

**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, 24 MARCH 2021**

**1315 - 1615 hrs**

Materials to be supplied by examination centres

Candidate's examination workbook Graph paper
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Examination Paper Inserts

DRG - 095 DRG - 096 DRG - 097 DRG - 098 DRG - 099
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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.

# ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

Attempt ALL questions

Marks for each part question are shown in brackets

All formulae used must be be stated and the method of working and ALL intermediate steps must be made clear in the answer

## Section A

1. DRG - 095

(a) State what the following items are and describe their function. (2)



(b) Using drawing references identify the HT and LT temperature regulating valves. (2)

(c) Using drawing references identify the inlet and outlet valves of the LT harbour pump. (2)

2. DRG - 096

(a) State what item 3 is and describe it's function. (2)

(b) State the type of sealing arrangement used by the pump assembly. (2)

(c) State the number of stages the pump has. (2)

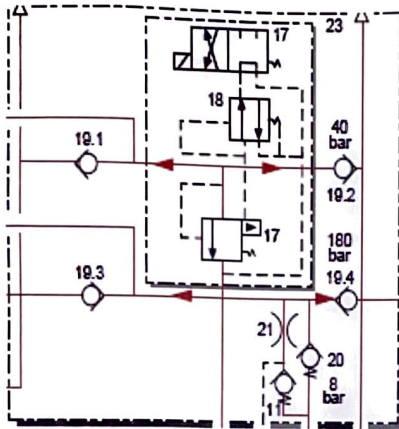
(d) State the part numbers of all casing sections that make up the pump assembly. (4)

3. DRG - 097

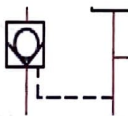
- (a) State the thickest plate section visible at the sheer strake. (2)
- (b) State the approximate length of the centre aft peak tank. (2)
- (c) State whether there is any difference in the vessel's beam between the stern and mid ship, explaining how this decision was reached. (3)
- (d) Describe how the approximate length of the vessel can be ascertained. (3)

4. DRG - 098

- (a) State the function of the following assembly within the system. (2)



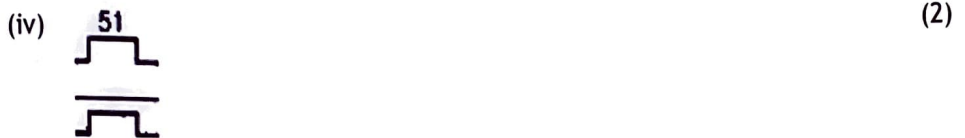
- (b) State the following item and describe its function. (2)



- (c) State the functions of the auxiliary gear pump, including when the system is operational. (4)
- (d) State the functions of the auxiliary servo pump. (2)

99

5. (a) State the following item and describe its function. (2)



(b) State what indicated faults may cause the motor to stop. (2)

