

MANDATORY CBT

CBT #	Title	Done (Y/N)	CTO initials
CD # 1370	Managing Process Safety in OE	Y	DD
CD # 0197	MLC 2006, Basic Introduction	Y	DD
CD # 0606	Hearing Conservation	Y	DD
CD # 0192	MLC 2006, On Board Responsibilities	Y	DD
CD # 0125	Hot Work	Y	DD
CD # 0127	Enclose Space entry	Y	DD
CD # 0612	Respiratory protection	Y	DD

ENGINEERING CBT

CD #0007	Inert Gas Generator	y	DD
CD #0008	Flue Gas Plant		
CD #0009	Fuel Oil System	y	DD
CD #0010	Marine Fuel Handling and Pre-Treatment		
CD #0017	Steering Gear	y	DD
CD #0018	Cooling System	y	DD
CD #0024	Auxiliary Engine		
CD #0030	Marine Lubricants	y	DD
CD #0034	AC4, Digital Governor System		
CD #0043	Bilge Water Separator	y	DD
CD #0046	Auxiliary Boiler Plant	y	DD
CD #0047	Fuel Combustion Efficiency		
CD #0072	Basic Hydraulics	y	DD
CD #0074	Sulzer Medium Speed Diesel Engine		
CD #0078	Pumps and Pumping Operations		
CD #0091	Incinerators	y	DD
CD #0094	Flexinert Gas Generator		
CD #0097	Energy Conservation		
CD #0098	Fresh Water Generator	y	DD
CD #0116	AC4 - MAN B and W		
CD #0118	Steering Gear, RAM type		
CD #0162	Separators, ALCAP Separation principles		
CD #0163	Separators, The ALCAP system		
CD #0164	Separators, ALCAP Fuel oil system		
CD #0165	Separators, ALCAP Lube oil system		
CD #0166	Separators, ALCAP Monitoring and control		

SAFETY CBT

CD #0001	Personal Safety	y	DD
CD #0002	Ship General Safety	y	DD
CD #0004	SOPEP		
CD #0005	ISM Code	y	DD
CD #0006	OPA 90	y	DD
CD #0014	Vessel Structural Conditions		
CD #0028	Protection and Indemnity		
CD #0029	Hull and Machinery		
CD #0035	Inspections		
CD #0036	Medical First Aid		
CD #0073	Crisis Management		
CD #0087	Personal Survival and Survival Craft		
CD #0088	Human Relations		
CD #0089	Medical Care		
CD #0092	Introduction to MARPOL	y	DD
CD #0115	Security Awareness		
CD #0121	Ship Security Officer Training System		
CD #0122	ISO 14001 Environmental Management		
CD #0123	Risk Assessment and Management		
CD #0149	Incident Investigation		
CD #0155	Stowaways, Migrants and Refugees		
CD #0156	Piracy and armed robbery 1		
CD #0160	Fire Fighting - Basic		
CD #0161	Fire fighting - Advanced		
CD #0246	Piracy and armed robbery II		
CD #0285	Enclosed space entry, Awareness		
CD #0600	CEMS - Crew Endurance Management System		
CD #0605	Workplace Ergonomics and Back Care	y	DD

COMPASS

FIRST ASSIGNMENT: E/Cadet: Lamba Nadeep Kumar

Compass No	Title	Completed Y/N
201.01.3E 101.01	Safety & emergency- operation & maintenance of lifeboat/rescue boat	28 MAR 2017
201.04.3E 101.07	Safety & emergency- emergency response	12 MAR 2017 DD
208.01.3E 102.01	Auxiliary systems operation- hydraulic system	23 MAR 2017
208.06.3E 102.02	Auxiliary systems operation- boilers & exhaust gas economizer	25 APRIL 2017
208.07.3E 101.02	Auxiliary systems operation- incinerator	2 APRIL 2017
208.09.3E 101.05	Auxiliary systems operation- pumps & valves	20 APRIL 2017
210.02.3E 102.03	Cargo system operation- inert gas system	25 APRIL 2017
210.04.3E 103.01	Cargo system operation- keeping a safe watch	09 May 2017
214.01.3E 108.01	Main propulsion system operation- main engine	17 May 2017
214.02.3E 109.01	Main propulsion system operation- steering gear	09 May 2017
214.03.3E 109.02	Main propulsion system operation- keeping a safe watch	17 May 2017

SECOND ASSIGNMENT

Compass No	Title	Completed Y/N
207.01.3E 108.02	Auxiliary systems maintenance- hydraulic systems	
207.06.3E 108.03	Auxiliary systems maintenance- boilers & exhaust gas economizer	
210.01.3E 108.04	Cargo system operation- cargo & ballast pump operation	
210.03.3E 109.07	Cargo system operation- gas detection	
211.01.3E 109.08	Electrical maintenance- safe electrical maintenance	
212.01.3E 109.11	Electrical operations- electrical system low voltage	
21.02.3E 110.01	Electrical operation- electrical system high voltage	
212.04.3E 110.02	Electrical operations- automation & control	
213.01.3E 110.03	Main propulsion system maintenance- main engine maintenance	



Chevron COMPASS – Competency Assessment Tool

201.04.3E - Safety & Emergency - Emergency Response – for 3/E		
Candidate Name: LAMBA NADEEP	Rank: E / CADET	Meets ALL Requirements? Yes or No?
Assessor: (signature) 	Assessor: (print) DEJAN JERVENIC	Date 12 MAR 2017.
Comment: + extree Question & obserotation during DRILLS		
Summary of Competency Requirements		
A competent person should: <ul style="list-style-type: none"> Have knowledge of the emergency response plan and be able to carry out duties as required. 		
Key Criteria for Evaluating Competence		
Standard:	Measure:	✓
Ability to locate and explain Company procedures related to emergency response.	Logs into MWS and brings up relevant screens in OPS. Explains the scope and content of relevant Company procedures.	✓
Ability to explain the requirements as per SOLAS & MARPOL for emergency response.	Explains the scope and content of SOLAS, Chapter II-2, Part E, Regulation 15. Explains the scope and content of MARPOL Annex I, chapter 5, regulation 37.	✓
Ability to know the location & content of the emergency response plans for various emergencies.	States the location of and explains the content of man overboard, fire, oil spill and security emergency response plans as per vessel's safety and security arrangements.	✓
Ability to understand and execute the duties and responsibilities as per muster list and emergency response plan during drills & training.	States and explains the duties and responsibilities of 3/E for man overboard, fire, oil spill and security emergency as per muster list and emergency response plan. Executes the duties and responsibilities of 3/E for man overboard, fire, oil spill and security emergency as per muster list and emergency response plan during drills and trainings.	✓
Ability to carry out effective internal & external communication during emergency response.	Carries out internal and external communications during drills as per the emergency response plan and CSC requirements.	✓
Ability to perform the log entry and record keeping for emergency response.	Makes correct entries in the log book as per the log book entries matrix, Master's/Chief Engineer's standing orders and regulatory requirements.	✓
Options for Completing Competency Requirement		
<ul style="list-style-type: none"> Assessment: Written and/or <u>oral test</u> 		<ul style="list-style-type: none"> Assessment: <u>Observation</u> and/or <u>questioning</u>
For cadets only - please complete at same time as relevant Task Sheets or Training Record Book Activities.		

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME: LAMBA MADHEP

WEEK: 03 MAR 17 TO 10 MAR 17

TRB TASK	SOURCES OF IGNITION FIRE-FIGHTING APPLIANCES IN ENGINE ROOM LIFE SAVING APPLIANCES OIL POLLUTION CONTROL SOURCES OF POLLUTION SAFE WORKING PRACTICE	PROJECT & WORKBOOK	
COM PASS		CBT #18	COOLING SYSTEM
PRACTICAL SKILLS		PIPELINES & DRAWING	MAIN ENGINE JACKET COOLING SYSTEM
CADET COMMENTS			
CTO COMMENTS	DIG COOLING SYSTEM NEED TO BE COMPLETED FOR NEXT INTERVIEW. TRB TO BE COMPLETED AS PER TASK WHICH ONE ARE SIGNED. WINDOWS WIRED REPORT TO BE COMPLETED BEFORE NEXT INTERVIEW		
VMT COMMENTS			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME: LAMBA NADEEP
 WEEK: 11 MAR'17 TO 17 MAR'17

TRB TASK	→ IRON (Fe) Test and TBN Testing for M/E cyl. oil	PROJECT & WORKBOOK	<ul style="list-style-type: none"> • Fuel oil Transfer • ME local control from emergency Maneuvering Position • Pressure Test on Spare D/G fuel Injector.
COM PASS	Safety and Emergency - Emergency Response	CBT	<ul style="list-style-type: none"> • Personnel Safety (CD# 001) • Machine lubricants (CD# 0030)
PRACTICAL SKILLS		PIPELINES & DRAWING	<ul style="list-style-type: none"> • D.E. LT cooling System • LT Fresh water Cooling System
CADET COMMENTS			
CTO COMMENTS			
VMT COMMENTS			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME: NADEEP LAMBA

WEEK: 17 March'17 TO 24 March'17

TRB TASK	PROJECT & WORKBOOK		
<ul style="list-style-type: none"> → INCINERATOR → Sewage Treatment Plant → Change of window paper 			
PASS COM		CBT → Basic Hydraulics	→ Cooling Water System (Seawater) → Fuel Oil System (M/E & C/E F.O. Service)
PRACTICAL SKILLS		→ Lifeboat and Rescue Boat → Sounding of tanks and Bilge Transfer → ME local operation → Engine Log Book	
CADET COMMENTS			
CTO COMMENTS			
VMT COMMENTS			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME: NADEEP LATBA

WEEK: 24 March '17 TO 31 March '17

<p>TRB TASK</p>	<ul style="list-style-type: none"> → OWS → Sewage Treatment Plant → Maintenance of shell and tube type HE → MGPS → FWS → Maintenance Responsibility → ORB → Watchkeeping Procedure → Communication Skills 	<p>PROJECT & WORKBOOK</p>	<p>→ Boiler water level DP Transmitter and legs blowdown</p>
<p>COM PASS</p>	<p>→ Safety and emergency - operation and maintenance of lifeboat / rescue boat</p>	<p>CBT</p>	<p>→ General Safety → Incinerator</p>
<p>PRACTICAL SKILLS</p>	<ul style="list-style-type: none"> → OWS operation → P/E Pre. Post tests, blow through → Watch Inspection D/G, Purifiers, Boilers → LO Analysis → Participation on safety half day 	<p>PIPELINES & DRAWING</p>	<p>→ (Aux. Boiler fuel oil service) fuel oil system</p>
<p>CADET COMMENTS</p>	<p>NA</p>		
<p>CTO COMMENTS</p>	<p>Weekly planner to be filled up properly. To have all paper ready for interview. When you have a problem with TRB inform etc. Be more proactive.</p>		
<p>VMT COMMENTS</p>			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 31 March 19 TO 07 APRIL 17

<p>TRB TASK</p>	<ul style="list-style-type: none"> → Boiler Sectional View → Familiarisation with compressed air system → Centrifugal pump (sectional) → Boiler Gauge Glass overhauling 	<p>PROJECT & WORKBOOK</p>	<ul style="list-style-type: none"> → AIR COMPRESSOR Maintenance → COPT Procedure → Lubricant Analysis
<p>COM PASS</p>	<ul style="list-style-type: none"> → Incinerator → Hydraulic System 	<p>CBT</p>	<ul style="list-style-type: none"> → 0009 fuel oil system
<p>PRACTICAL SKILLS</p>	<ul style="list-style-type: none"> → COPT starting 	<p>PIPELINES & DRAWING</p>	<ul style="list-style-type: none"> → fuel oil system (Bunker Transfer) → fuel oil system (purification)
<p>CADET COMMENTS</p>			
<p>CTO COMMENTS</p>			
<p>VMT COMMENTS</p>			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 8 APRIL '17 TO 14 APRIL '17

TRB TASK	<ul style="list-style-type: none"> → CONTROL OF NOx Emission → Purification (Lubricating oils) → Purification (Fuel oils) → Boiler Safety Valve → Hydraulic Motor for windlans → Quick closing valves 	PROJECT & WORKBOOK	
PASS		CBT	<ul style="list-style-type: none"> → BOILER → OPA 90
PRACTICAL SKILLS		PIPELINES & DRAWING	<ul style="list-style-type: none"> → Incinerator fuel oil system
CADET COMMENTS			
CTO COMMENTS			
VMT COMMENTS			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 15 APRIL 2017 TO 21 APRIL 2017

TRB TASK	<ul style="list-style-type: none"> → Self Development → volatile organic compounds → fuel oil transfer pump → Emergency Situations → Bilge and sludge pump → steering gear System 	PROJECT & WORKBOOK	<ul style="list-style-type: none"> → Scavange Space Inspection → Bunkering
COM PASS	→ Pumps and Valves	CBT	→ MARPOL
PRACTICAL SKILLS		PIPELINES & DRAWING	<ul style="list-style-type: none"> → Steam Service system for Steam turbine → Steam Service system
CADET COMMENTS			
CTO COMMENTS			
VMT COMMENTS			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 22 APRIL 17 TO 28 APRIL 17

<p>TRB TASK</p> <ul style="list-style-type: none"> → AIR Stearing Valve → Fuel oil filter cleaning → Piston → Purifier (General Info). → Steering gear ram → Engine room ventilation 	<p>PROJECT & WORKBOOK</p>	<ul style="list-style-type: none"> → Tappet clearance
<p>PRACTICAL COM PASS</p>	<p>CBT</p>	<ul style="list-style-type: none"> → ISM CODE → Inert Gas Generator
<p>CADET COMMENTS</p>	<p>PIPELINES & DRAWING</p>	<ul style="list-style-type: none"> → Steam, Feedwater and Condensate System
<p>CTO COMMENTS</p>		
<p>VMT COMMENTS</p>		

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 29 APRIL '17 TO 5 MAY '17

TRB TASK	<ul style="list-style-type: none"> → Sounding Computation → Steam trap → Fuel Pump → Working on Deck Machinery → Sulphur Content → Air Handling unit 	PROJECT & WORKBOOK	<ul style="list-style-type: none"> → Pumpjoe overhaul
COM PASS		CBT	<ul style="list-style-type: none"> → Steering gear
PRACTICAL SKILLS		PIPELINES & DRAWING	<ul style="list-style-type: none"> → Condensate Water System → Bilge, fire and C/S System.
CADET COMMENTS			
CTO COMMENTS			
VMT COMMENTS			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 6 May' 2017 TO 12 May' 2017

TRB TASK	PROJECT & WORKBOOK	
<ul style="list-style-type: none"> → Lubrication → Purifier Description → Fuel Injector → Variable Injection Timing 		
<p>PASS</p> <ul style="list-style-type: none"> → Cargo System operation - keeping a safe watch → Main Propulsion System - steering gear 	<p>CBT</p> <ul style="list-style-type: none"> → Fresh water Generator → Bilge water Separation. 	<ul style="list-style-type: none"> → Lube oil Purification
<p>PRACTICAL SKILLS</p>	<p>PIPELINES & DRAWING</p>	
<p>CADET COMMENTS</p>		
<p>CTO COMMENTS</p>	<p>HE IMPROVE IN ALL ASPECT. JUST TO CONTINUE ON THIS WAY.</p>	
<p>VMT COMMENTS</p>		

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 13 May'17 TO 19 May'17

<p>TRB TASK</p>	<ul style="list-style-type: none"> → Oil Mist Detector → Viscosity fuel oil controller → crosshead Guide and stopper → Domestic fridge description 	<p>PROJECT & WORKBOOK</p>	<ul style="list-style-type: none"> → ME Performance Test → ME Exhaust Valve overhauling
<p>COM PASS</p>	<ul style="list-style-type: none"> → Main Propulsion System operation - Keeping a safe watch 	<p>CBT</p>	
<p>PRACTICAL SKILLS</p>		<p>PIPELINES & DRAWING</p>	<ul style="list-style-type: none"> → Lube oil System (ME service) → Lube oil System (Stern tube)
<p>CADET COMMENTS</p>			
<p>CTO COMMENTS</p>			
<p>VMT COMMENTS</p>			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 20 MAY'17 TO 26 MAY'17

<p>TRB TASK</p> <ul style="list-style-type: none"> → Governor → Temperature controlling valve → Hydraulic line diagram for deck Machinery → Various control inputs → Boiler Burner → Concepts of Maintenance 		<p>PROJECT & WORKBOOK</p>	
<p>COM PASS</p>		<p>CBT</p>	
<p>PRACTICAL SKILLS</p>		<p>PIPELINES & DRAWING</p>	<p>→ lube oil diagram (Turbine System)</p>
<p>CADET COMMENTS</p>			
<p>CTO COMMENTS</p>			
<p>VMT COMMENTS</p>			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME:

WEEK: 27 MAY'17 TO 2 JUNE'17

<p>TRB TASK</p> <ul style="list-style-type: none"> → Combustion Space Relief valve → Crankcase explosion door → Line diagram for Recfer System → Piston → Steam distribution familiarisation → Boiler Gauge Glass Blow down 		<p>PROJECT & WORKBOOK</p>	
<p>COM PASS</p>		<p>CBT</p>	
<p>PRACTICAL SKILLS</p>		<p>PIPELINES & DRAWING</p>	
<p>CADET COMMENTS</p>			
<p>CTO COMMENTS</p>	<p>Very Good progress. Reports are done very professional. EXTREMELY GOOD IMPROVEMENT IN HIS ATTITUDE.</p>		
<p>VMT COMMENTS</p>			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME: NADEEP LAMBA

WEEK: 3 JUNE '17 TO 9 JUNE '17

TRB TASK	<ul style="list-style-type: none"> → FIRE FIGHTING SYSTEM (FIXED) → LOW LEVEL CUTOUT OF BURNER → E/R VENTILATION 	PROJECT & WORKBOOK	
COM PASS		CBT	
SKILLS		PIPELINES & DRAWING	→ F.O. AND L.O. DRAIN
COMMENTS			
CTO			
COMMENTS			
VMT			
COMMENTS			

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME: NADEEP LAMBA

WEEK: 10 JUNE'17 TO 16 JUNE'17

TRB TASK	→ AIR HANDLING UNIT → PISTON MATERIALS → AIR COMPRESSOR	PROJECT & WORKBOOK	
COM PASS		CBT	
PRACTICAL SKILLS		PIPELINES & DRAWING	→ SCOPPER PLUGS (DECK)
CADET COMMENTS			
CTO COMMENTS			
VMT COMMENTS			

SYSTEM PIPING DIAGRAMS – ENGINE

Lamba nadeep

Priority No:	Code	System Description	Date Completed
1.	E37	Cooling Water System (M/E H/T F.W.)	09 March 2017
2.	E36	Cooling Water System (G/E L/T & H/T F.W.)	16 March 2017
3.	E35	Cooling Water System (Low temp. F.W.)	16 March 2017
4.	E34	Cooling Water System (Seawater)	23 March 2017
5.	E25	Fuel Oil System (M/E & G/E F.O. service)	23 March 2017
6.	E26	Fuel Oil System (Aux. Boiler F.O. service)	5 APRIL 2017
7.	E23	Fuel Oil System (Bunker / Transfer)	5 APRIL 2017
8.	E24	Fuel Oil System (Purification)	11 APRIL 2017
9.	E27	Fuel Oil System (Incinerator/Emergency G/E)	15 APRIL 2017
10.	E44	Steam service system for steam turbine	20 APRIL 2017
11.	E45	Steam service system	20 APRIL 2017
12.	E43	Steam, feed water & condensate system	27 APRIL 2017
13.	E46	Condensate water system	02 May 2017
14.	E47	Bilge, fire & G/S system	03 May 2017
15.	E30	Lube Oil System (transfer / purification)	12 MAY 2017
16.	E31	Lube Oil System (M/E service)	18 MAY 2017
17.	E33	Lube Oil System (Stern tube)	18 MAY 2017
18.	E32	Lube Oil System (Steam turbine)	25 MAY 2017
19.	E47-1	Local firefighting system	
20.	E21	Sanitary & F.W. Service System (Purifier Operating Water)	
21.	E22	Sanitary & F.W. Service System (Sewage system)	
22.	E38	Compressed Air System (Starting/G.S/Control)	
23.	E40	Compressed Air System (Emergency shut off valve fire damper)	
24.	E39	Compressed Air System (Control air)	
25.	E42	Exhaust Gas system	

CADET WEEKLY DEVELOPMENT PLANNER

ENGINE

CADET NAME: NADEEP LAMBA

WEEK: 17 JUNE '17 TO 23 JUNE '17

TRB TASK		PROJECT & WORKBOOK	
COM PASS		CBT	
PRACTICAL SKILLS	<ul style="list-style-type: none"> → ASSISTING 3/E → INVENTORY → WATCHKEEPING 	PIPELINES & DRAWING	
CADET COMMENTS			
CTO COMMENTS			
VMT COMMENTS			

TRB %

DATE	GOAL	COMPLETED
17MAR2017	7%	7%
24MAR2017	15%	15%
31MAR2017	23%	23%
7APRIL2017	30%	30%
14APRIL2017	37%	37%
21APRIL2017	44%	44%
28APRIL2017	51%	51%
5MAY2017	58%	58%
12MAY2017	65%	65%
19MAY2017	72%	72%
26MAY2017	79%	79%
2JUNE2017	86%	86%
9JUNE2017	93%	98%
16JUNE2017	100%	100%
23JUNE2017		



Capricorn Voyager

FREQUENT OPS USED

❖ **FREQUENTLY USED OPS:**

- OPS 18A – CADET’S ONBOARD TRAINING PLAN / INITIAL INTERVIEW
- OPS 22 – CARGO , BALLAST AND BUNKER TANK CLEANING
- OPS 24 – TANK LEVEL ALARM TESTING
- OPS 30 – CARGO , BALLAST AND BUNKER TRANSFER INSTRUCTION
- OPS 32 – VESSEL FAMILIARISATION AND REFRESHER TRAINING
- OPS 33 – HOT WORK PERMIT
- OPS 44 – CRITICAL PROTECTION DEVICE BYPASS PERMIT
- OPS 45 – CRITICAL PROTECTION DEVICE BYPASS LOG
- OPS 45A – CRITICAL PROTECTION DEVICE BYPASS REVIEW
- OPS 55 – JOB HAZARD ANALYSIS
- OPS 56 – DAILY WORK SAFETY NOTICE
- OPS 66 – ENCLOSED SPACE ENTRY PERMIT
- OPS71 – CONTRACTOR WORK PERMIT
- OPS 85 – LOCKOUT/TAGOUT WORK PERMIT
- OPS 86 - SW PERMIT

Cadet's Onboard Training Plan/Initial Interview

OPS-18A



To be completed shortly after joining the vessel by cadet in consultation with the Training Officer and reviewed/updated on monthly basis

Name: _____		Date: <u>8/18/2014</u>
1. Safety training to be completed during the assignment (BBS, HIT, LO/TO, etc.)		
Initial Plan	Follow-up	
2. Basic skills training to be completed (fabric maintenance, tanker safety practices, basic maintenance, etc.)		
Initial Plan	Follow-up	
3. MDS assessment to be completed (focus to be on job safety and LSA)		
Initial Plan	Follow-up	
4. Cadet record book current status; plan for items to be completed		
Initial Plan	Follow-up	
5. Cadet record book required; projects to be completed		
Initial Plan	Follow-up	
6. Watch schedule to be followed (only intermediate and final trip cadet)		
Initial Plan	Follow-up	
Comments on cadet progress throughout the assignment		
Training Officer Name		Approval for initial training plan. Master / Chief Engineer Name:

Hot Work Permit

OPS-33 No. _____



This permit valid from: Date / hrs. to: Date / hrs.

