

# Maintenance items for UE Eco-Engines 3<sup>rd</sup> Generation

*Japan Engine Corporation*

*We fuse tradition and innovation from global perspective*

- to grow the Japan flagged marine engines with our customers*
- to open up the next generation.*

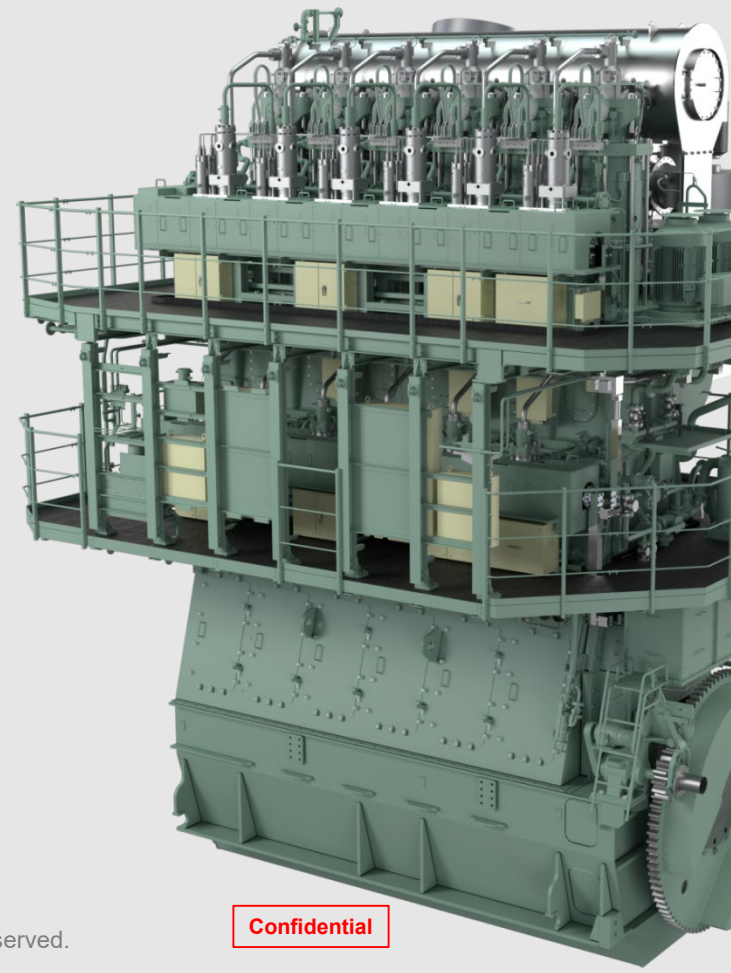
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1

***Electronic control components***

2

Maintenance items within every 2.5 years (16,000~20,000hrs)

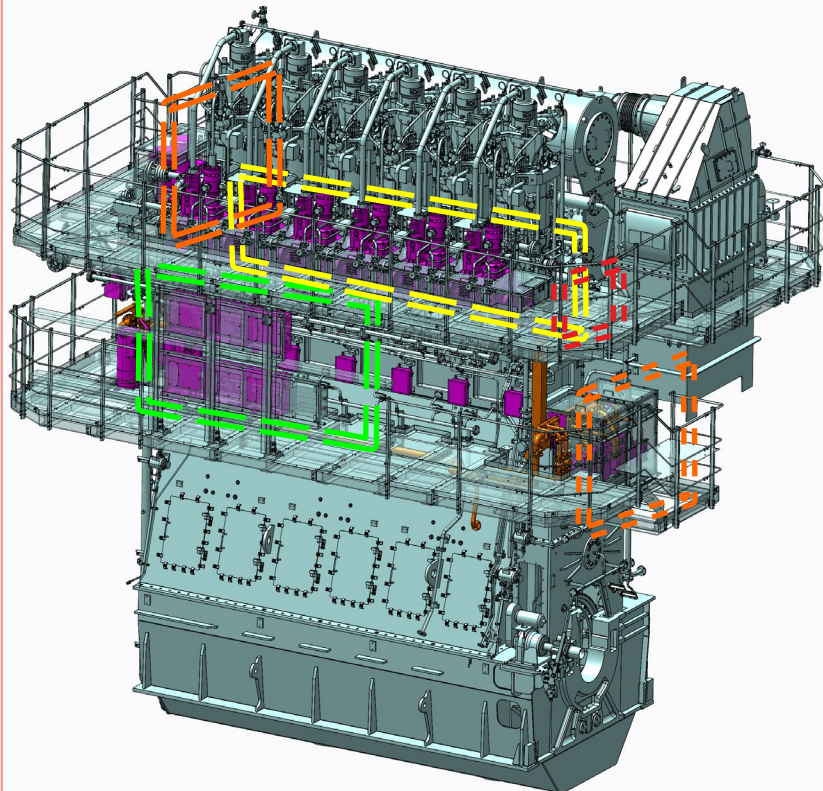
3

Maintenance items within every 5 years (32,000~40,000hrs)

4

Maintenance items within every 10 years (64,000~70,000hrs)

# 1 Electronic control components



## 1. Cylinder control unit

- 1-a) Solenoid valve unit (Solenoid valve, Main valve)
- 1-b) Exhaust valve driving unit

- 2-a) Engine driven high pressure pump
- 2-b) Electric driven high pressure pump

- 3. Hyd. Oil Damper
- 4. Relief valve unit
- 5. Automatic back-wash filter unit

## 6. Cylinder lubricating system (A-ECL system)

## 7. Rotary Encoder (Crank Angle Sensor)

## 8. Control system (in Engine room)

## 9. in \*ECR (main controller)

1

Electronic control components

2

***Maintenance items within every 2.5 years*** (16,000~20,000hrs)

3

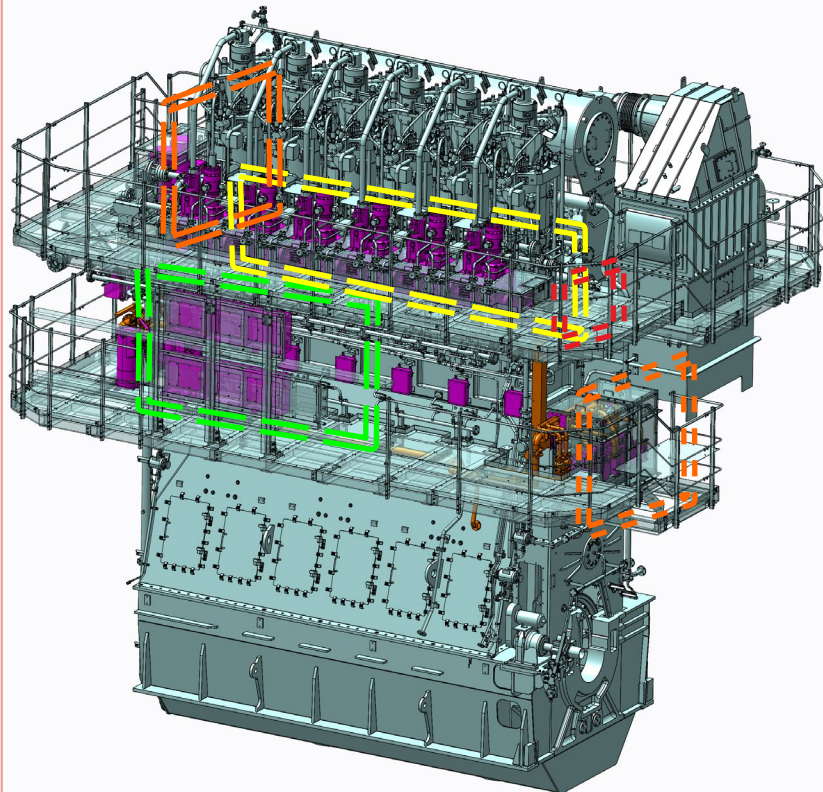
Maintenance items within every 5 years (32,000~40,000hrs)

4

Maintenance items within every 10 years (64,000~70,000hrs)