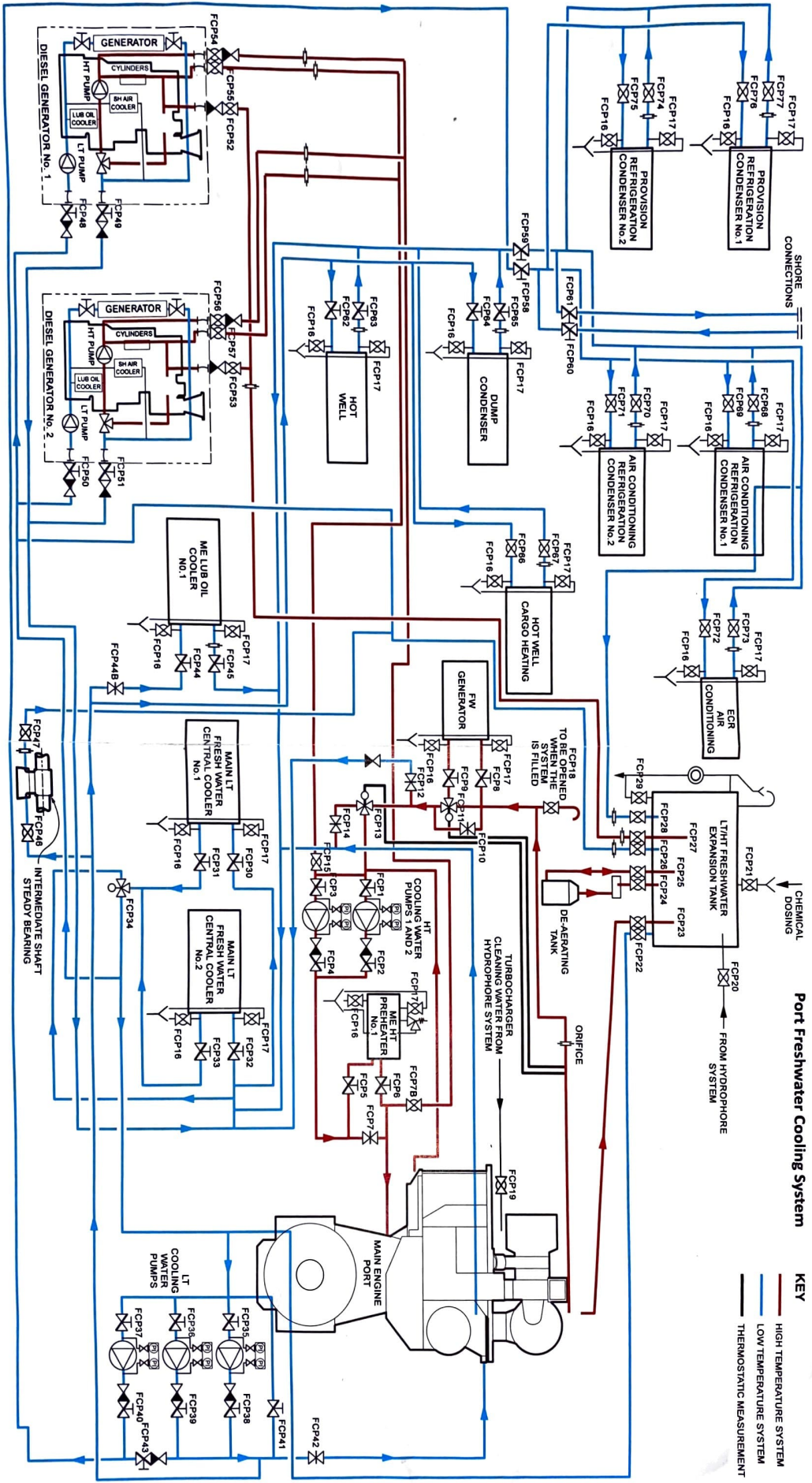
Section B

6. DRG - 095

- (a) Using drawing references, describe any changes in configuration that might be made and the LT cooling water flow path, when the vessel is in port and you are using the LT harbour pump for cooling the auxiliary machinery. (10)
- (b) Using drawing references, describe the HT and LT flow paths when the vessel is at sea and the main engine is operational. (15) 3

7. DRG - 098

- (a) Using drawing references, describe the emergency operating procedure, including oil flow paths, to house the fin in the event of a system failure. (10) 7
- (b) Using drawing references, describe the set up and operation of the system shown, including oil flow paths. (15) 10



