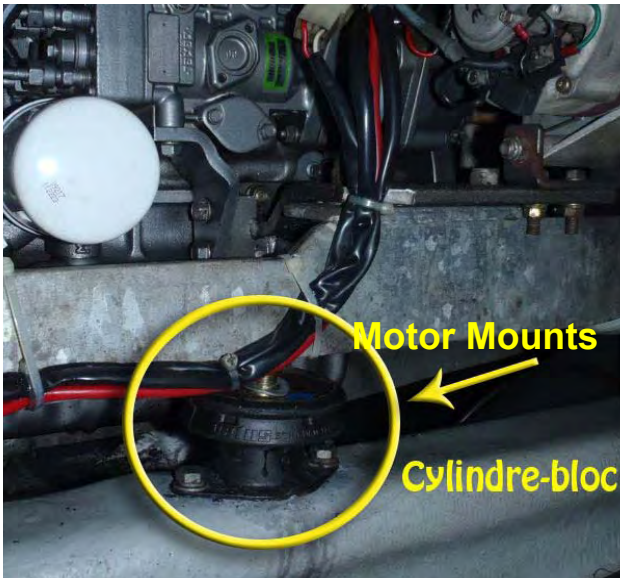
Replace Motor Mounts and Align Engine SM (other models similar)

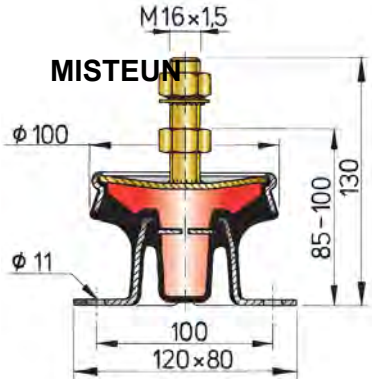
To create this, I used numerous documents, including one that was created in French. There is certainly more editing needed. Any help will be appreciated. A few parts of the text did not translate well and I need some help...that text is in RED. **See early SM & Santorin notes on last page**

Remove the cover fasteners on the engine hatch for it to hold open and fully upright. Attach the Mizzen halyard on the 2 engine upper mountings in order that it can be lifted. **Revised 27 Jan 21**



Replacement of Motor Mounts

Vetus Motor Mounts for Engine Frame



VETUS HYDRAULIC ENGINE MOUNTIN MITSTEUN. It is filled with oil. When oil is noticed at the Motor Mounts, replace them. **NOTE:** Some SMs were originally equipped with Yanmar Motor Mounts, others with the Vetus K50 at all 6 positions, including C-Drive.

Measure very precisely the height and the adjustment of each Motor Mount and mark the position of each. These measurements will be used to preset the new supports understanding that they will be a little higher than the old ones which will have subsided over time.

Remove the brake cylinder (if equipped) Measure the length or count the number of exposed threads of the extended adjustment bolt on the cylinder. **Remove** the locking nut and completely unscrew the bolt 22mm located at the rear of the cylinder. The calipers should open. Now remove the cylinder. **Unscrew** the brake cylinder's pressure hose at the reversing transmission (a few drops will fall but it will not drain the reversing transmission).

Locate and Mark the precise position of the cylinder mounting plate, which supports the calipers on the frame. **Remove** the support plate completely. 2 bolts 22mm. Access to Vetus flexible coupling is now improved.

Decouple the engine from the C-Drive.

Lift the 4 corners of the engine chassis using the mizzen halyard and replace the Motor Mounts.

Replace the mounts.

Optional SM (Yanmar): Remove the 4 hose clamps (at the outlet of the turbo and on the Vetus Water Muffler), we then remove the Vetus Water Muffler and the Large Exhaust hose is pulled towards the rear of the engine to clear the chassis. Access is then very easy for unscrew the old Motor Mounts. You need 24mm to dismantle the exhaust hose running along the diesel tank.

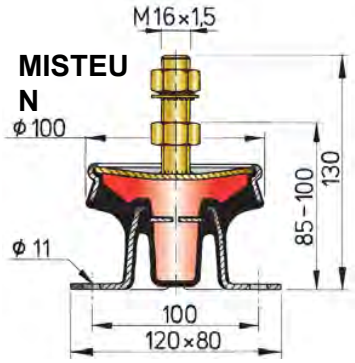
Vetus Motor Mounts for some SM Engine Frames and most SM C-Drive cross-members

Vetus K50, K75 & K100 are exactly the same size. I cannot tell them apart by measuring.

Vetus K50 Motor Mount

Amel used many different motor mounts. When Bob Rossi changed them on his SM 429 KAIMI changed his mounts, all 6 were K50s. I believe that many different mounts will work and there is no right one, except if you want to replace them with exactly what you have. In that case, only you can Identify them.

