

Technical notes of interest to Marine Engineers

The Alfa Laval MAB separator

A practical maintenance guide

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These units are used extensively on the smaller ships, larger boats and yachts. I have worked on several in my short time at sea. One day we were bored and a bit un-impressed with the cleaning manual we had, so we made our own guide to cleaning them. Following the brief introduction from the Alfa Laval MAB brochure, below, you will find a, hopefully, helpful illustrated guide to routine maintenance on these units.

Application

Purification or clarification of mineral oils used in marine installations and power stations (fuel and lubricating oils).

Working principle

Separation takes place in a solids-retaining bowl that can be arranged for either clarification or purification. In both cases, the contaminated oil is fed into the separator through the centre, and it is separated by centrifugal force into its various phases, the heaviest phase (sludge and water) being forced outwards to the periphery of the bowl. The accumulation of sludge is periodically removed from the bowl by hand.

Installation

The oil is pumped, heated, and separated as shown in the figure. A liquid seal in the separator bowl prevents the oil from escaping through the water outlet. If this seal is broken, an alarm device is activated. With unmanned engine rooms, the signals are transmitted to a remote control unit. When the seal is broken, the three-way valve shuts off the oil feed and the oil is recirculated until the fault is corrected.



Standard design

Solids- retaining separator comprising a frame containing in its lower part a horizontal drive shaft with friction clutch and brake, worm gear and a vertical bowl spindle. The worm gear is placed in an oil bath.

The bowl is fixed on the top of the spindle inside the space formed by the upper part of the frame and the frame hood which also carries the feed and discharge systems. The frame hood is hinged to facilitate easy access for cleaning the bowl which is of the solidwall disc type.

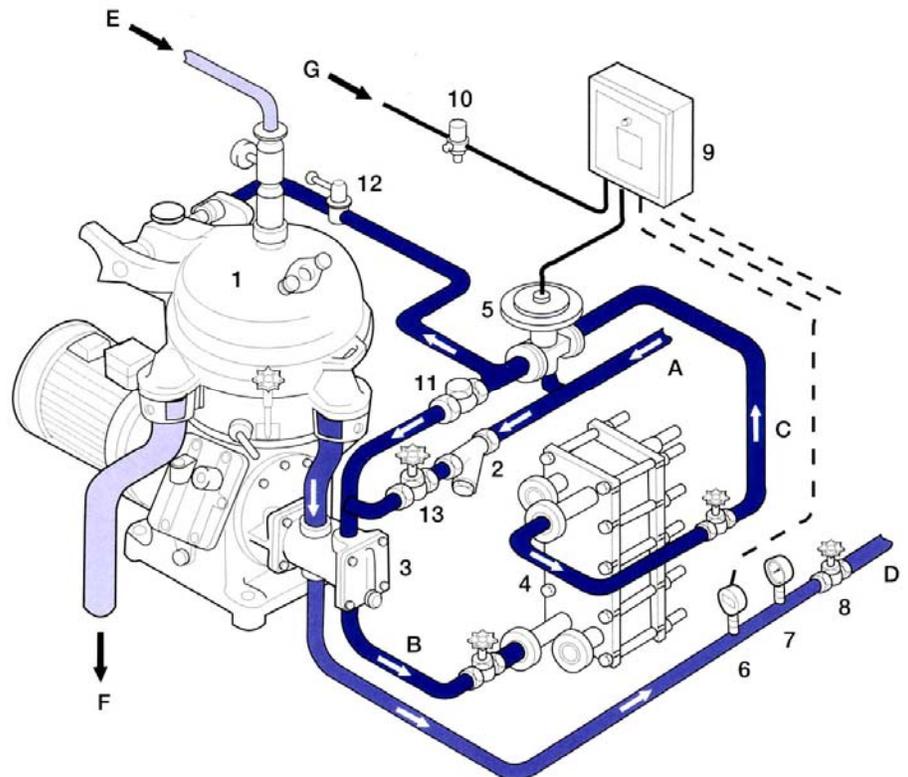
Basic equipment

Dirty oil inlet device. Clean oil outlet device with sight glass. Water outlet spout. Liquid seal water inlet. Set of gravity discs. Clarifier parts comprising discharge collar, top disc without neck, and bottom disc without holes. Revolution indicator. Set of resilient mountings. Set of Standard Spare Parts. Built-on gear type pump (combined feed/discharge pump).