### Port Freshwater Cooling System

- KEY**
- HIGH TEMPERATURE SYSTEM
  - LOW TEMPERATURE SYSTEM
  - THERMOSTATIC MEASUREMENT

CHEMICAL DOSING

FROM HYDROPHONE

ORIFICE

TURBOCHARGER CLEANING WATER FROM HYDROPHONE SYSTEM

TO BE OPENED WHEN THE SYSTEM IS FILLED

COOLING WATER PUMPS LAND 2

HT

ME HT PREHEATER No. 1

MAIN LT FRESH WATER CENTRAL COOLER No. 2

MAIN LT FRESH WATER CENTRAL COOLER No. 1

INTERMEDIATE SHAFT STEADY BEARING

ME LUB OIL COOLER No. 1

SHORE CONNECTIONS

PROVISION REFRIGERATION CONDENSER No. 1

PROVISION REFRIGERATION CONDENSER No. 2

AIR CONDITIONING REFRIGERATION CONDENSER No. 1

AIR CONDITIONING REFRIGERATION CONDENSER No. 2

DUMP CONDENSER

HOT WELL

CARGO HEATING

FW GENERATOR

DE-AERATING TANK

LT/HT FRESH WATER EXPANSION TANK

ME LUB OIL COOLER No. 1

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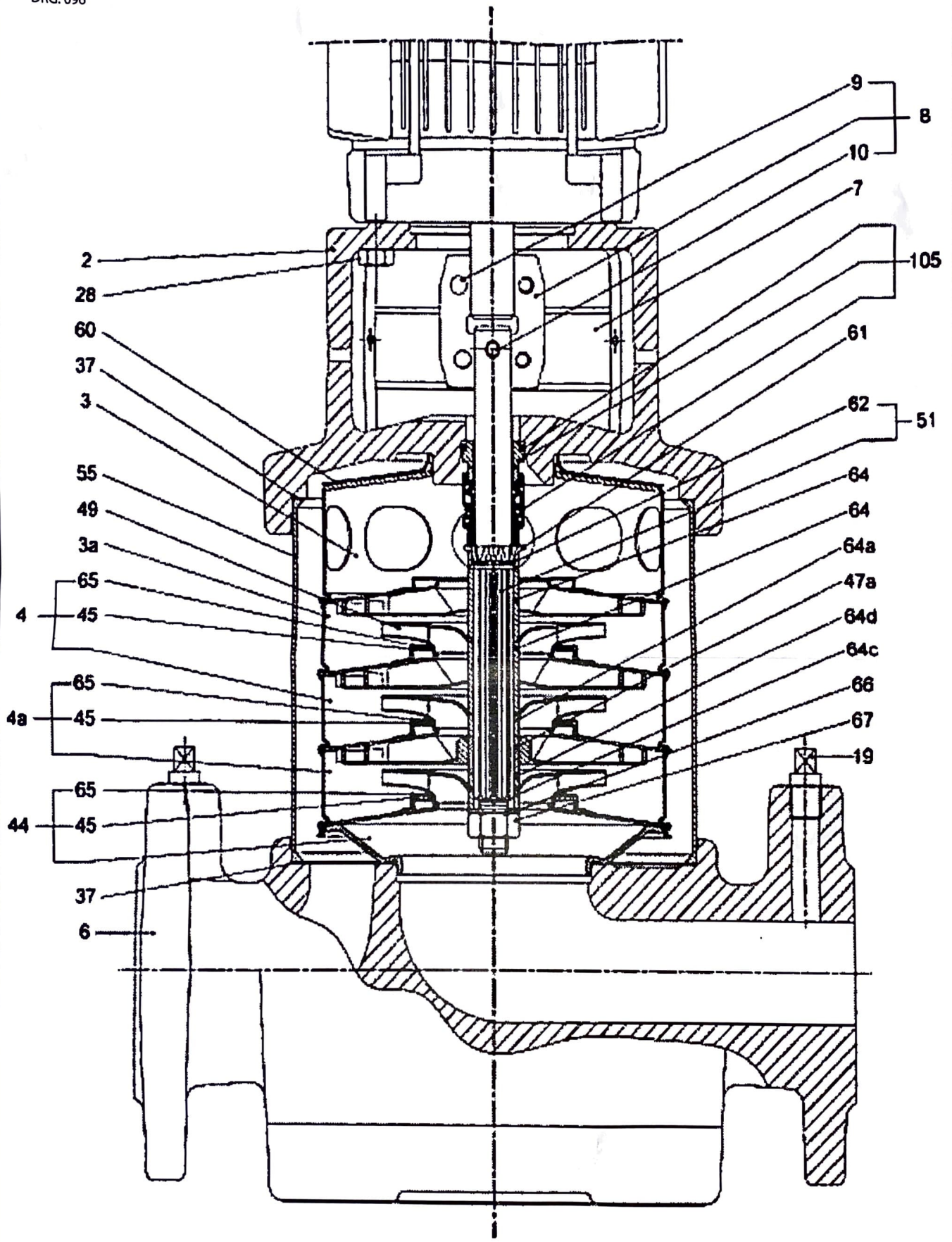
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MORNING BECK  
(20,234 A/B)

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8,530 OFF CL.

13,990 OFF CL.

11,470 OFF CL.

8,950 OFF CL.

8,430 OFF CL.

3,910 OFF CL.