## 2 Maintenance items within every 2.5 years (Eco-3<sup>rd</sup> Generation)

	Component	Description	Work	2.5 yrs
1	Cyl Control Unit	1-a) Solenoid valve unit (Solenoid valve, Main valve)	Exchange	
		1-b) Exhaust valve driving unit	Over Haul	●
2	2-a) Engine Driven High Pressure Pump	High Pressure Pump	Exchange	
		Proportional Solenoid Valve	Exchange	●
		Amplifier	Exchange	
	2-b) Electric Driven High Pressure Pump	High Pressure Pump	Exchange	
		Spider	Exchange	●
3	Hyd. Oil dumper	Consumable parts (Cap seal, O-rings & Gasket)	Over haul	●
4	Relief Valve Unit	Relief Valve	Exchange	
5	Automatic Back Wash	Treatment Filter (over 7 cylinders)	Exchange	
6	Cylinder lubricating system (A-ECL system)	Spider	Exchange	●
		Lubricator with Solenoid valve	Exchange	
		Suction Filter	Exchange	
		Line Filter	Exchange	
7	Rotary Encoder (Crank Angle Sensor)	Rotary Encoder	Exchange	
		Coupling	Exchange	
8	Control System -Eco & A-ECL electrical component- (in Engine room)	Converter (AC/DC, DC/DC)	Exchange	
		Fan	Exchange	
		Capacitor (for Eco and A-ECL)	Exchange	
		Potentiometer	Exchange	
9	Engine Control Room (Main Controller)	Eco Main Controller (LCD, board, controller)	Exchange	
		PCB (Printed Circuit Board) for Cylinder Controller	Exchange	
		PCB (Printed Circuit Board) for Local Control Box	Exchange	
		A-ECL Control system (LCD, board, controller)	Exchange	



## 1. Cylinder control unit

- 1-a) Solenoid valve unit (Solenoid valve, Main valve)
- 1-b) Exhaust valve driving unit

- 2-a) Engine driven high pressure pump
- 2-b) Electric driven high pressure pump

## 3. Hyd. Oil Damper

- 4. Relief valve unit
- 5. Automatic back-wash filter unit

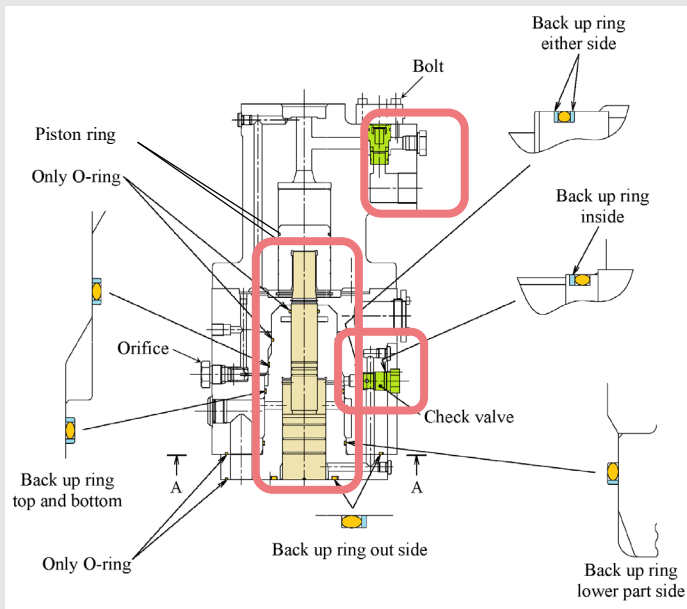
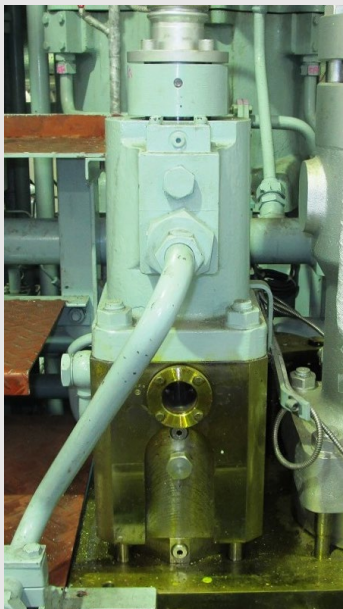
## 6. Cylinder lubricating system (A-ECL system)

## 7. Rotary Encoder (Crank Angle Sensor)

## 8. Control system (in Engine room)

## 9. in \*ECR (main controller)

# 1-b) Exh Valve driving unit – Press Reducing Piston & Check valves

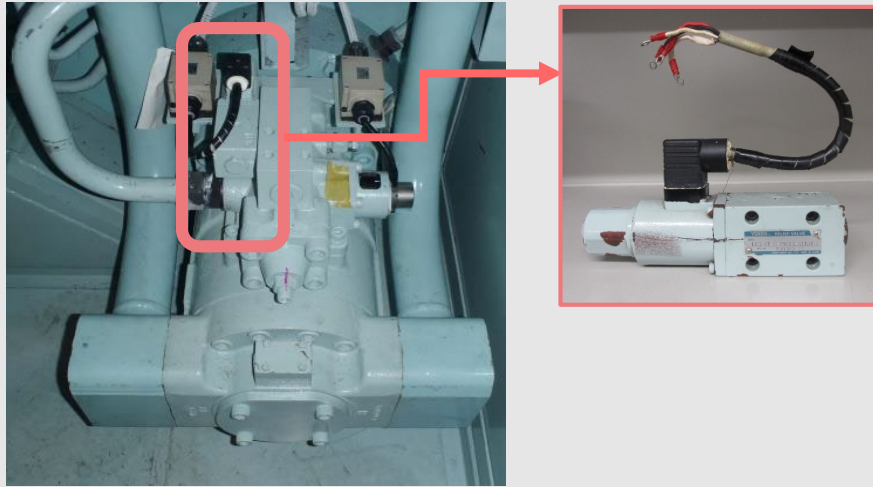


No.	Parts name	Interval	Action	Working time
1-b)	Exh Valve Lower Actuator	2.5 years	<b>Overhaul</b>	<b>5 hrs/unit x 2 engineers + Workers</b>

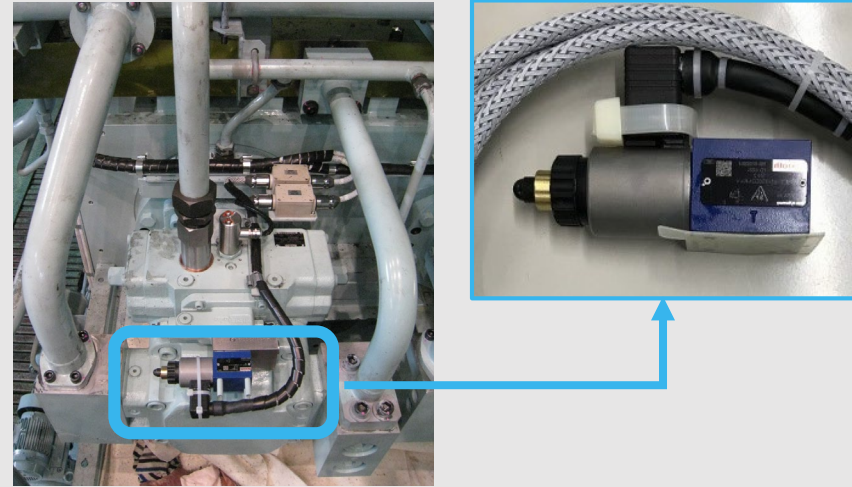
\* Influence on the main engine condition : Abnormality occurs in the open/close operation of the exhaust valve.

