

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, 15 JULY 2020

1315 - 1615 hrs

Materials to be supplied by examination centres

Candidate's examination workbook
Graph paper

Examination Paper Inserts

DRG - 076
DRG - 077
DRG - 078
DRG - 079
DRG - 080

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. Piping Systems - DRG 076
 - (a) State the identification number of the crossover valve that enables cargo hold bilge water tank to be pumped by ER bilge pump. (2)
 - (b) State the identification number of the crossover valve that enables engine room bilge water to be pumped by either Cargo hold bilge pump, or Fire/bilge pump. (2)
 - (c) Describe the function of the compressed air line. (2)
 - (d) State the function of valve 091, near the forward end of the engine room, describing how and when it is used. (2)
 - (e) Describe the functions of outlet valves 083 and 084 at the dirty bilge tank. (2)

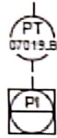
2. Mechanical Assembly - DRG 077
 - (a) On the elevation shown, state the discharge side. (2)
 - (b) State how the impellers are radially located on the shaft. (2)
 - (c) State with reasons, the type of service for which this pump may be suitable. (2)
 - (d) Describe how the casing sections and bearing supports are located and secured. (4)

3. Ship's Construction Drawing - DRG 078
 - (a) State the frame number the flat bottom of the hull starts at. (2)
 - (b) State the distance from the aft perpendicular to the transom. (2)
 - (c) State the dimensions and thickness of plate section 'A', identified on the drawing. (2)
 - (d) With the aid of a sketch, describe the difference in form between longitudinal stiffeners 46-49 and longitudinal stiffeners 43-44. (4)

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4. Hydraulic and Pneumatic System Drawings - DRG 079

(a) State what the following symbol indicates, and explain its function. (2)



(b) Generator safety control air is stored at 30 bar. State, with reasons, if this can be used to start the generator in an emergency. (2)

(c) State, with reasons, the total supply capacity per hour of the system shown. (2)

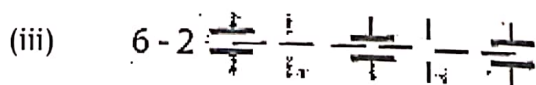
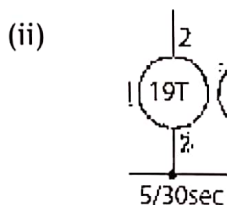
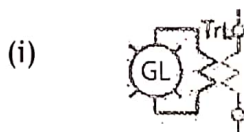
(d) State the diameter of the safety valve discharge line, from the main air receiver. (2)

(e) State the THREE working pressures evident in the system. (2)

5. Electrical Power Systems and Control Drawings - DRG 080

(a) Describe the function of the supplied drawing. (2)

(b) State what the following items are and describe their function:



(c) State the indication given if fuse 'FL' was blown (open circuit) and what effect it would have on the motor starting. (2)