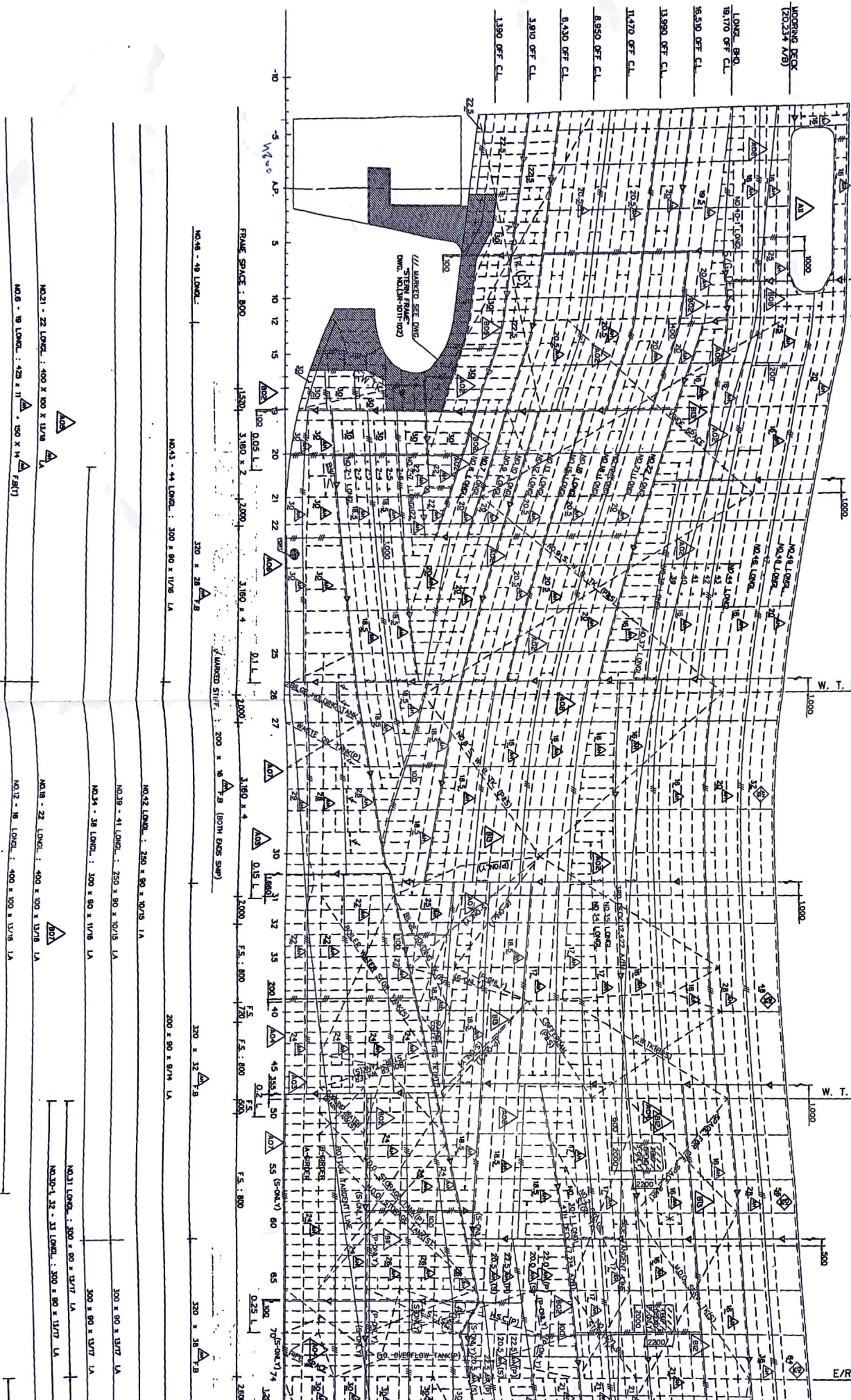
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A. P. B.H.D.