Extra equipment

Electric motor. Starter. Set of tools. Set of recommended additional spares for long-time service. Flexible connections. Preheater. Alarm device for broken liquid seal.

- A. Oil feed to pump
 - B. Oil to heater
 - C. Oil to separator
 - D. Oil from separator outlet
 - E. Liquid-seal supply
 - F. Water outlet
 - G. Air supply for three-way valve
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- 1. MAB separator
 - 2. Oil strainer
 - 3. Feed/discharge pump
 - 4. Plate heat exchanger
 - 5. Three-way valve
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- 6. Pressure switch
 - 7. Pressure gauge
 - 8. Regulating valve
 - 9. Liquid-seal alarm cabinet
 - 10. Air reducing valve
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- 11. Check valve
 - 12. Shut-off valve
 - 13. Regulating valve



Fuel Oil Purifier Cleaning

Text: M. Leduc, Pictures: J.Gibas.

The Alfa Laval MAB104 is a fuel oil purifier that purifies marine diesel oil. The fuel is then stored in the day tank prior to consumption. Depending on the delivered quality of the fuel, the fuel oil purifier – FOP, undergoes schedule cleaning every 25 hours of operations. This document serves to illustrate the procedure for those unfamiliar with it and perhaps re-iterate some points of the maintenance to those who are familiar with its maintenance.

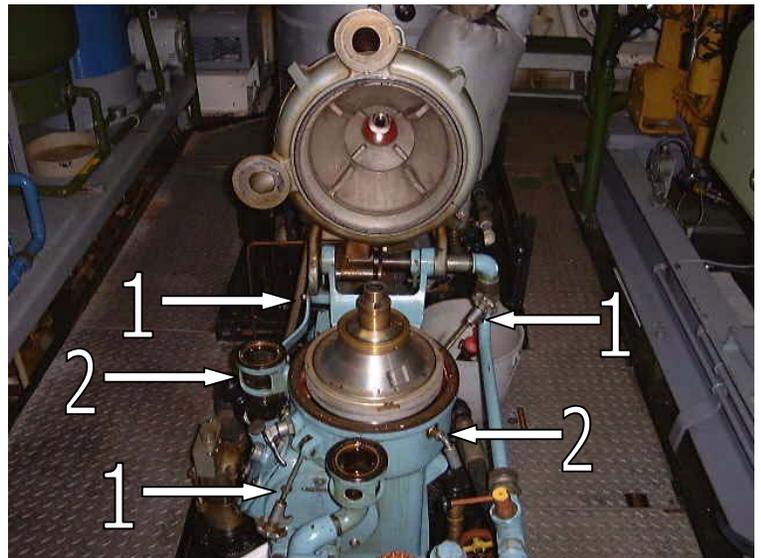


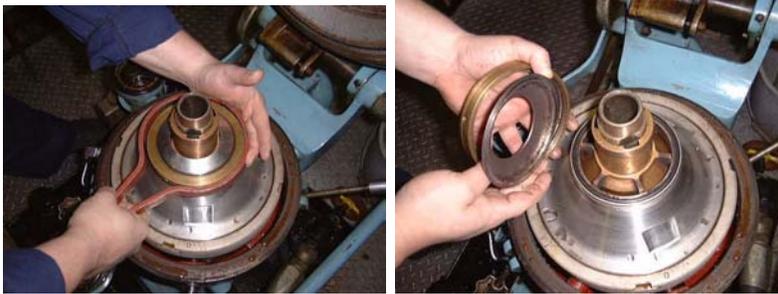
The objective of the task is to remove the build up of sludge, dirt, grim that gathers on the individual disc during the separation procedure. This debris must be physically taken off.



Before starting, be sure you are ready: Make sure you do not need the purifier for two hours (day tank full). You have all the tools; on the board above #1 SSG. The cleaning basin is empty and ready to place parts in. Having two 15l. Pails filled half way with diesel oil will make sure things go smoothly. Hunt down the Silicon (lube for o-rings) and Molykote (lube for threads).

- 1) Once unit is lock out with no chances of starting, the lid should be unfastened and open by undoing the two clamp bolts – look at its pivot point for the lock, which keeps the lid open.
- 2) Secure the bowl assembly by screwing in the two lock screws.