Section B

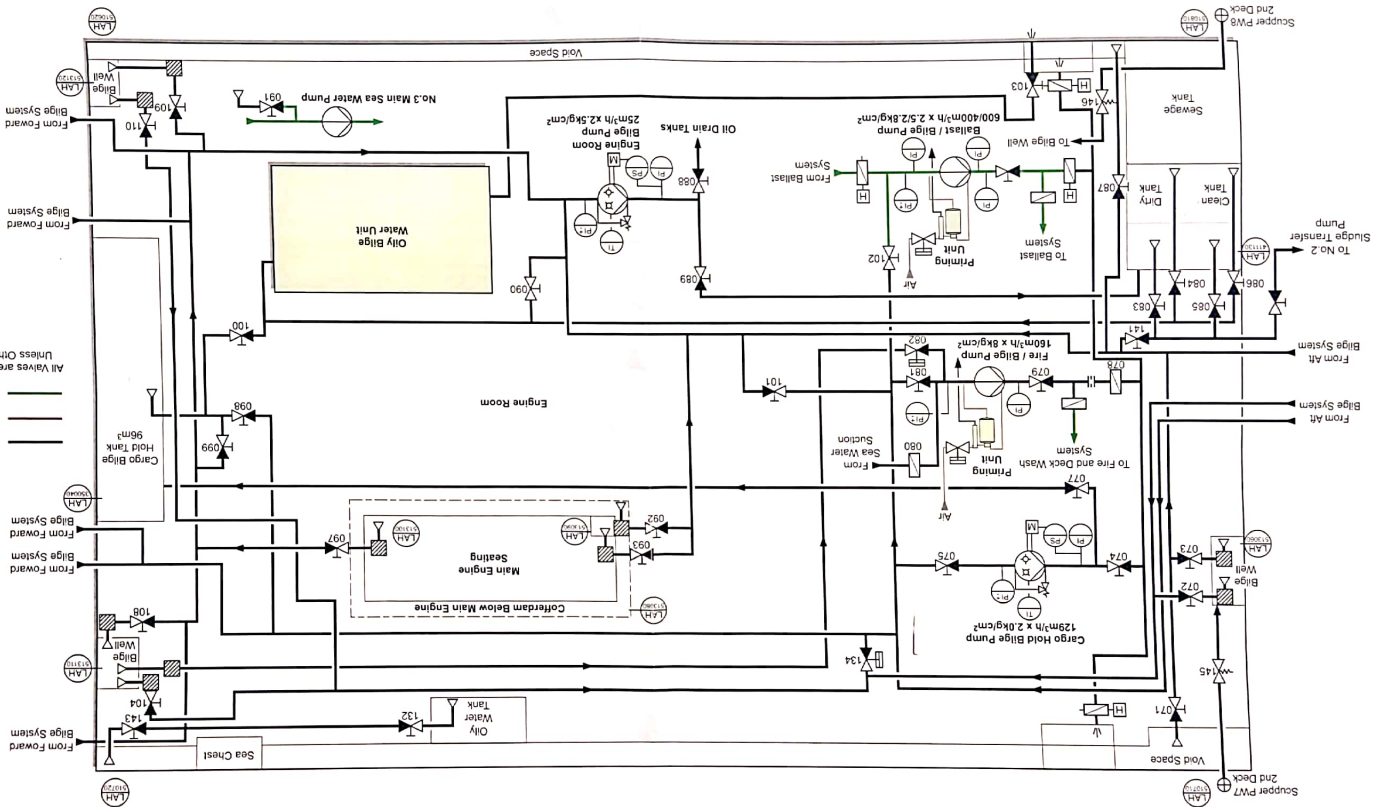
6. Mechanical Assembly - DRG 077

- (a) State the type of seal arrangement used by the pump. (2)
- (b) State the total number of casing sections that make up the pump assembly, including the bearing supports. (3)
- (c) Describe, using drawing references, the procedure for overhaul of the pump assembly. The overhaul should include replacement of all components subject to wear, and reinstatement of correct impeller clearance. (20)