This permit is valid for a maximum of 12 hours

Location of space: Job to be done:

Hot Work must not be done during transferring cargo, bunker operations, transferring fuel oil and lubricating oil, venting cargo tank vapors, cleaning or purging tanks, ballasting cargo tanks, and near flammable or combustible atmospheres.

Location of hot work: Brief description of work:

Hazardous Area Non-Hazardous Area

Zone:

Section 1: Shoreside Hot Work Preapproval Requirement

	Shoreside Preapproval Not Required	Submit Work Plan to Shoreside for Approval	Shoreside Approval Level
Open Flame Hot Work Inside Hazardous Area (Zone 0, 1, 2)		X	Fleet Operations Manager with HES concurrence
Open Flame Hot Work Outside Hazardous Area (including Engine Room)		X	Fleet Operations Manager (LNG) / Assistant Fleet Manager (Oil) with HES concurrence
Non-Open Flame Hot Work Inside Hazardous Area (Zone 0, 1)		X	Fleet Operations Manager (LNG) / Assistant Fleet Manager (Oil) with HES concurrence
Non-Open Flame Hot Work Inside Hazardous Area (Zone 2)	X		
Non-Open Flame Hot Work Outside Hazardous Area	X		

See ship's Hazardous Area Plan for zone marking.
 Note: *IEC Zones* *NEC Divisions*
 Zone 0 and Zone 1 = Division 1
 Zone 2 = Division 2

Section 2. General Precautions (Responsible Person Initial)

The following are required in addition to those requirements listed on associated permits and OPS-55.

Check boxes for items required below. When items are completed and verified, the Responsible Person initials the form.

Initials	
<input type="checkbox"/>	Equipment positively isolated (LOTO) and inspected safe for hot work.
<input type="checkbox"/>	Trained Fire Watch onsite
<input type="checkbox"/>	Adequate fire protection equipment is prepared, laid out and ready for use at the hot work area.
<input type="checkbox"/>	Work area shielded to contain sparks
<input type="checkbox"/>	Flammable, combustible, and hazardous materials are contained or removed from the hot work area (50 feet surrounding hot work location).
<input type="checkbox"/>	Hot work area (50 feet surrounding hot work location) inspected and gas tested safe for hot work.
<input type="checkbox"/>	Area barricaded or warning signs posted to identify hot work area
<input type="checkbox"/>	Equipment required to conduct hot work inspected to make sure that it operates correctly and equipment safeguards are in place.
<input type="checkbox"/>	Necessary approvals (e.g. port authority, government, Work Plan, etc.) obtained prior to hot work. Attach applicable approvals to this permit.

Fully compliant with flag state hot work regulations, if any. **Attach copy of flag state regulations.**

Additional Comments:

Section 3: Initial Gas Test Results

Multiple-gas detector model:					Serial No.:	
Other Testing Equipment Model:					Serial No.:	
Time	%LEL	%O2	CO	H ₂ S	Other _____	Gas Tester Initials

Continuous gas testing Required frequency for logging gas test results (if applicable):
 Required for non-intrinsically safe equipment.

Section 4: Approval and Acceptance Section (To be completed after Sections 1, 2, and 3 are complete.)

Fire Watch		Responsible Person		Worker Performing Hot Work		VMT Member	
Print Name:		Print Name:		Print Name:		Print Name:	
Signature:	Time:	Signature:	Time:	Signature:	Time:	Signature:	Time:
Work has been completed and all persons and materials have been removed. All equipment has been restored as required.							
Signature:	Time:	Signature:	Time:	Signature:	Time:	Signature:	Time:

Section 5: Permit Revalidation Section

Permit must be revalidated when hot work is stopped including, but not limited to:

- Worksite is left unattended.
- Gas testing results exceed the Safe for Workers limit.
- Portable or continuous gas testing equipment fails.
- An incident or near miss occurs.
- Hot work starts more than 30 minutes after initial gas testing is done.
- A change in conditions (e.g. work scope, control measures) from when the permit was initially generated.

All requirements and conditions of this Hot Work Permit have been verified and remain in effect. Gas test results must be recorded on this permit.

Responsible Person Signature: _____ Date/Time: /

Section 6: Ongoing Work Atmosphere Gas Test Results

Multiple-gas detector model:					Serial No.:	
Other Testing Equipment Model:					Serial No.:	
Time	%LEL	%O2	CO	H ₂ S	Other _____	Gas Tester Initials

Critical Protection Device Bypass Permit OPS-44



Permit No: CPV 160704 SP01

Date Issued: 04 Jul 16			
Operating Condition	Yes	No	N/A
1. Has an alternative action been considered before requesting to bypass this device?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Has the availability of redundant equipment been checked?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Will personnel still be safe after the device has been disabled?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Has the risk of fire, flood or pollution been evaluated before disabling device?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Have OPS Procedures been reviewed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Are regulatory requirements met or has an exemption been obtained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Can monitoring/protection of plant be done manually and are procedures in place to do so?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are there contingency plans in place?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Has the equipment been isolated and lockout tagout applied?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Can the equipment be stopped/started immediately in an emergency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. If equipment must remain operational, are alternative means of monitoring established?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Does overpressure in the system have an alternative means of protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Are additional critical protection devices verified as functioning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Are the requirements of the unmanned engine room certification met?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Are watches established if appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Have all operators been informed of current status?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Are bypass tags posted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Has the OPS-45 been updated in the Deck and Engine logbooks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Device	Date/Time Bypassed	Date/Time in Service	Functional Test Date/Time
Fire Detectors- Zone 11	/	/	/
Local Water Mist System- Zone 3	/	/	/
Water Mist Pump- on '0' position	/	/	/
	/	/	/
	/	/	/
Reason for Bypass: DG Performance Test			
Additional Safety Precautions (e.g. monitoring plan & backup plan): Standy person and Engine Room manned.			
Estimated Date/Time Back in Service:			
Justification for Duration: Critical devices bypassed till performance is complete.			
Responsible Person (Print Name): 2AE Sushant Pandey		VMT Member Approval (Print Name): C/E Graeme Young	
Signature:		Signature:	

Permit Revalidation Section

Permit must be revalidated when the estimated date/time back in service is exceeded.

New Estimated Date Back in Service:

Justification for Extension:

Responsible Person Signature:

VMT Member Signature:

Job Safety Analysis Sheet

OPS-55



Vessel: CAPRICORN VOYAGER	Job/Activity Reference #:	Page _____ of _____	Date: 4/12/2012
Job/Activity Description:		Manpower Requirements:	
<p>Hazard Management Requirement: All personnel are required to wear the appropriate personal protective equipment (PPE) for the specific task. To properly identify which PPE to wear, a pre-work evaluation of the potential hazards shall be thoroughly examined using Hazard Identification Tool (HIT) identified in the Potential Hazards section. The corresponding control/protection measures applied is documented in the Recommended Actions section.</p> <p>All personnel are required to wear eye protection, head protection, safety shoes, and long sleeved, cotton coveralls/boiler suits while working on deck and in machinery spaces. VMTs may allow equivalent clothing (i.e., cotton long sleeved shirts and pants). Hearing protection is required in any high noise environment. Refer to WPR-01-02/Attachment 4 for further guidance. If personnel are not sure as to which actions, procedures or PPE is most appropriate and effective, STOP WORK AUTHORITY shall be used and the supervisor should address the issue.</p>			
OPS References/Required Permits/Forms:		Required Level of Supervision:	Date last revised/updated:

Job #	Job Steps (in sequence) ²	Potential Hazards – Safety and Environmental	Recommended Actions, Procedures, or Safety equipment for the Job step

Daily Work Safety Notice

OPS-56



Vessel: Shore		Department:		Date: 10/1/2009	
<p>Instructions: This form is to be completed each day by the chief officer, first engineer and chief steward for deck, engine and steward department jobs. Post completed notices in prominent locations. Include any additional jobs that might be required during the day. All personnel are required to wear eye protection, head protection, safety shoes, and long sleeved, cotton boiler suits while working on deck and in machinery spaces. VMTs may allow equivalent clothing (i.e., cotton long sleeved shirts and pants). In addition, ear protection is required in any high noise environment. All personnel are required to wear eye protection and safety shoes while working in the galley. Any exceptions/additions should be addressed in the Relevant Safety Information.</p>					
Job Description		Potential Hazards to Personnel and/or Environment		Relevant Safety Information	
#	of	What/Where	Comments (incl. exceptions/additions PPE)	Oil Spill Equip.	Permits/ LOTO
1				<input type="checkbox"/>	<input type="checkbox"/>
2				<input type="checkbox"/>	<input type="checkbox"/>
3				<input type="checkbox"/>	<input type="checkbox"/>
4				<input type="checkbox"/>	<input type="checkbox"/>
5				<input type="checkbox"/>	<input type="checkbox"/>
6				<input type="checkbox"/>	<input type="checkbox"/>
7				<input type="checkbox"/>	<input type="checkbox"/>
8				<input type="checkbox"/>	<input type="checkbox"/>
9				<input type="checkbox"/>	<input type="checkbox"/>
10				<input type="checkbox"/>	<input type="checkbox"/>
11				<input type="checkbox"/>	<input type="checkbox"/>
12				<input type="checkbox"/>	<input type="checkbox"/>
BBS Observer:				Fireftg. Equip. <input type="checkbox"/> Vent./Light <input type="checkbox"/> Other Dept Notified <input type="checkbox"/> PFD/Safety Harness <input type="checkbox"/> Atmos. Test <input type="checkbox"/> Rescue Equip. <input type="checkbox"/>	

Work hours are required to comply with STCW, OPA 90 or other applicable flag state requirements.



Lockout/Tagout (LOTO) Work Permit OPS-85

No. CPV_140915_AMD01*

STEP 1: Lockout/Tagout Planning (Work Supervisor)		Date: _____	Time: _____
Work location, equipment and reason for isolation: _____		Work Supervisor Name: _____	
Isolation method and location of isolation point. <i>Note: If more than eight energy isolation devices are required, attach list.</i> 1. _____ 5. _____ 2. _____ 6. _____ 3. _____ 7. _____ 4. _____ 8. _____			
<input type="checkbox"/> Check box, if unable to fit a lockout device. Explain method of securing isolation: Explain method for releasing stored energy: Explain method of testing for Zero Energy State:			
LOTO Responsible Person (nominated by VMT Member)		VMT Member Name:	
Name: _____	Rank: _____	VMT Member Signature: _____	
STEP 2: Lockout/Tagout Execution (Work Supervisor, Responsible Person, Contractor)			
<input type="checkbox"/> NOTIFY: Affected personnel/departments of isolation and impacts to operations. <input type="checkbox"/> SHUTDOWN: All applicable equipment has been properly shutdown. Energy isolation devices listed in step 1 are in the closed, off or safe position, isolating all hazardous energy. <input type="checkbox"/> APPLY LOCK & TAG: Work Supervisor has secured each energy isolation device with a RED lock & tag. <input type="checkbox"/> VERIFY: Responsible Person has applied a BLACK lock to each lockout device. (Contractors use BLUE)		<input type="checkbox"/> GAS TEST ISOLATION POINTS (if applicable): Required when there is a potential for hazardous material release including flammable/combustible liquids or gas and toxics above permissible exposure limits. <input type="checkbox"/> EQUIPMENT PREPARATION (for isolation): Release all stored energy as per plan agreed to by the chief engineer/master. <i>Note: Be aware that machines could store energy internally such as spring, pressure accumulators, rotating masses, flammable liquids and gasses.</i> <input type="checkbox"/> ZERO ENERGY STATE: All equipment/system hazardous energy sources have been tested to ensure Zero Energy State.	
STEP 3: LOTO Execution Verification (Work Supervisor, Responsible Person, Contractor)			
<input type="checkbox"/> Steps 1 and 2 have been completed successfully. Work area is safe and ready for work to begin.			
Work Supervisor:		Contractor Name:	
Initial: _____	Date: _____	Time: _____	Initial: _____
_____	_____	_____	_____
Responsible Person:			
Initial: _____	Date: _____	Time: _____	
_____	_____	_____	
STEP 4: Testing of Equipment/System			
Note: If lockout/tagout devices must be temporarily removed, and the machine or equipment energized to test or reposition machine components, follow the following sequence of actions:		<input type="checkbox"/> Notify all affected personnel/departments & clear the machine/equipment of tools and materials. <input type="checkbox"/> Remove the lockout/tagout required for testing or positioning. <input type="checkbox"/> On completion of testing or positioning, return energy isolation devices to closed, off or safe position. <input type="checkbox"/> Re-apply lockout devices, padlocks, and tags. <input type="checkbox"/> Release all stored energy, re-test for Zero Energy State, & continue with servicing or maintenance.	
STEP 5: Returning Equipment/Systems to Service (Work Supervisor, Responsible Person, Contractor)			
<input type="checkbox"/> Equipment safe to energize. <input type="checkbox"/> All locks and tags have been removed.		<input type="checkbox"/> System(s) returned to desired state with all alarms reset. If moved to long-term isolation register, explain reason: _____	
Work Supervisor:			
Initial: _____	Date: _____	Time: _____	
_____	_____	_____	
Responsible Person:		Contractor:	
Initial: _____	Date: _____	Initial: _____	Date: _____
_____	_____	_____	_____
Remarks:			

Notes:
 Keep in ECR or CCR/Bridge when in force.
 File and maintain in centralized location when done.

*See procedure MGT-04-07, subsection 3.3, for numbering instructions.



Seawater System Work Permit OPS-86

No. CPV151021-SJ01*

Job Description/Location:

Complete this checklist before beginning inspections or repairs to sea water systems where watertight integrity is reduced to two valves, or fewer.

IMPORTANT: Once valves are closed and tagged and work has begun, no one shall operate or attempt to move these valves.

Report any problems or deviations from the work to the master and chief engineer.

Notify the home office of any significant change in status from the original.

To be checked by the master	To be checked by the chief engineer	To be checked by the officer in charge
<ul style="list-style-type: none"> <input type="checkbox"/> Conference held to review scope and technical aspects of the work. If contractor is involved, Contractor Work Permit (OPS-71) completed. Emergency response plan made up. <input type="checkbox"/> Communication established between job-site and bridge (cargo control if in port). <input type="checkbox"/> Emergency squad drill held, using the damage control plan. All necessary emergency tools available. <input type="checkbox"/> Weather forecast and sea conditions checked for period of work. <input type="checkbox"/> Operations Superintendent agreement with plan if work requires single valve segregation from sea.** <input type="checkbox"/> 	<ul style="list-style-type: none"> <input type="checkbox"/> Isolation plans and procedures reviewed with emergency squad leaders and persons involved with the work. Schematic diagrams used to pinpoint all valves to be closed. <input type="checkbox"/> "Splash zones" defined and electrical equipment protected as necessary. Electrical actuators including remote stations to be locked out/tagged out. See procedure WPR-01-10. <input type="checkbox"/> Water-tight integrity proven with drain valves. Condensers and piping can be pumped down to expedite the work, but pumps cannot be used to maintain watertight integrity. <input type="checkbox"/> All valves closed to isolate the system. Lockout/tagout procedures required. See procedure WPR-01-10. <input type="checkbox"/> Normal and emergency bilge pumps and valves tested and strainers cleaned for immediate use. <input type="checkbox"/> Sufficient manpower present on site for duration of work to immediately deal with any emergency situation. 	<ul style="list-style-type: none"> <input type="checkbox"/> Safe access or suitable work platform provided. <input type="checkbox"/> All other waterbox door openings remain in position (may be loosely bolted). <input type="checkbox"/> Responsible person (with walkie-talkie radio) in attendance at entrance of waterbox. <input type="checkbox"/> Condenser waterbox ventilated and well lighted. <input type="checkbox"/> Rags and debris removed from waterbox promptly. Do not accumulate materials. <input type="checkbox"/> Test bilge alarms for space where work is to be carried out.

Master (Print Name):	Chief Engineer (Print Name):	Officer in Charge (Print Name):	Date/Time /
Signature:	Signature:	Signature:	
Work Started	Date/Time /	Work Completed	Date/Time /

**Not applicable for removal of sea water strainer covers for strainer cleaning/inspection or condenser water box manhole covers for condenser cleaning/inspection.

PRELIMS

❖ HOT WORK

❖ ENCLOSED SPACES

❖ WORKING ALOFT

❖ NEAR MISS

❖ BEHAVIOUR BASED SAFETY (BBS)

HOT WORK

- Hot work is any work involving welding or burning and other work including certain drilling and grinding operations , electrical work and the use of non- intrinsically safe equipment , which might produce an incentive spark.
- It covers all such work , regardless of where it is carried out onboard a ship , including open decks, machinery room and the engine room.
- Hot work outside the engine workshop must be prohibited until the requirements of National Legislation and other applicable regulations have been met, safety consideration has been taken into account and a hot work has been issued.
- Such work are among the most common fire producing activities onboard a vessel. If proper safety precautions are to be taken , such work can be performed without accidents.
- A hot work permit is a document issued by a responsible person permitting a specific hot work to be done during a specific time interval in a defined area.

Enclosed Spaces

- Enclosed space is any portion of a vessel that has any of the following characteristics:
 - Limited openings for entry and exit
 - Unfavorable natural ventilation
 - A compartment not designed for continuous worker occupancy that might contain low levels of oxygen or other hazardous air-quality conditions.

- Enclosed spaces include cargo tanks, ballast tanks, double-bottom tanks, double-hull tanks, fuel tanks, sewage tanks, cofferdams, inter-barrier spaces, scrubber towers, water seals, void spaces, pump rooms, and any other machinery or equipment not routinely ventilated and entered, such as boilers and main engine crankcases.

- Entry to a confined space is considered to have occurred when a person's head or upper body enters the space.

WORKING ALOFT

- Working aloft is defined as any work above normal reach and where personnel are faced with risk of falling more than 2 meters.
- Typical areas are the superstructure , funnel , masts , tanks , engine room and the ship's side using a stage , Bosun's chair , Jacob's ladder or lifting up personnel with safety harness.
- For e.g : A Pump room or engine room emergency escape.
- Falling when performing work aloft can cause serious accidents. If proper safety precautions are taken such work can be performed without accidents.

NEAR MISS

➤ **What is a Near Miss?**

- A Near Miss any unplanned event having a potential but unrealized consequence for injury/illness to personnel, property, the environment, the company's reputation or financial performance.
- There exists an undefined factor (some call Luck) which differentiates between a Near Miss and an Incident. We can not rely on Luck alone to prevent incident.

➤ **Why Near Misses are NOT reported?**

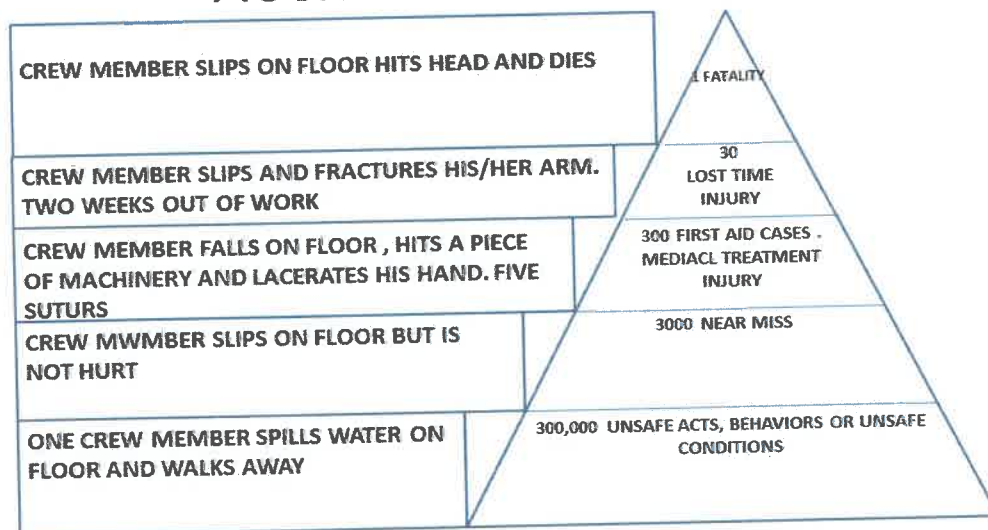
▪ **Because:**

- Not a clear understanding of what a Near Miss is
- No injury was sustained
- Company property damaged – not my problem
- It was my 'lucky day' syndrome
- Just another form to complete
- Threat of disciplinary action
- Corrective actions are frequently not implemented
- Culture does not support it

➤ **Unsafe condition – Near Miss - BBS Observation – Incident**

- **Unsafe Condition** : Cluttered worksite (trip hazards)
- **BBS Observation** : Person standing underneath a load suspended on the crane.
- **Near Miss** : Crane wires discovered eroded/damaged - lift was stopped.
- **Incident** : Crane wire parts when lifting up a load falling down and injuring a person standing underneath.

ACCIDENT PYRAMID



BEHAVIOUR BASED SAFETY

➤ **What is a BBS?**

- ✓ In a BBS observation it is the interaction between the observer and the worker been observed.
- In a BBS we basically look for :
 - Are we following our procedures?
 - Are the workers aware of their surroundings?
 - If anything is “AT RISK” or beyond your understanding ask the worker how you can help or make the situation more safe.
 - When you see a job being done correctly, take the time to communicate and share it as positive reinforcement of our work behaviours is effective.

➤ **For e.g:**

- For “ALL SAFE BBS” :

“While a worker was pouring boiler chemicals into a pail it was observed that he wore a rubber apron, rubber gloves, goggles, and a face shield because he said that the boiler chemicals could harm his skin or eyes if splashes got on him. All Safe!”

- For “NOT SAFE BBS” :

“While a worker was supervising a mooring operation it was observed that she was standing in the line of fire as the line was brought up tight. Stop Work Authority was used and the supervisor said she had not realized she was in the snap-back zone. Once the supervisor was repositioned to a safer area the mooring was completed safely.”

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13.	MGPS
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Combustion Space Relief Valve

Nadeep Lamba

Engine Cadet

Date: 02/06/17.

Signature:

CAPRICORN VOYAGER
OF. No. 2000143
GRT: 58442
NRT: 30000
HP : 18420

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.

Combustion Space Relief Valve

The spring loaded valve is designed to lift at a pressure of 200+5 bar to protect the cylinder components from the damage if the cylinder is over pressurized . It is mounted on the cylinder cover .

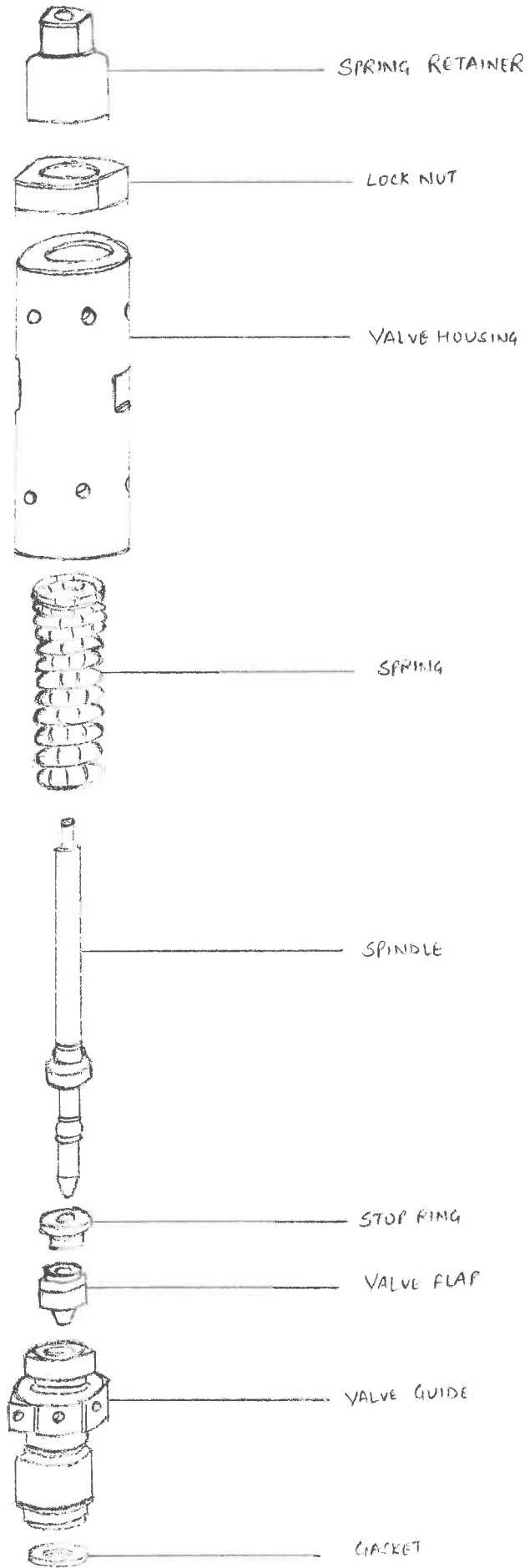
The portion which is attached to the cylinder cover is the valve guide along with a gasket.

