

**CERTIFICATES OF COMPETENCY IN THE MERCHANT NAVY -
MARINE ENGINEER OFFICER**

**EXAMINATIONS ADMINISTERED BY THE
SCOTTISH QUALIFICATIONS AUTHORITY
ON BEHALF OF THE
MARITIME AND COASTGUARD AGENCY**

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

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

WEDNESDAY, 19 JULY 2017

1315 - 1615 hrs

Examination paper inserts:

DRG - 015
DRG - 014
DGR - 013
DRG - 019
DRG - 012

Notes for the guidance of candidates:

1. 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.
2. Non-programmable calculators may be used.
3. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.

Materials to be supplied by colleges:

Candidate's examination workbook

ENGINEERING, SYSTEMS AND SHIP'S DRAWINGS

Attempt ALL questions

Marks for each part question are shown in brackets

Section A

1. Piping Systems - DRG. 015

- (a) Describe the following device, stating its function. (2)

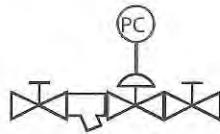


- (b) Describe the following device, stating its function at the feed pump. (2)



- (c) Describe how the temperature of the boiler circulating pumps is controlled. (2)

- (d) Describe the following device, stating its function. (2)



- (e) Describe the function of the economiser feed pump. (2)

2. Mechanical Assembly - DRG 014

- (a) Describe how the impeller is attached to the shaft. (2)

- (b) Explain the function of item 20. (2)

- (c) On the side elevation shown, state what sides the suction and discharge are on. (2)

- (d) Explain the function of item 530. (2)

- (e) Explain the purpose of item 180. (2)

3. Ship's Construction Drawing - DRG 013

- (a) State the precise location of No.4 WBT bottom plug. (2)
- (b) State the total number of bottom plugs. (2)
- (c) State what S.C. are. They are located between frames 40-42, port and stb. (2)
- (d) State between what frame numbers the void space around the pump room runs. (2)
- (e) Discuss, with reasons, what areas you would avoid placing support blocks, when the vessel is in dry dock. (2)

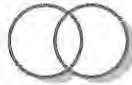
4. Hydraulic and Pneumatic System Drawings - DRG. 019

- (a) State what station currently has control of the main engine, and identify where on the drawing this is evident. (2)
- (b) State what items 7 and 88 are, explaining their function. (2)
- (c) State what item 127 is, explaining its function. (2)
- (d) Detail any drawing references that may help you physically identify the location of the ahead, astern, start and stop, remote control solenoid valves. (2)
- (e) State what item 30 is, explaining its function. (2)

5. Electrical Power Systems and Control Drawings - DRG 012

(a) State the type of device and its function for EACH of the following:

(i)



(2)

(ii)



(2)

(b) Describe the device and its function for both the emergency switchboard and the main switchboard 220 V feeder panel breakers.

(2)

(c) State the purpose of having two transformers feeding MSB feeder panel.

(2)

(d) Describe the Main/Emergency Board Interconnector.

(2)

