

# After cooler and Oil cooler service notes

## Nov 2018

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Disclaimer: Notes are done by boat owner who is not a marine technician or Yanmar specialist, so treat notes accordingly!

Job was done after 1450 hours on the engine and 10 years. Overall it took about 8 hours of my time (inefficient) and 2+2 hours of a general boat handyman. Condition of the After cooler was very good with very little build up of calcium but considerable build up of calcium for the Oil cooler. The radiator fellow (Gary of Port Moody Radiators) said the Oil cooler was getting overdue for a clean up. Perhaps 40% to 50% of the tubes were substantially clogged. No signs of engine temperature overheating had been observed prior to the service.

Pics of after cooler tubes and one end cap below:





Pic of Oil cooler tubes below:



Yuk!

## Notes for removal of After cooler. (2008 6LYA-STP)

- Tools
  - Various metric wrenches. (12mm, 14mm and 27mm) (27mm is not part of a normal set of wrenches)
  - Large adjustable wrench (for up to 1.5" locking nut for oil tube connections to Oil filter and for oil pipe connections to oil cooler)
  - Various screw drivers for clamps
  - Metric sockets. Long reach for the oil cooler clamps
- Order these spare parts
  - Three large O-rings for the after cooler. (Two for the end caps and one for the tube-set to outer housing)
  - One gasket (skewed rectangular in shape) between After cooler and engine.
  - Its a good idea to have some spare clamps on hand for after cooler air inlet and raw water pipes. (Three clamps died during our service)
  - One gasket for oil cooler end cap.
- Run engine to warm up oil for easy removal
- Drain oil. (For removal of oil filter)
- If doing the oil cooler, then suggest to also drain the oil from the oil cooler. There is a drain plug at the base of the oil cooler.
- Put red flag on throttle to avoid accidental starting
- Close Raw water intake seacock
- Drain raw water. Raw water flow is from Engine cooler to gearbox cooler to Oil cooler to after cooler. Drain from oil cooler seems to be okay.
- Remove breather tube from top left side of after cooler



- Remove hose from gear oil cooler to main oil cooler.





- Undo all screws raw water clamps. (one behind After cooler and one connecting oil cooler to after cooler)
- Loosen raw water clamps if possible with screw driver or hose tool.
- Loosen clamp for short hose from turbo charger into the after cooler (# 24 on schematic). (Large 3-4" clamp) (# 27)



- Remove throttle cable (and note which bolts are used)



and/or



- Undo bolt on after cooler right side end cap for a sensor cable or otherwise and move this out of the way



- Remove wiring for air heater plugs on top of after cooler. (Can also remove and check the air heater plugs at the same time)



- Remove air filter for turbo charger. There is a clamp behind the air filter before entry to the turbo charger and the whole air filter assembly can easily be twisted off and moved on top of engine.



- Remove the oil intake and outlet (metal) hoses from the oil filter (on top of the after cooler). No need to remove the whole oil filter assembly. These are the big bolts which need the 27mm wrench and the large adjustable wrench.



- There are about 10 (I think) bolts holding the after cooler in place.
  - 6 of these are for the engine air intake from the after cooler. (to the right side of the "M" in YANMAR) Don't remove the ones to the left



- Two are into the engine at the lower left side of the after cooler
- Two are close to the previous two but into a metal mounting close to where the raw water intake is to the oil cooler.



- One is behind the hose, so much more easily accessible after hose is removed.
- There are two are on the right side of the after cooler close to where the throttle cable was mounted but these are holding the throttle cable not the after cooler.
- Then wrestle for about 10 minutes with the after cooler (two people helps a bit) to get the three three hoses disconnected (two water and one for compressed air from turbo)