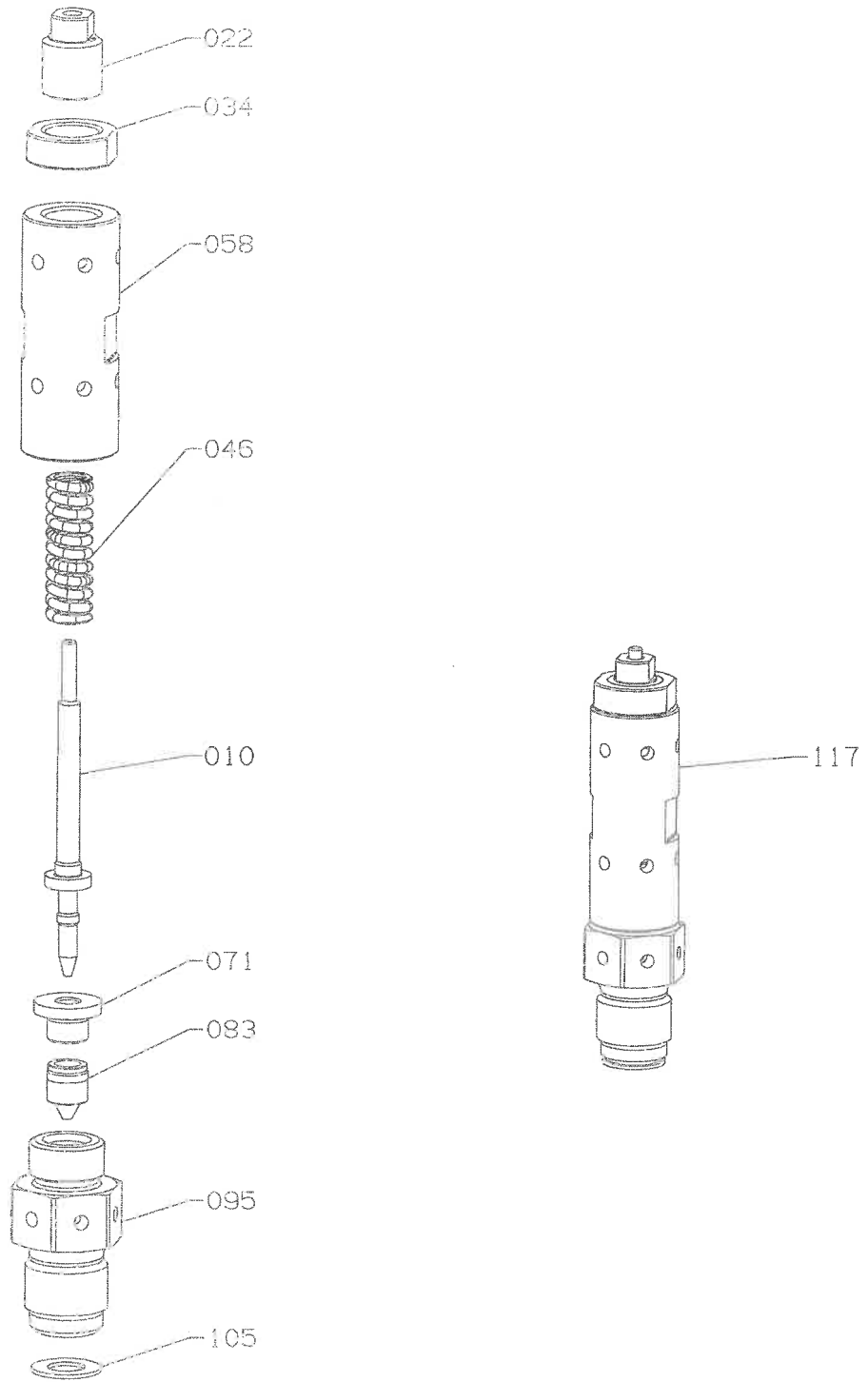
When the pressure exceeds the set value the valve seat lifts against the spring pressure and releases the excess pressure.

The valve seat movement is restricted by the stop ring .The spring is held in place by the spring retainer.

A locknut is provided for locking the spring to its set pressure.

SAFETY VALVE - CYLINDER





Item No.	Item Description
010	Spindle
022	Spring retainer
034	Lock nut
046	Spring
058	Valve housing
071	Stop ring
083	Valve flap
095	Valve guide
105	Gasket
117	Safety valve, complete

Item No.	Item Description
-----------------	-------------------------

MAN Diesel

MAN Diesel A/S • Denmark



Service Letter

SL08-491/AAB
January 2008

Omission of Cylinder-Cover-Mounted Safety Valves
All MAN B&W Two-stroke Engines
Action Code: WHEN CONVENIENT

Dear Sirs

MAN Diesel has decided to omit the so-called safety valve on all new engines delivered from 1 January 2007, as all engines of the MAN B&W design already have a built-in safety function with regard to excessive combustion pressure.

The cylinder pressure is controlled as a part of routine maintenance, and in the event that the cylinder pressure exceeds the design limit, the elasticity in the cylinder cover studs will allow the cylinder cover to lift, thereby ensuring relief of the high pressure gas. The safety valve used so far will not, in any case, be able to cater for such a situation.

Thus, the safety valve on engines in service can be omitted, pending the simple modification described in the following as well as approval from the relevant classification society.

HEAD OFFICE (& postal address)
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2450 Copenhagen SV
Denmark
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Fax: +45 33 85 10 30
mandiesel-cph@mandiesel.com
www.mandiesel.com

PrimeServ
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Fax: +45 33 85 10 49
PrimeServ-cph@mandiesel.com

PRODUCTION
Teglhølmegade 35
2450 Copenhagen SV
Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 17
manufacturing-dk@mandiesel.com

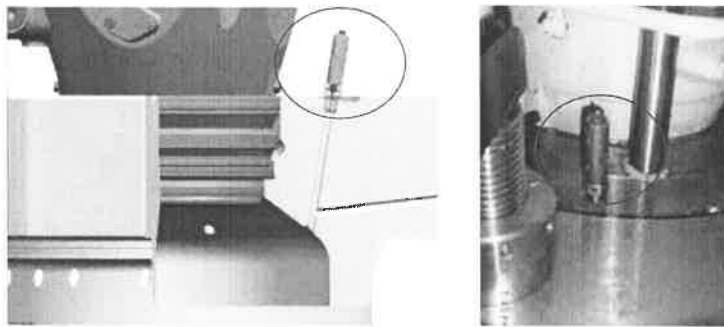
FORWARDING & RECEIVING
Teglhølmegade 35
2450 Copenhagen SV
Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 16
MAN Diesel A/S
Denmark
Reg. No.: 39661314

MAN Diesel – a member of the MAN Group

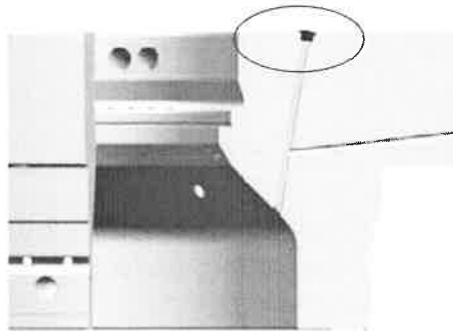


The necessary modifications are listed below:

- substitute the valve with a plug in accordance with EN47AR22
- add a jacketed packing ring in accordance with EN14B2230.



Remove the safety valve



Substitute the safety valve with a plug in accordance with EN47AR22
Add a jacketed packing ring in accordance with EN14B2230

Engines in service before 2007

The above modification is also applicable to engines that entered service before 1 January 2007, based on the following argumentation:

Many years ago, all classification societies of IACS (International Associations of Classification Societies) introduced rules that required safety valves with the combustion chambers. The classification societies requested that the opening pressure be adjusted to approximate $p_{max} + 40\%$.

In order to fulfil this class rule, MAN Diesel A/S developed safety valves that were design approved, pressure tested and certified by the individual classification society



– even though MAN Diesel was aware that for reasons of design and space limitations, the opening area in the safety valve would be insufficient to relieve the cylinder pressure fast enough.

A safety valve complying with this requirement requires an opening area in the size of the exhaust valve opening area, which is impractical.

As a consequence, MAN Diesel initiated a dialogue with the class societies in the forum of IACS/CIMAC, with a view to omit such valves.

MAN Diesel has argued that the function of the safety valve is insufficient, and that too high a cylinder pressure is actually limited solely by the cylinder cover lifting.

IACS and the majority of the class societies have accepted our point of view and, subsequently, the text in the IACS Unified Rules has been changed. Therefore:

IACS and the major classification societies have now adjusted their rules so that a safety valve or a warning device is **no longer required**.

Despite the fact that the majority and major classification societies have approved the above change – a dialogue is still ongoing with a few class societies regarding their final approval. Therefore, owners and operators of MAN B&W two-stroke engines should obtain acceptance from the relevant class society prior to initiating the above modification.

Once approval has been obtained – the necessary parts described above can be ordered from MAN Diesel or the relevant engine builder.

Questions or comments regarding this SL should be directed to our Dept. LEO.

Yours faithfully

MAN Diesel A/S



Carl Erik Egeberg

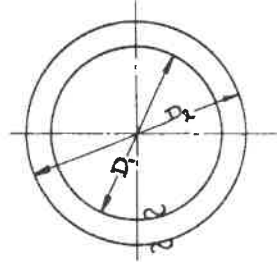


Stig B Jakobsen

Encl:
EN47AR22
EN14U2234

Completed: 1-2-31	Approved: 73	Amended: <i>EL</i> <i>Sml</i> 18-11-74	Replaced by:	Replaces:	Number of sheets: 1	Sheet no.: 1
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(Extract of N 14 A-B, N 15 A-B, N 16 A-B, Special packing rings).



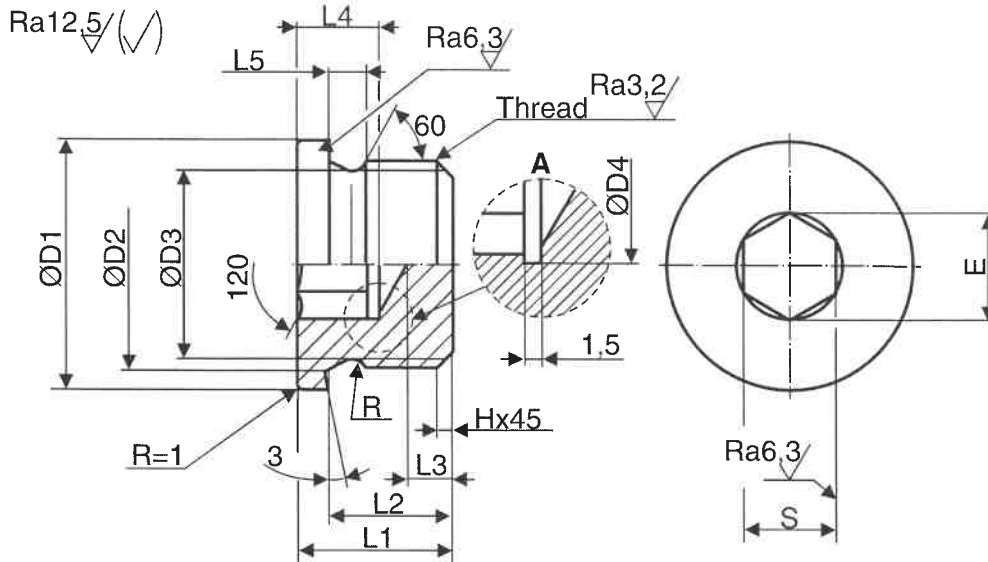
N14B		
D ₁	D ₂	t = 1% _n
16	22	
17	25	
19	26	
21	28	
23	32	
27	32	
27	35	
30	38	
34	44	
38	48	
42	52	
48	54	
48	58	
52	58	
54	65	
60	70	

Example : a copper packing ring with D₁ = 27 mm and D₂ = 35 mm is specified :

1	Kobberpakning	1	N 14 B 2735			
Ant.	Benævnelse	Pos.	Mrk. nr.	Tegn. nr.	Materiale	Vægt kg

Plug screws

Approved: 19931202 Amended: 20050322 Replaced by: Replaces: Page No.: 1 (1)



Dimensions in mm

Designation	10	12	14	16	18	20	22	24	26	30	33	36	42	48
Thread M*	*10x1	12x1.5	14x1.5	16x1.5	18x1.5	20x1.5	22x1.5	24x1.5	26x1.5	30x1.5	33x2.0	36x1.5	42x1.5	48x2.0
D1 h14	14.0	17.0	19.0	21.0	23.0	25.0	27.0	29.0	31.0	36.0	39.0	42.0	49.0	55.0
D2 ⁰ / _{-0.3}	10.3	12.3	14.3	16.3	18.3	20.3	22.3	24.3	26.3	30.3	33.3	36.3	42.3	48.3
D3 ⁰ / _{-0.2}	8.4	9.7	11.7	13.7	15.7	17.7	19.7	21.7	23.7	27.7	30.0	33.7	39.7	45.0
D4 ^{+0.5} / ₀	5.7	6.9	6.9	9.2	9.2	11.4	11.4	13.7	13.7	19.4	19.4	21.7	25.2	27.4
E min.	5.7	6.9	6.9	9.2	9.2	11.4	11.4	13.7	13.7	19.4	19.4	21.7	25.2	27.4
L1 ≈	11.0	15.0	15	15.0	16.0	18.0	18.0	18.0	20.0	20.0	21.0	21.0	21.0	21.0
L2 ±0.2	8.0	12.0	12	12.0	12.0	14.0	14.0	14.0	16.0	16.0	16.0	16.0	16.0	16.0
L3 min.	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
L4 min.	6.5	8.5	8.5	9.0	9.0	9.0	9.0	9.0	10.5	10.5	10.5	12.0	12.0	12.0
L5 ^{0.3} / ₀	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0
H ≈	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
R	1.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.6	1.2	1.2	1.6
S D12	5.0	6.0	6.0	8.0	8.0	10.0	10.0	12.0	12.0	17.0	17.0	19.0	22.0	24.0

This standard is in accordance with DIN 908 1992 and DIN 3852-1 form A 1992.

- References: Plug screws with pipe thread, EN47R.
- Material: S20R.
- Execution: With or without the clearance shown in detail A.
- Seating: To obtain seating against the bearing surface of the plug screw, the corresponding threaded hole must be chamfered or packing must be used.
- Tolerances: Thread - EN48H, (SB-standard).
Geometrical tolerances - ISO 4759-1, December 1978, product grade B.
- Packing rings: See EN14U and EN14S.
- Designation: A plug screw with M10x1 thread, is specified:
EN47AR10

Cylinder Cover – Safety Valve





Crankcase Explosion Door

Nadeep Lamba

Engine Cadet

Date: 02/06/17.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.

CAPRICORN VOYAGER
OF. No. 9000143
GRT: 58442
NRT: 30088
HP : 13450

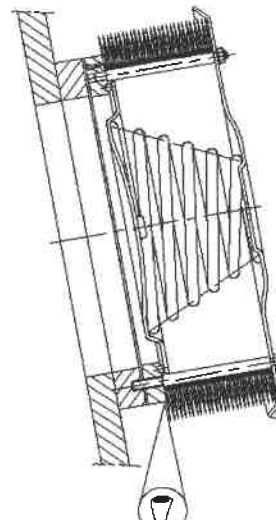
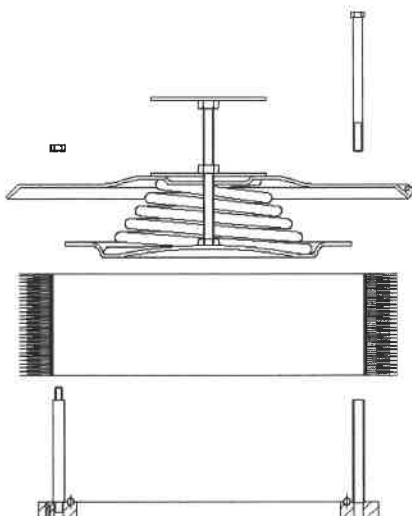
CRANKCASE EXPLOSION DOOR

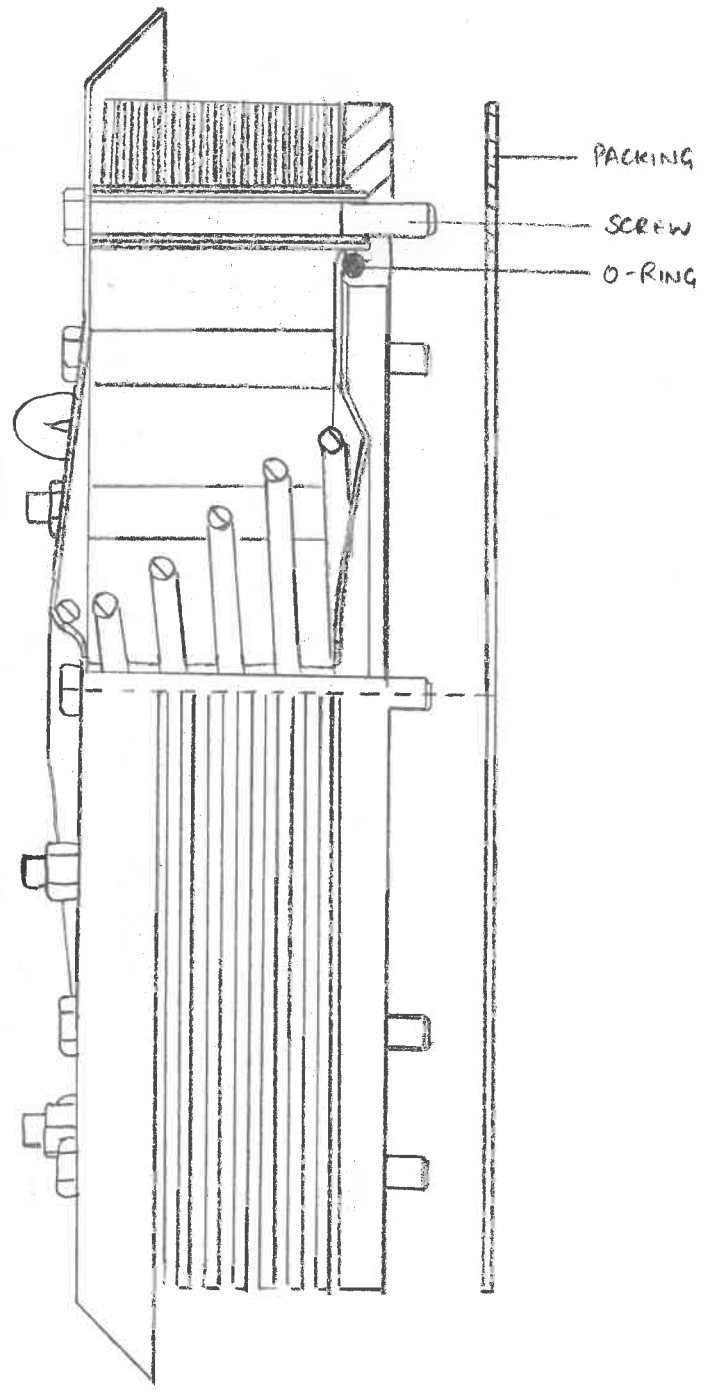
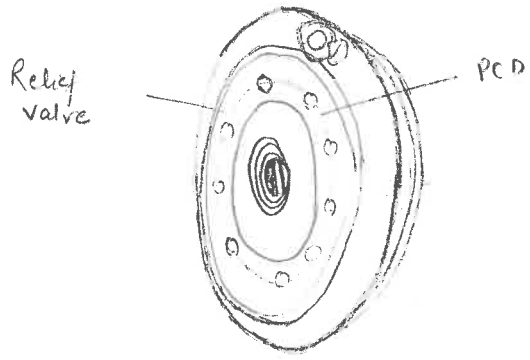
The crankcase relief door is provided on each unit so as to protect the walls of the crankcase from the effects of excessive pressure during a crankcase explosion. The size of the spring is calculated in order to release the pressure readily. Lifting force is checked each time the valve is overhauled by using a spring balance. The valve opening pressure can be determined by dividing the spring balance force by the effective area of the valve. The valve should shut immediately after the pressure pulse has passed.

A wire mesh is provided in the outlet path to take away the heat from the escaping explosion flame while a deflector plate is employed to direct gases across the face of the crankcase rather than directly into the engine room. The conical spring provides an even lifting pressure.

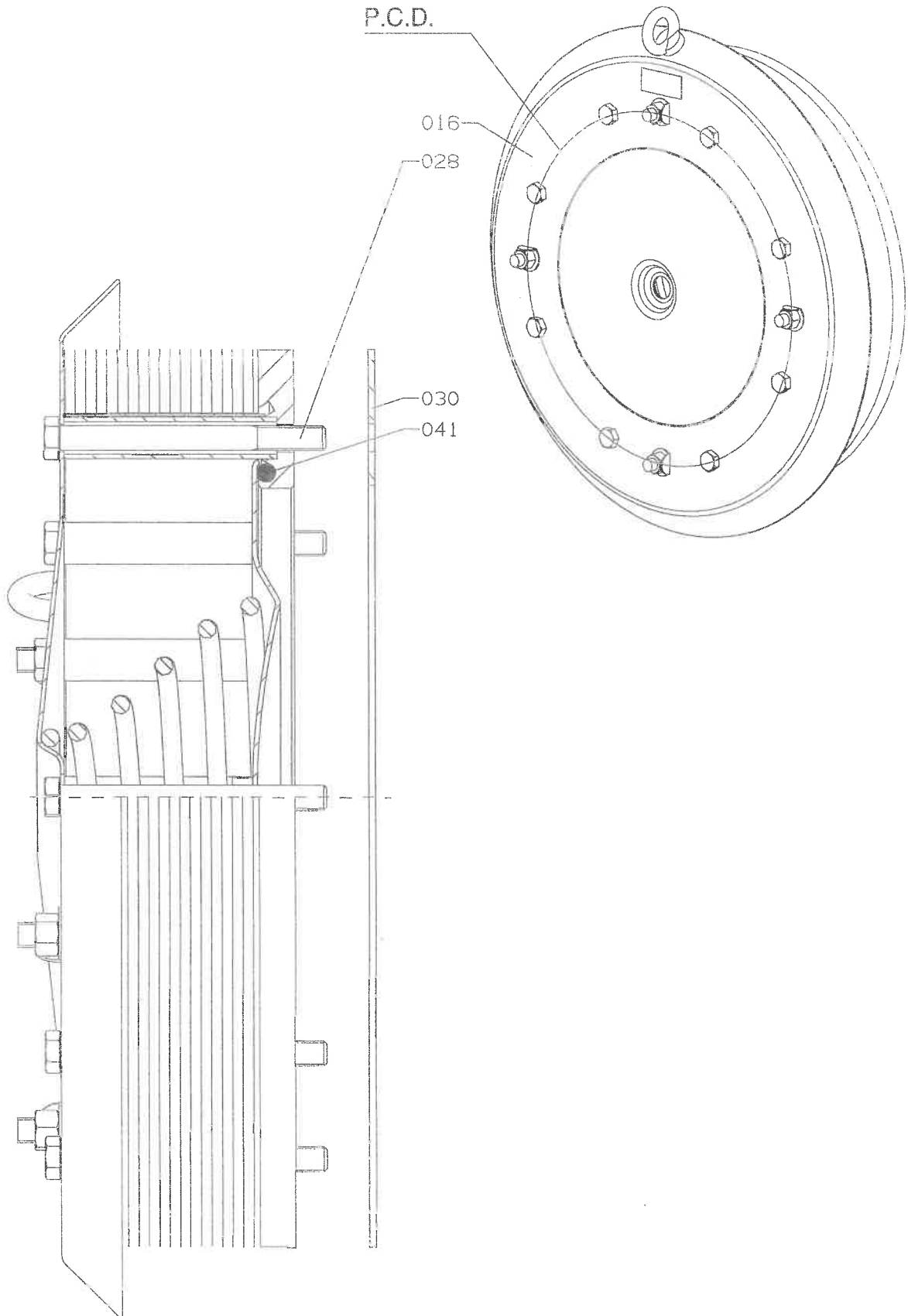
Inspections:

1. There should be no leakage from the relief valve under normal running conditions. If there is any leakage, the O-ring should be replaced.
2. If there is any damage in the flame arrester, it should be replaced at once.