Vetus K50 Motor Mount

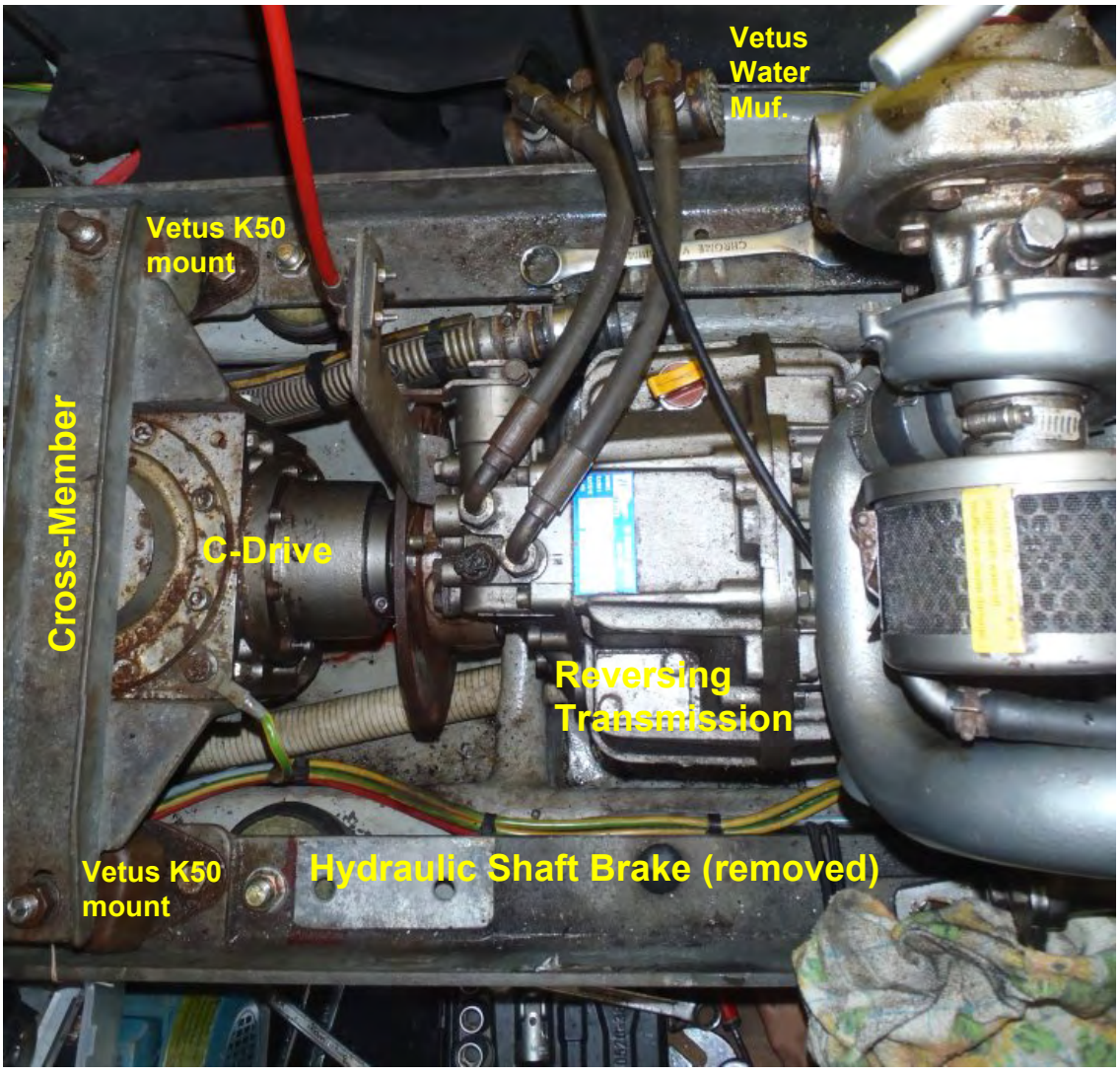


The Amel "C" drive design presents a novel marine engine mount configuration, namely, there is absolutely no thrust component and the mounts are not fastened to the engine!

Conventional "factory spec" mounts for marine (propulsion) engines are designed to handle three components; vibration dampening, torsional resistance and mostly, a huge thrust resistance. Without the requirement for withstanding a thrust component, I would assume as fact that "factory supplied" mounts are over specified for an Amel ("C" drive).

In fact, the "Amel way" (on "C" drive boats) does not even attach any "engine mounts" to the engine! Instead the engine is "hard bolted" to the frame carrying both the engine and "C" drive and the entire frame is connected to the hull with "engine mounts" (the "C" drive has it's own "engine mounts" to the frame). These "engine mounts" might more appropriately be called "vibration dampeners".

So, for example, Yanmar "factory spec" "engine mounts" are designed for four independent attachment points to the engine stringers to resist the full HP thrust of the propeller and handle torsion and vibration. On the Amel "C" drive, there are six "engine mounts" - four attachment points that are not independent with respect to the engine and two more for the "C" drive. Clearly a different engineering situation.