Section B

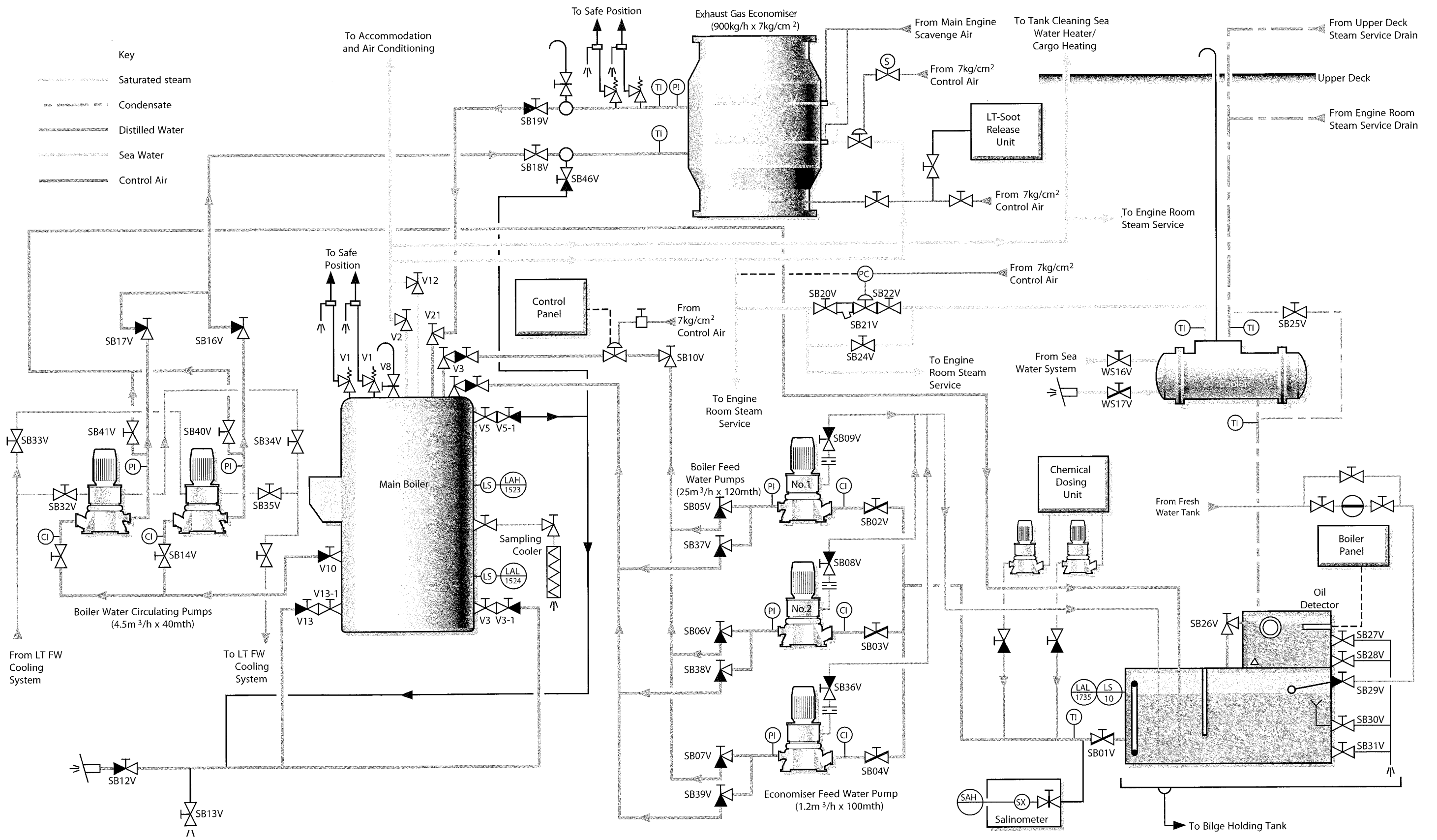
6. Hydraulic and Pneumatic Systems - DRG 019

The main air start automatic valve, does not return to the closed position on completion of the starting sequence, but remains open, and slowly returns to the closed position over a period of time.

- (a) State the item numbers of the components in the system that may cause the fault. (8)
- (b) Describe the operation of control for the automatic valve. (10)
- (c) Explain the possible faults that may cause the control failure, stating why this is of concern. (7)

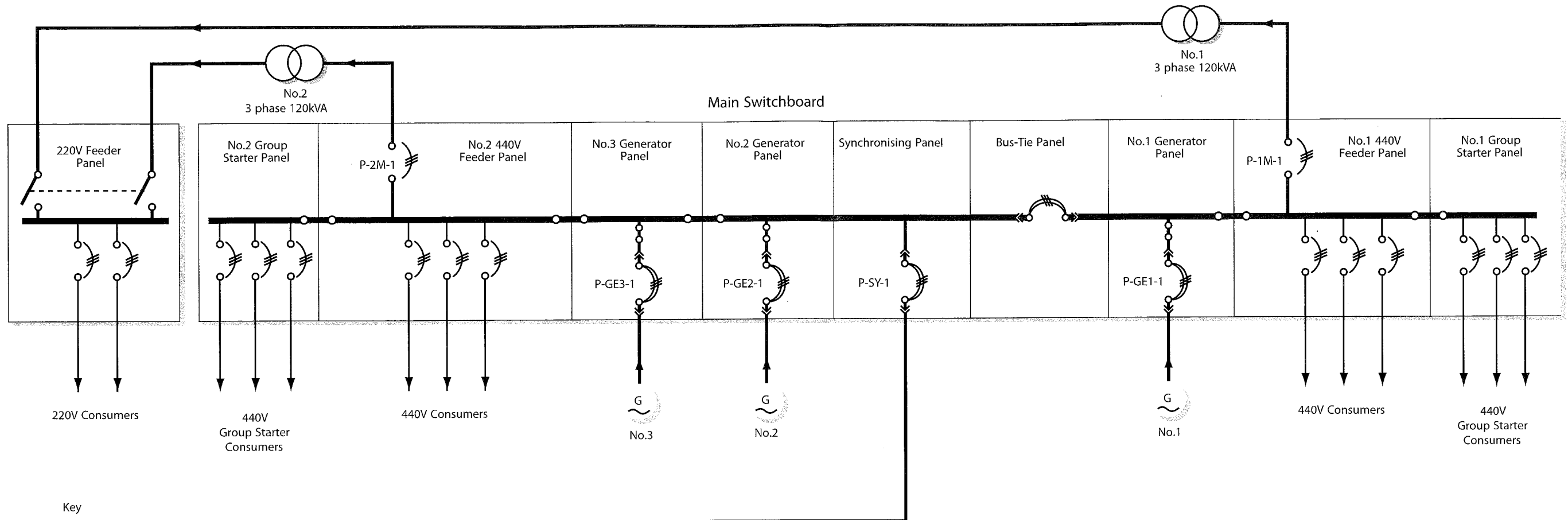
7. Mechanical Assembly - DRG 014

Describe the procedure for replacing the impeller wear rings on the illustrated pump. (25)