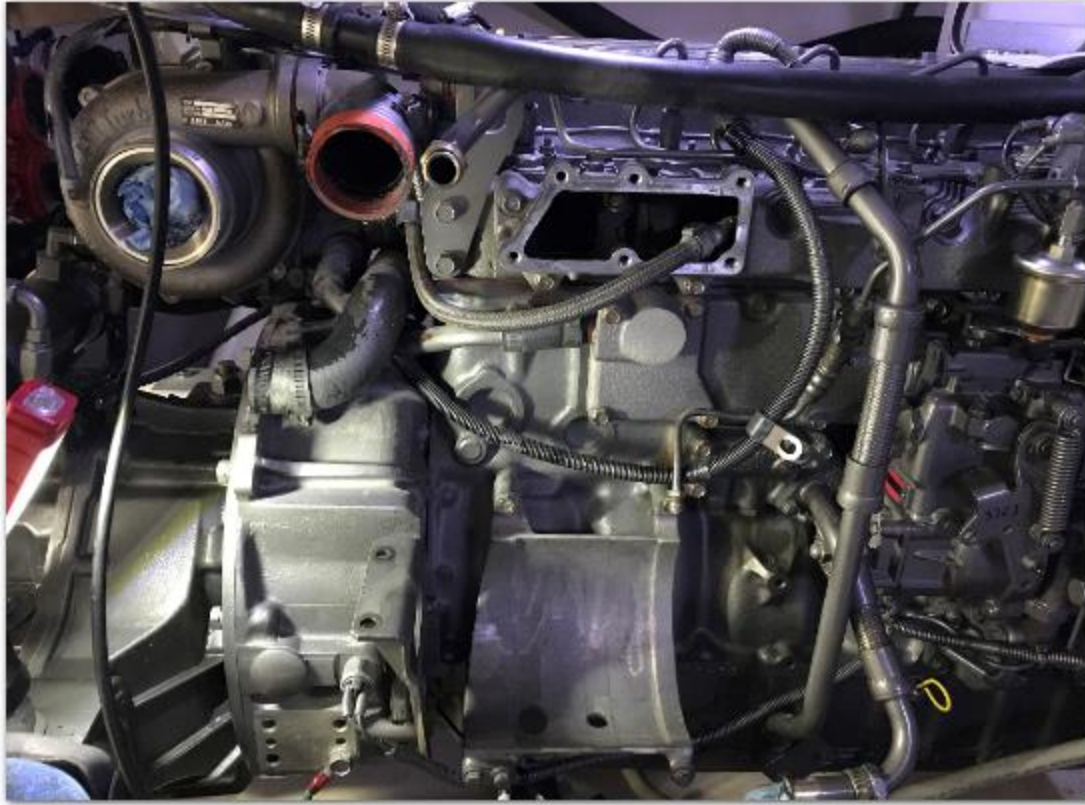
charger). A bit of cursing helps here. We did the left side water intake, then the water connection to the oil cooler and then the air intake from the turbo charger.

### Notes for removal of the oil cooler

- First, note that without the after cooler being removed, it would likely be impossible to remove the oil cooler.
- The oil cooler is simpler than the after cooler.
- There are two water hoses and four oil hoses and one wire which passes under the oil cooler which has to be loosened.
  - The two large oil hoses (one to the oil filter) can be removed with the large wrenches as above). One of the two smaller hoses can be removed, but the other one is best done when the oil cooler can be moved a bit to provide easier access.
  - Remove the one oil hose from the oil cooler to the oil filter, but remember how it was positioned for re-assembly.
- There are two metal clamps holding the oil cooler in place. Use a long reach socket wrench to loosen the nyloc nuts. (Or spend a long time with a regular wrench). The metal clamps can then be removed. These are around two rubber fittings which sit between the oil cooler and the cradle which supports the oil cooler. These can be removed at any time or even after the oil cooler has been taken off.
- Once the oil cooler is loosened, then tilt it out a bit to get access to the last hose (small one) on top of the oil cooler. (14mm wrench)
- If you have not already drained the oil from the oil filter, then re-consider. There is about 1.5 L of oil in there and you have to be ready to catch it or clean up the mess.
- Then you can remove the oil cooler

After removal of both coolers shown below:





#### Notes about the end caps for oil and after coolers:

- These do not need to be taken off until the whole after cooler has been removed.
- There are two on the after cooler (one on each side)
- There are two on the oil cooler, but only one is easily removable. The other is welded or soldered in place, so needs a professional radiator guy to do this. In our case, he was happy how it cleaned up, so it was not necessary to take of and re-weld the larger end cap of the oil cooler.
- Note the positions of the end caps so that they can be put back in the right positions.
  - On the oil cooler there was a very small arrow indented into the metal next to the notch on the end cap for correct alignment.
  - For the oil cooler end cap, there is a gasket. The end cap is held in place with a single bolt. There is also a small o-ring which goes on the bolt between the end cap and the gasket. Suggest some grease or gasket sealant around this o-ring. If too dry, it can get scrunched up as you tension up the bolt.