C-Drive Mounts:
Remove the nuts circled in Red above from the mounting studs. Then remove the mounting stud from each C-Drive mount. Then remove the bolts circled in Yellow that bolt the C-drive mount to the engine mounting frame. Once you do that you can slide the old C-Drive mounts out from under the mounting frame and slide the new ones in. As I understand it, the mounts should be adjusted so they are just barely starting to support the weight of C-Drive. If you crank them up too much you will put strain on the rubber hose that is keeping the water out of the boat. To relieve any strain, you can loosen the top two hose clamps on the large rubber hose (water will come in) and they tighten them back up.

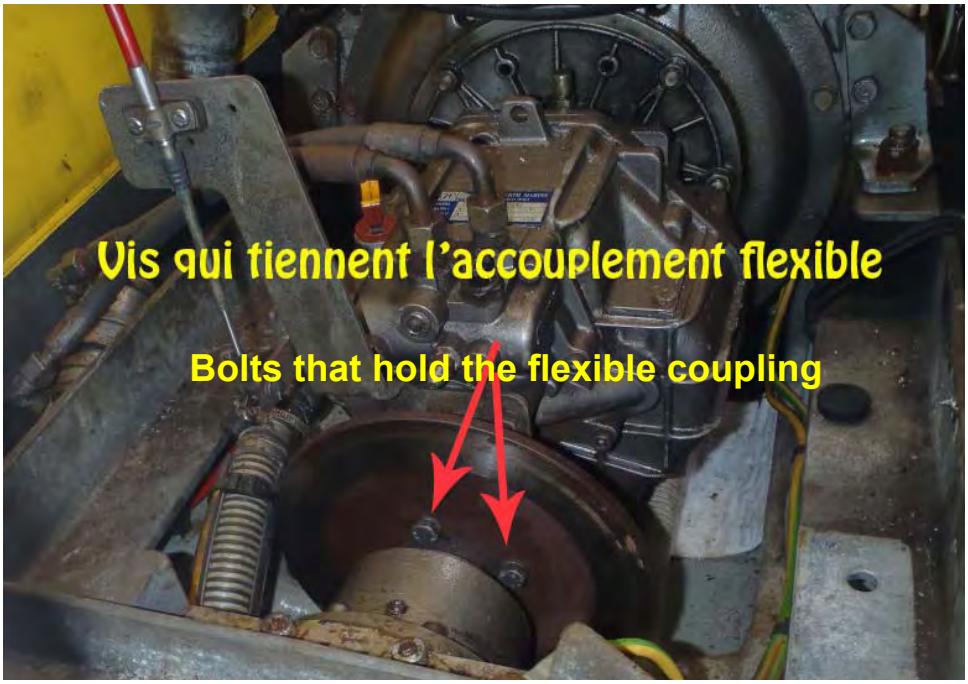
3) Vetus Flexible Coupling Removal

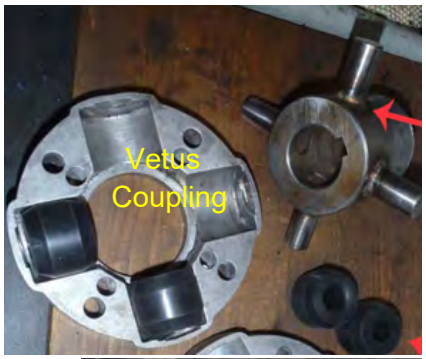
Unscrew the four nuts (24mm that hold the engine on the Motor Mounts.

Raise the engine with the mizzen halyard about 10 to 15 cm. When we the engine is free of the motor mounts, it can be moved with large screwdrivers or crowbars on the front supports (reversing transmission side. You should be able to move the engine by hand, it weighs about 250 kg and slides easily. You might have to dismantle some pieces to access the coupling nuts. Be prepared to mitigate any saltwater spillage.