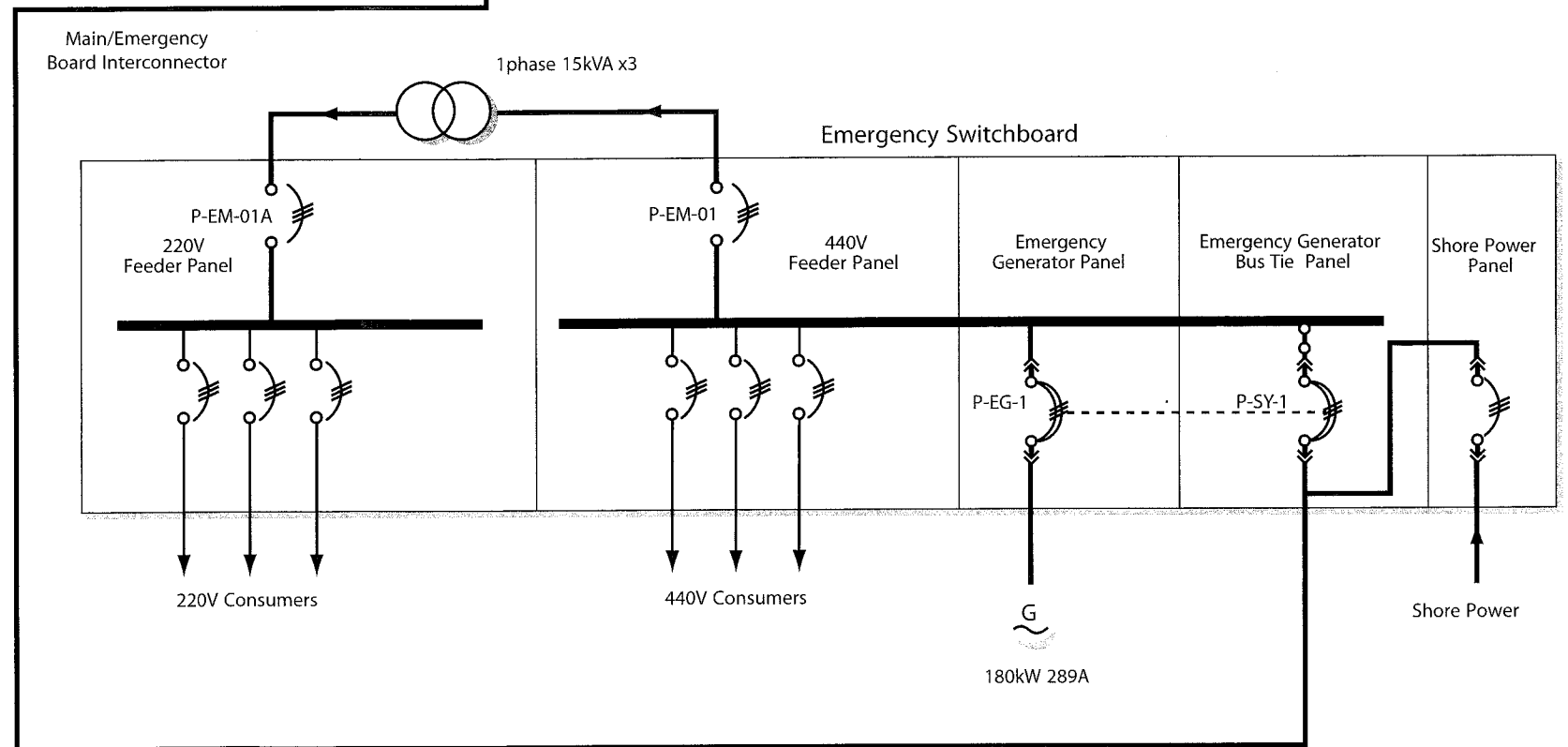
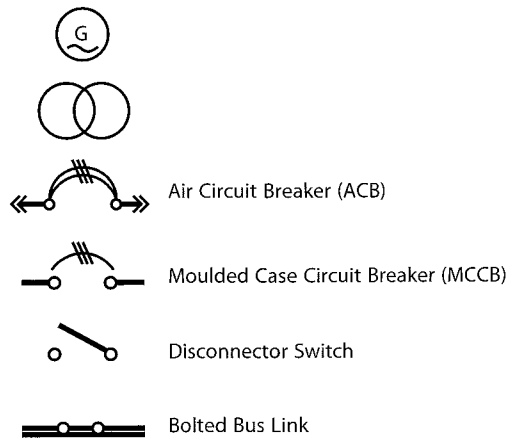