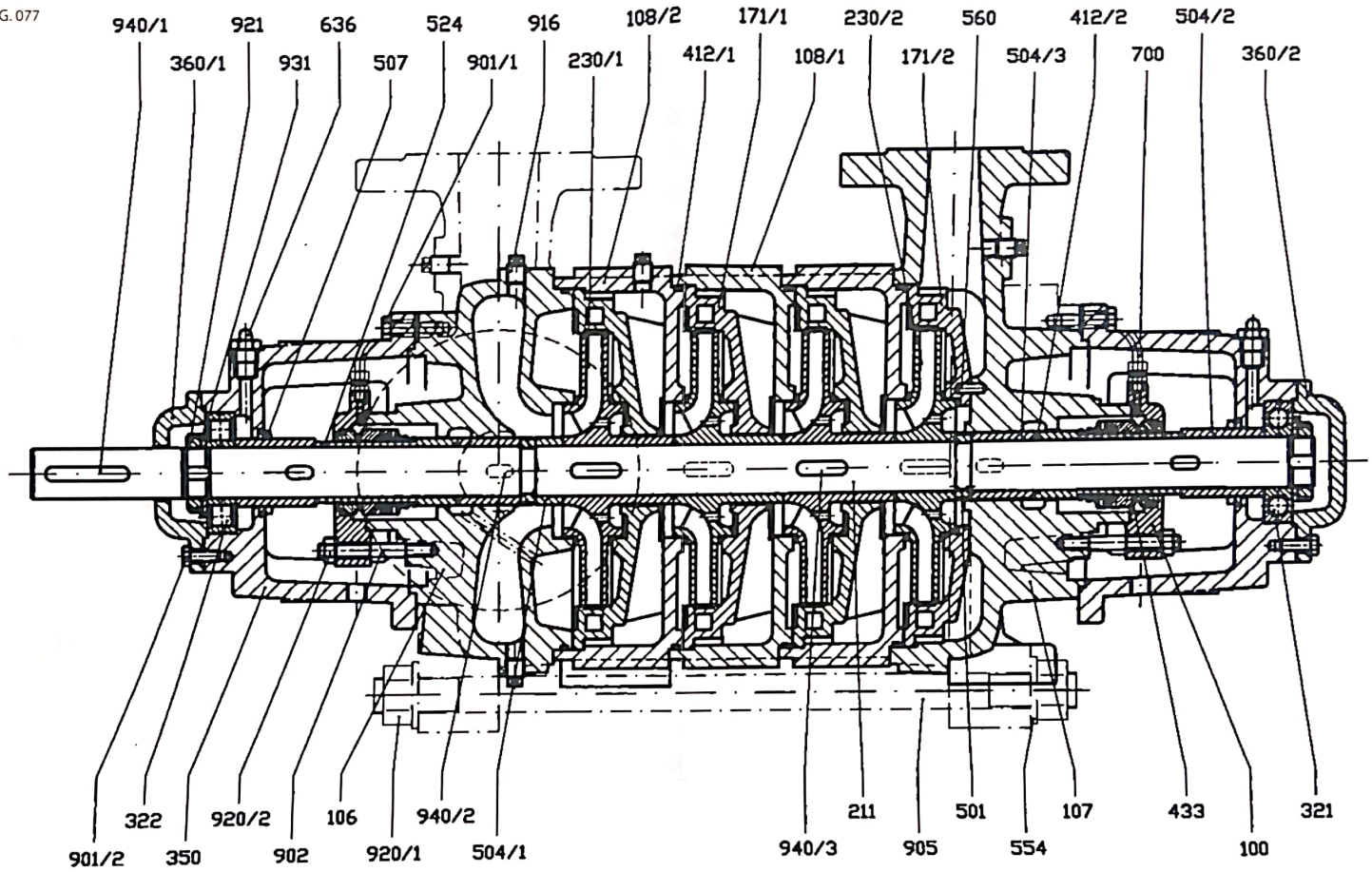
7. Electrical Power Systems and Control Drawings - DRG 080

- (a) Using drawing references, describe the action and sequence of automated actions that occur for the circuit to complete its designed function. (20)
- (b) Using drawing references, explain what would occur if there was an open circuit fault in cable '22' when the above sequence was initiated. (5)