## 2-a) Engine Driven Pump – Proportional solenoid valve

for UEC50LSE, 60LSII, 60LSE & 80LSE



for UEC45LSE & 60LSE

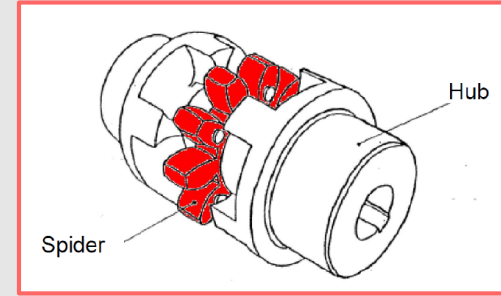
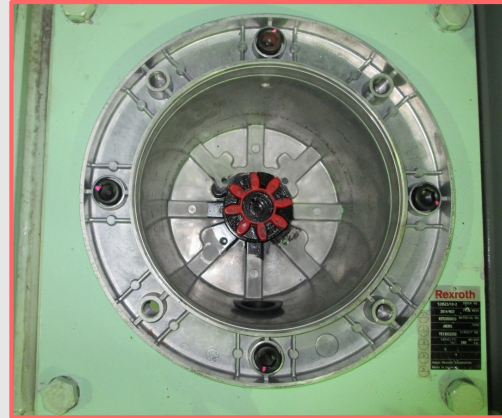
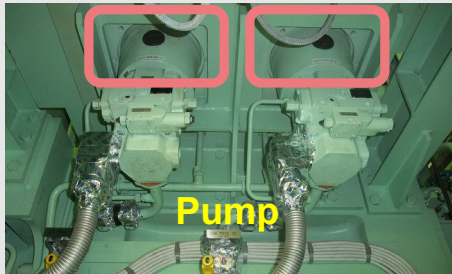
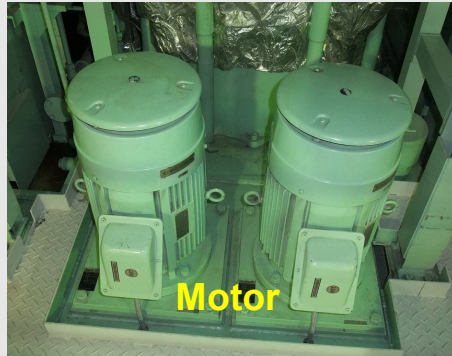


No.	Parts name	Interval	Action	Working time
2-a)	Proportional solenoid valve	2.5 years	Replacement & Adjustment	2 hrs/unit x 1 engineer + Workers

\* Influence on the main engine condition : Abnormality in hydraulic oil pressure control.



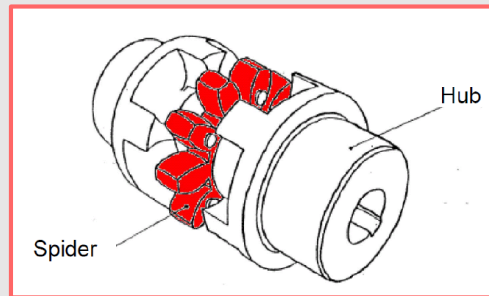
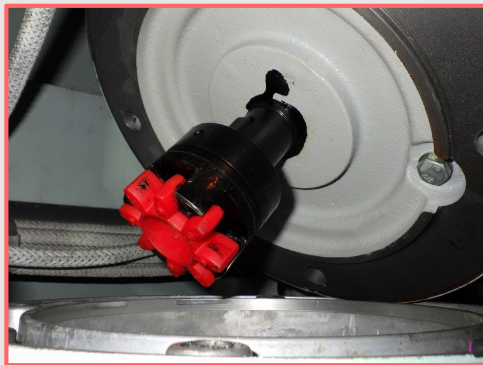
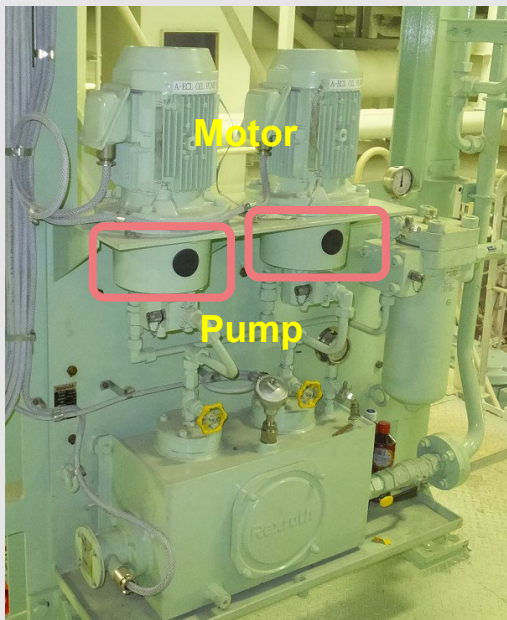
## 2-b) Electric Driven Pump – Spider coupling (Flexible coupling)



No.	Parts name	Interval	Action	Working time
2-b)	Spider coupling	2.5 years	Replacement	1 hr/unit x 2 engineer + Workers

\* Influence on the main engine condition : Damaged spider coupling leads to motor/pump shaft damage.

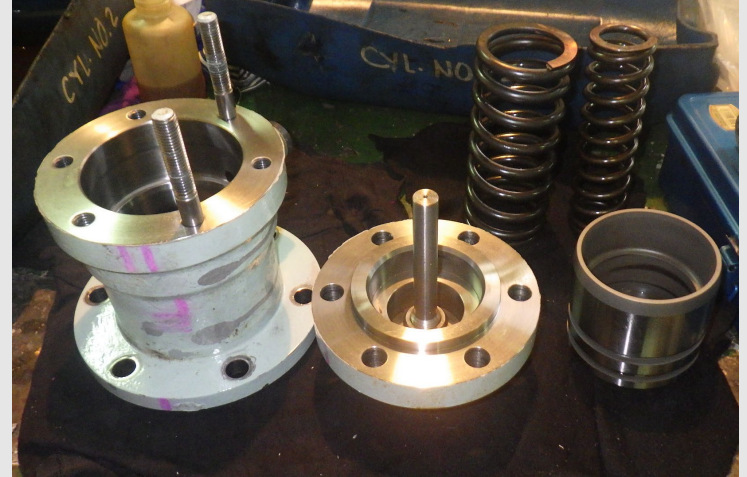
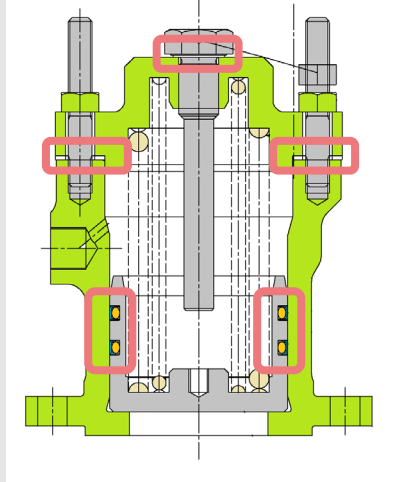
# 6. A-ECL Supply Unit – Spider coupling (Flexible coupling)



No.	Parts name	Interval	Action	Working time
6	Spider coupling	2.5 years	Replacement	1 hr/unit x 2 engineer + Workers

\* Influence on the main engine condition : Damaged spider coupling leads to motor/pump shaft damage.

### 3. Hydraulic oil damper – Cap seal, O-rings & Gasket



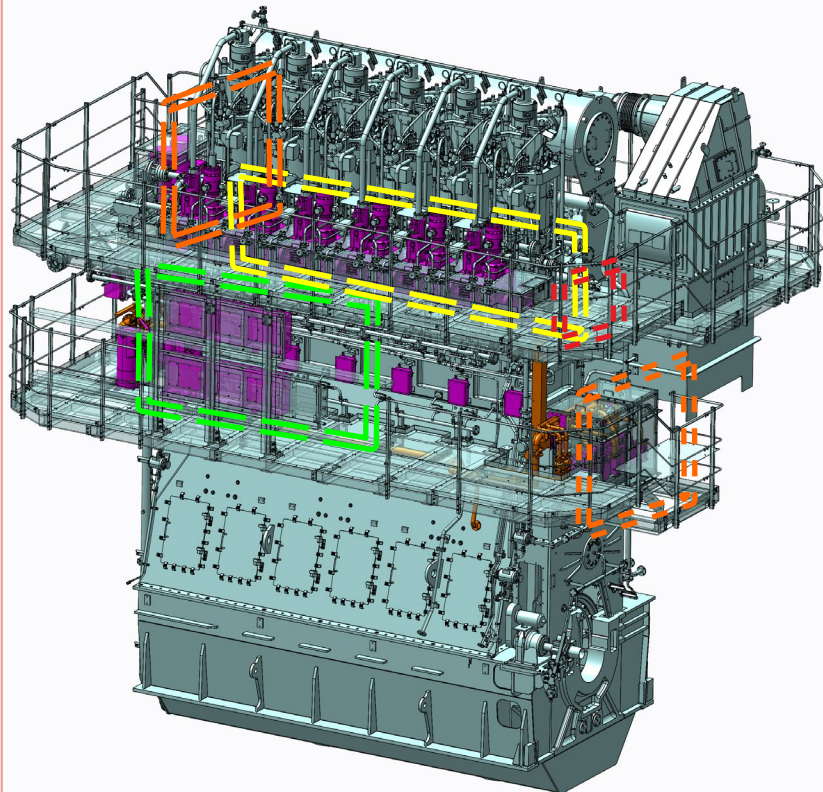
No.	Parts name	Interval	Action	Working time
3	Cap seal, O-rings & Gasket	2.5 years	<b>Overhaul</b>	<b>2 hrs/unit x 2 engineer + Workers</b>

\* Influence on the main engine condition : Damaged spider coupling leads to motor/pump shaft damage.