#### Notes about the servicing of the coolers

- About Cdn\$275 each for servicing which is a bit high, but the fellow did an excellent job including some re-leading around the ends of the tubes.
- Acid cleaning and pressure testing.





Pressure test



No bubbles!

- Replacement of the 3 O-rings on after cooler
- Replacement of the gasket (rubber) on one end of the oil cooler.
- After the job, the coolers should be re-painted using Yanmar grey or engine gray paint. Primer was not used.

### Note about zincs

- There is one in the after cooler (large) and one (smaller) in the oil cooler. May as well replace these. (They should have been removed for the acid cleaning anyway)

### Replacing the oil cooler

- This is quite straight forward, but should be done in the right order.
- First put the rubber fittings into the cradle.



- The put the short water hose onto the top of the oil cooler. (The second hose can be done much later). Remember the second clamp for the after cooler fitting.
- Then put the oil cooler in place in the rubber fittings. (Push the pipe for the raw water inlet through the bracket).
- Make sure the third wire which passes behind the two small oil hoses has been put in place (out of the way for later)
- Then attach the small oil hose at the back of the top of the oil cooler. (14mm). (In our case, the connections from the hoses into the oil filter had been removed and it was a bit tricky to get the one fitting lined up the correct way. Used "gimme the white stuff" and teflon tape to get the right tension on the fitting. (Hope this is right).



Note small hose fittings in lower portion of pic

- Then loosely fit the two large oil hoses (in and out) for the oil cooler. (Make sure that the oil filter will be correctly fitted to the one hose from the oil cooler).
- Make sure the small oil hoses have been tightened.
- Then set up the metal clamps for holding the oil cooler in place.
- Then fasten the large oil hoses on top of the oil cooler.

### Replacing the after cooler.

- This is basically the reverse of the dismantling process. Two people were useful but one person (not me) could have done it.
- The various bolts are all different lengths and it is worthwhile to have noted which went where. We got a few wrong which added time to the job.
- The hardest part is getting the hoses on. Three of them, same as when dismantling. We did the left side hose first, then the short one between after and oil coolers and then the main air inlet hose at the top which was a real pain. Using a screw driver or other lever helps to move the after cooler around till they are fitted.





This one was tough!

- Once these are in place, the rest is okay (if done in the right order).
- Don't forget about the gasket between after cooler and engine intake. Suggest to pry the after cooler away from the engine cooler a bit. Then position one corner so that you can use a pointy tool to prevent it from dropping behind the after cooler. Then carefully position it so that you can get one bolt in. Then a second, then remove the pointy tool and do the other four bolts. Don't fully tighten yet. You will need some tolerance / play in the after cooler to get the other bolts positioned.
- Put the other bolts holding the after cooler in place. The one under the left side of the after cooler close to the water intake fitting is the hardest.
- Also check that the oil fittings to the oil filter on top of the after cooler can be fitted. (In our case, the radiator guy took the oil cooler off and we had to re-fit. In that case the ordering of the various bolts there is important. Fit the oil filter holder before the hoses.
- Tighten the hose clamp between oil and after coolers. (Short hose)
- Once everything is fitted, then everything can be tightened up.
- Replace the water hose from gear cooler to oil cooler.
- Replace the air heater coils on top of the after cooler and the wiring.
- Replace the throttle cable
- Replace the sensor wire to right of the after cooler (on the end cap)
- Replace one wire at the base of the oil cooler. (A simple twist type hook)
- Tighten the hose clamp at back of after cooler for raw water.
- Tighten the hose clamp for air (from turbo charger to after cooler)
- Replace the air filter (into the turbo charger)