All Valves are Prefixed 'A722'
 Sea Water
 Air
 Bilge
 Key



DRG. 077



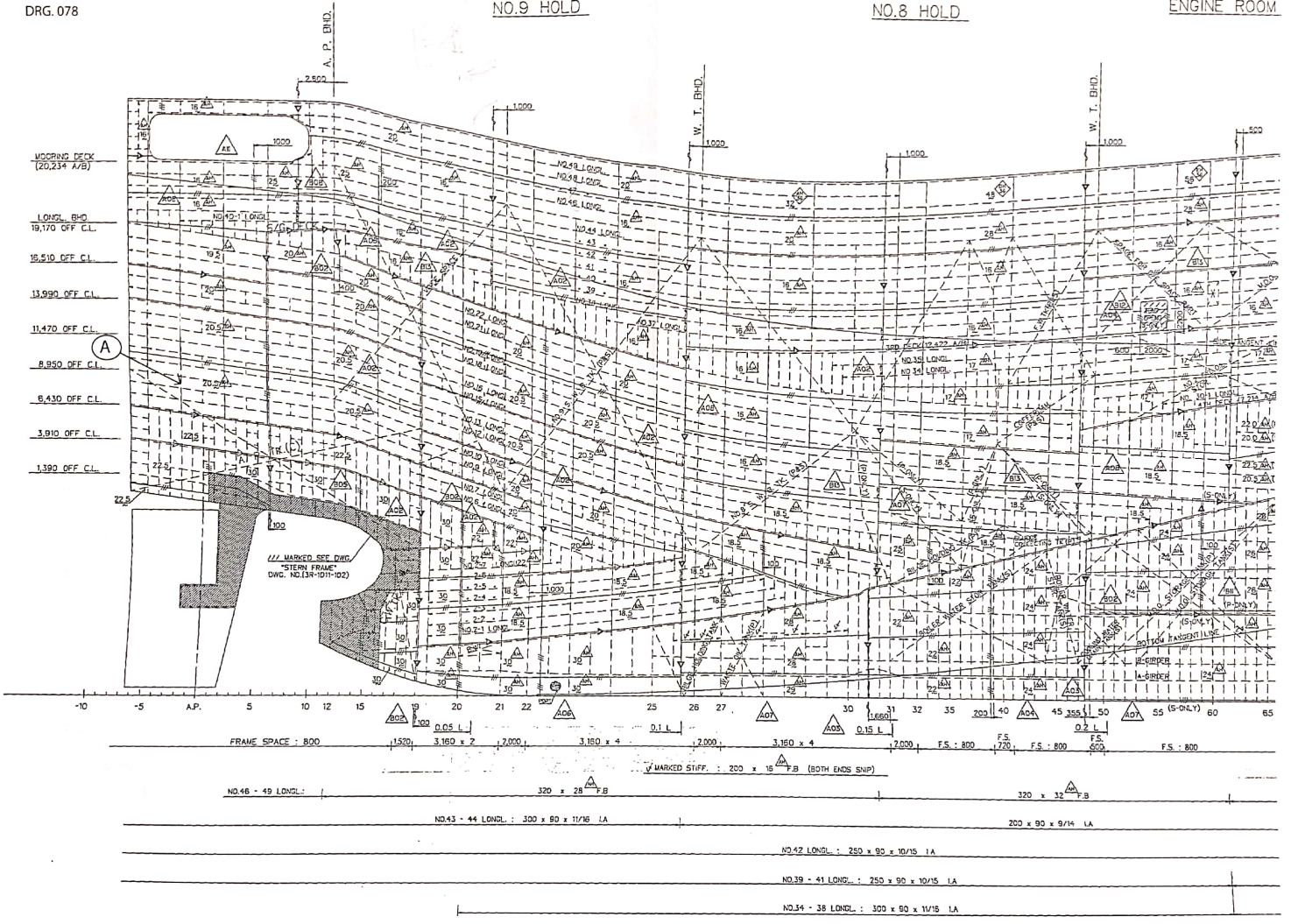
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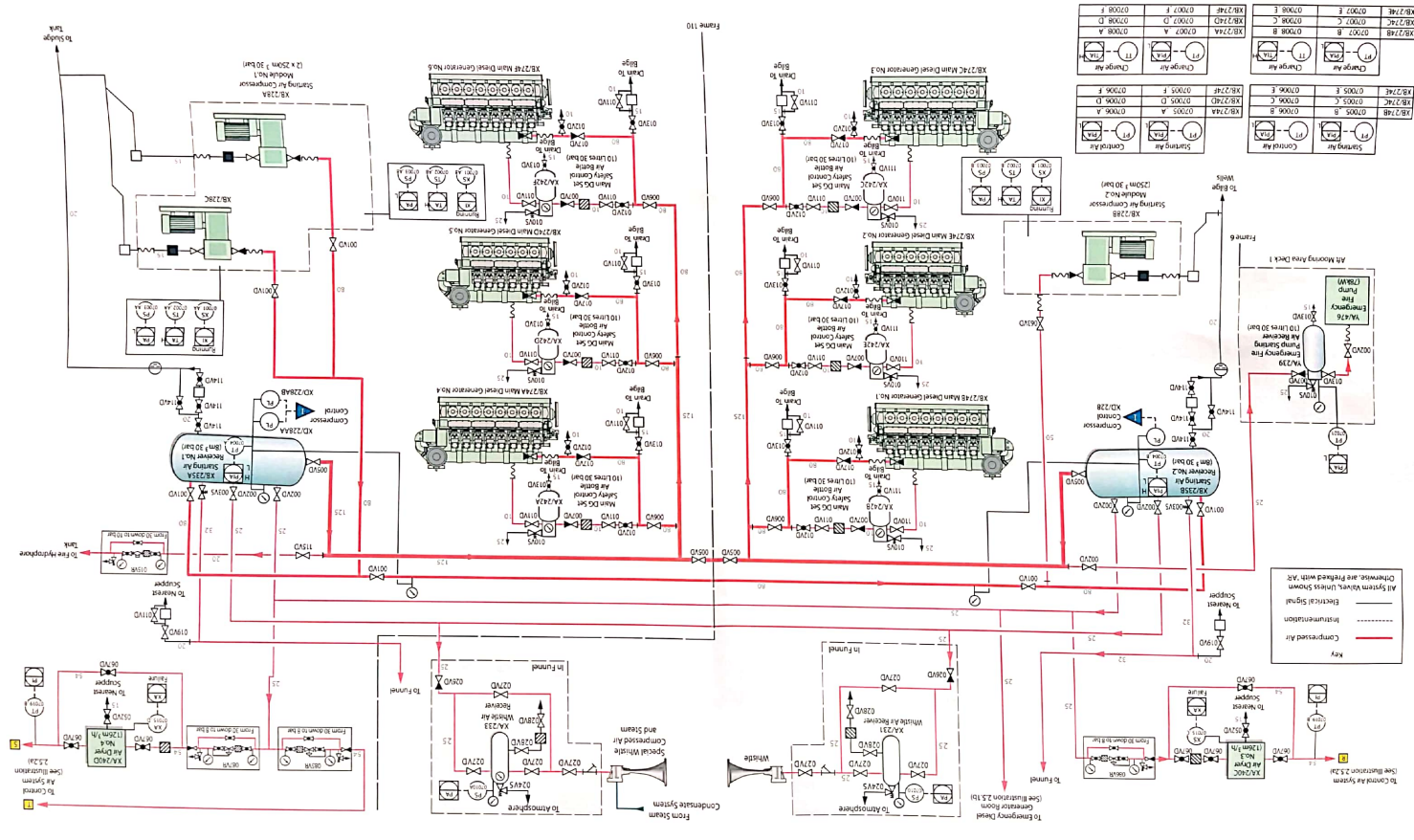
NO.9 HOLD

NO.8 HOLD

ENGINE ROOM



Frame 110



XB 2748	07005 B	07006 B	Change Air
XB 2748	07005 C	07006 C	Change Air
XB 2748	07005 D	07006 D	Change Air
XB 2748	07005 E	07006 E	Change Air
XB 2748	07005 F	07006 F	Change Air
XB 2748	07005 A	07006 A	Change Air
XB 2748	07005 D	07006 D	Change Air
XB 2748	07005 E	07006 E	Change Air
XB 2748	07005 C	07006 C	Change Air
XB 2748	07005 B	07006 B	Change Air
XB 2748	07005 A	07006 A	Change Air
XB 2748	07005 F	07006 F	Change Air