- 1 Electronic control components
- 2 Maintenance items within every 2.5 years (16,000~20,000hrs)
- 3 *Maintenance items within every 5 years* (32,000~40,000hrs)**
- 4 Maintenance items within every 10 years (64,000~70,000hrs)

### 3 Maintenance items within every 5 years (3<sup>rd</sup> Generation)

	Component	Descripton	Work	5 yrs
1	Cyl Control Unit	1-a) Solenoid valve unit (Solenoid valve, Main valve)	Exchange	
		1-b) Exhaust valve driving unit	Over Haul	●
2	2-a) Engine Driven High Pressure Pump	High Pressure Pump	Exchange	●
		Proportional Solenoid Valve	Exchange	
		Amplifier	Exchange	●
	2-b) Electric Driven High Pressure Pump	High Pressure Pump	Exchange	
		Spider	Exchange	●
3	Hyd. Oil dumper	Consumable parts (Cap seal, O-rings & Gasket)	Over haul	●
4	Relief Valve Unit	Relief Valve	Exchange	
5	Automatic Back Wash	Treatment Filter (over 7 cylinders)	Exchange	(●)
6	Cylinder lubricating system (A-ECL system)	Spider	Exchange	●
		Lubricator with Solenoid valve	Exchange	
		Suction Filter	Exchange	●
		Line Filter	Exchange	●
7	Rotary Encoder (Crank Angle Sensor)	Rotary Encoder	Exchange	●
		Coupling	Exchange	●
8	Control System -Eco & A-ECL electrical component- (in Engine room)	Converter (AC/DC, DC/DC)	Exchange	●
		Fan	Exchange	●
		Capacitor (for Eco and A-ECL)	Exchange	●
		Potentiometer	Exchange	●
9	Engine Control Room (Main Controller)	Eco Main Controller (LCD, board, controller)	Exchange	
		PCB (Printed Circuit Board) for Cylinder Controller	Exchange	
		PCB (Printed Circuit Board) for Local Control Box	Exchange	
		A-ECL Control system (LCD, board, controller)	Exchange	

**1. Cylinder control unit**

1-a) Solenoid valve unit (Solenoid valve, Main valve)

1-b) Exhaust valve driving unit

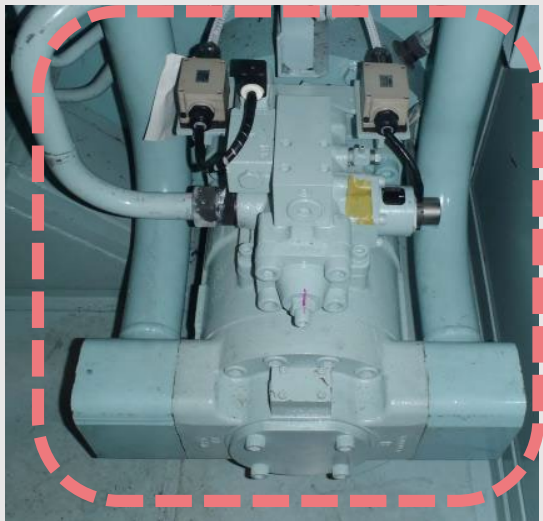
**2-a) Engine driven high pressure pump****2-b) Electric driven high pressure pump****3. Hyd. Oil Damper**

4. Relief valve unit

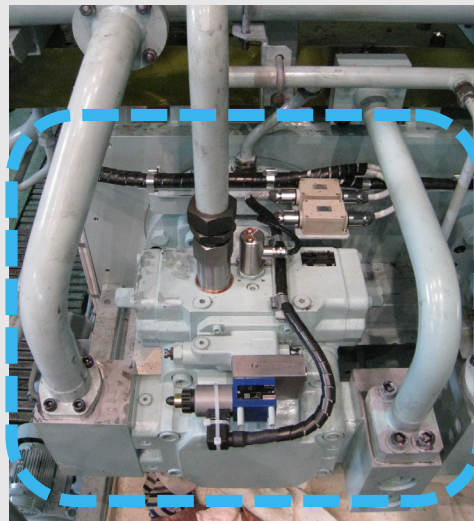
**5. Automatic back-wash filter unit****6. Cylinder lubricating system (A-ECL system)****7. Rotary Encoder (Crank Angle Sensor)****8. Control system (in Engine room)****9. in \*ECR (main controller)**

## 2-a) Engine Driven Pump (1/2)

for UEC50LSE, 60LSII, 60LSE & 80LSE



for UEC45LSE & 60LSE



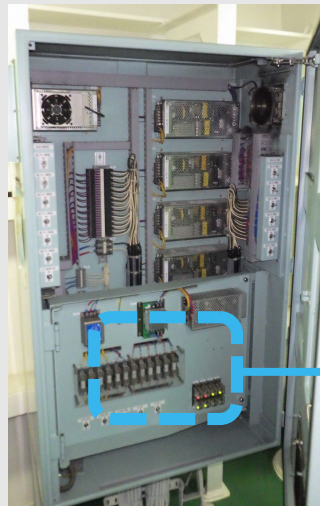
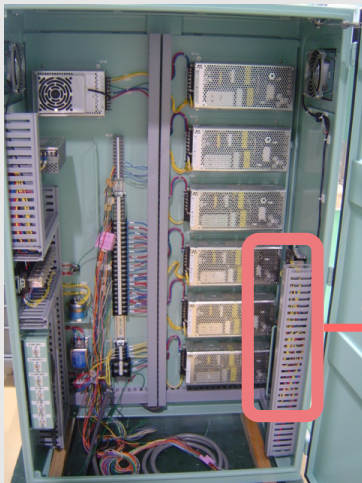
No.	Parts name	Interval	Action	Working time
2-a)	Engine driven pump	5 years	<b>Replacement &amp; Adjustment</b>	<b>6 hrs/unit x 2 engineers + Workers</b>

\* Influence on the main engine condition : There is a risk to damage the internal parts of engine driven pump.