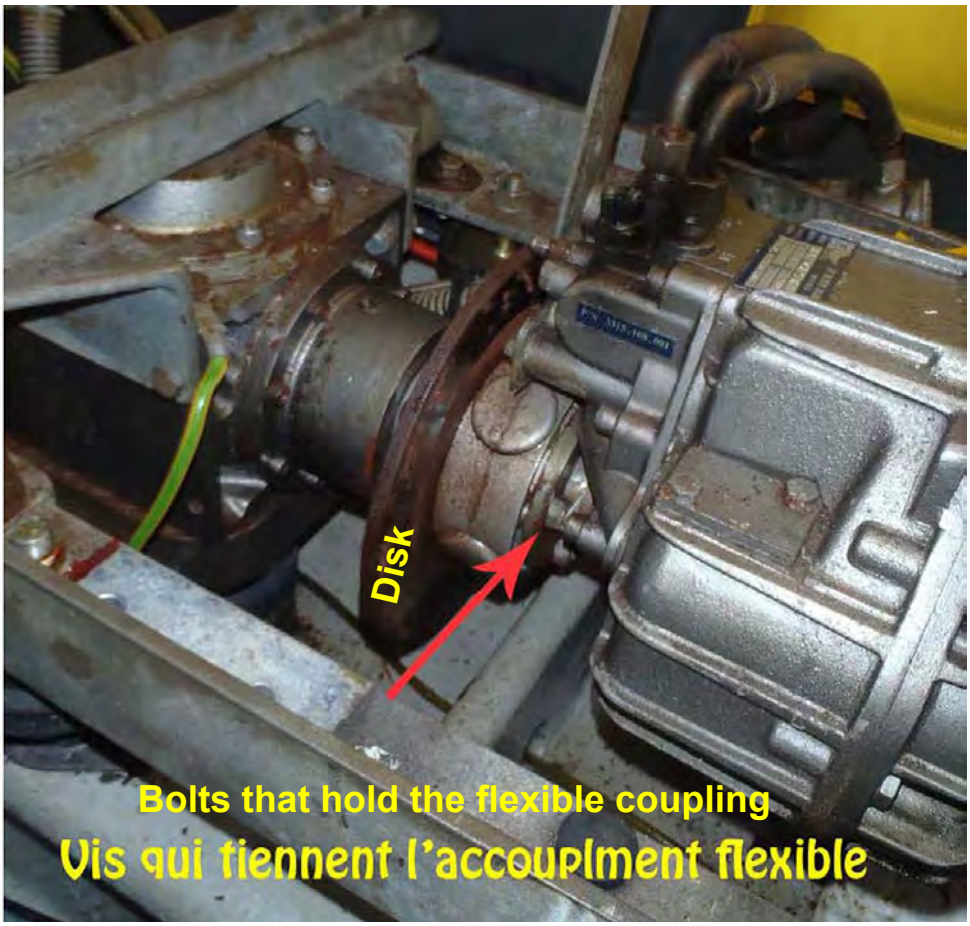
Remove the gray PVC pipe Shaft-protector held by a stainless steel clamp.

Unscrew the four nuts (17mm on either side of the shaft-brake disc. The flexible coupling halves should separate. Usually only the aft half of the flexible coupling removes easily. When it is removed, notice the 4 large round rubber donuts mounted on 4 stainless steel shafts (Vetus K018 4 rubber bushings).

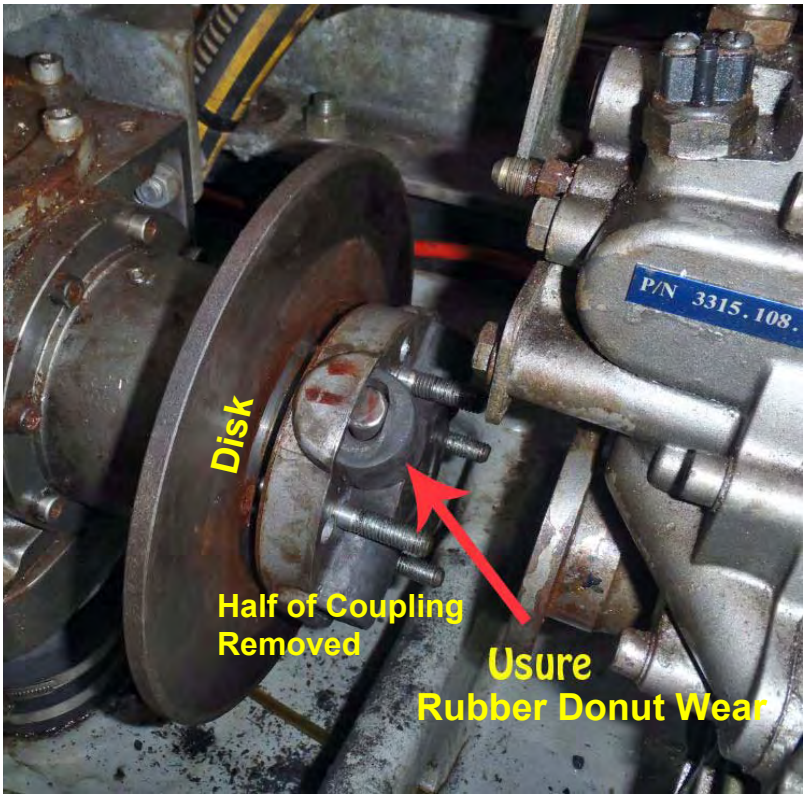




Above: Reversing Transmission Output Coupling



PEARL: I used a chisel and hammer after soaking in Corrosion X (on the advice of Craig). Heating with a blow torch was the secret.
I used the tool, but the connection from my gearbox is a spider (four arms) rather than a circular plate, so using feeler gauges was a little more tricky than when the gearbox is fitted with a circular plate. I got a short piece of 35mm tubing which fits inside the Amel tool and slides along as an extension to the drive shaft. You can then slide this tube up to the centre of the Gearbox to get the direct line of the 35mm shaft. Ian, Ocean Hobo SN 96



