

CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY
MARINE ENGINEER OFFICER

STCW 78 as amended MANAGEMENT ENGINEER REG. III/2 (UNLIMITED)

040-36 - ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

WEDNESDAY, 23 OCTOBER 2024

1315 - 1615 hrs

Materials to be supplied by examination centres

Candidate's examination workbook
Graph paper

Examination Paper Inserts

DRG 165
DRG 166
DRG 167
DRG 168
DRG 169

Notes for the guidance of candidates:

1. Examinations administered by SQA on behalf of the Maritime & Coastguard Agency
2. Candidates are required to obtain 50% of the total marks allocated to this paper to gain a pass **AND** also obtain a minimum 40% in Sections A and B of the paper.
3. Non-programmable calculators may be used.
4. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.



Maritime &
Coastguard
Agency



ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

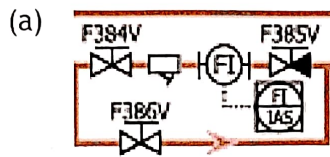
Attempt ALL questions.

Marks for each part question are shown in brackets.

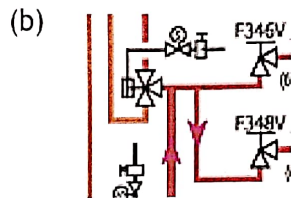
Section A

1. DRG165

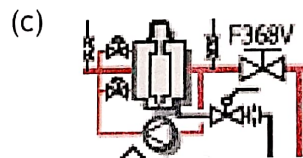
State what the following items are and describe their specific function in the illustrated system.



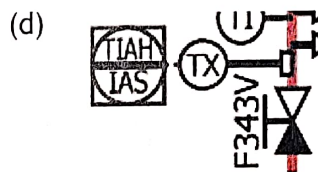
(2)



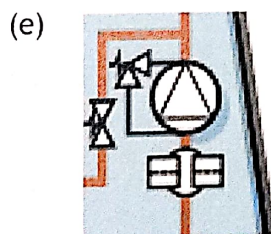
(2)



(2)



(2)



(2)

2. DRG.166

- (a) Using drawing references identify the casing sections that make up the pump assembly, including the mounting casing. (2)
- (b) Using drawing references describe how the pump shaft alignment is maintained. (3)
- (c) Using drawing references, describe the type of seal arrangement used in the illustrated assembly. (3)
- (d) Describe the function of item '38B' in the illustrated assembly. (2)

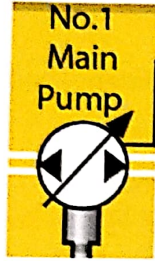
3. DRG.167

- (a) State the heaviest plate section visible on the illustration with reasons for it's location. (2)
- (b) Describe how the approximate length of the vessel between perpendiculars can be ascertained from drawing. (3)
- (c) State the frame number at which the flat side of the hull starts. (2)
- (d) Describe, with dimensions, the longitudinals 26-38, that run across frame number 131. (3)

4. DRG.168

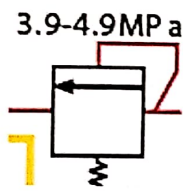
State what the following items are and describe their specific function in the illustrated system.

(a)



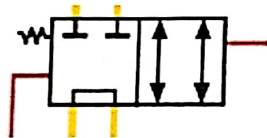
(2)

(b)



(2)

(c)



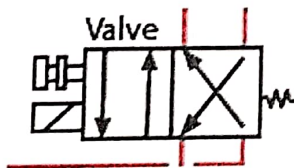
(2)

(d)



(2)

(e)

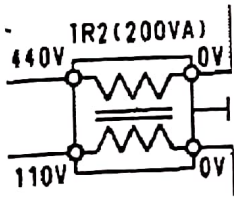


(2)

5. DRG.169

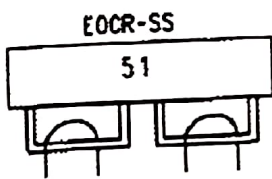
State what the following items are and describe their specific function in the illustrated system.