W. T. B.H.D.

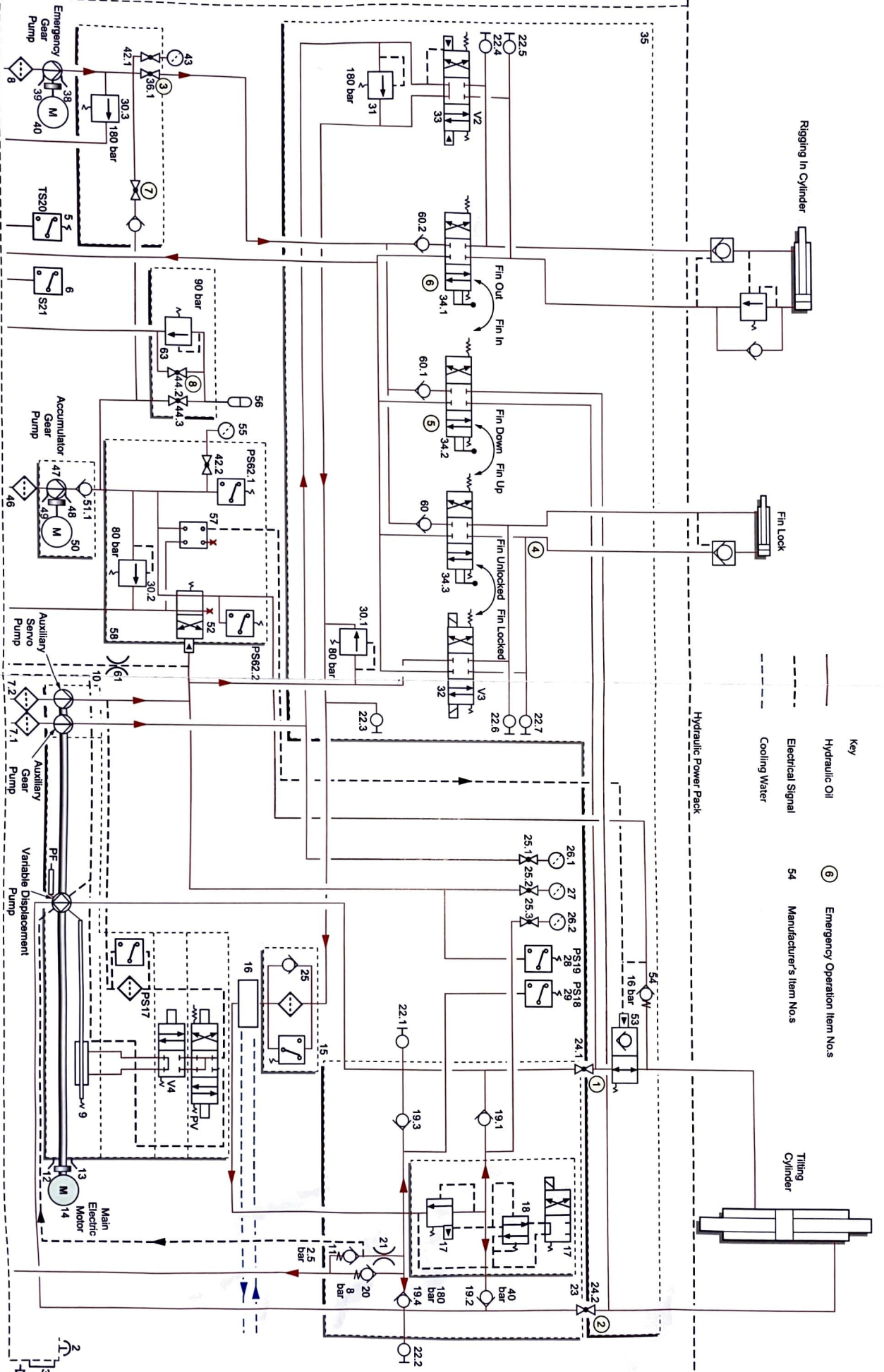
W. T. B.H.D.

E/R B.H.D.



- NO.21 - 22 LANE: 400 x 90 x 1 1/8 LA
- NO.22 - 23 LANE: 400 x 90 x 1 1/8 LA
- NO.23 - 24 LANE: 400 x 90 x 1 1/8 LA
- NO.24 - 25 LANE: 400 x 90 x 1 1/8 LA
- NO.25 - 26 LANE: 400 x 90 x 1 1/8 LA
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- NO.40 - 41 LANE: 300 x 90 x 1 1/8 LA
- NO.41 - 42 LANE: 300 x 90 x 1 1/8 LA
- NO.42 LANE: 350 x 90 x 10/15 LA
- NO.43 - 44 LANE: 300 x 90 x 1 1/8 LA
- NO.45 - 46 LANE: 300 x 90 x 1 1/8 LA
- NO.47 - 48 LANE: 300 x 90 x 1 1/8 LA
- NO.49 LANE: 300 x 90 x 1 1/8 LA
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- NO.92 - 93 LANE: 300 x 90 x 1 1/8 LA
- NO.94 - 95 LANE: 300 x 90 x 1 1/8 LA
- NO.96 - 97 LANE: 300 x 90 x 1 1/8 LA
- NO.98 - 99 LANE: 300 x 90 x 1 1/8 LA
- NO.100 - 101 LANE: 300 x 90 x 1 1/8 LA