RELIEF VALVE



Item No.	Item Description
016	Relief valve (P.C.D. 465mm)*
028	Screw*
030	Packing*
041	O-ring*
<p>Note: *When ordering, please state manufacturer of Relief Valve and P.C.D. xxx mm</p>	

Item No.	Item Description

Dear Sirs

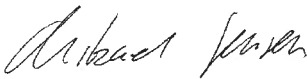
This service letter provides information on a new generation of type approved crankcase explosion relief valves.

The new generation of crankcase explosion relief valves has been approved to meet new IACS specifications. The new relief valve generation will improve protection of your engine and crew and prevent fire damage in case of a crankcase explosion. This new generation of crankcase explosion relief valves are to be fitted on all new engines where the contract for construction of the ship is on or after 1 July 2008.

Engines built after 1999 are in general fitted with crankcase explosion relief valves meeting the 1999 MAN Diesel Specification and are also acceptable for service.

IACS specifications and type test procedures are described in IACS UR M66 Type Testing Procedure for Crankcase Explosion Relief Valves. Type approved crankcase explosion relief valves have been available since January 2008.

Yours faithfully



Mikael C Jensen
Vice President, Engineering



Tommy R Rasmussen
Senior Manager, Production Support

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MAN Diesel
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Production
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Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 17
manufacturing-dk@mandiesel.com

Forwarding & Receiving
Teglhømsgade 35
2450 Copenhagen SV
Denmark
Phone: +45 33 85 11 00
Fax: +45 33 85 10 16

MAN Diesel
Branch of MAN Diesel SE, Germany
CVR No.: 31611792
Head office: Teglhømsgade 41
2450 Copenhagen SV, Denmark
German Reg.No.: HRB 22056
Amtsgericht Augsburg

Action code: AT FIRST OPPORTUNITY

Crankcase Relief Valve Prevention and Damage Control

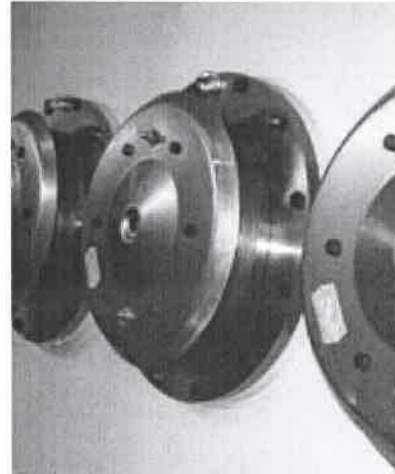
SL09-512/CAA
May 2009

Concerns

Owners and operators of MAN B&W two-stroke diesel engines.
Type: All MAN Diesel two-stroke types

Short summary

Oil mist detectors gives a warning before a crankcase explosion occurs.
A new generation of crankcase explosion relief valves provides improved damage control in case of a crankcase explosion.



Crankcase explosion relief valves fitted on engine.



Contents

Crankcase explosion relief valves	page 2
Oil mist detector	-
Approved valves	-
Non-approved valves	page 3
Check list	page 4
Further information	-

Crankcase explosion relief valves

Functionality of crankcase explosion relief valves:

1. Relieve the explosion pressure from the crankcase.
 - Valves open
2. Quenching the flame front with built-in flame arresters.
 - Efficient flame arresters prevent fire and subsequent fire damage outside the crankcase. Furthermore, they prevent ignition of the oil mist cloud having escaped the crankcase.
3. Close automatically after relieving the explosion pressure
 - Air and gas tight valve closure constrains the amount of oxygen entering the crankcase after an explosion. Subsequently, the low oxygen concentration in the crankcase suppresses the crankcase fire and reduces the risk of subsequent explosions.

Crankcase relief valve specifications

In the period 1999-2007, two crankcase explosion relief valve brands were approved to meet the 1999 MAN Diesel specifications and they are class approved (see Fig. 1):

- Hoerbiger Ventilwerke, type EVN
- Mt. Halla Control Valves, type HCSG

Provided they are installed correctly and well maintained, the two types may be used for continued service (see check list).

Crankcase explosion relief valves meeting the new specifications in IACS UR M66 Type Testing Procedure for Crankcase Explosion Relief Valves have been available for purchase since the beginning of 2008 (see Fig. 1a).

Oil mist detector

The OMD is an important tool for preventing crankcase explosions. We recommend connecting the OMD to the engine control system, so that the engine control system can issue a slowdown request in case of too high oil mist concentration in the crankcase.

Additionally, checking the oil mist detector and the oil mist alarm should be included in the regular maintenance routine.

Type approved crankcase explosion relief valves

As of July 2007, two types of crankcase explosion relief valves have been type approved to meet the specifications in IACS UR M66 Type Testing Procedure for Crankcase Explosion Relief Valves:

- Hoerbiger Ventilwerke, type EVS
- Mt. Halla Control Valves, type M20

In 2009, three new suppliers of crankcase explosion relief valves have been type approved:

- Kwang San, type KSRV
- Hyunwoo SMT, type HWG
- Unitech, Type ERV

New manufactures of the crankcase explosion relief valves are in the type approval process, please contact MAN Diesel for additional information.

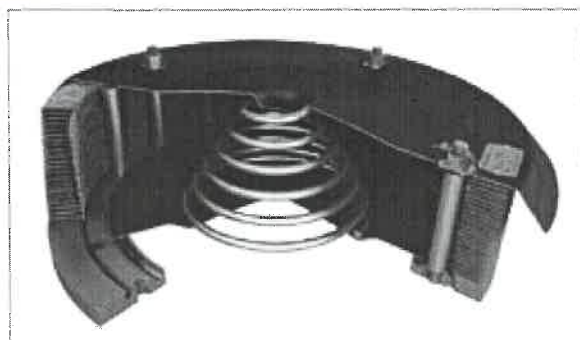


Fig. 1: Example of crankcase explosion relief valves type approved in 1999.

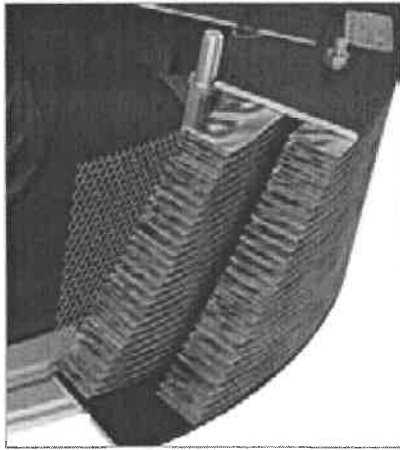


Fig. 1a: New type of crankcase explosion relief valves with two flame arresters - type approved in 2007.

Non-approved crankcase explosion relief valves or valves not fulfilling the present standard

In case your investigation finds that your MAN Diesel engines are equipped with non-approved crankcase explosion relief valves or valves not fulfilling the present standard, please do not hesitate to contact MAN Diesel PrimeServ for advice on how to retrofit new type approved crankcase explosion relief valves and calculate the correct valve size. The opening free area of the crankcase explosion relief valves must not be less than $115 \text{ cm}^2/\text{m}^3$ of the crankcase gross volume.

Check list

A crankcase explosion relief valve is a safety device. Along with an effective oil mist detector, well-functioning crankcase explosion relief valves diminish the risk of critical human injury and severe material damage in the event of a crankcase explosion.

However, discussing crankcase explosions a few other issues need to be addressed, so we have created a list of precautions against crankcase explosions. We recommend using the list as a check list to learn how well protected your engines are against crankcase explosions and the consequential damage:

1. Crankcase explosion relief valves have been approved according to IACS UR M66 Type Testing Procedure for Crankcase Explosion Relief Valves or MAN Diesel 1999 specifications.
2. Oil mist detectors are well maintained and tested according to the manufacturer's maintenance and test manual.
3. Oil mist detectors are connected to the engine control system. The engine control system issues a slow-down request in case of too high oil mist concentration in the crankcase.
4. Crankcase pipe connections are made of steel or other explosion proof material.
No "garden hose type" solutions!
5. Venting pipes are made of steel and are at least 20 meters long.
6. Crankcase opening covers are gas proof and close tightly before the engine is started.
7. Crankcase explosion relief valves and flame arresters are undamaged and uncovered.
Never cover a flame arrester with plastic, paper or paint!
8. Spare parts are original MAN Diesel spare parts, and all maintenance is performed according to the enclosed instructions and/or MAN Diesel instruction manuals.

Further information

Further information on crankcase explosion relief valves and crankcase explosions:

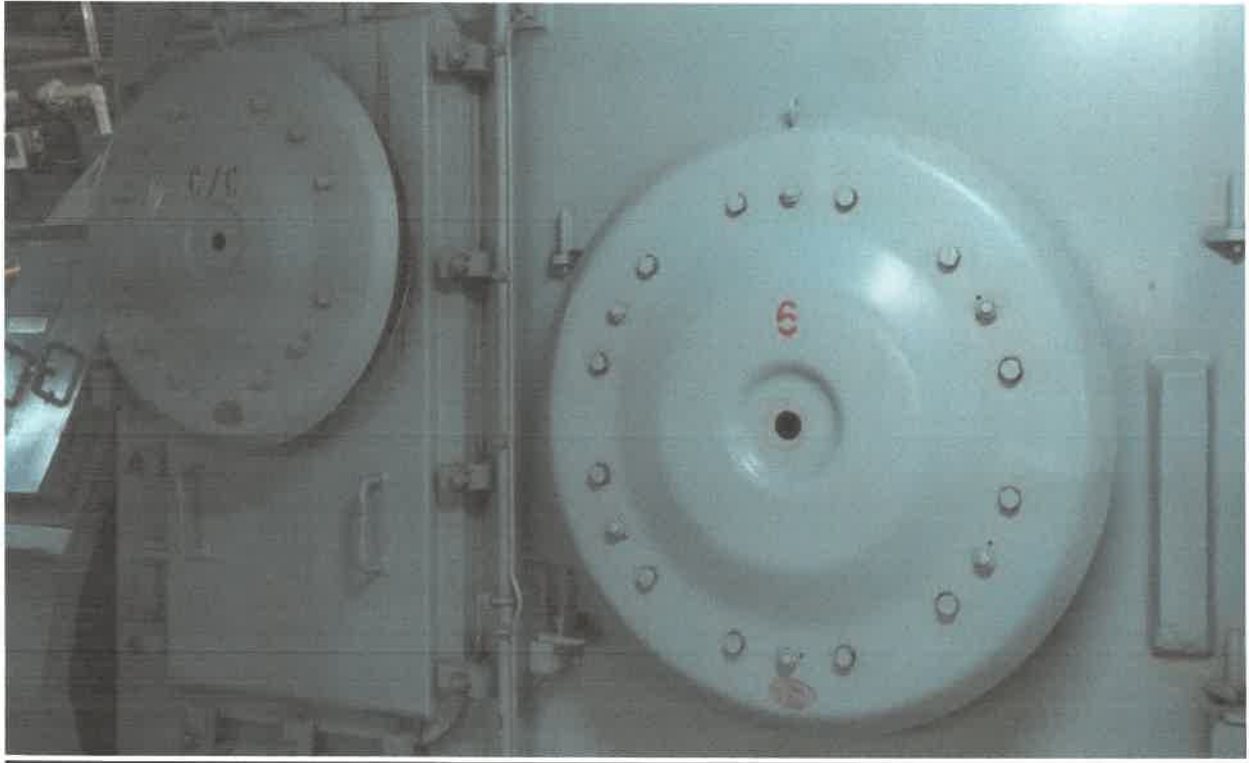
- Service letter SL99-373/ERO
- Service letter SL03-420/ERO

Our service letters are available online. Please register here to get online access to service letters:

www.mandiesel.com/sl-registration

By registering, you get online access to our service letters and you will be notified by email when new service letters are published.

Crankcase explosion Door





Blowing Down Of Boiler

Nadeep Lamba

Engine Cadet

Date: 29 MAY 2017

Signature:

Nadeep Lamba



Blowing Down Of Boiler

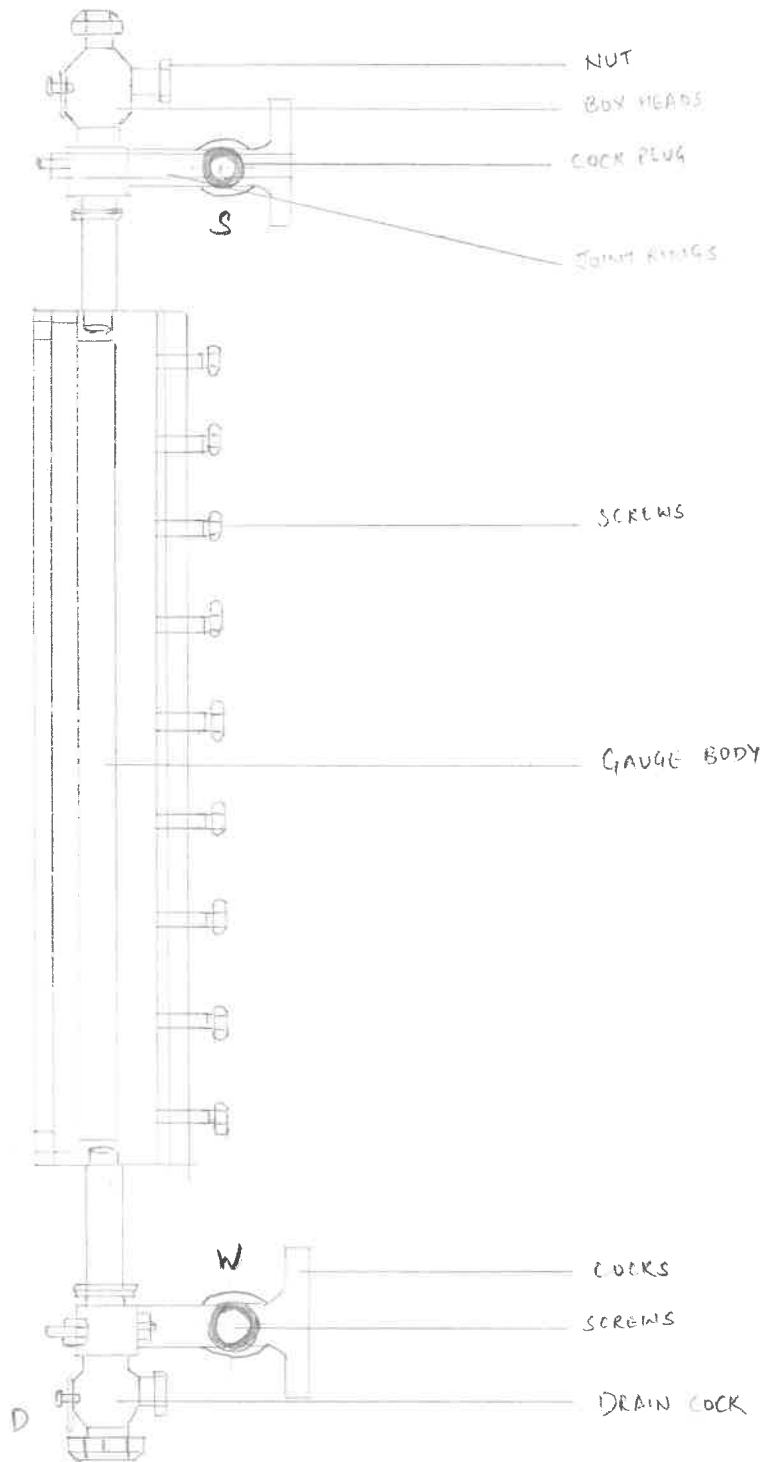
- ❖ The gauge should be blown down before lighting up the boiler and just before closing down the boiler.

➤ **Cleaning the water side:**

- Shut the cock S and open the cock W.
- Open the drain cock D for a short time. This sucks the water out of the glass without, however, totally depressurising the gauge body.
- Shut the cock D and then water is forced upwards into the glass again.
- Repeat this procedure several times, opening and shutting the cock D. The water level in glass rises and falls.

➤ **Cleaning the steam side:**

- Shut the cock W.
- Open the cock S.
- Blow through the steam side and gauge body by opening the drain cock D for 1-2 seconds.
- A steam blowing of longer duration is not advisable considering the service life of glass.
- Turn the cocks to operating position.



BOILER GAUGE GLASS

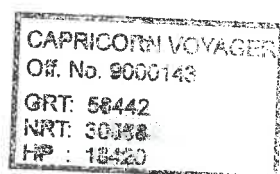


Line Diagram for Reefer System

Nadeep Lamba

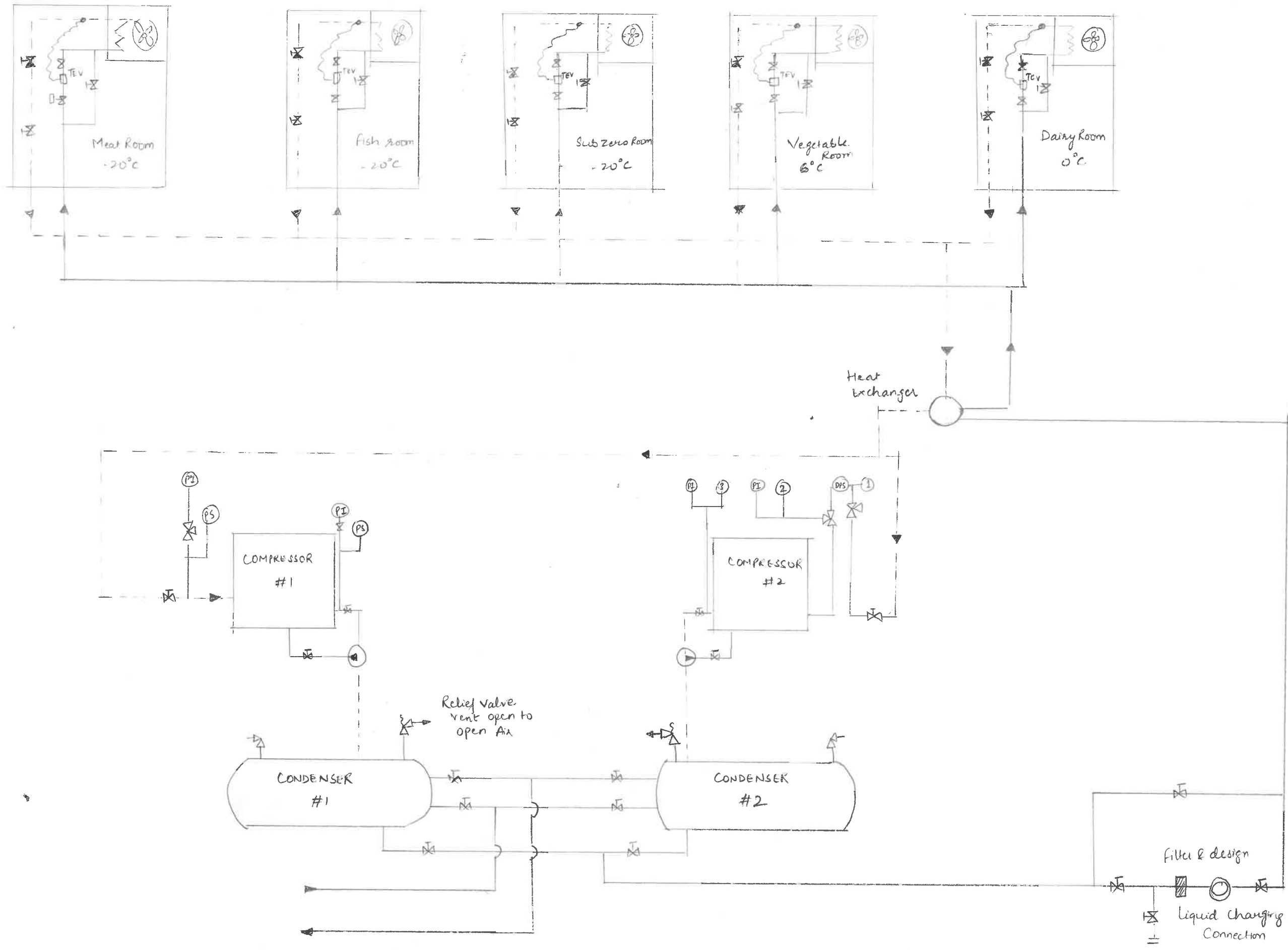
Engine Cadet

Date: 01.06.13



Signature:

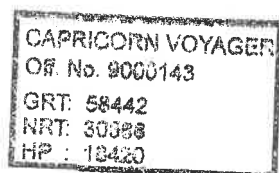
A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.