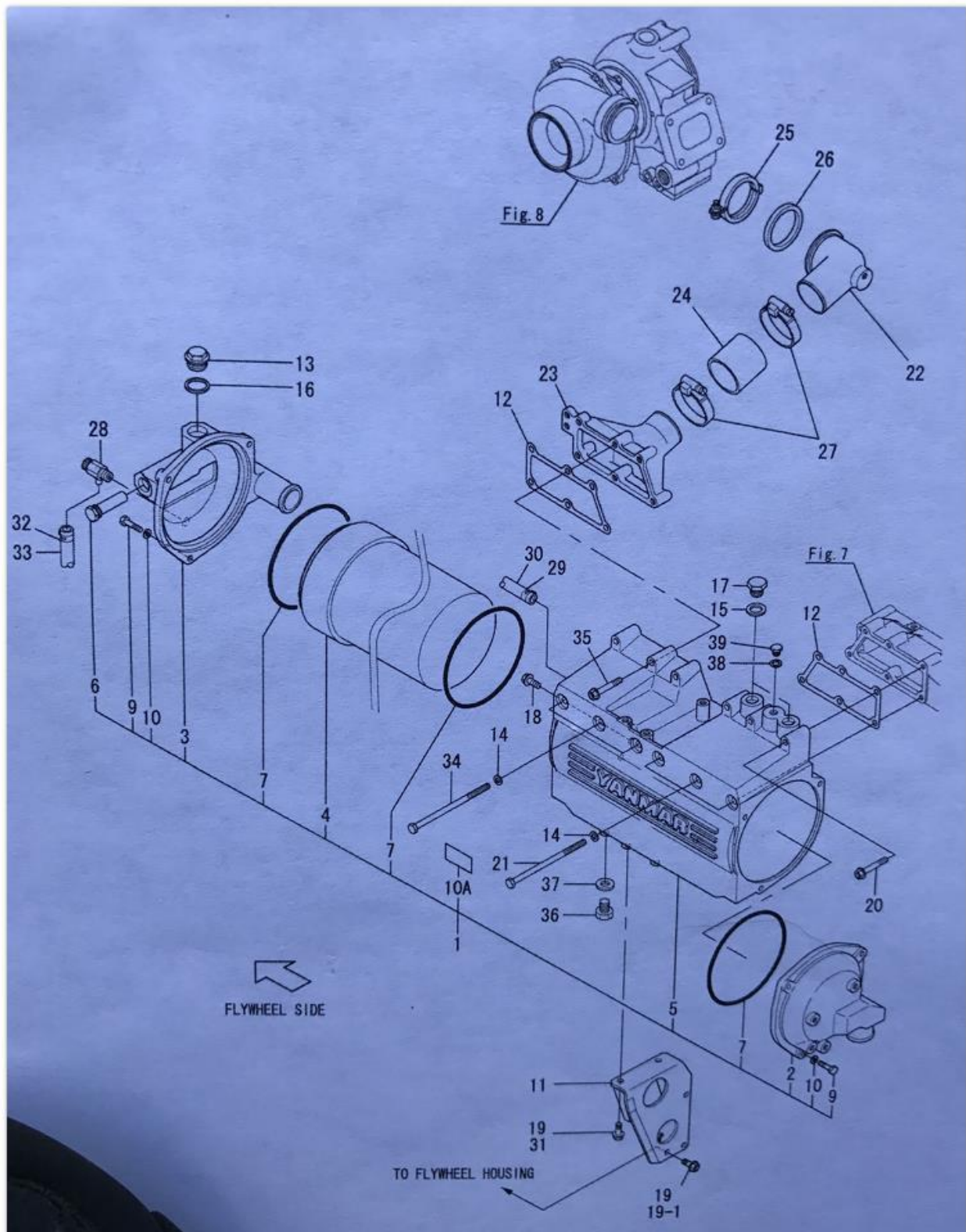
In my case, we used this opportunity to also replace the impeller for the raw water pump. Old one was still good after some 400 hours (3 years). Two O-rings needed for this. Best to remove the whole pump and then replace the impeller.