(a)



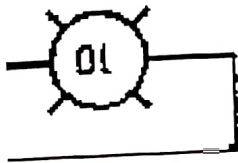
(2)

(b)



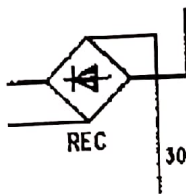
(2)

(c)



(2)

(d)



(2)

(e)



(2)

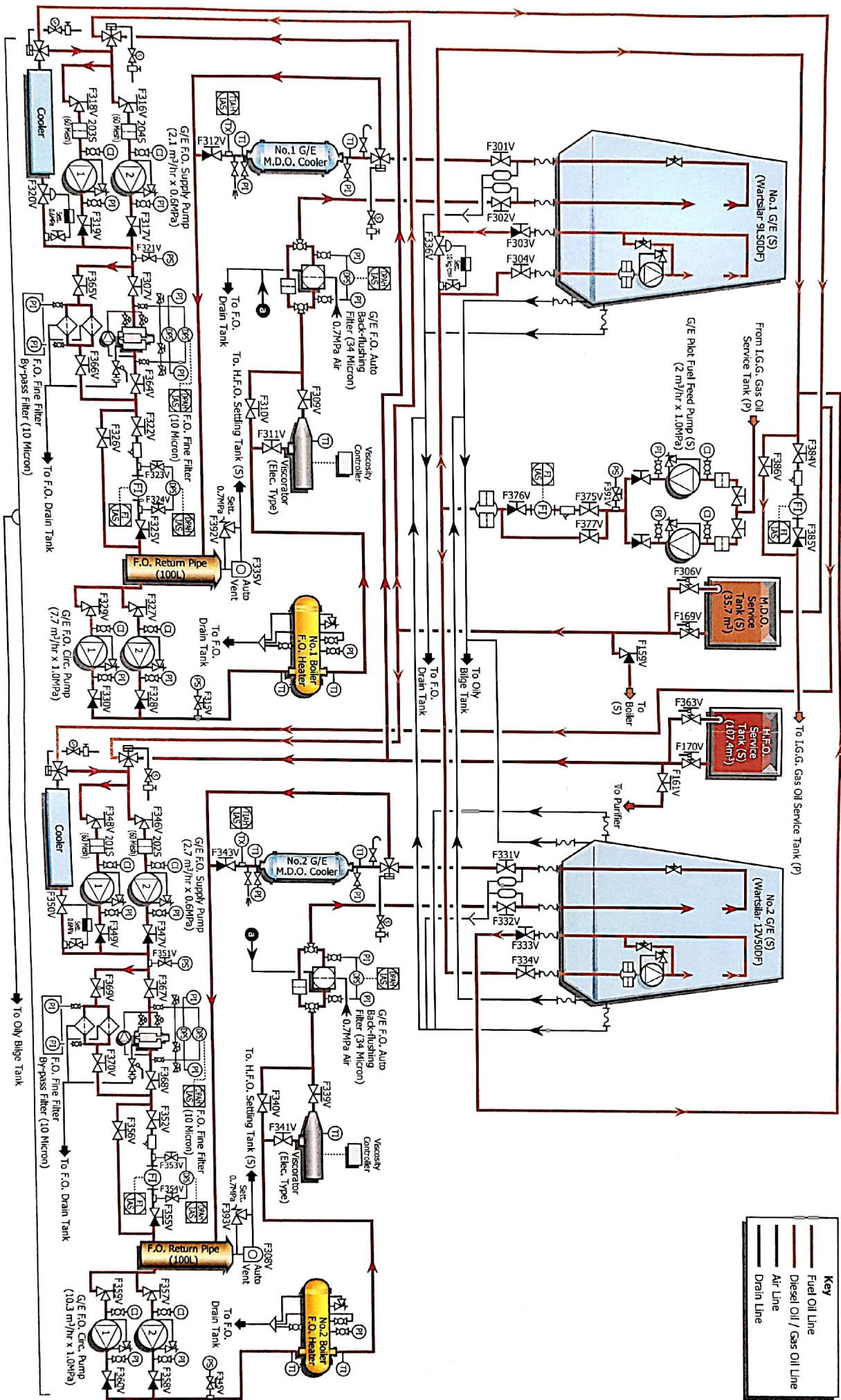
Section B

6. DRG.165

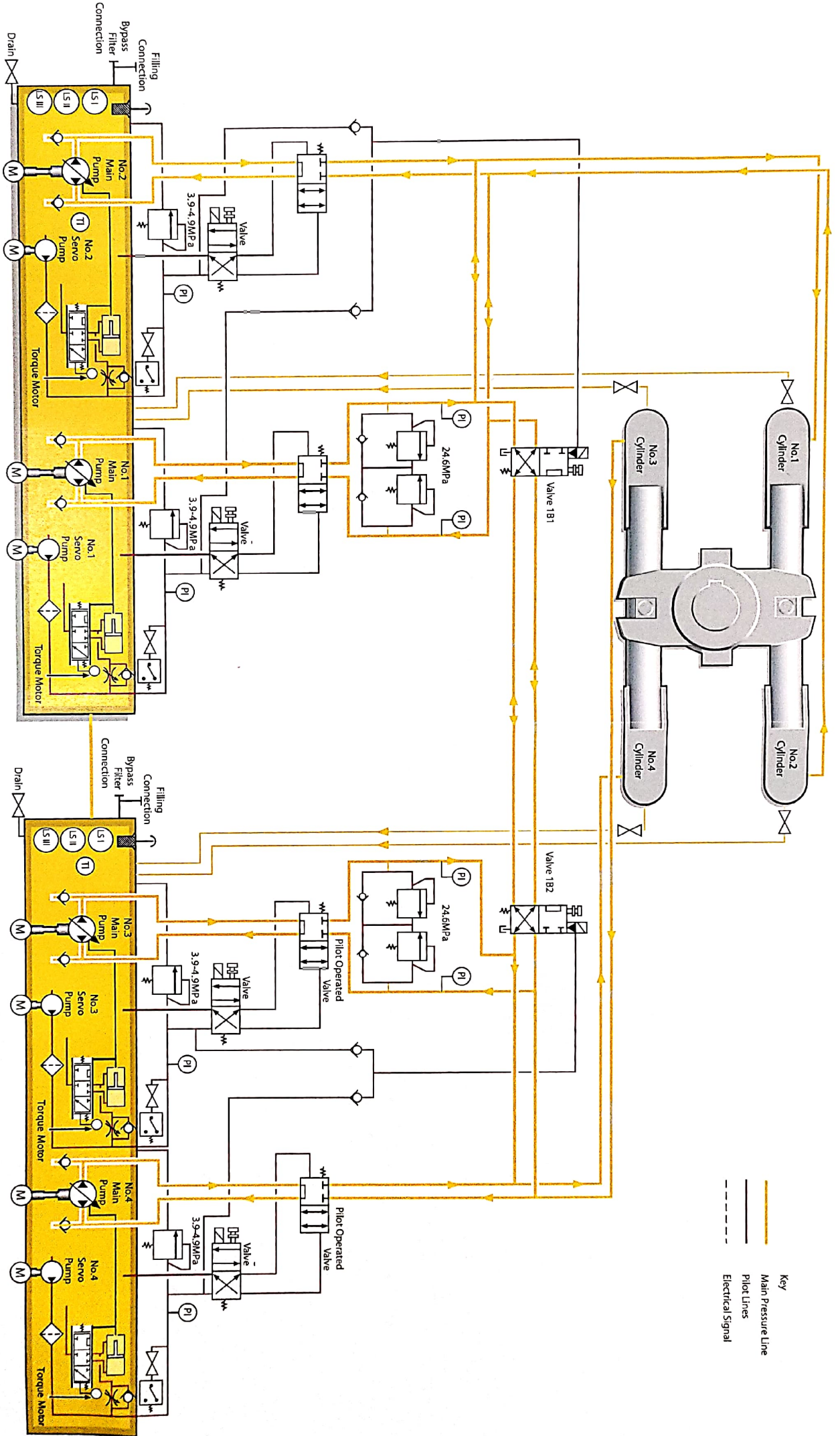
- (a) Using drawing references describe the flow paths and operation of the pilot fuel system, including gauging of fuel used. (5)
- (b) Describe the oil flow paths and system configuration when the system is operating on HFO, including valve positions and pressure regulating controls and consumption monitoring. (20)