Key

- Saturated steam
- Condensate
- Distilled Water
- Sea Water
- Control Air



Key



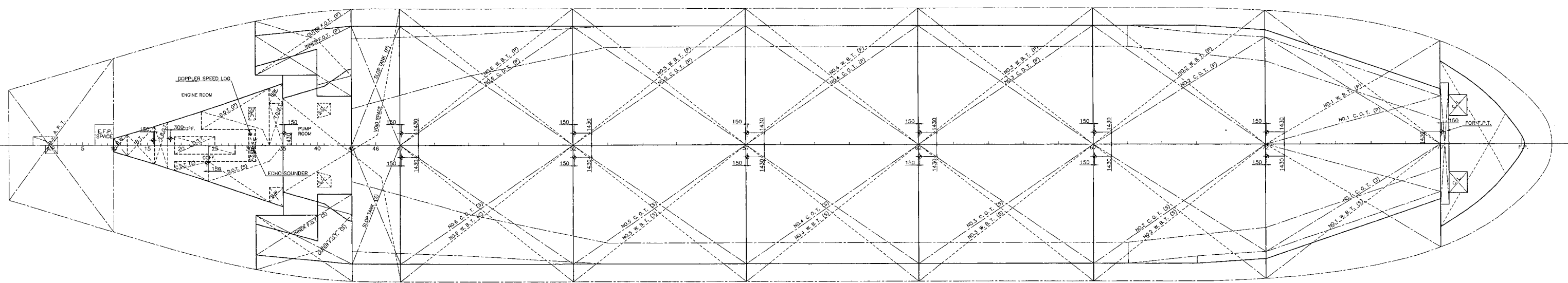
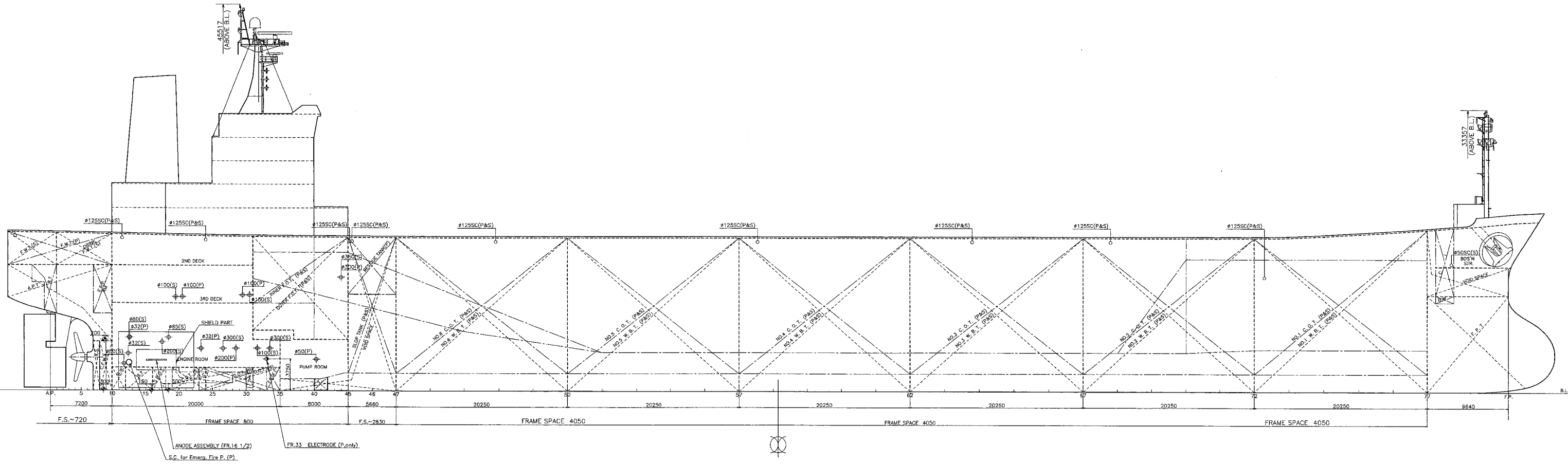
(DRG. 013)