- 3) Using the smaller Alfa Laval spanner, remove the gravity disk-locking ring by turning **clockwise** to remove. Hand power should be enough force. Remove gravity disk and o-ring; take them to the cleaning bin.



- 4) Using the larger Alfa Laval spanner remove the bowl's lock ring. Using a lead hammer (dead blow) from the Oil Purifier station, tap handle of tool in a **clockwise** fashion. Remove bowl hood and take it to the cleaning bin with the lock ring, paying attention to the o-ring around the bowl's hood



- 5) Remove the top disc and take to cleaning bin. Then grab the disk stack and lift straight up and into one of your buckets half filled with clean fuel oil. The disc soaking in diesel will make cleaning them easier.



- 6) Empty the bowl of the oily water using the small suction hand pump or cup. Remove the spindle lock nut (not shown) using the wrench on the FOP tool board. Then in its place, screw in the puller; also on the FOP tool board, until you feel a slight rise in the bowl (becomes unseated). With the puller secure, the bowl may now be lifted and carried over to the cleaning bin.



- 7) Take this time to prepare for re-assembly by cleaning the inside of the unit with a rag. Then checking spindle "wobble", there should be very little. Carefully take out the lid's o-ring and the two sight glass o-ring; clean and inspect for damage. Lube o-rings with Silicone and place in grooves. The FOP is now ready for re-assembly, once cleaning is complete.

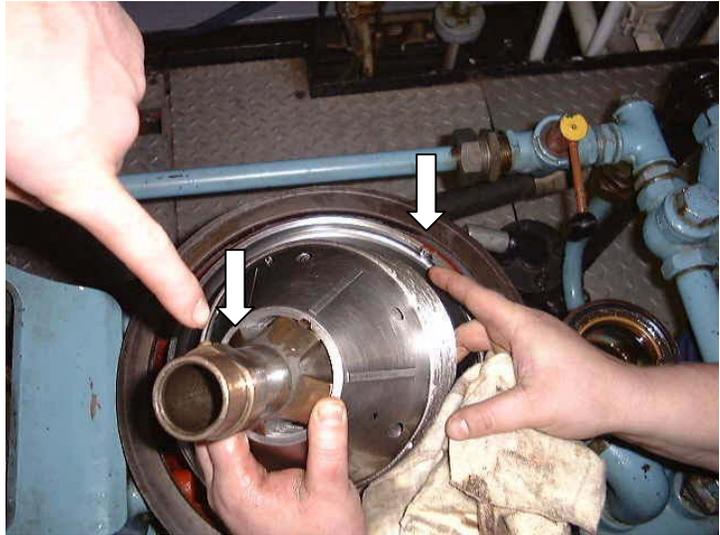


- 8) At the cleaning bin, using gloves; clean the gravity disc, hood, top disc and locking rings with a plastic brush and clean fuel oil from your second bucket. Place the above items on the rag-covered deck to drip dry. Clean and inspect o-rings. Then clean the purifier's bowl. Once clean, dry and carefully place it back on the spindle in the purifier and tightened the lock nut. The important thing to remember while cleaning purifier parts is to **not** scratch, gouge or dent the surfaces. Therefore, no metal instruments, steel wool or the likes should be used. If you have a stubborn spot that the brush cannot get, use a stiff piece of plastic, such as a kitchen spatula or the likes.