## 2-a) Engine Driven Pump (2/2) – Amplifier for Engine driven pump

for UEC50LSE, 60LSII, 60LSE & 80LSE

for UEC45LSE & 60LSE

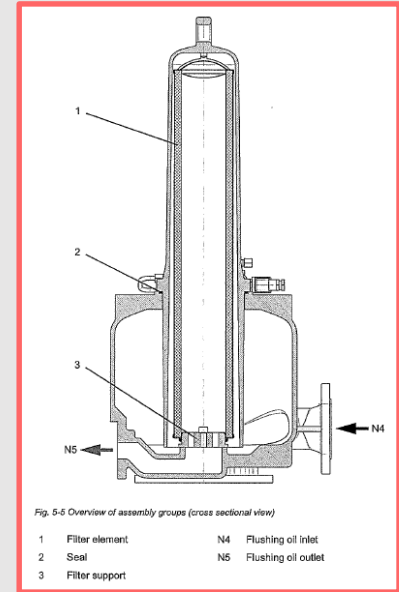
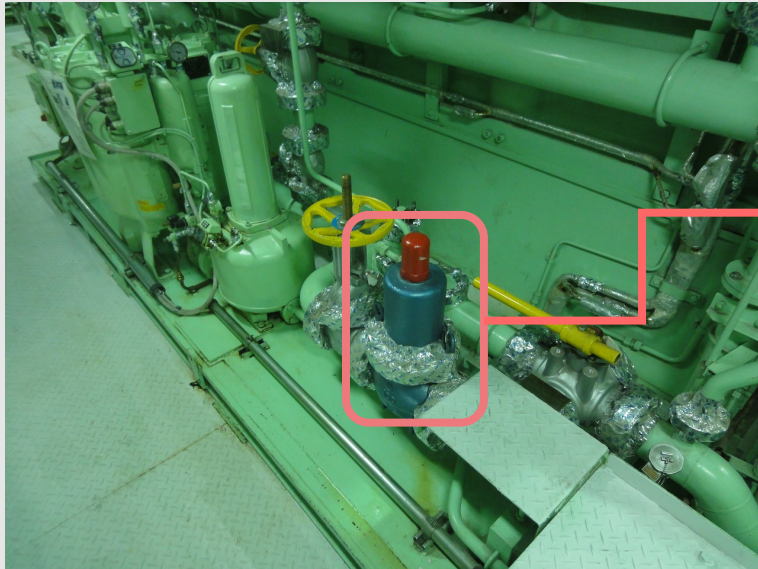


No.	Parts name	Interval	Action	Working time
2-a)	Amplifier	5 years	Replacement & Adjustment	2 hrs/unit x 1 engineers + Workers

\* Influence on the main engine condition : Abnormality in hydraulic oil pressure control.

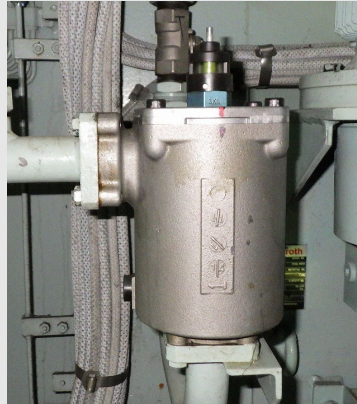
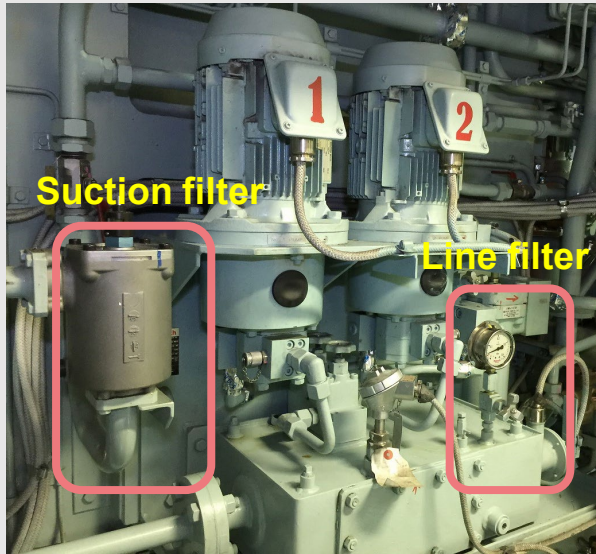


# 5. Automatic Backwash – Treatment Filter (Separate system only)



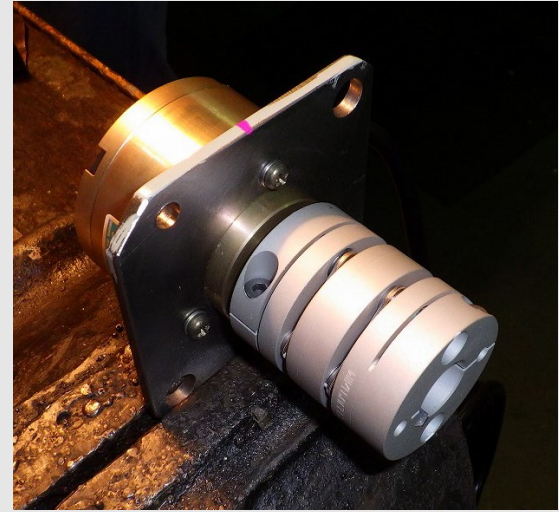
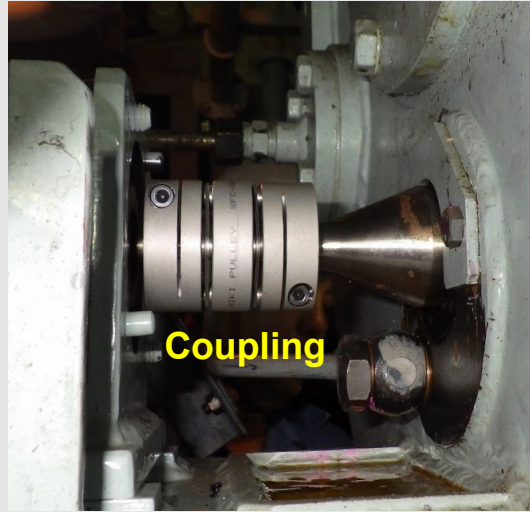
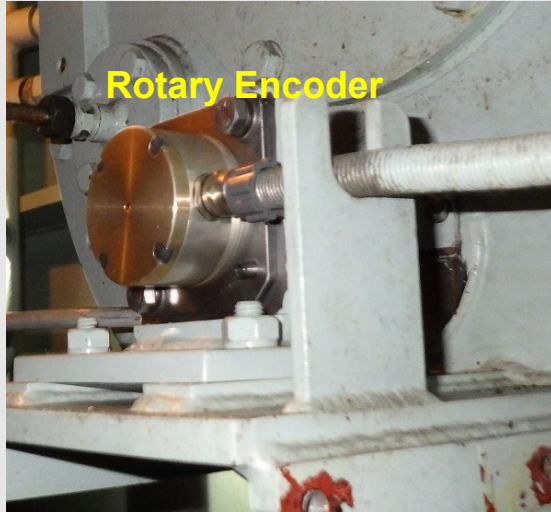
No.	Parts name	Interval	Action	Working time
5	Treatment Filter	5 years	<b>Replacement</b>	2 hrs x 1 engineer + Workers

# 6. A-ECL Supply Unit – Filters (Element, seal rings)



No.	Parts name	Interval	Action	Working time [ /set]
6	Suction Filter	5 years	Replacement	1 hr x 2 engineers +Workers
	Line Filter	5 years	Replacement	1 hr x 2 engineers +Workers

# 7. Rotary Encoder (Crank angle sensor) & Coupling



No.	Parts name	Interval	Action	Working time
7	Rotary Encoder & Coupling	5 years	Replacement & Adjustment	6 hrs x 2 engineer + Workers

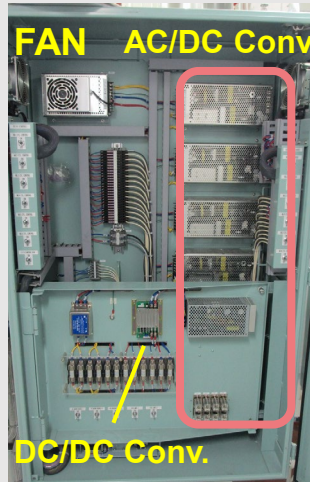
\* Influence on the main engine condition : Pick up sensor will backup the detection of the crank angle.(without black out)