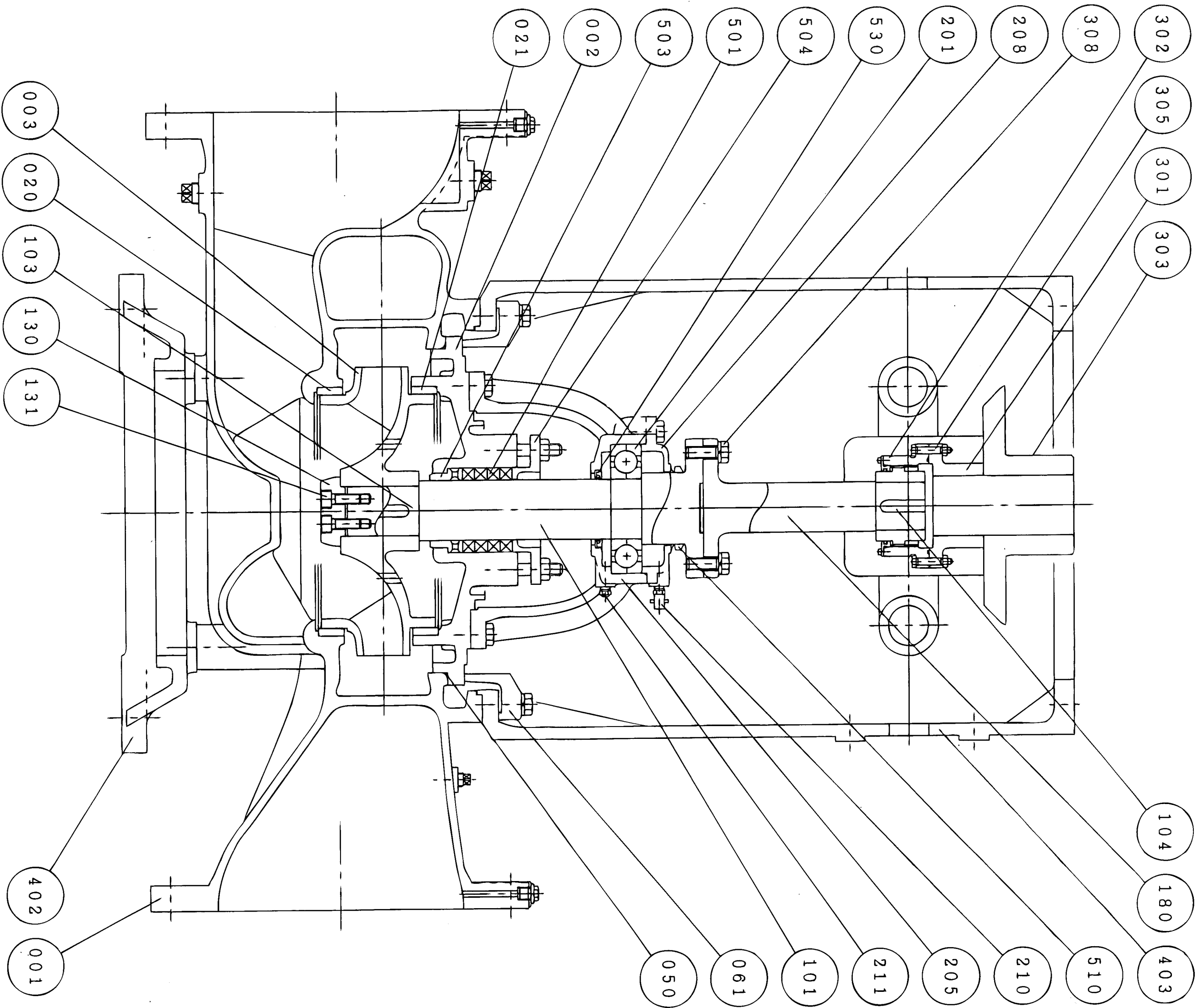
ZINC ANODE IN SEA CHEST

FR.NO.	SUDE	SIZE	QUAN.
40 - 42	S	300x150x20	6
40 - 42	P	300x150x20	6
31 - 32	S	300x150x20	3
30 - 31	P	300x150x20	6
12 - 13 (EMERG.FIRE PUMP S.C.)	P	300x150x20	1

SYMBOL AND NOTES

- MARK SHOW BOTTOM PLUG
- ⊕ O.B.D.V. : OVER BOARD DISCHARGE VALVE
- SC. : SCUPPER
- ⊙ ELECTRODE





WHEEL HOUSE (W/H)

ENGINE (ENG)

CONTROL ROOM (C/R)

REVERSING LINE (REV)

STARTING LINE (STT)

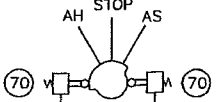
SPEED SETTING LINE (SPD)

TELEGRAPH TRANSMITTER PANEL

BRIDGE CONTROL UNIT

SPEED SET
STOP
START
AS
AH

W/H O C/R



START STOP (180)

MAIN CONTROL UNIT

TIMER

GOVERNOR CONTROL CIRCUIT

C/R DISPLAY

(170) RELAY PANEL

AIR SOURCE (AIR)

SAFETY DEVICE (SAF)