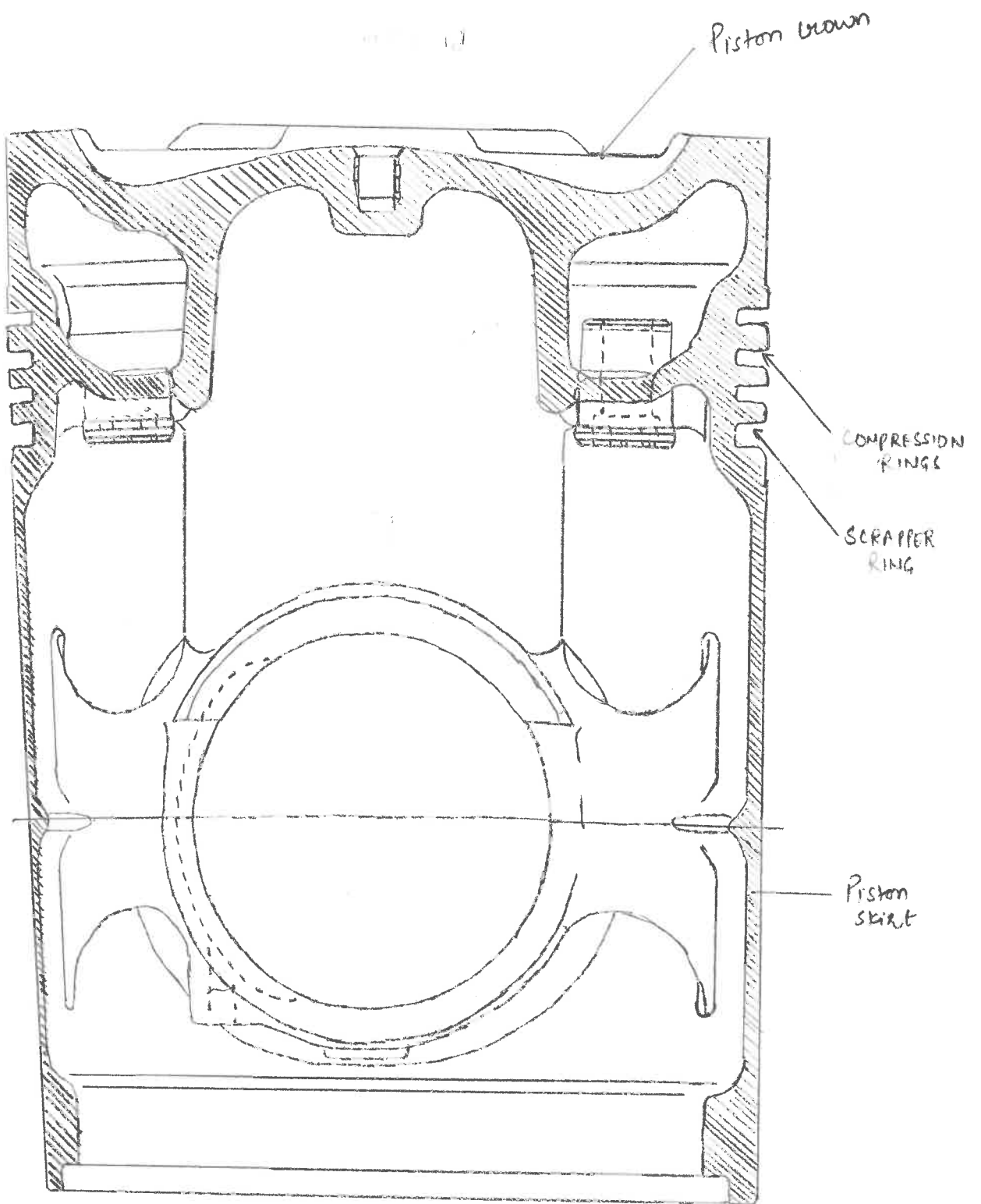
Piston
Nadeep Lamba
Engine Cadet

Date: 30 MAY 2017

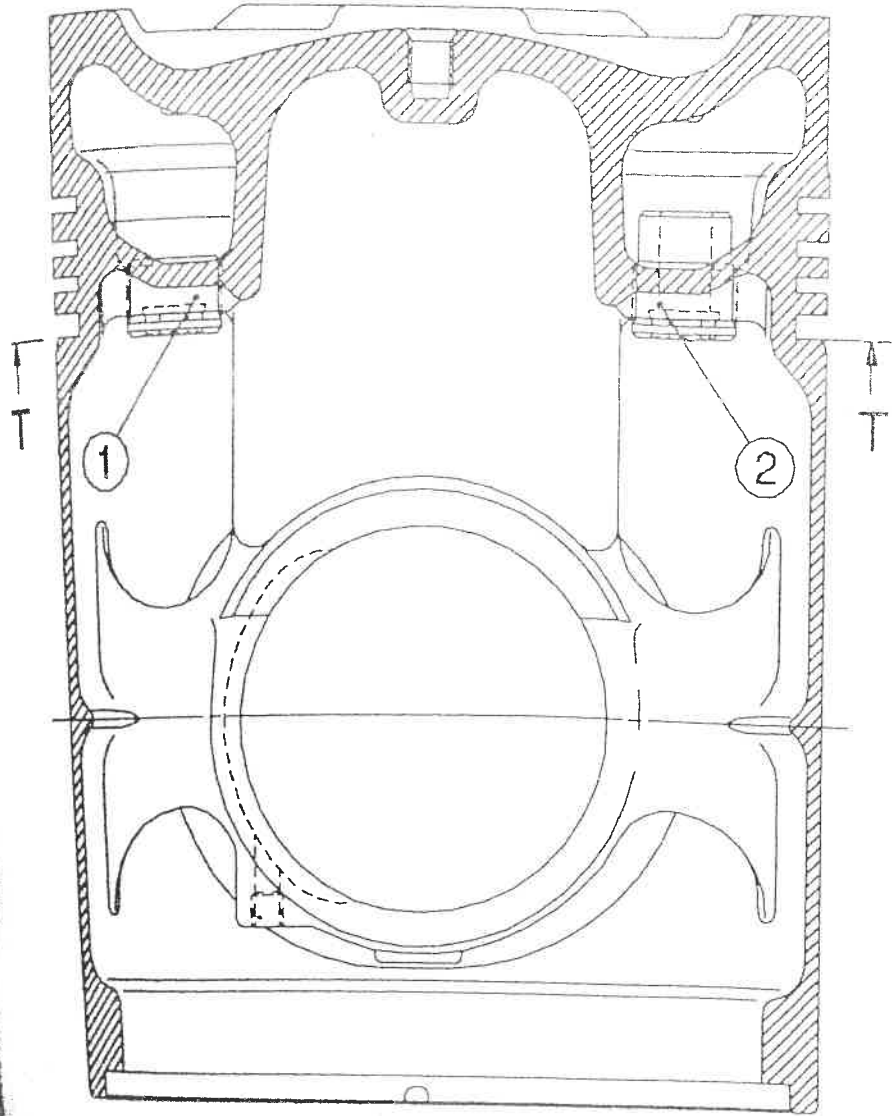


Signature:

2/E *Nadeep Lamba*



PISTON



① Part no. 1683601-6, plug screw

Piston

The piston, which is oil-cooled and of the monobloc type made of nodular cast iron, is equipped with 3 compression rings and 1 scraper ring.

By use of a combination of compression rings with different barrel-shaped profiles and chrome-plated running surface on all rings, the piston ring pack is optimized for maximum sealing effect and minimum Wear rate.

The piston has a cooling oil space close to the piston crown and the piston ring zone. The heat transport, and thus the cooling effect are based on the shaker effect arising during the piston movement. Oil from the engine's lubricating oil system is used as cooling oil.

The piston is provided with a turned edge at the top due to the flame ring mounted in the cylinder liner.



Steam Distribution familiarisation

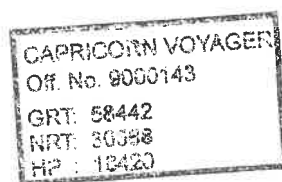
Nadeep Lamba

Engine Cadet

Date: 01 June 2017

Signature:

2/E Budhni



STEAM DISTRIBUTION

1. State the precautions necessary before starting a supply of steam to any section or starting machinery.

- The steam line should be drained. Drain cocks are usually available on steam traps. Check that the steam trap isolating valves are open and the steam trap bypass valve is shut.
- Before opening any valve which will supply steam to the line should be opened in crack condition. The line should be allowed to warm up and all the condensate, if any, should get evaporated otherwise there is a risk of water hammer. Then the steam inlet valve can be opened slowly. The rate of opening the valve depends on the size of the line it will be supplying steam.

2. What are the arrangements for removing water from the steam line?

- Steam traps are fitted with isolating valves on condensate return lines.
- For example at the outlet steam heating coils for fuel oil tanks, drain separator etc. drain separator is provided upstream of the COPTs on the 16K steam line to remove any water particles so that the steam turbine is protected from any impingement. Also any steam line can be drained manually by opening the drain cocks on steam traps.

3. How will you ensure that steam is flowing through a steam heating coil in a fuel tank?

- Check that the steam trap isolating valves are open and then slowly open the steam trap drain cock and check whether steam is flowing out along with some condensate.
- Also it can be checked if the line and valves are warm by touching with the back of your hand.

4. What are the arrangements provided for detection of leaky heating coil, particularly that for heating tanks containing oils?

- Cascade tank has an observation tank at the inlet of condensate for all the dirty condensate return lines, mostly cargo and fuel oil tank heating coils and fuel oil heaters. If sheen of oil is observed during through the observation glass on top of the condensate it indicates leaky heating coil. Alarm for high oil density is also provided in the observation tank.

5. What will be the consequences if oil gets pumped into the boiler through feed system?

- Oil will form a thin film on the inner surface of the water tubes. This will cause loss of heat transfer and can cause overheating of tubes. If any tube damage takes place white smoke can be observed through the funnel and there will be substantial decrease in water level.
- The conductivity of the boiler water will increase substantially which will require frequent scum blow downs (another indication of oil contamination).

6. Name the various trips and alarms.

The various trips and alarms are-

- Atomizing steam pressure low alarm switch
- Flame eye failure alarm switch
- Fuel oil pressure low alarm switch
- Fuel oil temperature low alarm switch
- Fuel oil temperature high alarm switch
- Drum high steam pressure alarm switch
- Drum low steam pressure switch
- Drum high boiler water level switch
- Drum low boiler water level switch
- Smoke Indicator switch
- Fuel oil pump auto change over switch
- Atomizing steam pressure low low shutdown switch
- Flame failure shutdown switch
- Igniter failure shutdown switch
- Forced draft air flow low shutdown switch
- Fuel oil pressure low low shutdown switch
- Fuel oil temperature low low shutdown switch
- Fuel oil temperature high shutdown switch
- Drum high steam pressure shutdown
- Drum water level high high shut down switch
- Drum water level low low shut down switch
- Boiler emergency stop /local & ECR

List of Alarm switches:

Atomizing steam pressure low alarm switch: 2.1 kg/cm²

Flame eye failure alarm switch

Fuel oil pressure low alarm switch: 16 kg/cm²

Fuel oil temperature low alarm switch: 105 Deg.C

Fuel oil temperature high alarm switch: 145 Deg.C

Drum high steam pressure alarm switch : 17,3 kg/cm².

Drum low steam pressure switch: 4.0 kg/cm²

Drum high boiler water level switch: +150 mm

Drum low boiler water level switch: -100 mm

Smoke Indicator switch

Fuel oil pump auto change over switch

List of Shutdown switches:

Atomizing steam pressure low low shutdown switch: 1.6 kg/cm²

Flame failure shutdown switch

Igniter failure shutdown switch

Forced draft air flow low shutdown switch

Fuel oil pressure low low shutdown switch: 12 kg/cm²

OIL POLLUTION

SOURCES OF OIL POLLUTION	PREVENTION
1. From ER bilges	<ul style="list-style-type: none"> - Ensuring bilges are pumped overboard only through the oily water separator and the Oil content meter is always calibrated at the renewal of the IOPP certificate and it is cleaned regularly. OWS overboard discharge locked out at all times except when it is in operation and keys with chief engineer only. - Ows discharge should be in accordance with marpol annex 1 , reg 15. - Ensure that the Emergency Bilge Suction is shut and locked to ensure that the main cooling sea water pump does not take suction from the bilges. - Regulars monitoring of bilge well levels and daily testing of bilge alarms. - When test running bilge, fire and general service pumps, we must make sure that they are lined up properly
2. From leaky oil coolers (particularly generator engine coolers)	<ul style="list-style-type: none"> - The generator engines are cooled by LT fresh water (centralized cooling system), so possibility of leaks reduces. The cooling water system has an oil detector near the intersection of HT and LT water system, so if it gives alarm, we should check the oil leaks and rectify them. - Make sure that the fresh water and sea water does not mix due to faulty gaskets in the central cooler,

	<ul style="list-style-type: none"> - Regular inspection and maintenance of oil coolers as per the Planned Maintenance system. - Having drip trays under the coolers.
3. From leaky stern tube seals	<ul style="list-style-type: none"> - Ensure that the Air sealing system is in proper condition by monitoring the air pressures - Daily monitoring of stern tube LO tank levels. In case there is an unusual change in the level, cause must be found out. - Replacing stern tube seals if they are found to be leaking and also in the dry dock as regular maintenance.
4. Overflow of tanks during transfer of oil, bunkering or due to leaky tanks	<ul style="list-style-type: none"> - We must ensure that the valves are lined up correctly before commencement of bunkering or transfer of oil. - The high level alarm of the tanks must be tested. - Scupper plugs must be placed. - Throughout the duration of the operation(bunkering or transfer of oil), there should be a stand-by person present at the manifold - The spill tank below the bunkering manifold should contain oil if it leaks during operation. - Oil spill gear should always be in readiness during these operations.
5. Disposal of oil soaked waste (cotton waste, rags, saw dust, boiler suits, etc.)	<ul style="list-style-type: none"> - Oil soaked wastes should be burnt in the incinerator or given to a shore facility in case it cannot be burnt on-board. It should not be disposed off in the sea.

Sec-3/9/16

MEASURES TO BE TAKEN IN CASE OF SMALL OIL SPILL:

In Case of Oil Spill during bunkering operation, if the spill happens at the manifold, the manifold area is protected by a spill tank. If the spill happens at the vents due to overflowing, the scupper plugs are in place and always standby person is available, so operation will be stopped before the oil goes over board. Also the oil spill equipment must be kept ready during any operation that has a hazard of oil spill. Oow officer should be informed and if can be cleaned by yourself , clean immediately.

3/E *[Signature]*

CTO *[Signature]*

09/03/2017

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30008
HP : 18410

E-9

Name of ship ... MT. CAPRICORN VOYAGER

IMO Number 9330604

MACHINERY SPACE OPERATIONS

Date	Code (letter)	Item (number)	Record of operations/signature of officer in charge
31 MAR 2017	C	11.1	NO. 1 HFO OVERFLOW DRAIN TANK
		11.2	17.0 m ³
		11.3	0.6 m ³
			<i>Namke</i> , NADEEP LAMBA, CADET, 31 MAR 2017
31 MAR 2017	D	13	2.0 m ³ Bilge water from E/R Bilge wells
		14	START: 0800; STOP: 0900
		15.3	TO BILGE HOLDING TANK, RETAINED 9.8 m ³
			<i>Namke</i> , NADEEP LAMBA, CADET, 31 MAR 2017
31 MAR 2017	I		13.0 m ³ Fuel from NO. 1 HFO overflow
			Drain Tank, Retained 0.5 0.5 m ³
			To NO. 2 HFO STORAGE TANK (P), Nly Retain
			<i>Namke</i> , NADEEP LAMBA, CADET, 31 MAR 2017
31 MAR 2017	H	26.1	SINGAPORE
		26.2	<i>Namke</i> 30 MAR 2017 08:00 START: 30 APRIL 2017 STOP: <i>Namke</i> 31 MAR 2017 12:00 31 APRIL 2017
		26.3	XXMT MGD BUNKERED IN TANKS
			XXMT ADDED TO DIESEL STORAGE SERVICE TANK, NOW
			CONTAINING XXMT
			XXMT ADDED TO DIESEL STORAGE TANK, NOW
			CONTAINING XXMT
			<i>Namke</i> , NADEEP LAMBA, CADET, 31 MARCH 2017

Signature of master *Namke* 3/6

CAPRICORN VOYAGER
 OR. No. 9000143
 GRT: 58442
 NRT: 30088
 HP: 18420

REV. 03 November 2010



VOP-04-04 Oil Record Book Part 1

Applicable To	Critical Safeguard	Version
All vessels	No	06 Feb 2017

Requirements

- None.

PROCEDURE STEPS

The Chief Engineer is responsible for the use of this procedure:

- If a step specifies who must do a task, that person must do the task.
- If a step does not specify who does a task, the Chief Engineer can do the task or delegate it.

- 1 Entries in the Oil Record Book (ORB) Part 1 are to be made promptly and accurately as per guidelines contained in the flag state issued Oil Record Book.
 - Reference Intertanko's [A Guide for Correct Entries in the Oil Record Book \(Part I - Machinery Space Operations\)](#) and IMO's [Guidance for the Recording of Operations in the Oil Record Book \(Part 1 - Machinery Space Operations\)](#), for examples.
 - Dates should be dd-MMM-yyyy format, for example, 16-MAR-2015.
 - Do not leave any blank lines between successive entries.
 - If an incorrect entry is recorded in the Oil Record Book (ORB), Part 1, it should immediately be struck through with a line in such a way that the incorrect entry is still clear. The incorrect entry should be signed and dated, with the new corrected entry following.
 - The names of tanks should be recorded as specified in the International Oil Pollution Prevention Certificate (IOPPC).
 - The incineration or the landing ashore of oily waste (for examples, oily rags and pads, oil contaminated solid wastes, etc.) should not be recorded in the Oil Record Book (ORB). This information should be recorded only in the Garbage Record Book. Waste oils (examples, sludge, slops, etc.) should be recorded in the ORB.

- 2 The Chief Engineer must make sure that the ORB is accurate and complete and then sign each page. He must then give the ORB to the Master.

- 3 The Master must sign completely filled pages in the ORB prior to arrival in port.

- 4 When changing Masters, the departing Master must sign any part filled pages and cross out blank lines and initial prior to handover to the relieving Master.

5 The Oil Record Book (ORB) is to be retained onboard for the life of the ship and then sent to the Chevron Corporate archives ashore.

- For records retention guidelines, refer to [VOP-01-01/Attachment 1](#), Records [Retention Guidelines](#).

Records and Checklists

Oil Record Book (ORB), Part 1.

Referenced Documents

[MARPOL](#), Annex 1, Appendix III, Regulation 17

[A Guide for Correct Entries in the Oil Record Book \(Part I - Machinery Space Operations\)](#), Intertanko

[Guidance for the Recording of Operations in the Oil Record Book \(Part 1 - Machinery Space Operations\)](#), IMO

International Oil Pollution Prevention Certificate (IOPPC)

Procedure Owner	Assistant Fleet Manager
Functional Responsibility	Manager, Fleet Technical Fleet Manager

Uncontrolled Copy



Ref. T5/1.01

MEPC.1/Circ.736
8 November 2010

**GUIDANCE FOR THE RECORDING OF OPERATIONS IN THE OIL RECORD BOOK
PART I – MACHINERY SPACE OPERATIONS (ALL SHIPS)**

1 The Marine Environment Protection Committee, at its sixty-first session, (27 September to 1 October 2010), approved the Guidance for recording of operations in the Oil Record Book Part I – Machinery space operations (all ships) (paragraph 7.38 of document MEPC 61/24), attached in the annex.

2 The Guidance is intended to facilitate compliance with MARPOL requirements on board ships by providing advice to crews on how to record the various operations in the Oil Record Book by using the correct codes and item numbers in order to ensure a more uniform port State control procedure.

3 Governments Parties to MARPOL are invited to encourage implementation of the above Guidance for use aboard ships flying their flags and to disseminate it among all stakeholders including ship operators, surveyors and port State control officers.

ANNEX

**GUIDANCE FOR RECORDING OF OPERATIONS IN THE OIL RECORD BOOK
PART I – MACHINERY SPACE OPERATIONS (ALL SHIPS)**

General Guidance

- This guidance only includes sections C to I.
- Operations should be recorded in chronological order as they have been executed on board.
- Dates should be entered in dd-MONTH-yyyy format, e.g., 16-MAR-2009.
- Incineration or landing ashore of oily garbage and used filters should be recorded in the Garbage Record Book only.
- All Entries are to be made and signed by the officer or officers in charge of the operations concerned and each completed page shall be signed by the master of the ship.
- Do not leave any full lines empty between successive entries.
- If a wrong entry has been recorded in the Oil Record Book (ORB), it should immediately be struck through with a single line in such a way that the wrong entry is still legible. The wrong entry should be signed and dated, with the new corrected entry following.
- Tank nomenclature should be recorded as per the format noted within the International Oil Pollution Prevention Certificate (IOPPC).
- Recording of quantities retained in bilge water holding tanks listed under section 3.3 of the IOPPC is voluntary and not required by the Convention.
- The recording of general maintenance of items pertaining to the OWS remains voluntary and is this is not required to be recorded in the ORB.

Usage of code C.11: Collection of oil residues (sludge).

Example #1

Weekly inventory of oil residues (sludge) tanks (tank listed under item 3.1 in the Supplement to the IOPPC)

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH-yyyy</i>	C	11.1	<i>[Name of sec 3.1 Tank & Designation]</i>
		11.2	<i>xx m³</i>
		11.3	<i>xx m³</i>
<i>signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>			
<i>dd-MONTH-yyyy</i>	C	11.1	<i>[Name of sec 3.1 Tank & Designation]</i>
		11.2	<i>xx m³</i>
		11.3	<i>xx m³</i>
<i>signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>			

Example #2

Recording of oil residue (sludge) collected by manual operation in oil residue (sludge) tank (tank listed under item 3.1 in the Supplement to the IOPPC)*

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>C</i>	<i>11.1</i>	<i>[Name of sec 3.1 Tank & Designation]</i>
		<i>11.2</i>	<i>xx m³</i>
		<i>11.3</i>	<i>xx m³</i>
		<i>11.4</i>	<i>xx m³ collected from [identification of source]</i>
			<i>signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Note: Operator initiated manual collection where oil residue (sludge) is transferred (transfer with a pump) into the oil residue (sludge) tank(s). Examples of such operations could be:

1. Collection of oil residue (sludge) from fuel oil separator drain tanks.
2. Collection of oil residue (sludge) by draining engine sump tanks.
3. Adding fuel oil to an oil residue (sludge) tank (all content of a sludge tank is considered sludge).
4. Collection of sludge from bilge water holding tanks – in this case a disposal entry for bilge water is also needed.

* Use of Code Item Number C 11.4 only becomes applicable in accordance with MARPOL Annex I amendments which enter into force on 1 January 2011 (resolution MEPC.187(59)).

Usage of code C.12: Disposal or Transfer of oil residues (sludge).

Example #3

Disposal of oil residue (sludge) via shore connection

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd- MONTH- yyyy</i>	<i>C</i>	<i>12.1</i>	<i>xx m³ sludge from [Name of sec 3.1 Tank & Designation], xx m³ retained, to "identity or name of sludge receiver, i.e. barge, tank truck or shore facility" during port stay (Name of Port)</i>
			<i>signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Note: Ships' masters should obtain from the operator of the reception facilities, which includes barges and tank trucks, a receipt or certificate detailing the quantity of oil residue (sludge) transferred, together with the time and date of the transfer. This receipt or certificate, if attached to the Oil Record Book Part I, may aid the master of the ship in proving that his ship was not involved in an alleged pollution incident. The receipt or certificate should be kept together with the Oil Record Book Part I.

Example #4

Draining of water (disposal) from an oil residue (sludge) tank listed under item 3.1 in the Supplement to the IOPPC, to a bilge water holding tank listed under item 3.3 in the Supplement to the IOPPC

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>C</i>	<i>12.2</i>	<i>xx m³ water drained from [Name of sec 3.1 Tank & Designation] xx m³ retained, to [Name of sec 3.3 Tank & Designation] retained in tank(s) xx m³ signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Note: Collection of bilge water need not to be accounted for, so only one entry is required.
Capacity of sludge tanks should not be recorded for C.12.x entries.

Example #5

Transfer from one oil residue (sludge) tank to another oil residue (sludge) tank, both listed under item 3.1 in the Supplement to the IOPPC

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>C</i>	<i>12.2</i>	<i>xx m³ sludge transferred from [Name of sec 3.1 Tank & Designation], xx m³ retained, to [Name of sec 3.1 Tank & Designation] retained in tank(s) xx m³ signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #6

Incineration of oil residue (sludge) in Incinerator

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>C</i>	<i>12.3</i>	<i>xx m³ sludge from [Name of sec 3.1 or 3.2.3 Tank & Designation], xx m³ retained, Burned in Incinerator for xx hours signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #7

Burning of oil residue (sludge) in Boiler

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operation and signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>C</i>	<i>12.4</i>	<i>xx m³ sludge from [Name of sec 3.1 Tank & Designation], xx m³ retained, Burned in Boiler for xx hours signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #8

Evaporation of water (disposal) from an oil residue (sludge) tank listed under items 3.1 in the Supplement to the IOPPC

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH-yyyy</i>	<i>C</i>	<i>12.4</i>	<i>xx m³ water evaporated from [Name of sec 3.1 Tank & Designation], xx m³ retained. signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #9

Regeneration of fuel oil from oil residue (sludge)*

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operation and signature of officer in charge</i>
<i>dd-MONTH-yyyy</i>	<i>C</i>	<i>12.4</i>	<i>xx m³ sludge disposed by regeneration of x m³ fuel in [Fuel Tank & Designation] and x m³ of water in [Name of sec 3.3 Tank & Designation] signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

* Only permitted if mentioned as an approved means of disposal in the IOPPC Supplement.