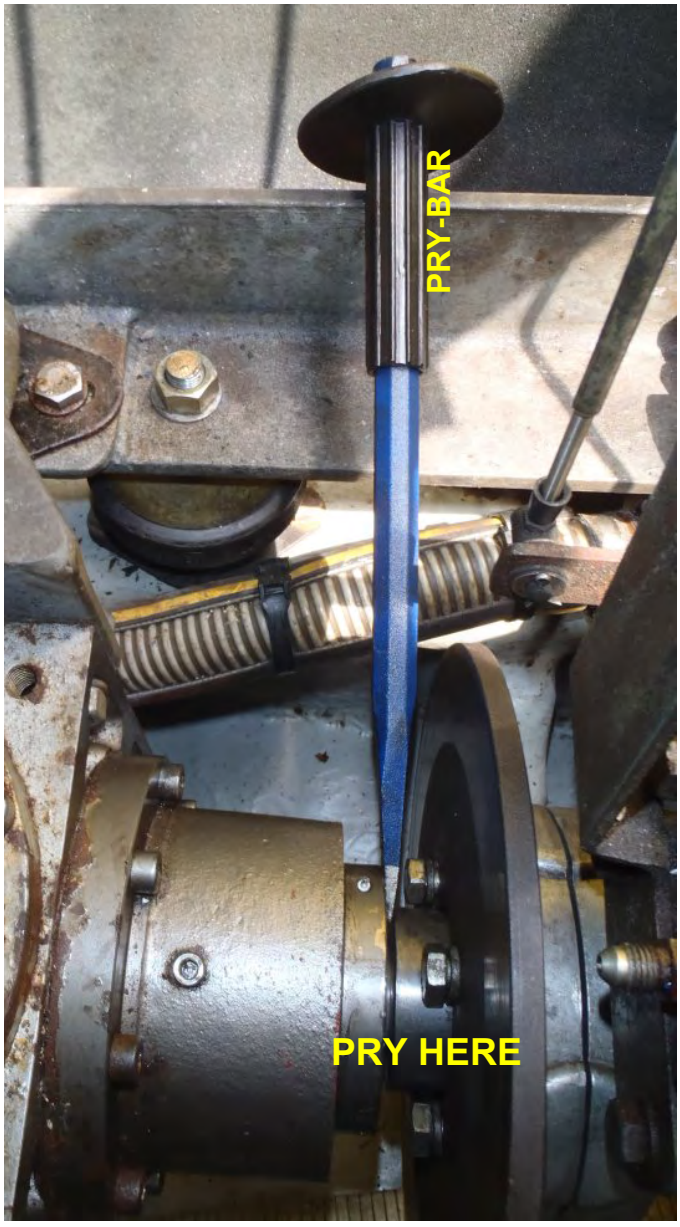
It is very likely that the flexible coupling will not easily release from the shaft. Take care not to damage the the shaft (diameter 35mm).

Use plenty of penetrating lubricant and 2 large screwdrivers or pry-bars to remove the flexible coupling by prying in the groove located between the C-Drive and the coupling.

Do not hesitate to use heavy force on the pry-bar. Pry, then turn the shaft 1/4 turn and pry again. Spray the shaft continuously plenty of Penetrating Oil.

Note: There is one key on the coupling.

It may be necessary to move the engine aft to clear the flexible coupling. This flexible coupling is a Vetus Type 6 for a 35mm shaft. If you find damaged rubber donuts, you need **Vetus kit K018.** It is very likely that you will replace the entire Vetus coupling. You will not know until it is removed.



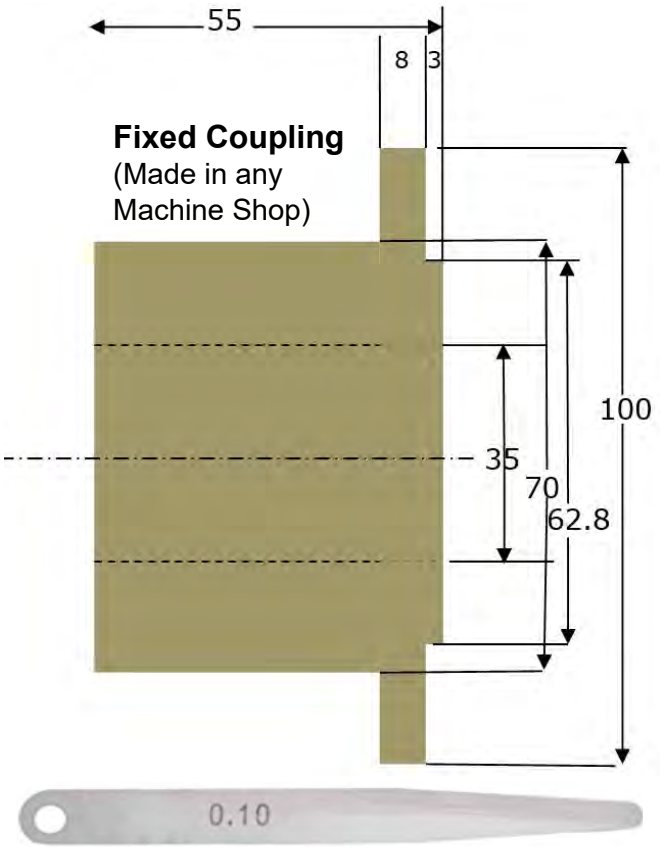
Vetus K018 kit includes 4 rubber bushings

Vetus K053 Original

Vetus K053 Modified: Coupling modified by Amel. Note the bevel which was machined at the shaft entry by Amel

4) The Alignment

I highly recommend using a Fixed Coupling to align the reversing transmission output Output Coupling with the C-Drive input shaft. The following drawing is for a 35mm shaft.