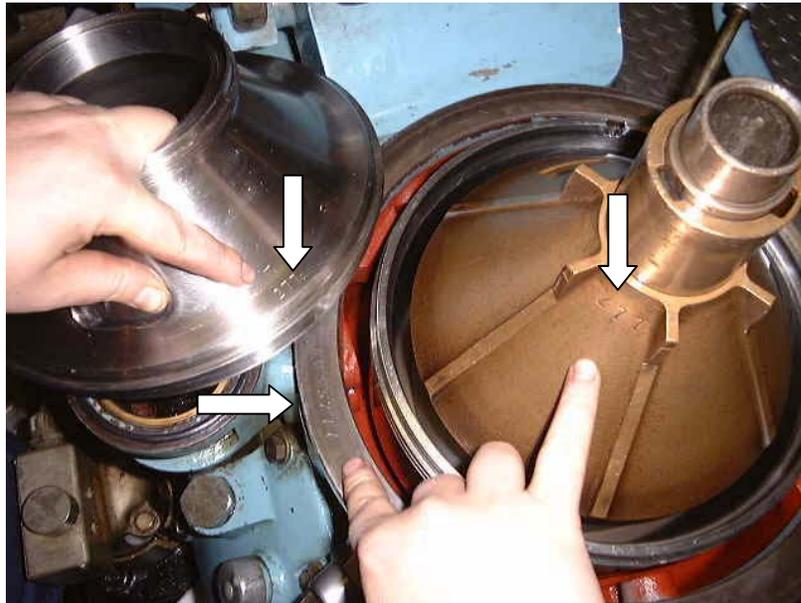
- 9) Take the stack of disc out of your first bucket, tip up side down and place it in the cleaning bin. Carefully remove base, clean and stand upright to the side of the bin. Then, one by one, take a disc, clean it using the soaking fuel oil to rinse them. Once clean, place it on the base without losing it's stacking order.

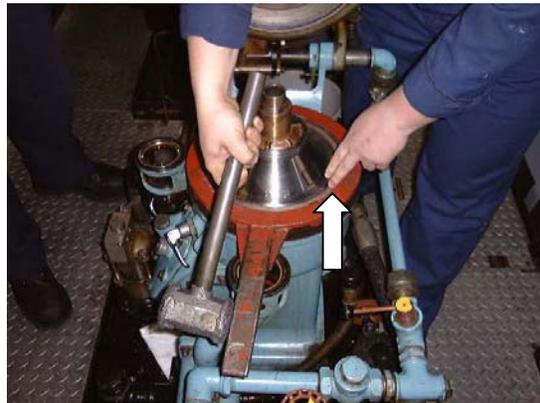
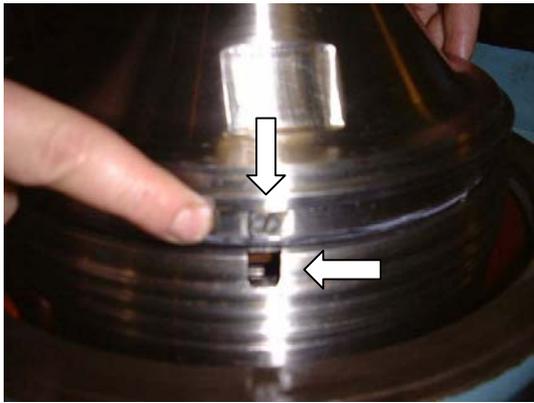
10) With all the disc on the base, take the lot and re-install it in the bowl in the purifier. The disc set is matched with the bowl, so rotate the stack until it falls ($\sim\frac{1}{4}$ ") into place. In the picture you can see the flat area of the base lines up with the notch in the bowl.



11) Then place the top disc on the stack of disk (not pictured). It too, is aligned with the bowl, so rotate the top disc until it falls ($\sim\frac{1}{4}$ ") into place.

12) The complete bowl unit is balanced at the factory, so it is crucial for the parts that were balance together, be put back together. Check for the factory stamping of the pieces; they should all be the same. On this purifier it's 277, the last three digits of the purifier's serial number.





13) Lubricate large o-ring with silicon and set it in the groove of the hood. Place hood on the bowl, aligning the tab on the hood (picture above) with the notch in the bowl. Do not force anything; the entire piece up to this point should have "fallen" into place without force. Lightly lubricate the large locking ring with Molykote and install. Using the dead blow hammer, the large spanner and medium force, drive the locking ring **counter clockwise** until the "O" marks on the ring match up to the "O" marks on the hood. Should the marks line up and the ring still be loose, keep driving it until it stops. The angle between the two marks is an indication of wear. Should the angle be too much (~25 degrees) the whole bowl should be sent to Alfa Laval for servicing.

14) Clean and lubricate small o-ring and insert it in the hood's top groove. Place gravity (aka Paring) disc and installed small locking ring after lubricating threads with Molykote. Moderately tighten it using the small spanner.



15) Release locking screws and rotate bowl assembly to check for trouble (grinding, roughness etc) it should be smooth. Close the unit's lid and secure both clamps hand tight.



16) Remove lockouts and test your handy work. See, that's not so hard! ΩΩΩ