CONTROL AIR LINE (0.69MPa)
STARTING AIR LINE (2.94MPa)
ELECTRIC LINE
LAN CABLE

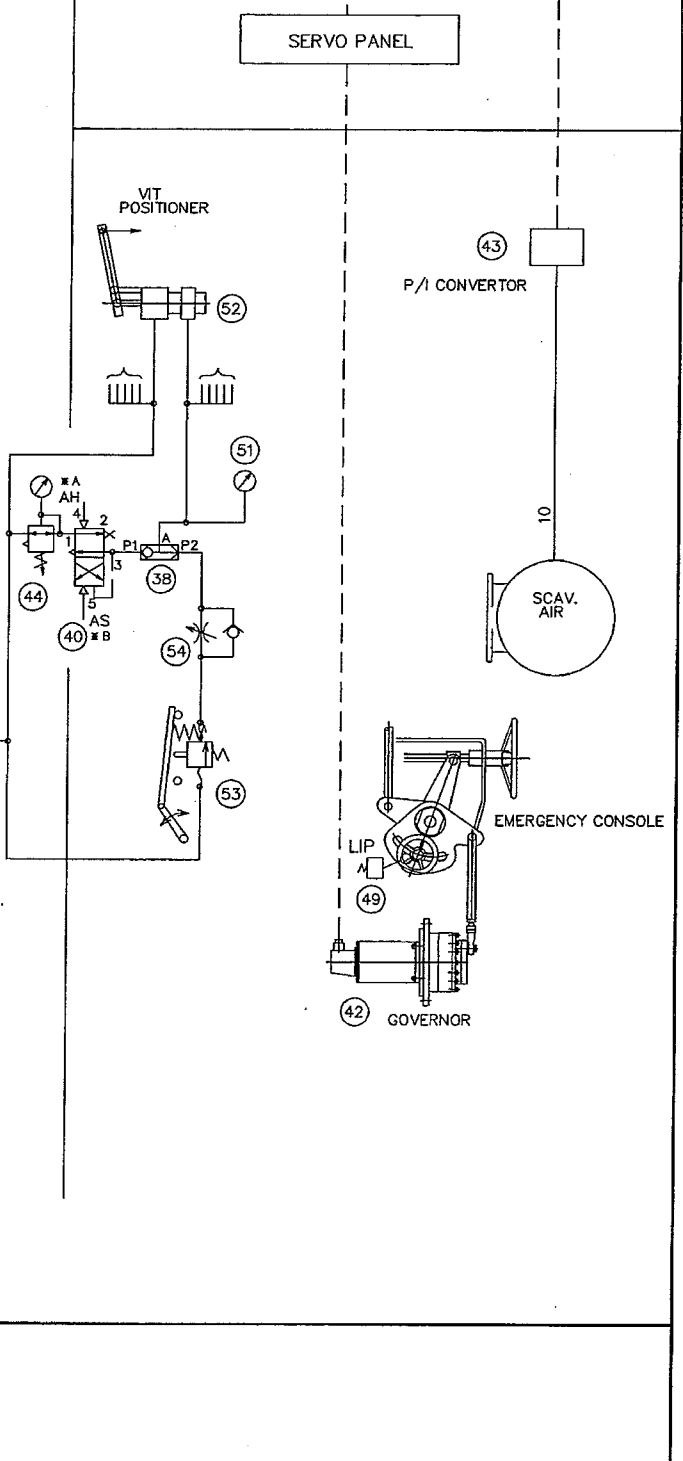
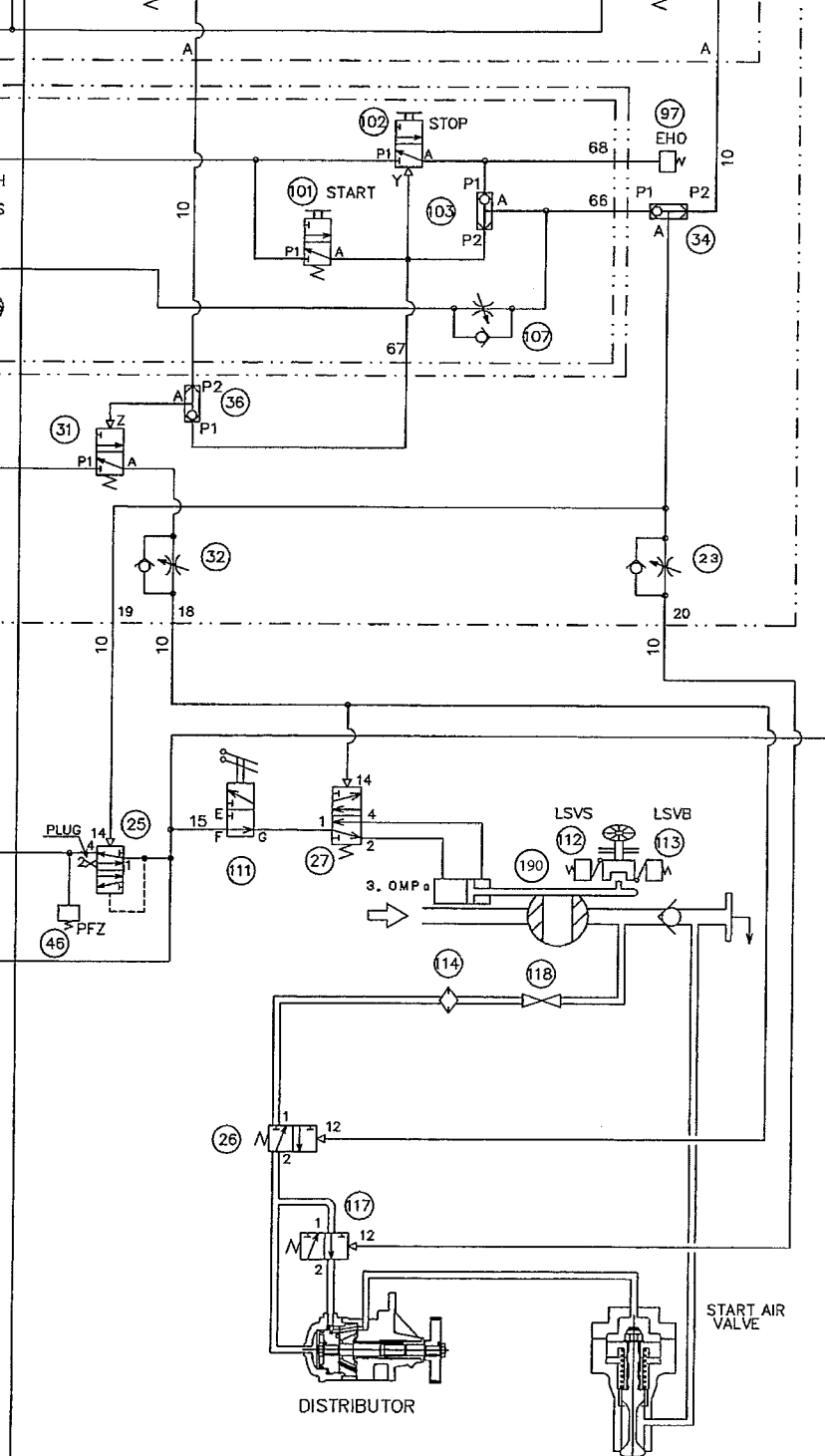
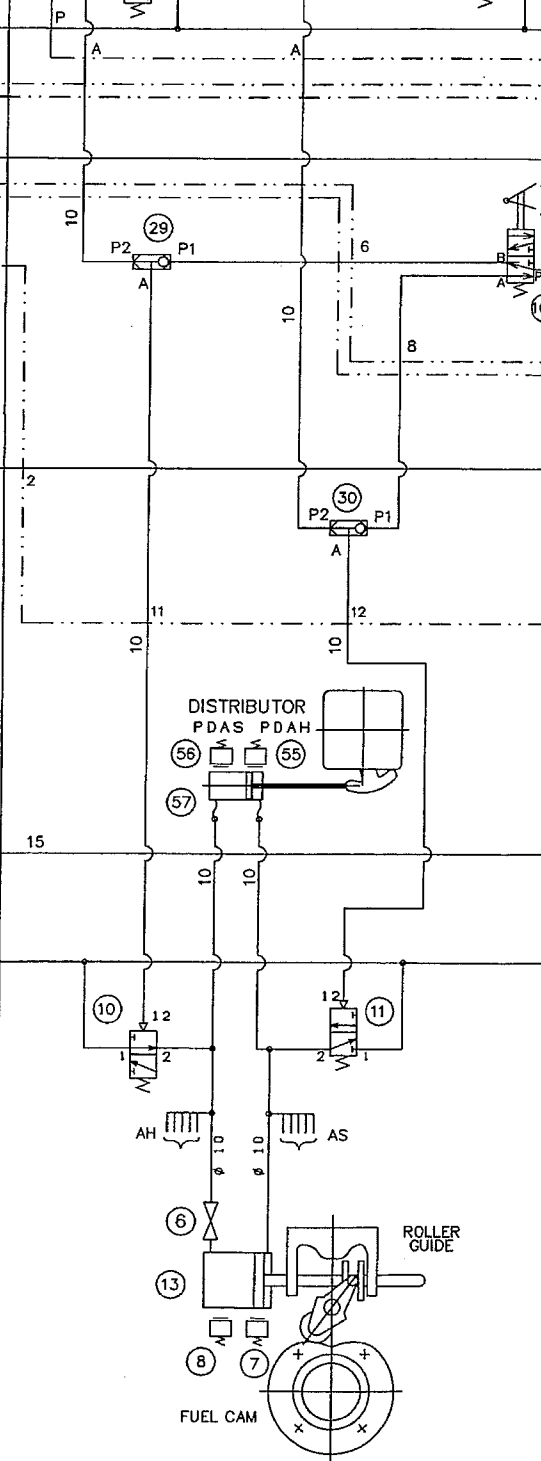