PEARL: Make the bore of the Fixed Coupling a few thousands larger than 35 mm, otherwise it will be very difficult to get on or off the shaft, also machine a slight bevel on the longer end so that the Fixed Coupling enters the shaft with ease.

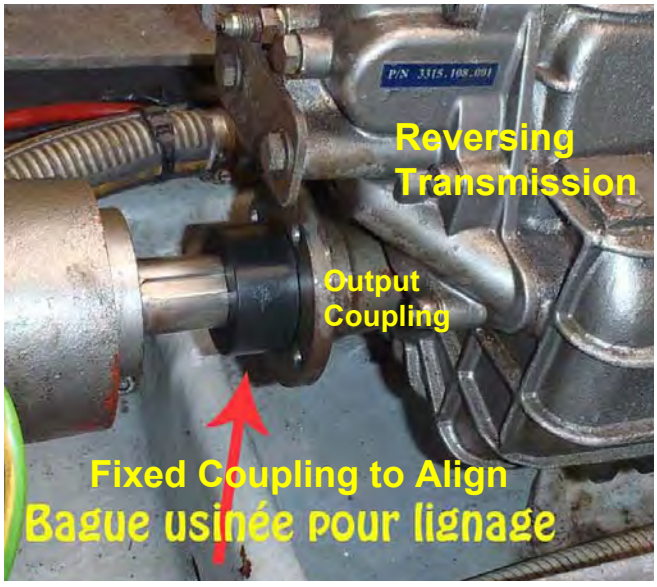
Press the Fixed Coupling on the C-Drive shaft where the Flexible Coupling was located.

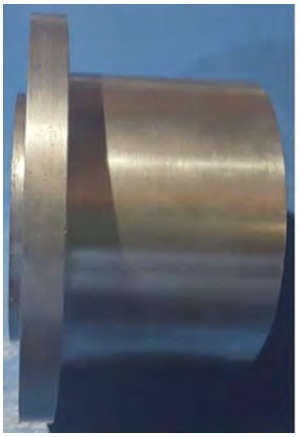
Ease & Adjust the halyard and move the motor to roughly align the Fixed Coupling to the reversing transmission Output Coupling.

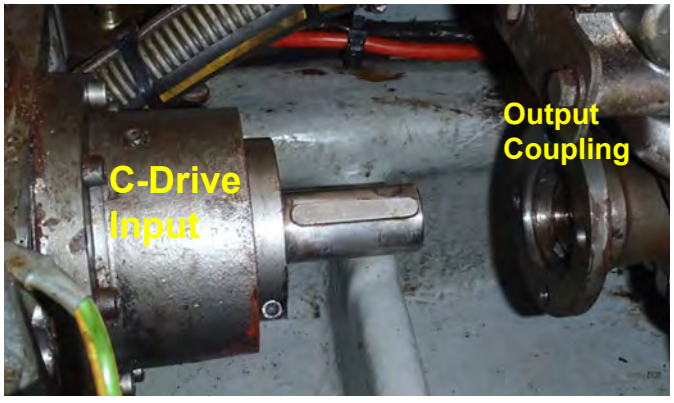
Ease the bolts on front cross member that supports the C-Drive. Then, when it is free and flexible, the bar is compressed by tightening the nuts of the two Motor Mounts under the front crossbar (24mm) from one turn to one turn and a half turns.

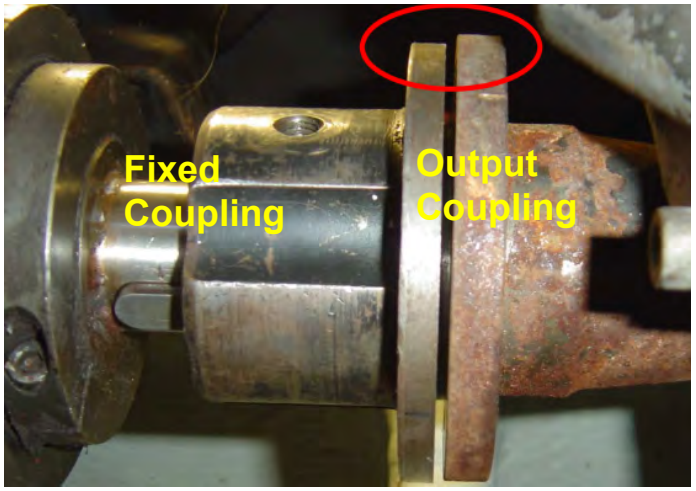
Note: There is less weight on these cross-member motor mounts than on the other 4 motor mounts under the engine. Care must be taken to ensure that this weight difference does not the cross-member mount to cause a binding from miss-alignment caused by the weight difference. ***Look at the final step on the last page.***