Key

Hydraulic Oil (6) Emergency Operation Item Nos

Electrical Signal 54 Manufacturer's Item Nos

Cooling Water

Tilting Cylinder

Rigging In Cylinder

Fin Lock

Hydraulic Power Pack

35

22.5  
22.4

180 bar

30.3  
180 bar

90 bar

80 bar

5.80 bar

22.7  
22.6

22.3

30.1  
5.80 bar

22.1

19.3

19.1

24.2  
23

40 bar  
180 bar  
8 bar

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19.2

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8 bar

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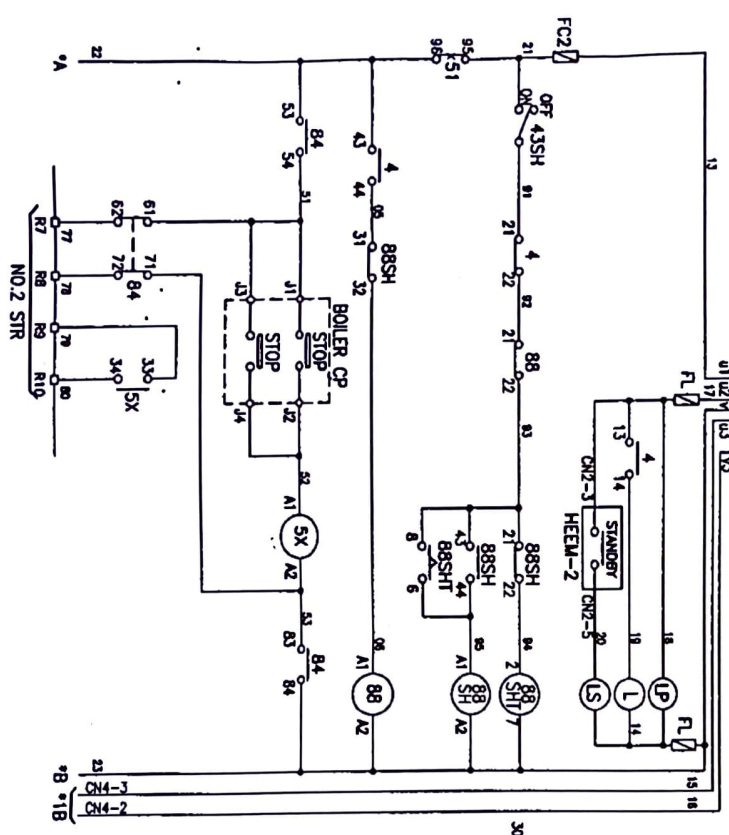
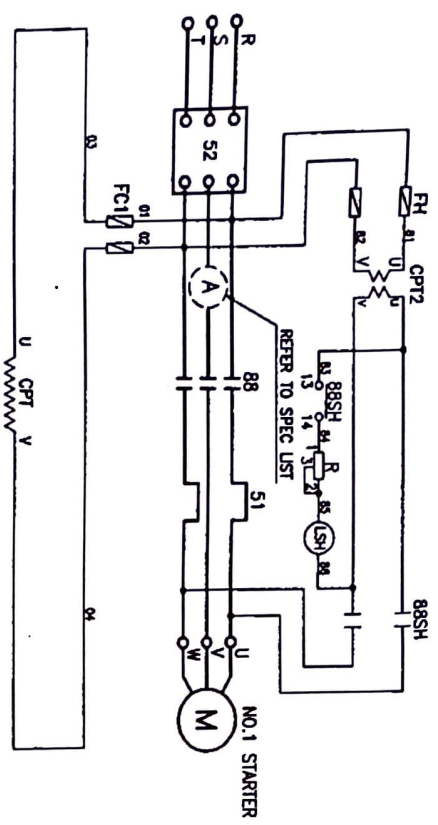
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