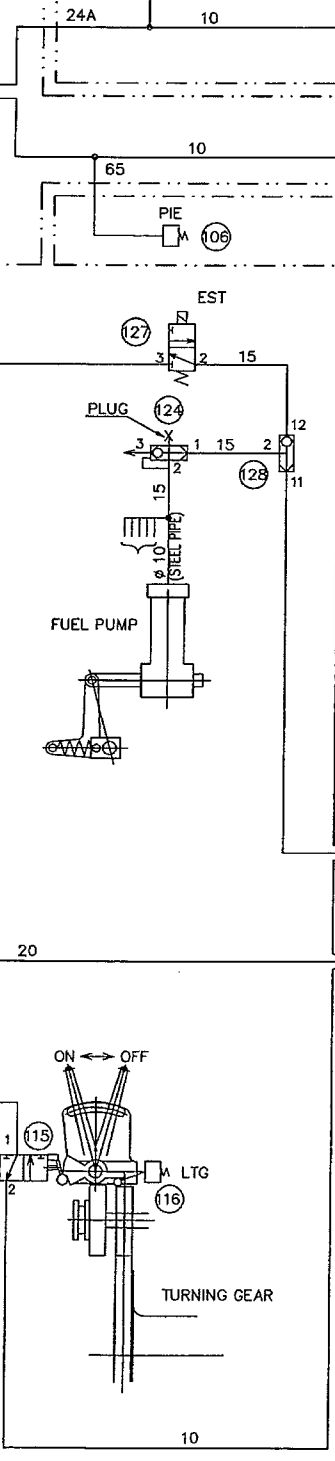
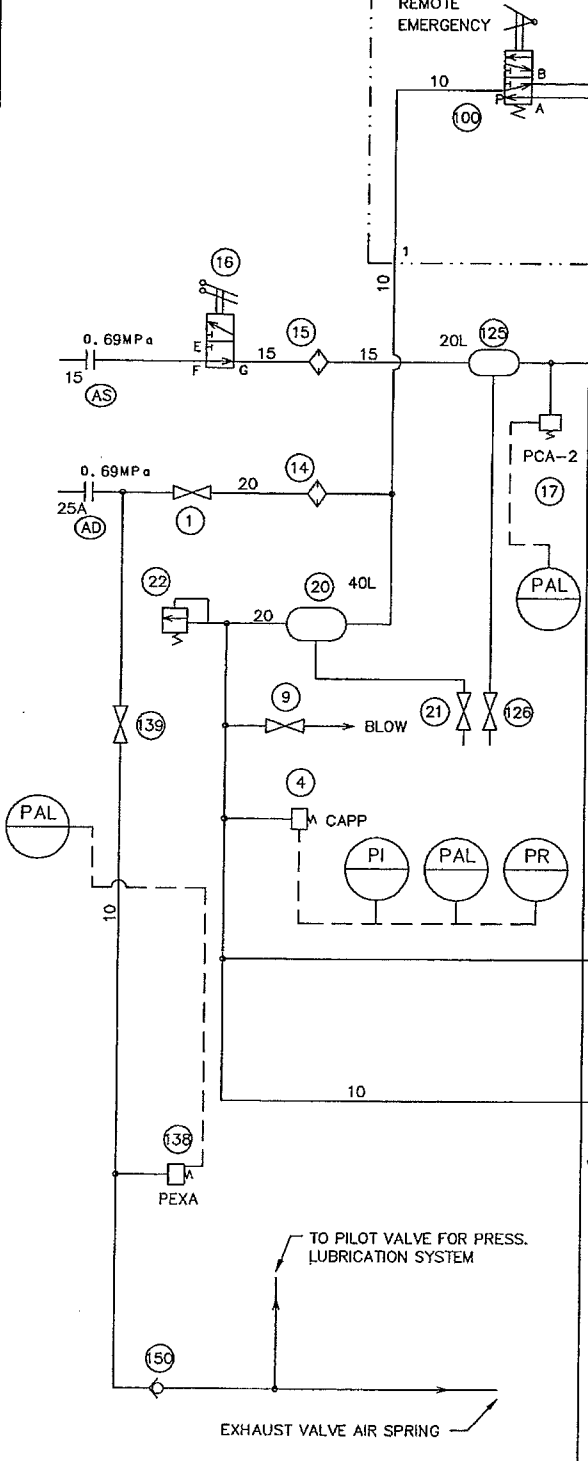
E/S EMERGENCY PANEL

REMOTE EMERGENCY

UNIT BOX (U/B)

MONO BLOCK

SERVO PANEL



TO PILOT VALVE FOR PRESS. LUBRICATION SYSTEM

EXHAUST VALVE AIR SPRING

TURNING GEAR

ROLLER GUIDE

FUEL CAM

DISTRIBUTOR

START AIR VALVE

SCAV. AIR

EMERGENCY CONSOLE

GOVERNOR

P/I CONVERTOR

VT POSITIONER