Usage of code D: Non-automatic discharge overboard or disposal otherwise of bilge water which has accumulated in machinery spaces.

Example #10

Pumping of bilge water from engine-room bilge wells to a tank listed under item 3.3 in the Supplement to the IOPPC

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH-yyyy</i>	<i>D</i>	<i>13</i>	<i>xx m³ bilge water from engine-room bilge wells,</i>
		<i>14</i>	<i>Start: hh:mm, stop: hh:mm</i>
		<i>15.3</i>	<i>To [Name of sec 3.3 Tank & Designation], retained in tank(s) xx m³ signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #11

Transfer of bilge water between tanks listed in item 3.3 in the Supplement to the IOPPC

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH-yyyy</i>	<i>D</i>	<i>13</i>	<i>xx m³ bilge water from, [Name of sec 3.3 Tank & Designation], xx m³ retained,</i>
		<i>14</i>	<i>Start: hh:mm, stop: hh:mm</i>
		<i>15.3</i>	<i>To [Name of sec 3.3 Tank & Designation], retained in tank(s) xx m³ signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #12

Pumping of bilge water overboard from tank listed in item 3.3 in the Supplement to the IOPPC

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>D</i>	<i>13</i>	<i>xx m³ bilge water from [Name of sec 3.3 Tank & Designation] Capacity xx m³, xx m³ retained</i>
		<i>14</i>	<i>Start: hh:mm, stop: hh:mm</i>
		<i>15.1</i>	<i>Through 15 ppm equipment overboard Position start: xx deg xx min N/S, xx deg xx min E/W Position stop: xx deg xx min N/S, xx deg xx min E/W signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #13

Disposal of bilge water from tank listed in item 3.3 in the Supplement to the IOPPC to oil residue (sludge) tank listed in item 3.1 in the Supplement to the IOPPC

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operation and signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>D</i>	<i>13</i>	<i>x m³ bilge water from [Name of sec 3.3 Tank & Designation], now xx m³</i>
		<i>14</i>	<i>Start: hh:mm stop: hh:mm</i>
		<i>15.3</i>	<i>Collected in [Name of sec 3.1 Tank & Designation] retained in tank(s) xx m³ signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Note: A code C.11.4 recording may be required if this operation is a manual operator initiated operation.

Usage of code E: Automatic discharge overboard or disposal otherwise of bilge water which has accumulated in machinery spaces.

Example #14

Pumping of bilge water overboard via 15 ppm equipment from tank listed in item 3.3 in the Supplement to the IOPPC or from engine-room bilge wells

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd-MONTH- yyyy</i>	<i>E</i>	<i>16</i>	<i>Pump start hh:mm at xx deg xx min N/S, xx deg xx min E/W from [Name of sec 3.3 Tank & Designation]</i>
		<i>18</i>	<i>Stop hh:mm signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #15

Transfer of bilge water from engine-room bilge wells to a tank listed under item 3.3 in the Supplement to the IOPPC

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	E	17	Transfer start hh:mm to [Name of sec 3.3 Tank & Designation]
		18	Stop hh:mm
			signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Usage of code F: Condition of oil filtering equipment.

Example #16

Failure of Oily Filtering Equipment, Oil Content Meter or stopping device

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	F	19	hh:mm
		20	hh:mm (might be unknown – if spare parts has been ordered)
		21	[Reason for Failure, if known]
			signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: The condition of the oil filtering equipment also covers the alarm and automatic stopping devices, if applicable.

A code 'I' entry should also be made indicating that the overboard valve was sealed shut due to non working Oil Filtering Equipment or Oil Content Meter.

On the date where the system is functional again, a new entry, using code F 19 / 20 / 21 should be made where F 19 is the date and time of the initial failure and F 20 is the time the system is functional again.

Example #16bis

When proper operation of the Oily Filtering Equipment, Oil Content Meter or stopping device is restored

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	F	19	hh:mm (the same time as in example 16)
		20	hh:mm (the time the system is functional)
		21	[Reason for Failure, if known]
			signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: The condition of the oil filtering equipment also covers the alarm and automatic stopping devices, if applicable.

A code 'I' entry should also be made indicating that the overboard valve was sealed shut due to non working Oil Filtering Equipment or Oil Content Meter.

Usage of code G: Accidental or other exceptional discharges of oil.

Example #17

Accidental Pollution

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	G	22	hh:mm
		23	Position: xx deg xx min
		24	Quantity of oily residue (if known)
		25	Circumstances of the discharge
			signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: If failure of Oil Filtering Equipment or Oil Content Meter related equipment is involved, appropriate (F) entry is to be made in ORB.

Relevant sections of the SOPEP (SMPEP) are to be used to combat oil spills at sea.

Examples of Circumstances of discharge include, but are not limited to:

1. Oil Content Meter failure.
2. Fuel tank overflow.
3. Ruptured bunkering hose/flange.
4. Fuel tank leakage (due to collision or grounding).

Usage of code H: Bunkering of fuel or bulk lubricating oil.

Example #18

Bunkering of Fuel oil

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	H	26.1	[Name of Port]
		26.2	Start dd-mm-yyyy Stop dd-mm-yyyy
		26.3	xxxx MT of ISO-xxxx HFO x.x % S bunkered in tanks:
			aaaa MT added to [Tank Name & Designation] now containing bbbb MT
			cccc MT added to [Tank Name & Designation] now containing dddd MT
			signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Example #19

Bunkering of Bulk Lubricating oil

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	H	26.1	[Name of Port]
		26.2	Start dd-mm-yyyy Stop dd-mm-yyyy
		26.4	xx MT [Type of Oil] bunkered in tanks:
			xx MT added to [Tank Name & Designation] now containing xx MT
			signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: Separate entries required for each grade of fuel oils and lubricating oils respectively to ensure transparency.
This entry is not required if lubricating oils are delivered onboard in packaged form (55 gallon drum, etc.).

Usage of code I: Additional operational procedures and general remarks.

Example #20

Pumping oily bilge water from a Cargo Hold bilge holding tank to a tank listed under item 3.3 in the Supplement to the IOPPC

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	I		xx m ³ oily bilge water from Cargo Hold bilge holding tank to [Name of sec 3.3 Tank & Designation] signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: Any collection and transfer of oily bilge water into the engine-room bilge holding tank(s) from a cargo hold bilge holding tank(s) should be recorded using code (I)

Example #21

Entry pertaining to an earlier missed operational entry

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy (1)	I		Entry pertaining to an earlier missed operational entry
dd-MONTH- yyyy (2)	C	12.2	xx m ³ sludge transferred from [Name of sec. 3.1 Tank and Designation], xx m ³ retained to [Name of sec 3.1 Tank & Designation], retained in tank(s) xx m ³ signed (1): (Officer-in-charge, Name & Rank) dd-MONTH-yyyy signed (2): (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: Date (1) to be the date of the original operation.
Date (2) to be the current date i.e. the date the entry is made.
Signed (1) Signature of Officer making I entry
Signed (2) Signature of Officer making missed entry

Example #22

De-bunkering of Fuel oil

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	I		xxxx MT of ISO-xxxxx HFO x.x % S de-bunkered from tanks: xxxx MT removed from [Tank Name & Designation] now containing xxx MT De-bunkered to "identity or name of receiver i.e. barge, tank truck or shore facility" in "Name of Port" Start dd-mm-yyyy Stop dd-mm-yyyy signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: Include receipt & certificate from receiver for amount & type of fuel oil de-bunkered.

Tankers with slop tanks

Example #23

Transfer of sludge from engine-room oil residue (sludge) tank to deck/cargo slop tank

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	C	12.4	xx m ³ sludge from [Name of sec 3.1 Tank & Designation], xx m ³ retained, Transferred to Deck Slop Tank [designation] signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Example #24

Transfer of bilge water from tank listed in item 3.3 in the Supplement to the IOPPC to deck/cargo slop tank

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	D	13	xx m ³ bilge water from [Name of sec 3.3 Tank & Designation] Capacity xx m ³ , xx m ³ retained
		14	Start: hh:mm, stop: hh:mm
		15.3	Transferred to Deck Slop Tank [designation] signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Note: Requires this method listed in the IOPP Supplement under item 3.2.4.
If non-oil-cargo related oily residues are transferred to slop tanks of oil tankers, the discharge of such residues should be in compliance with Regulation 34. (UI 22.1.1 for Regulation 15).
Requires an entry in the Oil Record Book – Part II using code (O).
If sludge or bilge water is transferred from multiple tanks in engine-room a separate entry must be made in ORB Parts I & II for each transfer.

General Guidance – Additional Voluntary Recordings

Example #25

Voluntary declaration of quantities retained in bilge water holding tanks ref. MEPC.1/Circ.640 – record weekly

Date	Code	Item No.	Record of operations/signature of officer in charge
dd-MONTH- yyyy	I		Weekly Inventory of Bilge Water Tanks (listed under item 3.3) [Name of sec 3.3 Tank & Designation] capacity xx m ³ , xx m ³ retained signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy

Example #26

Optional sealing of MARPOL Annex I related valve and/or equipment

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd- MONTH- yyyy</i>	<i>I</i>		<i>Overboard valve [Valve Number] from 15 ppm bilge water separator unit sealed</i>
			<i>seal no.: xxxxxxxx,</i>
			<i>signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

Example #27

Breaking of optional seal on MARPOL Annex I related valve and/or equipment

<i>Date</i>	<i>Code</i>	<i>Item No.</i>	<i>Record of operations/signature of officer in charge</i>
<i>dd- MONTH- yyyy</i>	<i>I</i>		<i>Overboard valve [Valve Number] from 15 ppm bilge water separator unit unsealed</i>
			<i>for normal operation of 15 ppm unit</i>
			<i>seal no.: xxxxxxxx</i>
			<i>signed: (Officer-in-charge, Name & Rank) dd-MONTH-yyyy</i>

SEWAGE TREATMENT PLANT

A. Give a brief description of arrangements of STP.

Sewage Treatment Plant

Manufacturer: DVZ Services

No. of sets: 1

Model: DVZ-SKA-20 Biomaster

Type: Biological oxidation and discharge

Organic load rating: BOD 5.15kg per day

Sewage collecting tank: 7.0m³

Discharge Pump

No. of sets: 1

Capacity: 15m³/h at 18mth

Vacuum System

Manufacturer: EVAC

Type: EasyFit

Pumps

No. of sets: 2

Rating: 2.6kW at 3,420 rpm

The sewage treatment plant is a biological unit which works on the aerobic activated sludge principle. The plant will treat black and is fully automatic in operation. Ship's sewage from the toilets and urinals is designated as "black water".

The sewage collection system is of the vacuum type with the vacuum being provided by means of an ejector, non return flap valve and two pumps. Normally, one of the pumps is operated as a vacuum pump and the other as a discharge pump to the sewage treatment plant. The discharge pump starts and stops by means of level float switches inside the holding tank. The pump duties can be

changed over when required. The vent of the holding tank and the sewage treatment plant (aeration chamber) leads up to the funnel.

This sewage treatment plant consists of a tank with three compartments:

1. Aeration compartment: An air blower supplies air to the compartment, which provides the oxygen the aerobic organisms need for digesting raw sewage. The bacterial action breaks down the sewage, producing carbon dioxide, water and new bacteria.
2. Clarification compartment: The effluent passes into this compartment and settles out. This compartment has a submerged fixed bed. The sewage to be treated must circulate through this bed. Fine oxygen bubbles blown in by a special disperser keep the sewage in suspension and excite the microorganisms on the surface of the fixed bed which cause almost complete aerobic biological degradation of the faecal mass. A surface skimmer in the compartment removes floating sludge and debris from the surface and returns it to the aeration compartment.
3. Chlorine contact compartment: Water is brought in contact with liquid chlorine and is thus sterilized. The outlets for various discharges are on this compartment.


B. What are the common hazards with sewage system?

1. Bacteria and viruses present in the water can cause health problems.
2. Inhalation of hazardous vapors of chlorine can cause severe harm to internal organs.
3. Foul odour.
4. H₂S gas.

C. What are the precautions to be taken while working on the STP?

1. Ensure proper PPE is worn.
Rubber gloves, safety glasses, protective clothing is to be worn. Rubber boots, Face shield and goggles if the job at hand requires it.
2. Ensure zero energy (isolate the system) when any maintenance operation is to be carried out.
3. When it is necessary to enter tank carry out complete procedure of enclosed space entry. Complete OPS-66 permit. Ensure that standby person is present.
4. Do not expose tank interior or its vent termination to an open flame.
5. The plant requires a throughput of raw sewage in order to keep the bacteria active. If no sewage is supplied for a long period of time then the bacteria will become inactive and thus the operation of the plant will be impaired.
6. Use comfo mask during operation.

CARRICORN
Off. No. 9010
GRT: 58442
NRT: 50388
HP: 18412


CTO
24 MAR 17



Control of NOx Emission

Nadeep Lamba

Engine Cadet

Date: 13 APRIL 2017

Signature: *3/E KL*



Q. How is the emission of NO_x controlled in the main propulsion engine if applicable to your ship? If not state the reason. How is the emission of NO_x Controlled in the Auxiliary Engine if applicable to your ship? If not , state the reason .

- Nox emission occur due to high combustion temperatures .
- As the ship is classified by American Bureau of Shipping So Some tests by bureau are to be done (like Assessment tests and manufacturers test etc.) to control NO_x emission.
- Nox also can be maintained by using :
 - Maintaining the Combustion Temperature.
 - All the engine components are used as per the ABS requirements and each part must be as per IMO number .
- Also parameters to be noted like :
- Fuel Inject ion Timing , fuel injection valve opening pressure.
FUEL INJECTORS OF SLIDE TYPE USED, SAC VOL WHICH PREVENTS DRIBBLING OF FUEL INJECTORS HENCE HIGH TEM
- There is a NO_x technical file in which the parts like cylinder head , piston turbocharger , fuel injection pump etc.) are noted.
- As per MARPOL Annex VI,
- Regulation 13 , TIER 1 requirement is:
 - For Engine with rated speed of less than 130 rpm (M/E = 102) , the permissible emission is 17 g/kwh
 - For Engine with rated speed between 130 rpm and 2000 rpm (G/E = 720) , the permissible emission is 12.07 g/kwh

So for the Main Engine and Generator Engine emissions must be in control limits to reduce the NO_x emissions.

Q. why is the above rule not applicable for exhaust emission from oil fired boiler?

- The rate of NO_x formation is primarily a function of temperature. The formation is significant above 1200°C (Rapid above 1500°C)
- As no any emission control regulation for boilers in marpol as it is difficult to attain high temperature in boilers which emits NO_x.

→ *As the combustion chamber of the boiler is bigger so the combustion is effective as volume is larger so NO_x is not formed as compared to Main Engine the combustion space is small so not effective combustion takes place hence NO_x formed more.*



Sulphur Content

Nadeep Lamba

Engine Cadet

Date: 05/05/17

CAPRICORN VOYAGER
Off. No. 9000143
GRT. 58442
NRT: 30088
HP : 16480

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over the signature line.

SULPHUR CONTENT

1. What is max allowed sulphur content while the vessel is?

In ECA: 1%

Outside ECA: 3.5%

2. Write in details all the instructions printed on the label of fuel oil sampling bottle.

- Name of the vessel and its IMO number
- The bunker date and the sampling date
- Port or location where the bunker was taken
- Name of the supplier
- Name of bunker tanker/installation
- Location of the sampling device:
 - Vessel manifold
 - Bunker tank pipeline
 - Others (specify)
- What was the sampling method used:
 - Continuous
 - Composite of spots
 - Spot
 - Automatic
- Specify the grade of oil bunkered
- Specify the total quantity bunkered in MT
- Density of the oil bunkered in kg/cub.m
- Viscosity of the oil bunkered at 40 deg.C or 50 deg.C
- The seal number of the sample bottle sent to the laboratory
- The seal number of the sample bottle retained onboard
- The seal number of the sample bottle given to the supplier
- The seal number of the sample bottle of the MARPOL ANNEX VI sample retained onboard.
- The name and signature of the vessel representative
- The name and signature of the supplier representative
- The name and signature of the DNVPS representative

3. Name the materials which cannot be incinerated.

- Pyrotechnics
- Pressurized or closed containers

- Annex I, II and III Cargo Residues or related contaminated packaging.
- Polychlorinated biphenyls (PCBs) - an older form of stabilized transformer oil.
- Garbage as defined in Marpol Annex V containing more than trace quantities of heavy metal including mercury, cadmium, and lead as, may be found in some cell type batteries).
- Polyvinyl Chlorides (PVC) except in incinerators certified to either MEPC76(40) or MEPC 59(33)
- Refined Petroleum products containing Halogen (fluorine, Chlorine, Bromine etc) compounds.
- Metal (Scrap metal, Tins, Cans)
- Glass
- Food Waste



Volatile Organic Compounds

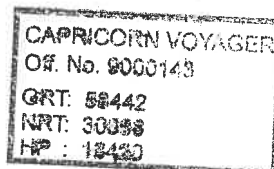
Nadeep Lamba

Engine Cadet

Date: 22/04/17.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.



Volatile Organic Compounds

Volatile organic compounds (VOCs) may be toxic, and when they evaporate into the air, they can react with Nitrogen Oxides (NOx) in sunlight and split apart oxygen molecules in air and thereby form ground-level ozone, commonly referred to as smog. The layer of brown haze it produces is not just an eyesore, but also is a source of serious illnesses. Ozone is extremely irritating to the airways and the lungs, causing serious damage to the delicate cells lining the airways. It contributes to decreased lung function, increased respiratory symptoms and illnesses.

❖ VOC emissions takes place on a tanker during the following operations:

- Loading/Unloading
- Carriage of relevant cargo
- Crude oil washing

❖ As Per Regulation 15 of Annex VI to MARPOL 73/78:

“Emissions of volatile organic compounds (VOCs) from tankers may, by each party to Annex VI, be regulated in its ports and terminals. All tankers which are subject to vapour emission control shall be provided with an approved vapour collection system, and shall use such system during the loading of cargoes.

❖ Vapour Emission Control System (VECS)

Vapour emission control systems were introduced in 1990 as a requirement for tankers loading oil and noxious liquid substances at US terminals (USCG 46 CFR Part 39).

The International Maritime Organization followed up with the introduction of IMO MSC.Circ.585 “Standards For Vapour Emission Control Systems” in 1992. International regulations requiring vapour emission control were introduced through Reg.15 of Annex VI to MARPOL 73/78 as adopted in 1997, although it is only required for ships loading cargo at terminals where IMO have been informed that VECS is mandatory.

Since 1990, most crude oil tankers have installed an onboard VECS system in compliance with USCG regulations. The regulations cover the technical installation (vapour recovery piping & manifold, vapour pressure sensors and alarms, level gauging, high level and independent overflow alarms) as well as operational restrictions and training.

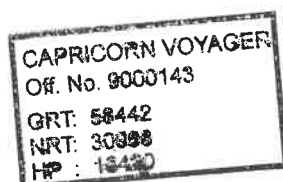
➤ Methods and Systems for the Control of VOC During Loading:

- Minimize excessive throttling and high flow velocities in pipes
- Operating pressures for cargo tanks should be high enough as safely possible during loading and carriage during transit.
- Manual pressure relief procedures (tank pressure control) to be followed.
- Maintain P/V-valves in proper operating condition
- Gaskets and hatches condition to be maintained.
- Inert gas topping should be minimized otherwise by adding inert gas does not prevent VOC release, but may increase subsequent venting and increased VOC emissions

Injuries and prevention

Injuries Caused By	How and where it can occur?	Possible consequences	Preventive measures
Impacts	<ul style="list-style-type: none"> -Finger getting trapped while hitting a nail with hammer -While walking & hitting head on some object 	<ul style="list-style-type: none"> -Finger trap in between -Serious head injury or swelling 	<ul style="list-style-type: none"> -Take care that hammering is done properly -Use safety helmet and mind your head
Slips	<ul style="list-style-type: none"> -Slippery surface on the floor of engine room platforms or -While climbing up or down the stairs of engine room 	<ul style="list-style-type: none"> -Legs or hands can get fractured -May cause serious back injury or cause leg or hand fracture 	<ul style="list-style-type: none"> -Clean any water or oil spill immediately -Always use 3 point contact with one hand on railings and be careful always
Falls	<ul style="list-style-type: none"> -Falling from height(ladder) or any higher platform -When painting on height or doing some jobs on cranes 	<ul style="list-style-type: none"> -Fractures of hands and fingers or serious back injury -May lead to serious injury 	<ul style="list-style-type: none"> -Always use safety harness while working aloft(height above your waist) -Radio use and one standby person
Entanglement of clothes, hair or tools	<ul style="list-style-type: none"> -While using lathe/grinder/drilling machine for machining -While working or cleaning any rotating parts 	<ul style="list-style-type: none"> -May cut the finger or cause serious injury to hands -May lead to cuts or serious injury 	<ul style="list-style-type: none"> -Always fold long sleeves -Always be aware of rotating parts while working -Gloves are not to be worn when working on lathe /grinder/ drilling machine
Heat burns	<ul style="list-style-type: none"> -Working on steam and associated system -Welding in the workshop -Burning garbage in incinerator 	<ul style="list-style-type: none"> -Can cause burning sensation and if serious cause skin to peel off -Can cause boils in the skin or burning on skin 	<ul style="list-style-type: none"> -Always be aware of the surrounding while working. Use leather gloves. -Use of PPE by referring to the PPE matrix -use thermal gloves if prolonged contact with high temperatures is required
Chemical burns	<ul style="list-style-type: none"> -While carrying out chemical dosing of boiler water -While use of chemicals for cleaning purpose 	<ul style="list-style-type: none"> -Can cause skin irritation and itching. -Can peel off the skin and damage the skin cells 	<ul style="list-style-type: none"> -Always use rubber gloves, face shield, goggles and apron while working with chemicals

Particles in eyes	-Chipping during welding -Grinding, buffing -Cleaning filters with air gun	-Can cause loss of vision/partial vision -Can cause serious injury to eye	-Use safety goggles always -Use face shield if necessary
Particles in body	-While working with pressurized equipment -While using air hoses or hydro blasting	-May lead to tearing of skin or lead to serious injury	-Always be aware of the surrounding while working with pressurized equipment -Try to avoid line of fire
Ingestion of harmful substances	-Ingestion of oil, dirt or chemicals by mistake due to dirty hands	-Food poisoning, stomach upset or other health hazards	-Always wash hands after work and try to use the correct gloves for the correct job to avoid contact
Inhalation of toxic vapor	-Cleaning of filters, bunker operation -While working with Sewage treatment plant -While working in enclosed spaces	-Fatigue, eye irritation, dizziness -Loss of consciousness	-Use comfo mask while working with toxic gases -Use of rattler to ensure no presence of toxic gases -Use of multi-gas & benzene detectors before entry
Lack of breathable air in the space	-Enclosed spaces where there is a lack of oxygen	-Can lead to death of person -Can lead to unconsciousness, dizziness	-Always check oxygen content before entering enclosed space. -Ventilate the area sufficiently and keep ventilation running even while working -Use of ventilation blowers
Sprains and other physical injuries	-Wrong body position while working	-Can lead to twisting of ankles, back pain and body pain -Can lead to fracture if serious	-Ensure good body position -Ask for assistance if required
Other causes	-Fall of heavy objects -Lifting of heavy objects	-Head injury or serious injury to body parts -Serious back injury	-Check lifting gear before use -Ask for assistance when needed



KM
07/03/17. 070

Job Scope : Iron (Fe) Test AND TBN TESTING FOR M/E CYL. OIL

Primary Hazards: Pressure: oil pressure, chemical: skin irritation

Additional precautionary measures: use rubber/leather gloves, face shield, open outlet valve of scavenge drain after taking sample

Description:

Step 1 : Sample the drip oil



- Sample at the scavenge air drain sampling valve during stable engine running conditions.
- Flush well before sampling.
- Collect a sample of 50-100 ml in a clean plastic conditioner.
- Transfer that sample in a FAST sample bottle for both onshore and onboard testing and identify the bottle well.