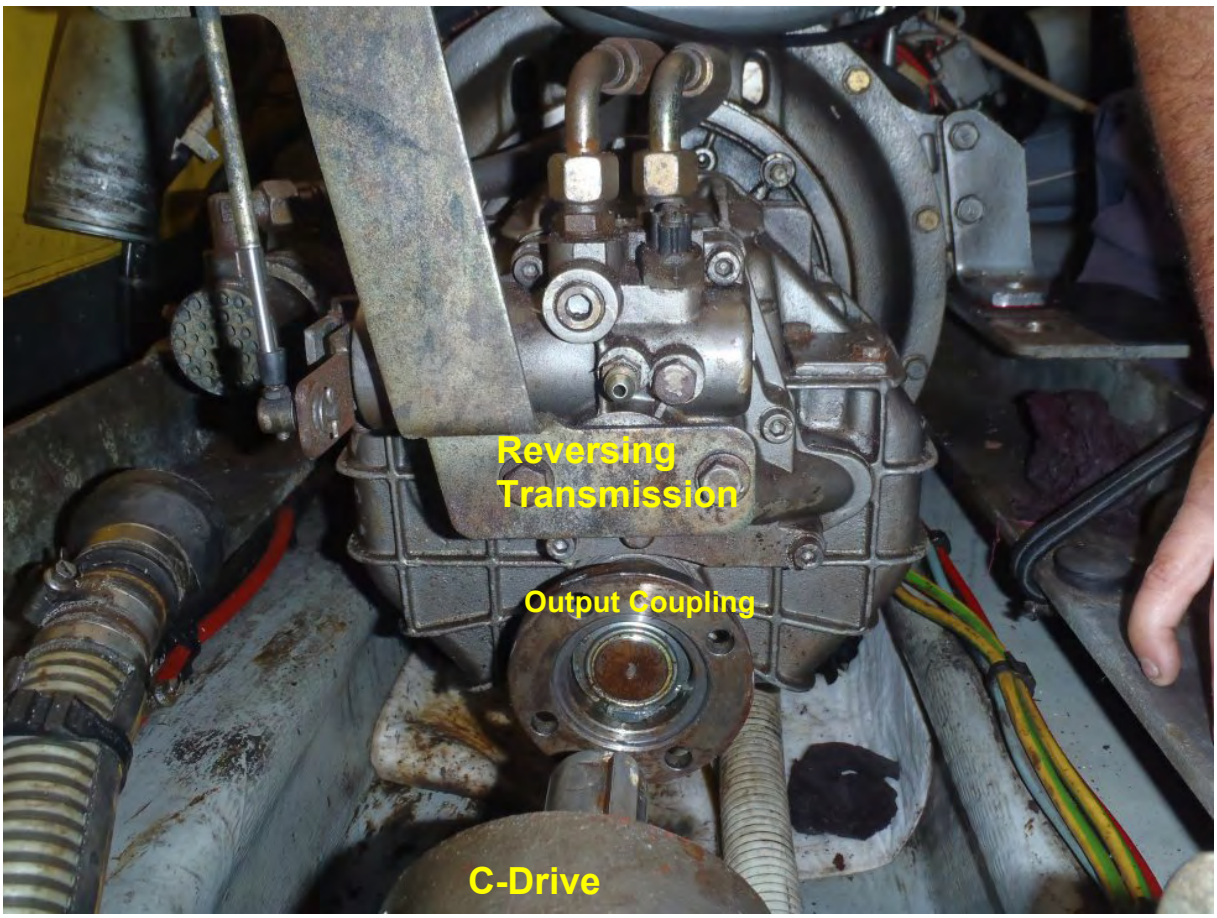
Adjust the gap circled to 0.01mm, which is 0.004 Imperial, all around the circumference of the output and fixed coupling joint. You should be able to turn these couplings by hand with the reversing transmission in neutral. See photo at left.