7. DRG.168

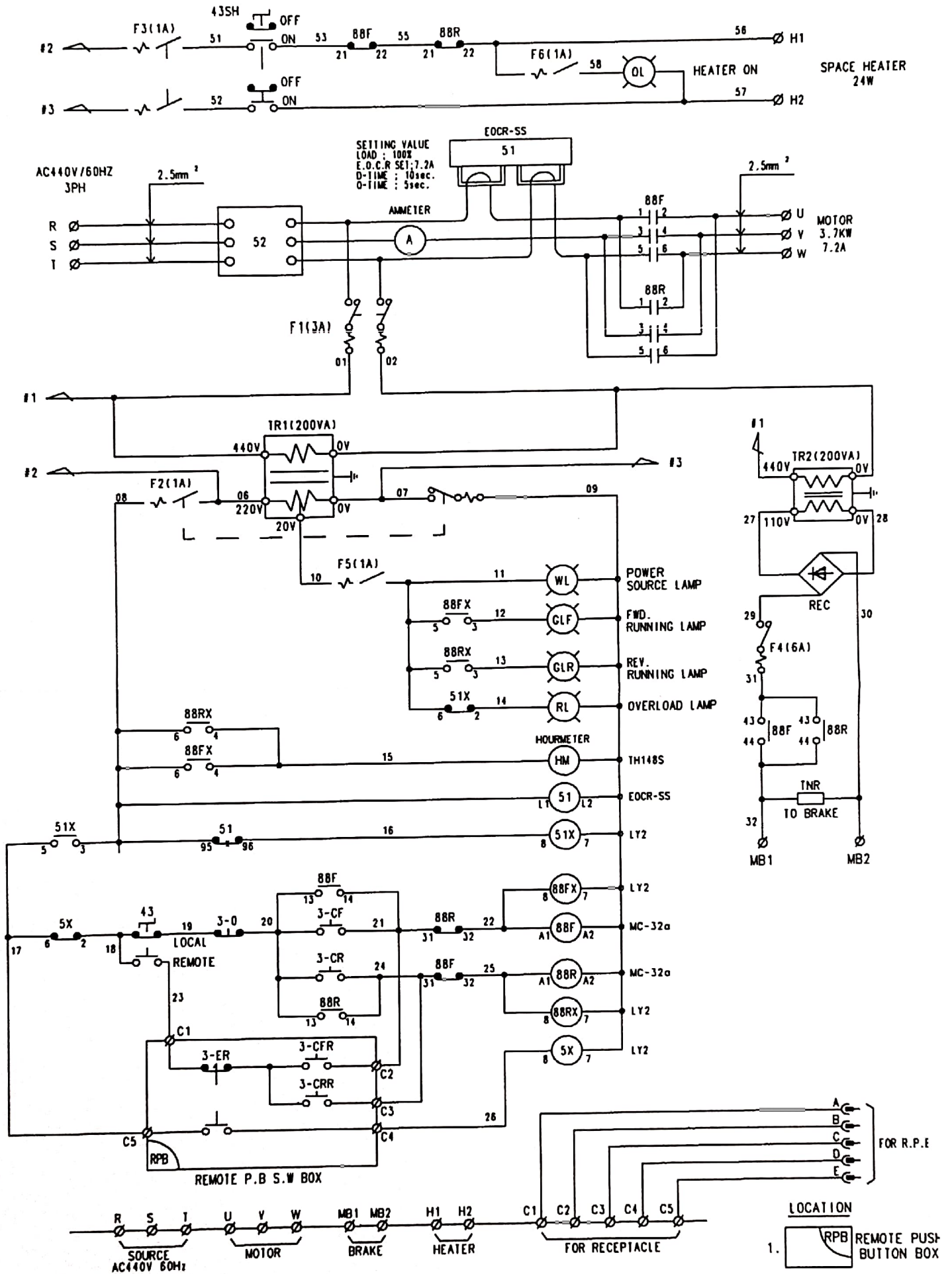
- (a) Using drawing references, describe the oil flow paths when the illustrated system is operating normally in full away condition with no traffic. (10)
- (b) With pump 3 in service, describe the sequence of events and how the system operates when the level in the sump starts and continues to drop. (15)