# 8. Control system - Eco & A-ECL electrical component (1/2)

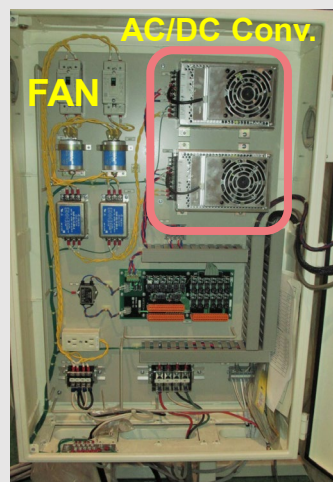
for UEC50LSE, 60LSII, 60LSE & 80LSE



for UEC45LSE & 60LSE



for A-ECL system

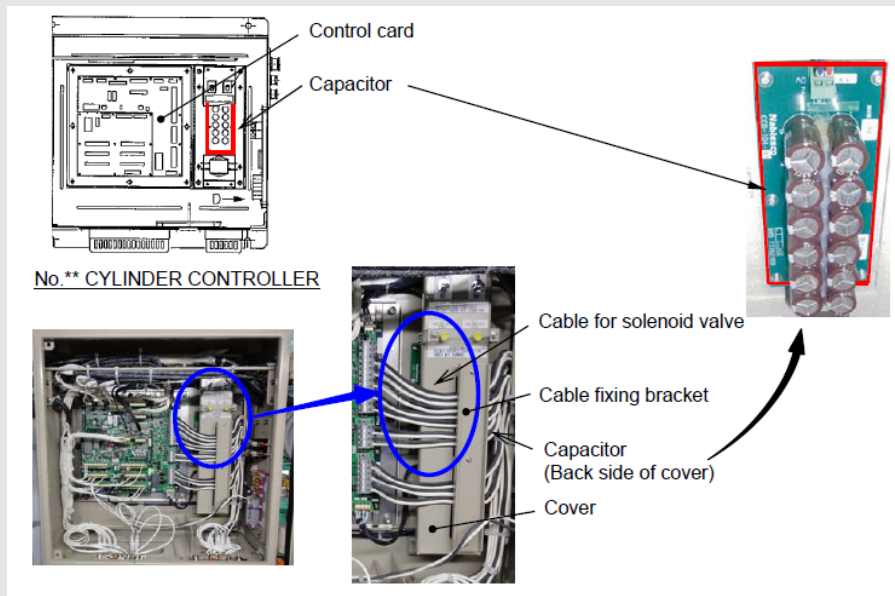


No.	Parts name	Interval	Action	Working time [/engine]
8	AC/DC Converter	5 years	Replacement	9 hrs x 1engineer
	DC/DC Converter	5 years	Replacement	
	FAN	5 years	Replacement	2 hrs x 1engineer

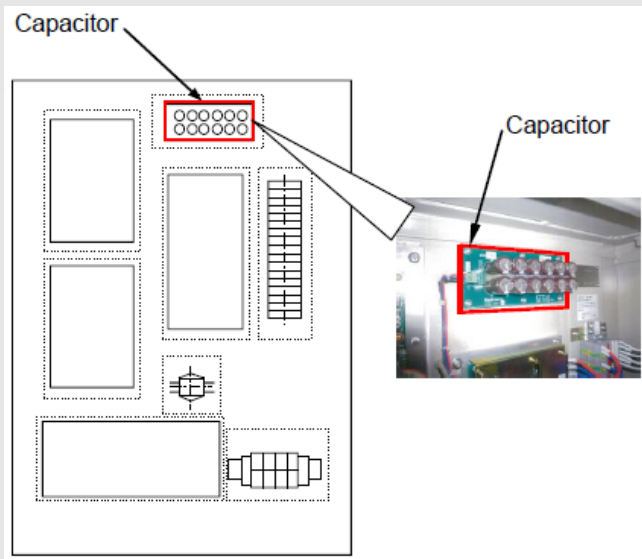
\* Influence on the main engine condition : Abnormality in control system.

# 8. Control system - Eco & A-ECL electrical component (2/3)

## for Eco cylinder controller



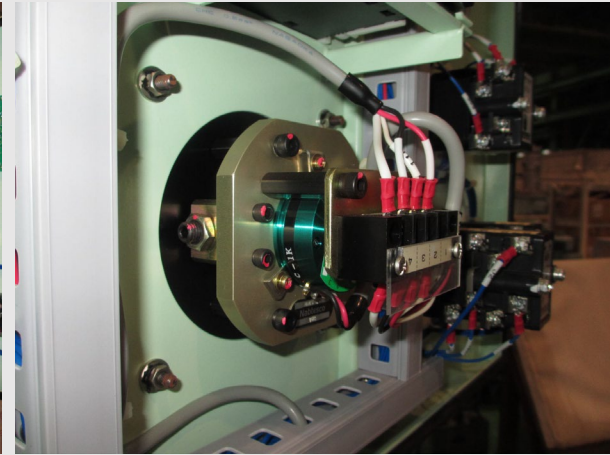
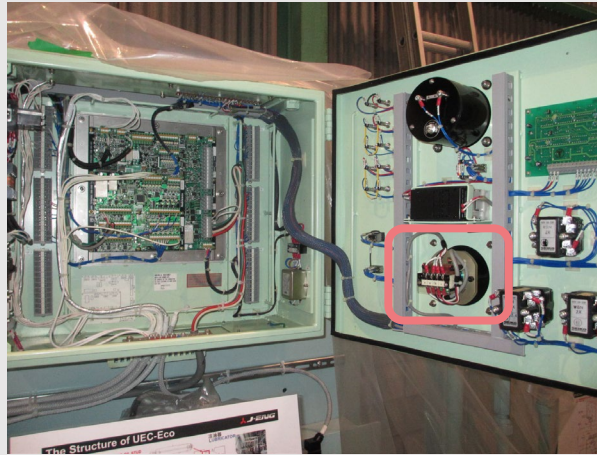
## for A-ECL controller



No.	Parts name	Interval	Action	Working time
8	Capacitor (For Eco)	5 years	Replacement	4 hrs x 1engineer (6cyl)
	Capacitor (For A-ECL)	5 years	Replacement	1 hr x 1engineer

\* Influence on the main engine condition : Abnormality in control system.

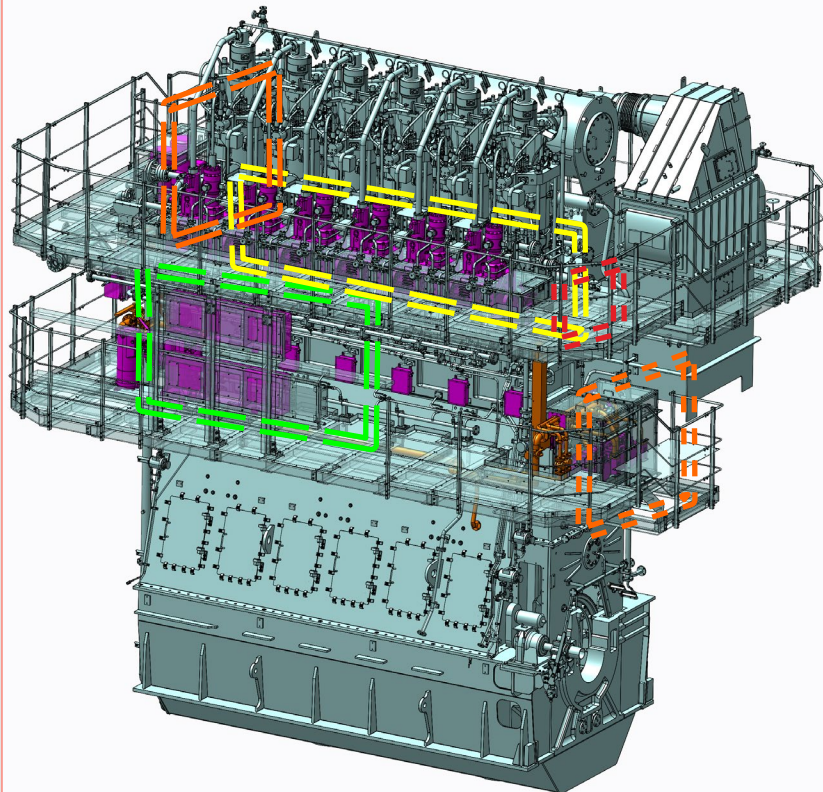
## 8. Control system - Eco & A-ECL electrical component (3/3)



No.	Parts name	Interval	Action	Working time
8	Potentiometer	5 years	Replacement	3 hrs x 1 engineer

\* Influence on the main engine condition : Abnormality in engine speed control at local maneuvering.