- Then replace oil (Rotella T4 15W40). About 14 L. Then later, when oil has moved around and filled the oil filter and oil cooler you will need about another 2L to top up.
- Then open the raw water inlet seacock.
- Then start engine and check for leaks etc. When first starting the engine after the oil change, it takes a bit longer for oil pressure to build up. (Perhaps 15 seconds from starting).
- When all done, then touch up the two coolers with Yanmar Gray paint.

So, about 3 hours for disassembly and similar for reassembly. This could be reduced somewhat now that the process is known.

## After Cooler Schematic

Below is from Yanmar tech doc. Shows which spare parts to buy (o rings (7) and gasket (12))





NO.	LEV.	Parts NO.	Description	Q'ty		
				(A)	(B)	(C)
1	1	119574-18100	COOLER ASSY, INTER			
1-1	1	119574-18101	COOLER ASSY, INTER		1	1
		(B=E50805)	(C=*1999.02)		1	1
1-2	1	119574-18102	COOLER ASSY, INTER	1	1	1
		(B=E50905)	(C=E40492)			
2	2	119574-18750	BOX, WATER	1	1	1
3	2	119574-18760	BOX, WATER	1	1	1
4	2	119574-18770	TUBESTACK	1	1	1
5	2	119574-18780	CASE	1	1	1
6	2	119574-18790	ZINC, ANTI-CORROSIVE	1	1	1
7	2	119574-18810	O-RING	3	3	3
9	2	X214320104	SCREW	6	6	6
10	2	X211810030	WASHER	6	6	6
10A	2	119574-18820	LABEL	1	1	1
		(B=E51387)	(C=E40739)			
11	1	119574-18120	SUPPORT	1	1	1
11-1	1	119595-18120	SUPPORT	1		
		(A=*2008.12)				
11-2	1	119595-18121	SUPPORT, AIR COOLER	1		
		(A=E00782)				
12	1	119574-18600	GASKET(INTER COOLER		2	2
12-1	1	119595-18600	GASKET	2	2	2
		(B=E50905)	(C=E40492)			
13	1	119574-18800	PLUG, M26X1.5	1	1	1
14	1	22137-080000	WASHER, 8	6	6	6
15	1	23414-180000	GASKET, 18X1.0		3	3
15-1	1	23414-200000	GASKET, 20X1.0	2	2	2
		(B=E50905)	(C=E40492)			
16	1	23414-260000	GASKET, 26X1.0		1	1
16-1	1	22190-270002	WASHER, SEAL 27	1	1	1
		(B=E50753)	(C=*1998.11)			
17	1	23887-180002	PLUG, 18		3	3
17-1	1	23887-200002	PLUG, 20	2	2	2
		(B=E50905)	(C=E40492)			
18	1	26106-080202	BOLT, M8X 20 PLATED	2	2	2
19	1	26106-080202	BOLT, M8X 20 PLATED		5	5
19-1	1	26106-080202	BOLT, M8X 20 PLATED	3	3	3
		(B=E50131)	(C=E40131)			
20	1	26106-080552	BOLT, M8X 55 PLATED		6	6
20-1	1	26106-080552	BOLT, M8X 55 PLATED	3	3	3
		(B=E51387)	(C=E40739)			
21	1	26116-081502	BOLT, M8X150 PLATED		6	6
21-1	1	26116-081502	BOLT, M8X150 PLATED	3	3	3
		(B=E51387)	(C=E40739)			
22	1	119574-18170	DUCT, AIR	1	1	1
22-1	1	119595-18170	DUCT, AIR	1		
		(A=*2008.12)				
23	1	119574-18180	DUCT, AIR	1	1	1
23-1	1	119595-18180	DUCT, AIR	1		
		(A=*2008.12)				
24	1	119574-18250	HOSE, AIR DUCT	1	1	1

N:Old  $\xrightarrow{\text{Yes}}$  New, Q:Old  $\xrightarrow{\text{No}}$  New, R:Old  $\xrightarrow{\text{Yes}}$  New, S:Old  $\xrightarrow{\text{No}}$  New, W:Add, Z:Discontinued, F:Interchangeable by set