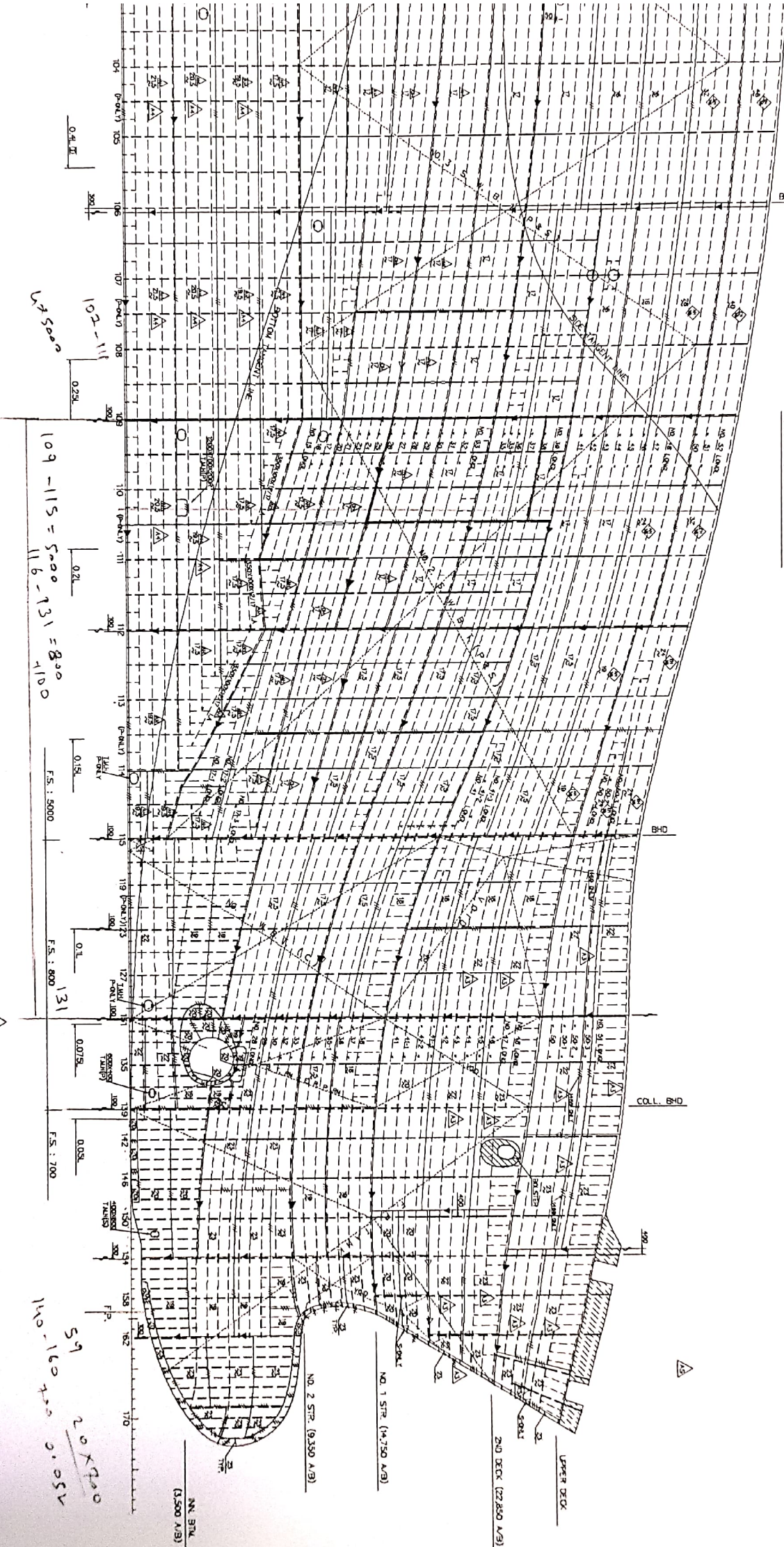
Key	
	Fuel Oil Line
	Diesel Oil / Gas Oil Line
	Air Line
	Drain Line