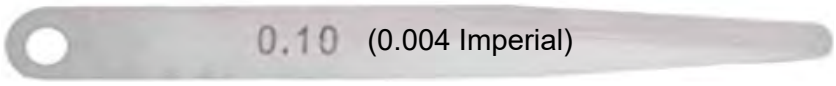






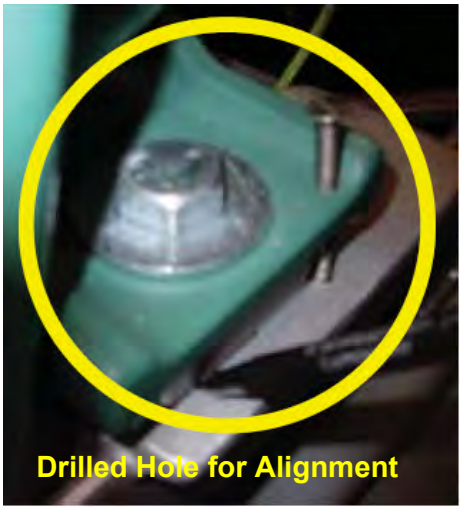


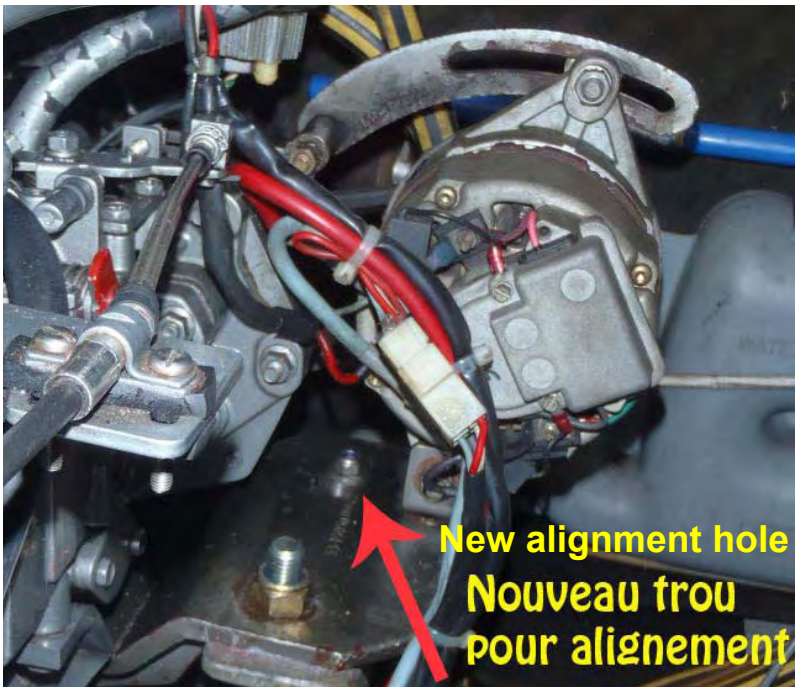
The height adjustment is done by varying the motor mounts. For the transverse and longitudinal setting, the motor position is adjusted and moved by using the halyard. Begin the alignment by adjusting the motor mounts by sight (eyeballing it) ensuring the coupling freely rotates. Next, use a 0.1 mm flat feeler gauge, which is 0.004 Imperial, all around the circumference between the Fixed Coupling and the Output Coupling of the reversing transmission. It is IMPORTANT that the gap is identical all round (between the Output Coupling of the reversing transmission and the Fixed Coupling.



0.1mm Feeler Gauge OR
0.004 Imperial

Once the engine is perfectly aligned, locate very precisely the position of the motor mount studs longitudinal and transverse adjustment. Drill a hole in the port aft engine support which passes through the chassis. There was a hole, but it will no longer align with the new position of the engine. You may have to move the 24V alternator. This is a very valuable reference to use later. It will help you place the engine in the perfect place. Place the bolt in the adjusted hole and manually rock the engine to find the 3 other mount studs. Now mark the 3 other pads with a marker.





Slide the engine toward the aft and replace the Fixed Coupling with the new or refurbished original flexible coupling. This may be difficult. Use Emory Cloth to sand the shaft and inside the coupling so that they are well polished. Also file the edges of the end of the shaft and the edges of the opening of the flexible coupling with a small file to make a slight bevel to facilitate placement. Lubricate the shaft and coupling assembly with Lanacote, grease, or engine oil. Do not force the Fixed or Flexible coupling on the shaft.

Move the engine forward and to its correct position by using the alignment hole and marks made previously. Take this opportunity to assemble with new bolts, washers, and nuts-especially the Nyloc nuts.

Start the exact engine placement by inserting a bolt into the previously drilled hole in the support pad at the rear port-side of the engine. Manually move the engine to locate the other three studs (identified positions). Tighten all.

Final Step - Cross-member mount adjust

At the completion of the above positioning operation, the two motor mounts on the front crossmember, which maintains the angle C-Drive need a slight adjustment. Loosening the cross-member motor mount nuts 1/4 turn should realign everything.

It is possible that the new position put in tension the C-Drive Rubber Hose which seals the opening between the C-Drive and the hull (see above photo).

Loosen the top two large hose clamps to place the hose in a neutral stress-free position. **CAUTION** During this operation, the sea water will enter the boat but the gray water sump is nearby. Tighten the two clamps when complete.

Refit the brake cylinder and plate, the exhaust turbo outlet, the inlet and outlet of sea water and perform a sea trial and test at various RPMs for engine vibration.

The procedure takes time, patience, special tools, and some luck. Experience will help.

Early SM & Santorin Notes

I have re-red the paragraph I wrote in your update. I was wrong about the gearbox plate which is not a spider with four arms. I have included a photo of the plate.

As you can see it is not a complete circular plate, neither is it flat. So the feeler gauge has to go between the raised inner ring and the Amel tool. Lining up the engine is less easy, which is why a used a short 35mm steel tube which is just short of filling the gap with the Vetus coupling removed. It fits into the hole in the Amel tool and can slide forward to line up directly with the gearbox shaft. Sorry I haven't got a photo of that.

Another point on the Santorin (and the earlier SM) is that with the prop shaft alternator belt pulley, the bolts supplied with the Vetus coupling bushes are not long enough. I don't know if this is the same as with the shaft brake.

Ian Ocean Hobo SN 96