	Component	Description	Work	10 yrs
1	Cyl Control Unit	1-a) Solenoid valve unit (Solenoid valve, Main valve)	Exchange	●
		1-b) Exhaust valve driving unit	Over Haul	●
2	2-a) Engine Driven High Pressure Pump	High Pressure Pump	Exchange	●
		Proportional Solenoid Valve	Exchange	●
		Amplifier	Exchange	●
	2-b) Electric Driven High Pressure Pump	High Pressure Pump	Exchange	●
		Spider	Exchange	●
3	Hyd. Oil dumper	Consumable parts (Cap seal, O-rings & Gasket)	Over haul	●
4	Relief Valve Unit	Relief Valve	Exchange	●
5	Automatic Back Wash	Treatment Filter (over 7 cylinders)	Exchange	(●)
6	Cylinder lubricating system (A-ECL system)	Spider	Exchange	●
		Lubricator with Solenoid valve	Exchange	●
		Suction Filter	Exchange	●
		Line Filter	Exchange	●
7	Rotary Encoder (Crank Angle Sensor)	Rotary Encoder	Exchange	●
		Coupling	Exchange	●
8	Control System -Eco & A-ECL electrical component- (in Engine room)	Converter (AC/DC, DC/DC)	Exchange	●
		Fan	Exchange	●
		Capacitor (for Eco and A-ECL)	Exchange	●
		Potentiometer	Exchange	●
9	Engine Control Room (Main Controller)	Eco Main Controller (LCD, board, controller)	Exchange	●
		PCB (Printed Circuit Board) for Cylinder Controller	Exchange	●
		PCB (Printed Circuit Board) for Local Control Box	Exchange	●
		A-ECL Control system (LCD, board, controller)	Exchange	●

**1. Cylinder control unit**

- 1-a) Solenoid valve unit (Solenoid valve, Main valve)
- 1-b) Exhaust valve driving unit

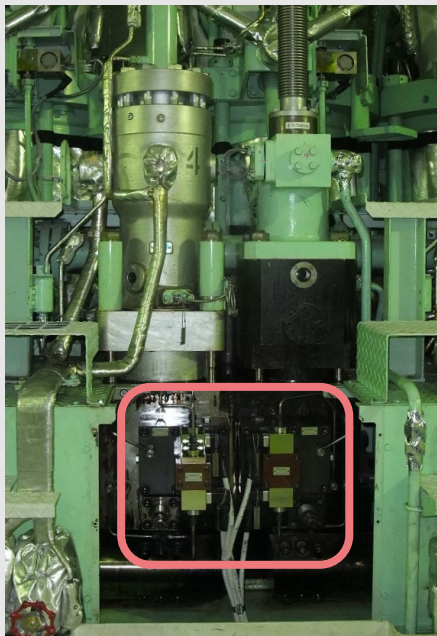
- 2-a) Engine driven high pressure pump
- 2-b) Electric driven high pressure pump

- 3. Hyd. Oil Damper
- 4. Relief valve unit
- 5. Automatic back-wash filter unit

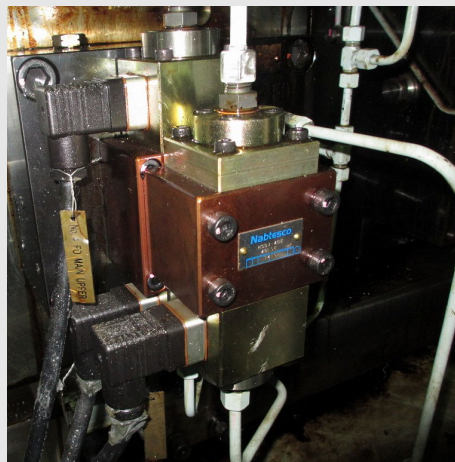
**6. Cylinder lubricating system (A-ECL system)****7. Rotary Encoder (Crank Angle Sensor)****8. Control system (in Engine room)****9. in \*ECR (main controller)**



# 1-a) Solenoid valve unit – Solenoid valve & Main valve



FO – Main/Sub solenoid valve  
Exh – Main solenoid valve



FO – PA/AT main valve  
Exh – PA/AT main valve

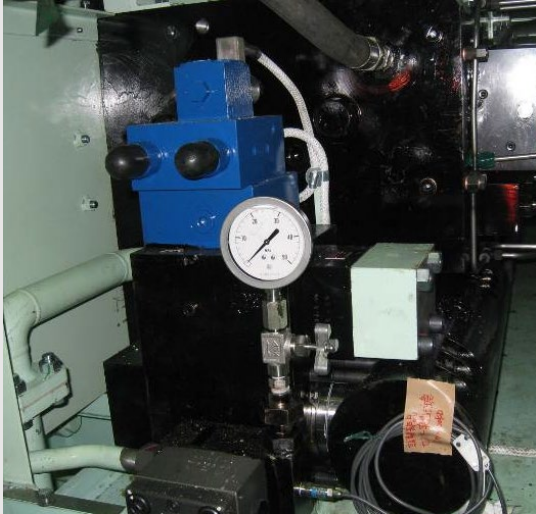


No.	Parts name	Interval	Action	Working time
1-a)	Solenoid valve unit	10 years	Replacement	3 hr/unit x 2 engineers + Workers

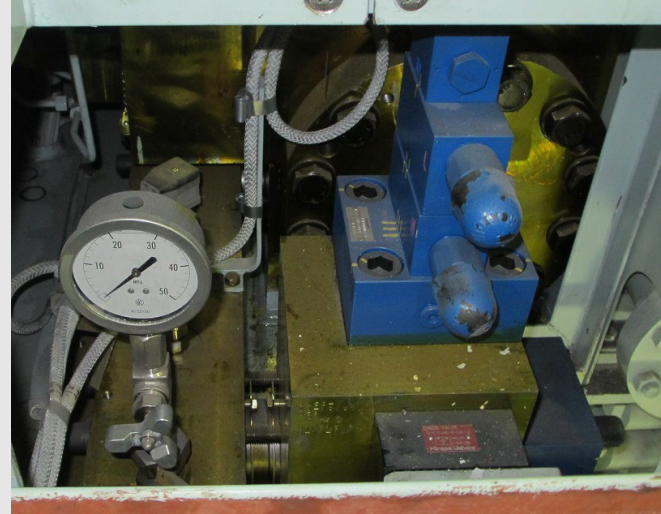
\* Influence on the main engine condition :  
Abnormality occurs in the operation of exhaust valve and fuel injection pump. High press oil leaks from inside.

## 4. Relief valve unit

for UEC50LSE, 60LSII, 60LSE & 80LSE

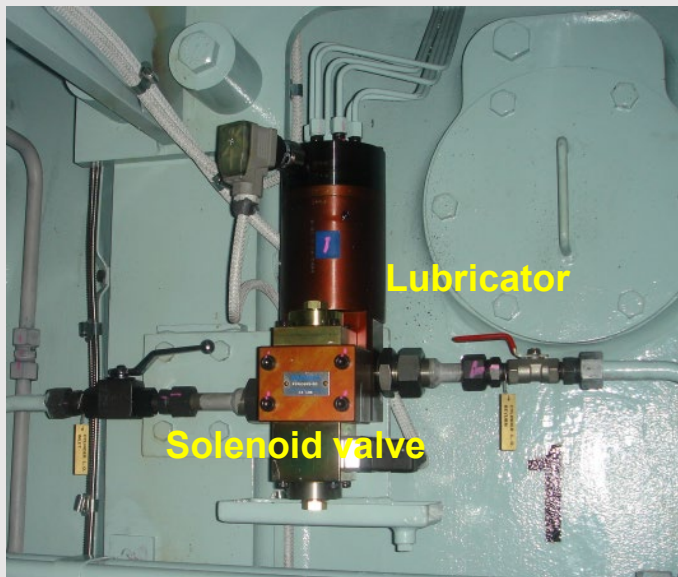


for UEC45LSE



No.	Parts name	Interval	Action	Working time
4	Relief valve unit	10 years	Replacement & Adjustment	3 hrs/set x 2 engineers + Workers