Key
Main Pressure Line
Pilot Lines
Electrical Signal



NO.1 CARGO TANK



SEE WIDESHIP SECTION (H-7000-201)	
L. NO. 50 - 52 : 400X40 F.B	L. NO. 50 - 52 : 400X24 F.B
L. NO. 47 - 48 : SEE WIDESHIP SECTION (H-7000-201)	L. NO. 50 - 52 : 400X24 F.B
L. NO. 41 - 46 : SEE WIDESHIP SECTION (H-7000-201)	L. NO. 42 - 48 : 475X11.5+150X22 F.B(T)
L. NO. 35 - 39 : 350X100X12/17 LA	L. NO. 41 - 43 : 425X11+150X18 F.B(T)
L. NO. 27 - 33 : 400X100X13/18 LA	L. NO. 28 - 38 : 425X11+10X14 F.B(T)
L. NO. 15 - 26 : 400X100X13/18 LA	L. NO. 50 - 51 : 425X11+150X18 F.B(T)
	L. NO. 41 - 43 : 400X100X11.5/16 LA
	L. NO. 37 - 39 : 300X80X12/17 LA
	L. NO. 29 - 36 : 350X100X12/17 LA
	L. NO. 28 - 28 : 400X100X11.5/16 LA
	BTUL LONG. : 425X11+10X14 F.B(T)

PART NO.	NAME OF PART	MATERIAL		PART NO.	NAME OF PART	MATERIAL	
		NAME	QTY			NAME	QTY
1	VOLUTE CASING	BRONZE	1	54-1	FLOATING SEAT	CARBON	1
2-1	VOLUTE COVER	BRONZE	1	54-2	PACKING RING	RUBBER	1
2-2	VOLUTE COVER	BRONZE	1	54-3	PACKING	GASKET	1
5	MOTOR BED	CAST IRON	1	54-4	SEAL RING	STAINLESS STEEL	SUS316 1
16	IMPELLER	STAINLESS STEEL	1	54-5	PACKING RING	RUBBER	1
17	IMPELLER	STAINLESS STEEL	1	54-6	SPRING	STAINLESS STEEL	SUS316 1
18	IMPELLER SHAFT	STAINLESS STEEL	1	54-7	STOPPERING & SETSCREW	STAINLESS STEEL	SUS304 1 SET
19-1	IMPELLER KEY	STAINLESS STEEL	1	60	PACKING	RUBBER	1
19-2	IMPELLER KEY	STAINLESS STEEL	1	70	SNAP RING	CARBON TOOL STEEL	SK5 1
20	COUPLING KEY	CARBON STEEL	1	144	BRACKET	STEEL	SS400 1
22A	SLEEVE	STAINLESS STEEL	1	146	COVER	BRONZE	CAC406 1
24	INTERMEDIATE SLEEVE	STAINLESS STEEL	1	373	COUPLING BOLT NUT & WASHER	STEEL	SS400 4SETS
27	IMPELLER NUT	STAINLESS STEEL	1	861	PACKING	GASKET	1
30	WASHERS	STAINLESS STEEL	1	862	PACKING	GASKET	1
31	PACKING	RUBBER	1	-	-	-	1
38A	MOUTH RING	SYNTHETIC RESIN	1	-	-	-	1
38B	MOUTH RING	SYNTHETIC RESIN	1	-	-	-	1
39	CASING RING	CARBON	1	-	-	-	1
49	COUPLING	DUCTILE CAST IRON	1	FCD400	MODEL	SECTIONAL DRAWING	
50	COUPLING	DUCTILE CAST IRON	1	FCD400	DRAW. NO.		