Recommended sampling frequency:

Onshore Drip oil Analysis:

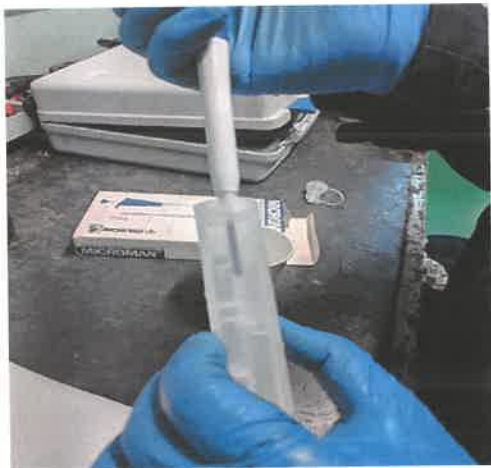
Every 2 months(- 1000 running hours)

Onboard Drip oil Analysis:

Every 2 weeks (-250 running hours)

Step 2 : Collect the data and complete the engine data sheet

Step 3: Analyze the drip oil samples using the DOT.FAST onboard Test Kit



- Always use recommended personal protection equipment.
- Set up the test equipment and samples in a clean environment.
- Identify the ITUs with corresponding cylinder number. Include one extra blank ITU zeroing the drip oil analyzer.
- Take the oil sample correctly with the pipette and dispense in the ITU.

- Close the ITU, crush all four ampoules and shake well. If zeroing , use the same process for the blank ITU (e.g., crush all four ampoules and shake well)

Tap the ITU content to the bottom and rest the ITU in a sloping position.

Rest time:

Brown – 1 hour

Black – 3 hour

Clear – 1 hour

- Prepare the drip oil analyzer and zero if necessary.
 - IMP : Do not press the ZERO button with an actual sample in place.
- Place a cuvette in the DispoRack and attach a filter to the ITU.
- Turn the ITU upside down above the cuvette and wait, allowing the liquid to separate into two layers. Then push the clear bottom layer into the cuvette until it reaches the mark.
- Immediately place the cuvette in the Drip oil Analyzer , read and record the result the DOT.FAST worksheet.
- Repeat for each ITU.

Step 5 : Enter the Data.

Step 6 : Dispose of the waste.

Test results are following:

CYLINDER UNIT NO.	FE IN PPM
1	164
2	148
3	155
4	87
5	112
6	120

TBN TEST

- Open the testing equipment, check if it is cleaned.
- There are 6 mode of different types of oil. We use mode no. 6 which is already calibrated for HT-70 oil
- Fill up the small chamber with 5 ml of used oil, but make sure you shake this sample before putting.
- Fill the large chamber with 10 ml of TBN REAGENT.
- Close the testing equipment, and switch on the power and select the mode (TBN-1,2,3...).
- Shake it for 2 minutes and after that note down the reading.



Following TBN results for cylinder oil for main engine

CYL. UNIT NO.	TBN
1	24
2	23
3	18
4	25
5	32
6	22

CAPRICORN VOYAGER
 Off. No. 9000143
 GRT: 58442
 NRT: 30388
 HP : 13420

CTO 

07 MAR '14



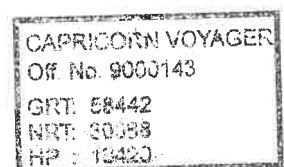
Fuel Oil Filter Cleaning

Nadeep Lamba

Engine Cadet

Date: 26 APRIL 2017

Signature: 3/E *NL*



FUEL OIL FILTER CLEANING

- **Job Done:** FO Weekly filter cleaning
- **Location:** Purifier Room
- **At Anchorage in Singapore**
- **Time:** Day
- **Weather conditions:** Fair
- **Outside temperature:** Hot
- **Nature of task:** Routine task
- **Items involved:** Heavy

1. Describe the difficulties faced in carrying out the job:

The ME FO supply pump no. 1 suction filter was cleaned as a FO weekly routine job. The ME FO supply pump no. 1 is located just above the forward starboard bilge well and it is a congested place to work upon and hence proper body position was required to carry out the job.

The filter itself is heavy and hence proper lifting technique was required for lifting and transfer to purifier room.

The purifier room is very hot and hence chances of heat exhaustion is always there.

2. What were the risks involved in carrying out the job and precautions taken?

➤ The primary hazards for the job were:

- Pressure: oil pressure, air pressure from the service air being used for cleaning the filter
- Chemical: skin irritation due to oil contact while removing and cleaning
- Temperature: heat exhaustion in the purifier room as it is very hot there
- Mechanical: equipment damage when cleaning with wrong tool or due to incorrect line up, system failure if not properly reset to function.
- Motion : Awkward body position

➤ The control measures taken for the same were:

- Pressure: ensure zero energy, proper PPE such as face shield, goggles & apron while using pneumatic tool.
- Chemical: wear rubber gloves while handling or cleaning filter to prevent oil contact.
- Temperature: take regular breaks, drink plenty of water, open doors of purifier room
- Mechanical: correct line up, reset back to normal by opening vent of filter and draining some of the oil.
- Motion : Proper body position

3. Give your opinion, with reasons, on the overall efficiency of the job done?

Overall, the job was performed in the right way taking care of the safety precautions with respect to the hazards that had been discussed prior to starting the job in the morning meeting and tool box meeting. All required PPE was worn. The filter was removed without making the surrounding dirty. It was cleaned in such a manner that it did not damage the wire mesh. After cleaning, the system was reset back to normal.



Lubrication

Nadeep Lamba

Engine Cadet

Date: 11/05/17

Signature:



A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke.

Lubrication

- Lubrication is a process to minimize friction between metal surfaces through the formation of lubricant film. It helps to cool down the surfaces
- To minimize friction between metal surfaces through the formation of a lubricant film
- To cool down hot surfaces
- To keep the equipment clean and to act as a transportation vehicle for combustion
- by-product particles until these can be permanently removed by filtration or purification

The different characteristics that are required from the lubricant to fulfill these functions will be discussed later.

First, an overview will be given of the various components of the medium speed diesel engine that require lubrication. These are:

- Piston and cylinder liner
- Piston undercrown
- Rocker arms and valves
- Bearings
- Small and big end bearings of the connecting rod
- Crankshaft bearings
- Camshaft bearings
- Turbocharger bearings

Lubricant Characteristics:

Lubricant need to fulfill a number of different functions for better and smooth functioning of machineries and these are :

- Corrosion protection : When combustion takes place, sulphurous compounds present in the fuel oxidize to form sulphurous oxide (SO₂) and sulphuric oxide (SO₃). In combination with water, sulphuric oxide can condense onto the liner, piston or piston ring surface as sulphuric acid (H₂SO₄), which then results into corrosive attack of the cast iron.
- Detergency : Engine cleanliness can be maintained by ensuring that the engine oil has a high detergency. Soot and ash deposits are cleaned away by the detergents as soon as they are formed and then transported by the lubricant back to the sump and to the purifier where they can be removed.
- Dispersancy : Oxidation products have too low a density to be removed in a centrifugal separator. Therefore oxidation products need to be dispersed as very fine particles, which are too light to deposit and build up lacquer. Heavy duty diesel engine oils used in highspeed truck diesel engines typically have a very high dispersancy, because they are not equipped with centrifugal separators and lubricant needs to keep all particles into fine dispersion.

- Thermo-oxidative stability : When a lubricant is exposed to high temperatures in an atmosphere where oxygen is present, the lubricant will start to degrade by oxidation. Oxidation reactions proceed more rapidly as temperature goes up and iron is a well-known catalyst for the oxidation process.

These conditions very much prevail on hot engine surfaces, like the cylinder liner, piston crown, piston ring grooves, piston rings and piston undercrown. Lubricant oxidation may result in the formation of acids, insoluble sludge

- Wear protection
- Heat transfer
- Viscosity control in a wide temperature range
- Foam control
- Water shedding properties
- Compatibility with paint or polymers
- Compatibility with fuel

One of the most critical tasks of the lubricant is to neutralize acid that is formed in the combustion chamber, hence avoiding piston and liner corrosion.

In order to accomplish that, the lubricant contains overbased detergents, which possess a high level of alkalinity that can react with acids to form neutral salts.

HYDRODYNAMIC LUBRICATION

Bearings are lubricated by fluid films. The journal is always smaller than its surrounding bearing.

When the shaft is static it will make contact with the bearing and this contact will be a line. On each side of this line the normal distance between the shaft and the bearing will increase gradually and will in effect be a curved wedge.

When the shaft revolves in the presence of an adequate liquid supply (Lubricating oil), the oil is pulled into the wedge and pressure is set up.

The pressure of liquid in the wedge-shaped space sets the shaft over to one side and lifts the shaft away from the bearing so that it is supported on an oil film. The position where the oil film thickness is least will be a small distance away from the static contact line in the direction of shaft rotation.

For pressure to be built up to a high value enough to separate the shaft from the bearing the oil must have sufficient viscosity and the speed of the shaft must be above a certain value. This form of lubrication is referred to as fluid film or hydrodynamic lubrication

Boundary Lubrication

Boundary lubrication occurs when the rotational shaft speed falls and the oil wedge is lost .Metal to metal contact then occurs.

To prevent metallic contact under boundary condition greases may be used or additives may be added to the oils. Very highly loaded crosshead bearings in two – stroke engines may approach boundary conditions.

JOB SCOPE : Change of Bridge Wiper

Primary Hazards:

- Electrical : Electric Shock
- Gravity : Falling from height

Additional Control Measures:

- Electrical : Use rubber gloves
- Gravity : Proper certified harness and rescue gear is used.

Control Measures:

- LOCK OUT / TAG OUT

Description :

As I assisted ETO for Change of bridge window wiper whose belt got outdated and preventing smooth functioning of wiper.



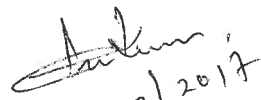
Hence with the help of 1/Engineer we managed to remove the wiper belt.



At last we changed the wiper and tested it functioning properly.

Dated : 07 March 2017

Signature :


14/03/2017



Lockout/Tagout (LOTO) Work Permit OPS-85



No. CPV 170307 AK01*

STEP 1: Lockout/Tagout Planning (Work Supervisor)

Date: 07 Mar 17

Time: 08:00

Work location, equipment and reason for isolation:

BRIDGE , TROUBLESHOOTING WINDOW WIPER PORT SIDE.

Work Supervisor Name:

ETO ARUNAV

Isolation method and location of isolation point. Note: If more than eight energy isolation devices are required, attach list.

1. SWITCH OFF BREAKER WINDOW WIPER ,Bridge , 220V NAV
2. &SAFETY EQP.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Explain method for releasing stored energy: SWITCH OFF

Explain method of testing for Zero Energy State: CHECK WITH MULTIMETER

Check box, if unable to fit a lockout device. Explain method of securing isolation: TAG ONLY.

LOTO Responsible Person (nominated by VMT Member)

Name: Zoran

Rank: 1/E

VMT Member Name: CE GRAEME YOUNG

VMT Member Signature:

STEP 2: Lockout/Tagout Execution (Work Supervisor, Responsible Person, Contractor)

- NOTIFY: Affected personnel/departments of isolation and impacts to operations.
- SHUTDOWN: All applicable equipment has been properly shutdown. Energy isolation devices listed in step 1 are in the closed, off or safe position, isolating all hazardous energy.
- APPLY LOCK & TAG: Work Supervisor has secured each energy isolation device with a **RED** lock & tag.
- VERIFY: Responsible Person has applied a **BLACK** lock to each lockout device. (Contractors use **BLUE**)

GAS TEST ISOLATION POINTS (if applicable): Required when there is a potential for hazardous material release including flammable/combustible liquids or gas and toxics above permissible exposure limits.

EQUIPMENT PREPARATION (for isolation): Release all stored energy as per plan agreed to by the chief engineer/master.

Note: Be aware that machines could store energy internally such as spring, pressure accumulators, rotating masses, flammable liquids and gasses.

ZERO ENERGY STATE: All equipment/system hazardous energy sources have been tested to ensure Zero Energy State.

STEP 3: LOTO Execution Verification (Work Supervisor, Responsible Person, Contractor)

Steps 1 and 2 have been completed successfully. Work area is safe and ready for work to begin.

Work Supervisor:

Initial: [Signature] Date: 07/MAR/17 Time: 08:20

Contractor Name:

Initial: NA Date: NA Time: NA

Responsible Person:

Initial: [Signature] Date: 07/MAR/17 Time: 08:20

STEP 4: Testing of Equipment/System

Note: If lockout/tagout devices must be temporarily removed, and the machine or equipment energized to test or reposition machine components, follow the following sequence of actions:

- Notify all affected personnel/departments & clear the machine/equipment of tools and materials.
- Remove the lockout/tagout required for testing or positioning.
- On completion of testing or positioning, return energy isolation devices to closed, off or safe position.
- Re-apply lockout devices, padlocks, and tags.
- Release all stored energy, re-test for Zero Energy State, & continue with servicing or maintenance.

STEP 5: Returning Equipment/Systems to Service (Work Supervisor, Responsible Person, Contractor)

Equipment safe to energize.

All locks and tags have been removed.

System(s) returned to desired state with all alarms reset.

If moved to long-term isolation register, explain reason:

Work Supervisor:

Initial: [Signature] Date: 07/MAR/17 Time: 11:40

Responsible Person:

Initial: [Signature] Date: 07/MAR/17 Time: 11:40

Contractor:

Initial: NA Date: NA Time: NA

Remarks:

Notes:

Keep in ECR or CCR/Bridge when in force.
File and maintain in centralized location when done.

*See procedure MGT-02-04 for numbering instructions.

OPS-85 (14 Nov 2016)
Required by SAF-02-02, SAF-02-05,
SAF-02-06, OOS-04-02, OOS-06-01



SAF-02-08/Attachment 2 Rescue Plan Template

Date of job: 07 March 2017	Work Location: BRIDGE NEAR WINDOW WIPER
Standby Person Name: A/B	
Rescue Personnel and Responsibilities: Standby Man – A/B Team Leader – Bosun	
Muster station – BRIDGE	
In case of emergency muster at agreed location, prepare rescue gear and carry out rescue at height.	
Rescue equipment and location: Safety Harness, – BRIDGE NEAR WINDOW WIPER	
Rescue Personnel Muster Location: BRIDGE	
Rescue Personnel PPE: Hard hat, Safety glasses, Boiler suit, Safety shoes	
Rescue Personnel Communication Plan: Rescue team, Stand by person & all involved personnel to be ready on site Communication to be maintained via VHF radio channel 1	

For enclosed space rescues, atmosphere must be tested before entry.

Instructions: Think of potential emergencies that can occur while conducting the job. Use this

template to identify how to be prepared for the type of rescue you could be faced with.

Responsibilities – identify personnel assignments

Rescue from height – person responsible for rigging retrieval system to lift or lower person suspended on fall protection, person to give medical care, persons used for manpower on lines.

Equipment - prepared, centrally located and checked

Examples: Trauma bag, airway management bag, burn bag, rescue bag & equipment for rigging

ropes, pullies, harnesses for rescuers and victim/s, anchor points/hoist.

Communication - What communication system / plan will be used to summon rescue team members to needed location to minimize response time?

(01 Sep 2015)

Uncontrolled when printed.



Main Switch Board Distribution System

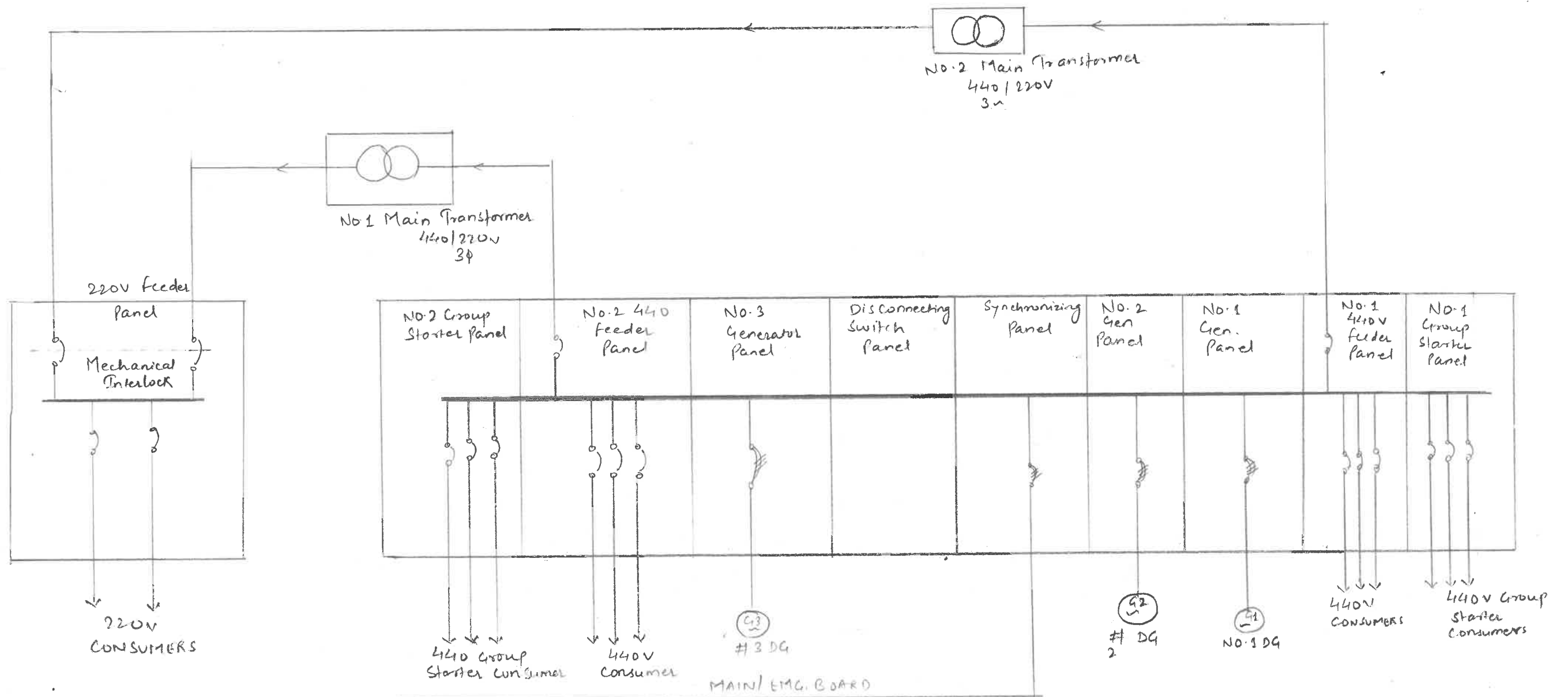
Nadeep Lamba

Engine Cadet

Date:

Signature:

A handwritten signature in black ink, appearing to read "Nadeep Lamba", written over the "Signature:" label.

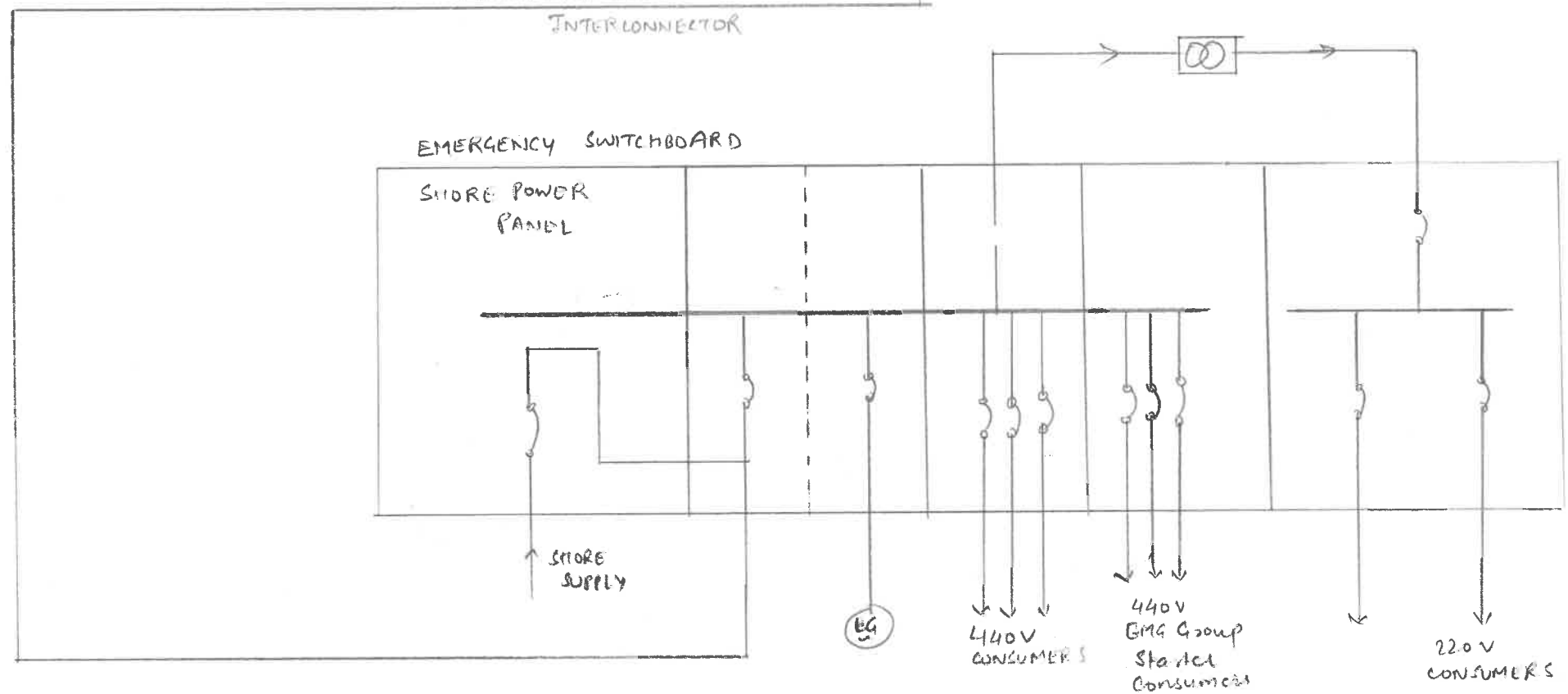


MAIN/EMG. BOARD

INTERCONNECTOR

AIR CIRCUIT BREAKER (ACB)

MOULDED CASE (MCCB) CIRCUIT BREAKER



[Handwritten signature]



Shore Supply Connection

Nadeep Lamba

Engine Cadet

Date:

Signature:

A handwritten signature in blue ink, appearing to read "Nadeep Lamba", written over a horizontal line.

DESCRIPTION OF SHORE CONNECTION

A shore connection box is provided in the emergency generator room on the starboard side of a deck funnel casing to accept electrical power supply cables during drydock. The shore connection box connects, via a breaker, to the main switchboard synchronizing panel, where a further breaker connects it to the main switchboard bus bar.