## 6. A-ECL system – Lubricator & Solenoid valve



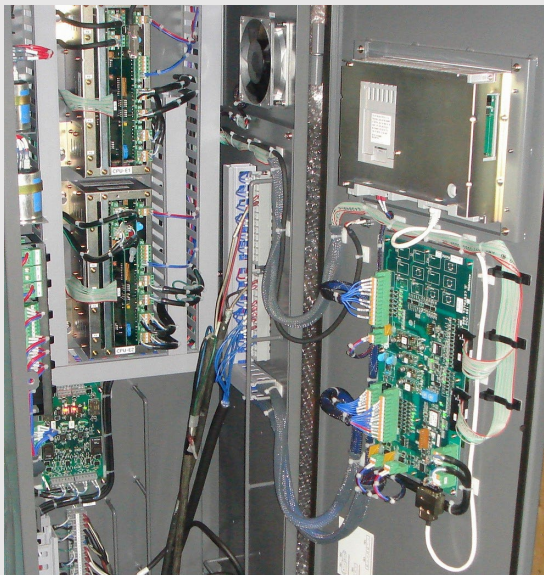
No.	Parts name	Interval	Action	Working time [ /unit]
6	Lubricator with Solenoid valve	10 years	Replacement	2 hr x 2 engineers +Workers

# 8. Control system (1/4) – Eco main controller

Main controller



Each board



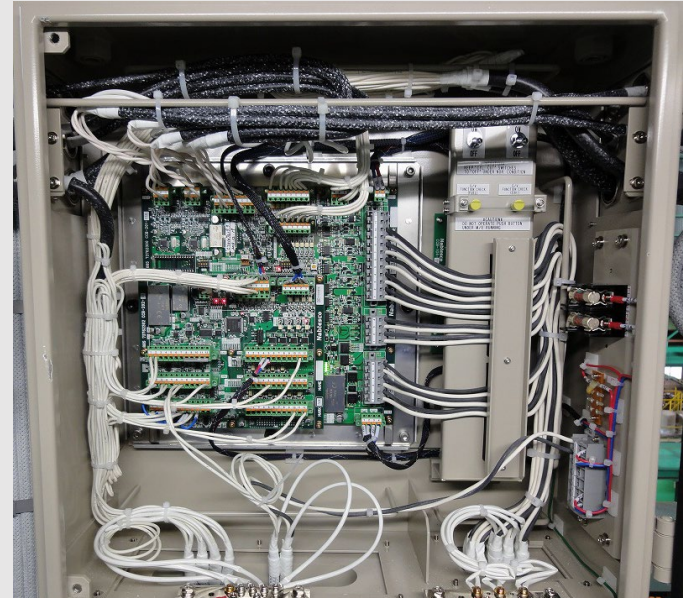
Display unit



No.	Parts name	Interval	Action	Working time
8	Each unit for Eco main controller	10 years	Replacement	4 hrs x 1engineer

\* Influence on the main engine condition : Abnormality in control system.

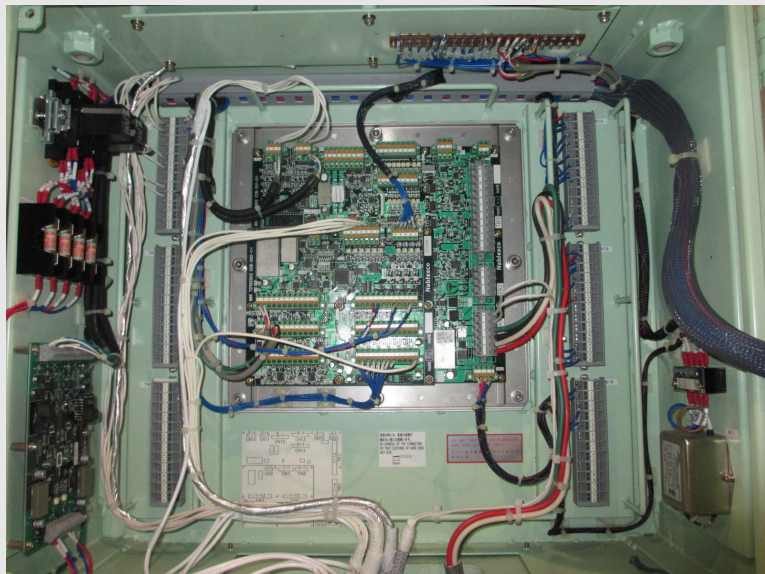
## 8. Control system (2/4) - Cylinder controller



No.	Parts name	Interval	Action	Working time
8	P.C.B. (Printed Circuit Board)	10 years	Replacement	8 hrs x 1engineer (6cyl.)

\* Influence on the main engine condition : Abnormality in control system.

# 8. Control system (3/4) - Local Control Box



No.	Parts name	Interval	Action	Working time
8	<b>P.C.B.</b> (Printed Circuit Board)	10 years	<b>Replacement</b>	8 hrs x 1engineer

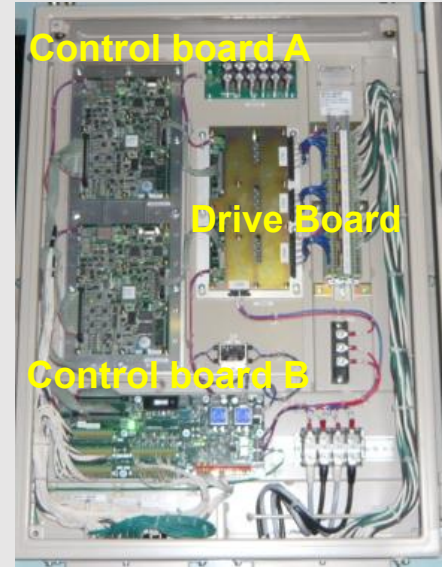
\* Influence on the main engine condition : Abnormality in control system.

# 8. Control system (4/4) – A-ECL control system

## A-ECL Operation panel



## A-ECL Control unit



No.	Parts name	Interval	Action	Working time
8	Each unit for A-ECL controller	10 years	<b>Replacement</b>	2 hrs x 2engineers

\* Influence on the main engine condition : Abnormality in control system.

## Japan Engine Corporation

*We fuse tradition and innovation from global perspective*

- to grow the Japan flagged marine engines with our customers*
- to open up the next generation*



Contact:

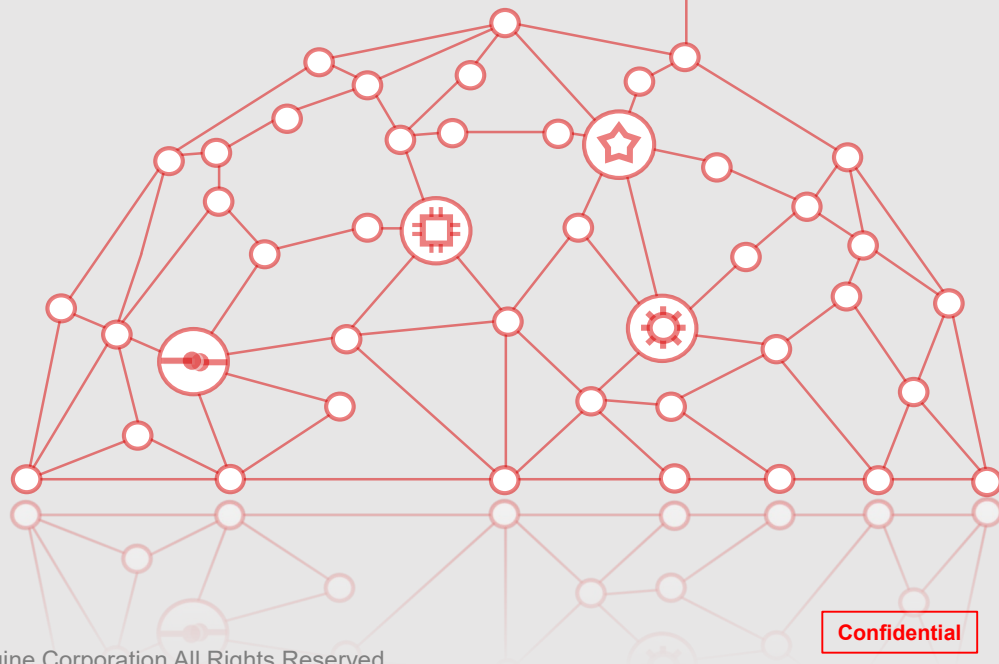
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