When on shore power, the emergency switchboard can be supplied as normal through the main/emergency switchboard bus tie circuit-breakers.

Monitoring lamps for SHORE POWER AVAILABLE and SHORE MCCB ON are located on the main switchboard synchronizing panel, and an ammeter and voltmeter with the facility to monitor the shore current and voltage are located on the main switchboard No.2 generator panel.

A frequency meter, ammeter and voltmeter are located on the emergency switchboard, emergency generator panel with the facility to monitor the shore supply voltage, current and frequency.

A phase sequence monitoring system, kilowatt hour meter and SHORE SOURCE, SHORE MCCB CLOSED and SHORE MCCB OPEN indicators are fitted at the shore connection box. The phase sequence should be checked before connecting shore power to the switchboards. When the shore supply has been connected at the box, it should be switched on ashore and the PHASE SEQUENCE TEST pushbutton pressed. If the phase sequence is incorrect (REVERSE indicator illuminated) the shore supply must be isolated and two supply phases changed over. The supply should then be reinstated and the phase sequence checked again.

The kilowatt hour meter is provided to measure and record the power consumed by the vessel when on shore supply.

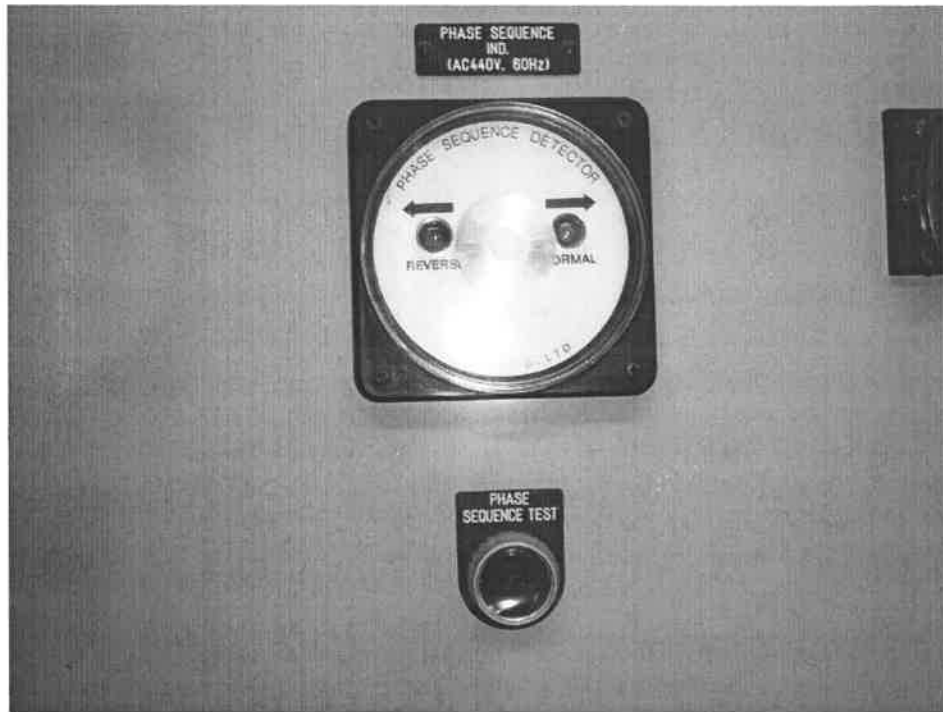
Interlocking is provided between the ship's main generator ACBs and the shore supply breaker. The shore supply breaker cannot be closed if any generator ACB is closed. Conversely, none of the ship's generator ACBs can be closed if the shore supply breaker is closed. This arrangement prevents the shore supply being paralleled with any other supply.

❖ The various shore connection meters are:

- Watt Hour Meter
- Shore Source Indication
- Shore MCCB Closed Indication

- Shore MCCB Open Indication
- Phase Sequence Indication Meter
- Phase Sequence Test Pushbutton
- Shore Connection Box
- MCCB (SC) Shore Connection Cable Access Cover
- Feedback Indication
- 24V DC Source Indication
- MSB Power Supply Indication
- Bus Tie Closed Indication
- Bus Tie Open Indication
- Frequency Meter
- Voltmeter
- Insulation Meter
- Earth Lamps
- Bus Tie ACB Trouble Reset Illuminated Pushbutton
- Earth Test Pushbutton
- Power Mode Selection Switch
- Frequency Meter Selection Switch
- Link to Main Switchboard Circuit-Breaker (SP-001) Standby Indication
- Emergency Generator Running Indication
- ACB Closed Indication
- ACB Open Indication
- Ammeter
- Wattmeter
- Space Heater Indication
- Hour Meter

- Space Heater On/Off Selection Switch
- EG ACB Trouble Reset Illuminated Pushbutton
- Ammeter Selection Switch
- ACB Control Switch
- Emergency Generator ACB (Inside Panel)



Phase sequence indicator



Wattmeter on the shore connection panel



Shore connection breaker



Indicators on the shore connection panel



Star Delta And DOL Starter

Nadeep Lamba

Engine Cadet

Date:

Signature: 

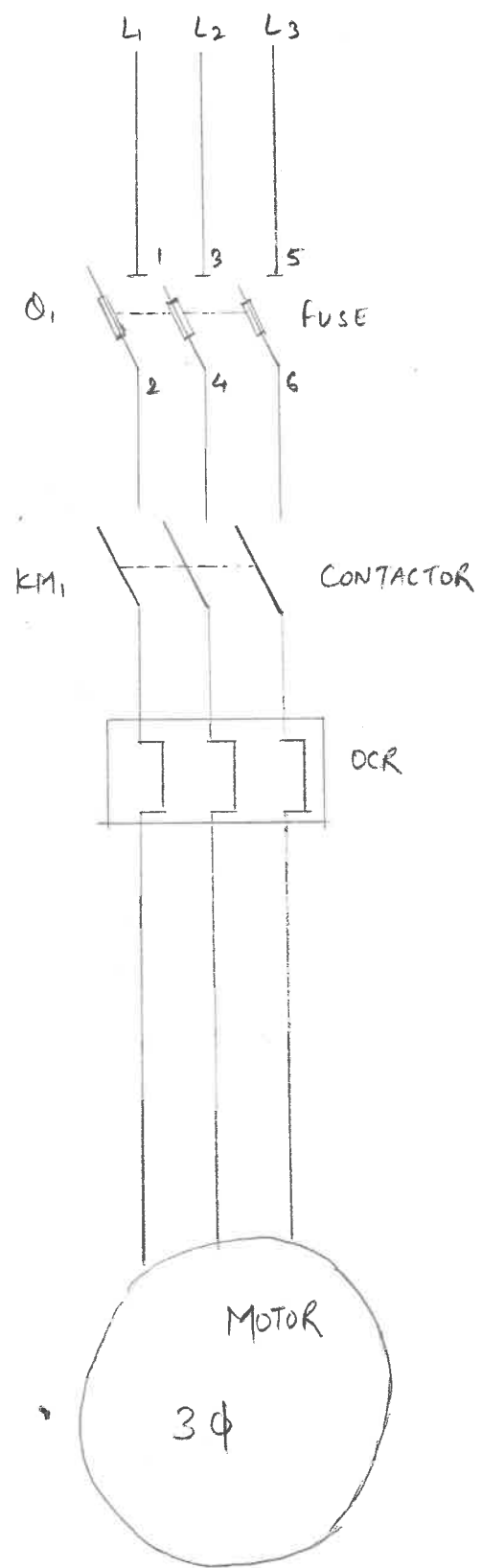
DOL STARTER

DOL switching demands a short duration but large starting current of 5-7 times FLC fixed by the motor impedance and are generally acceptable to the supply generator as long as the corresponding voltage dip is not greater than 10-15% within the run-up period. For large motor drives, this starting surge will cause an unacceptable voltage dip at the supply busbars, with likely malfunctions of other consumers. The voltage dip is further compounded as all the other connected motors compensate by demanding an increased current to maintain their original power output. If prolonged, this sudden current loading may cause supply line and generator to trip.

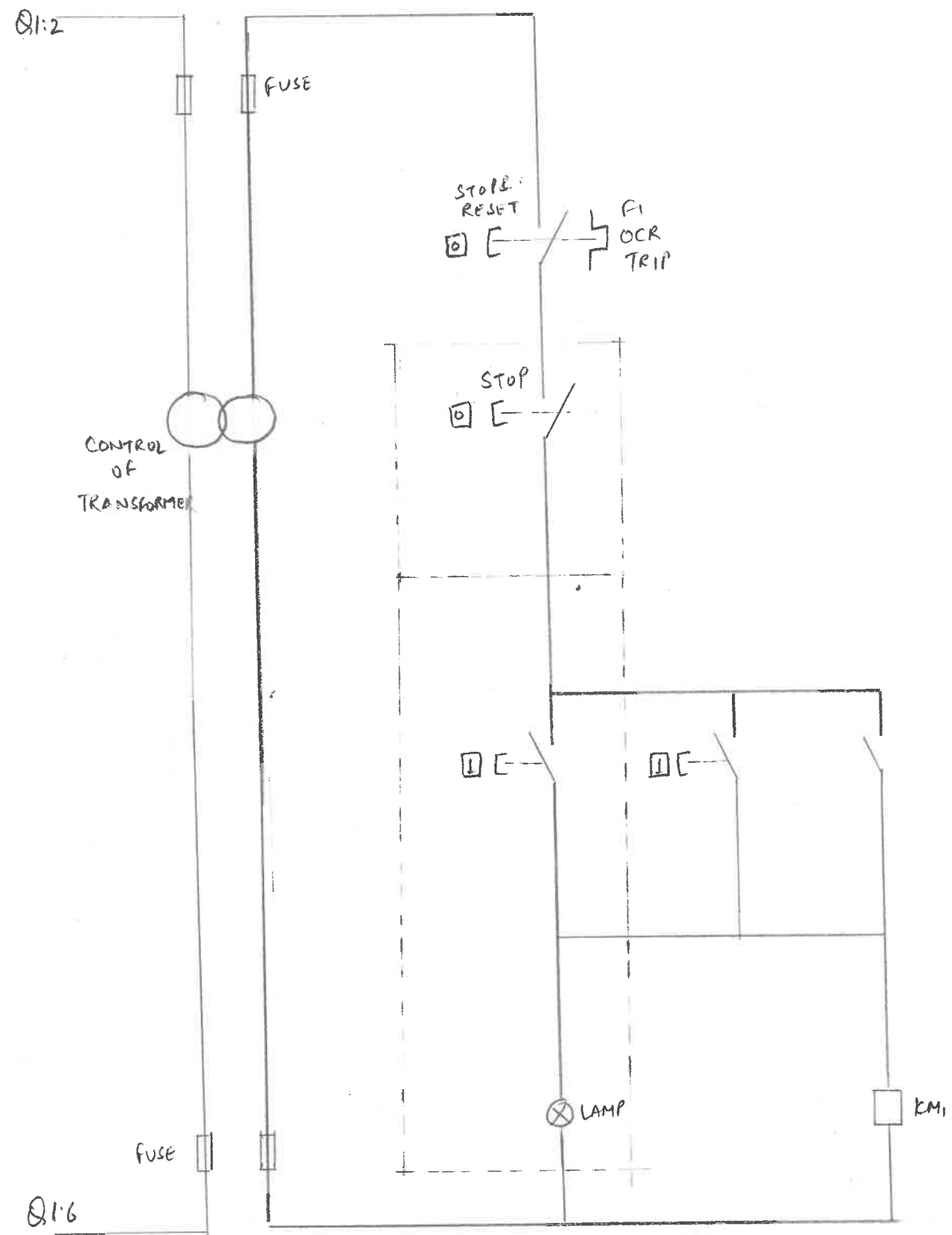
STAR DELTA STARTER

If a motor is DOL started with the stator winding star connected, it will only take one-third of the starting current that it would take if the windings were delta connected. The starting current of a motor that is designed to run delta connected can be reduced in this way.

Star –delta starters for small motors may be operated by a manual changeover switch. For large power motors, the phase windings are automatically switched using contactors controlled by a timing relay.

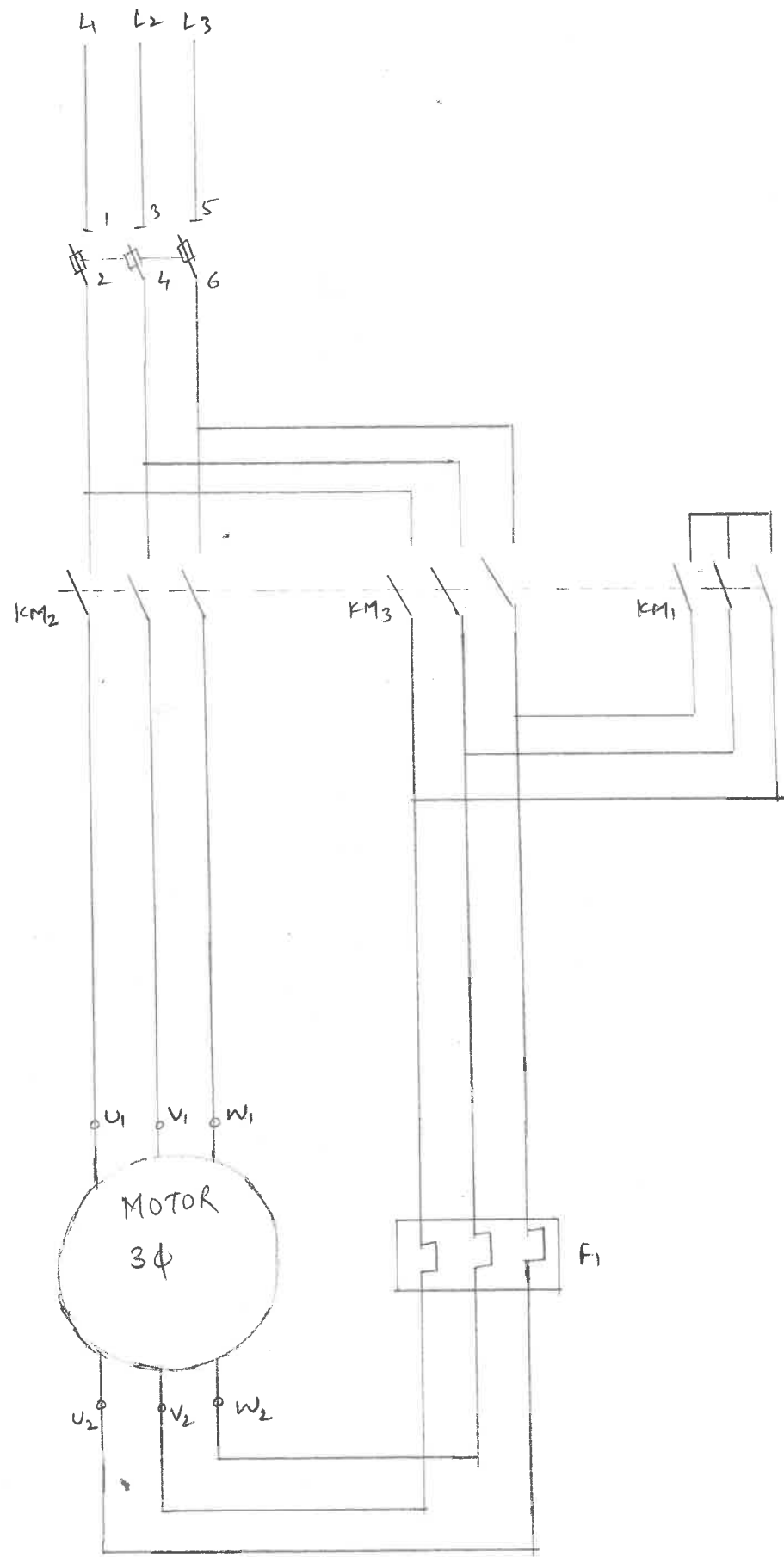


POWER CIRCUIT
(DOL STARTER)

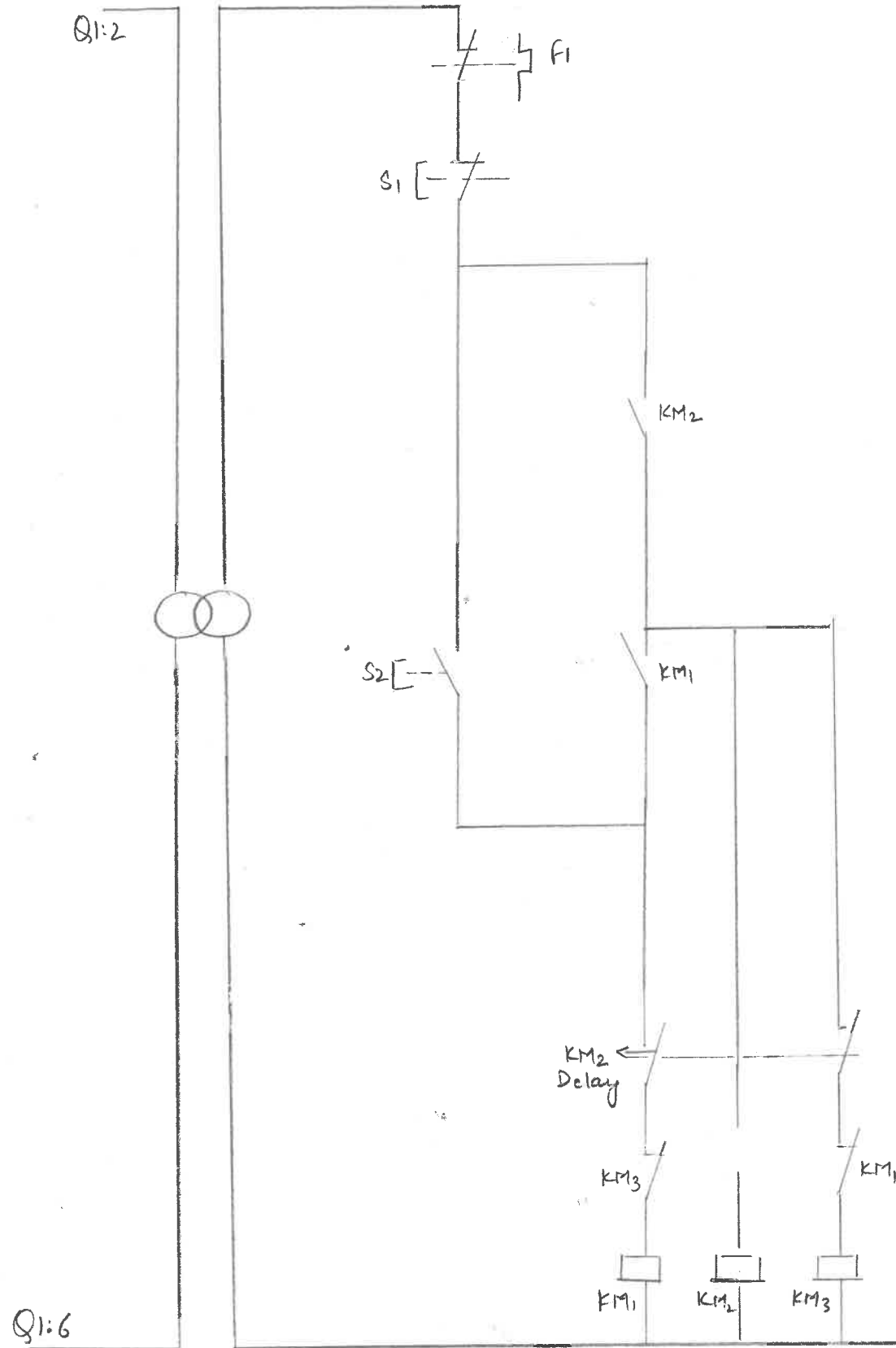


CONTROL CIRCUIT
(DOL STARTER)

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POWER CIRCUIT



Q1:6

CONTROL CIRCUIT

Signature



Engine Room Crane

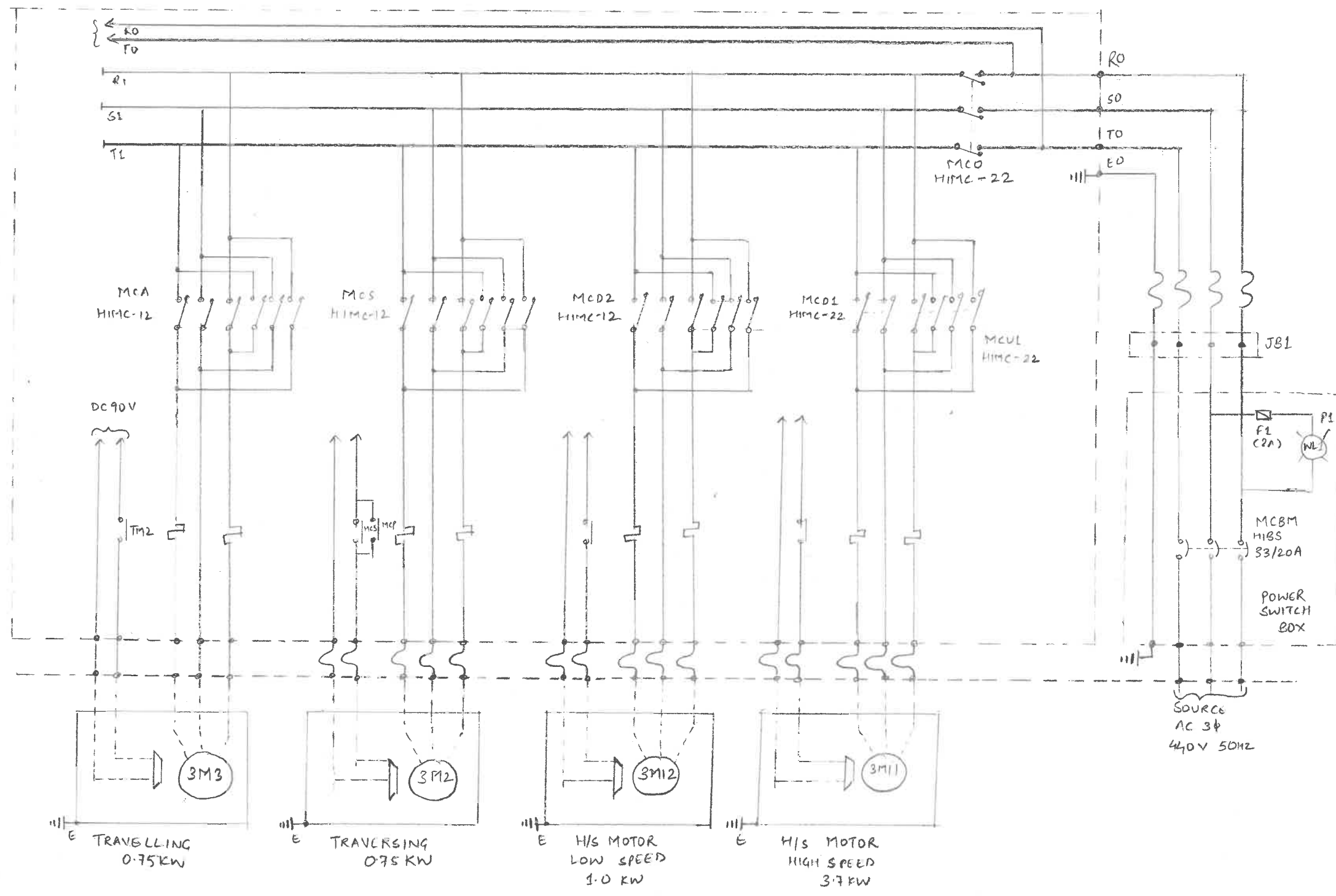
Nadeep Lamba

Engine Cadet

Date:

Signature:

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ENGINE ROOM CRANE

[Handwritten signature]



Main Air Compressor

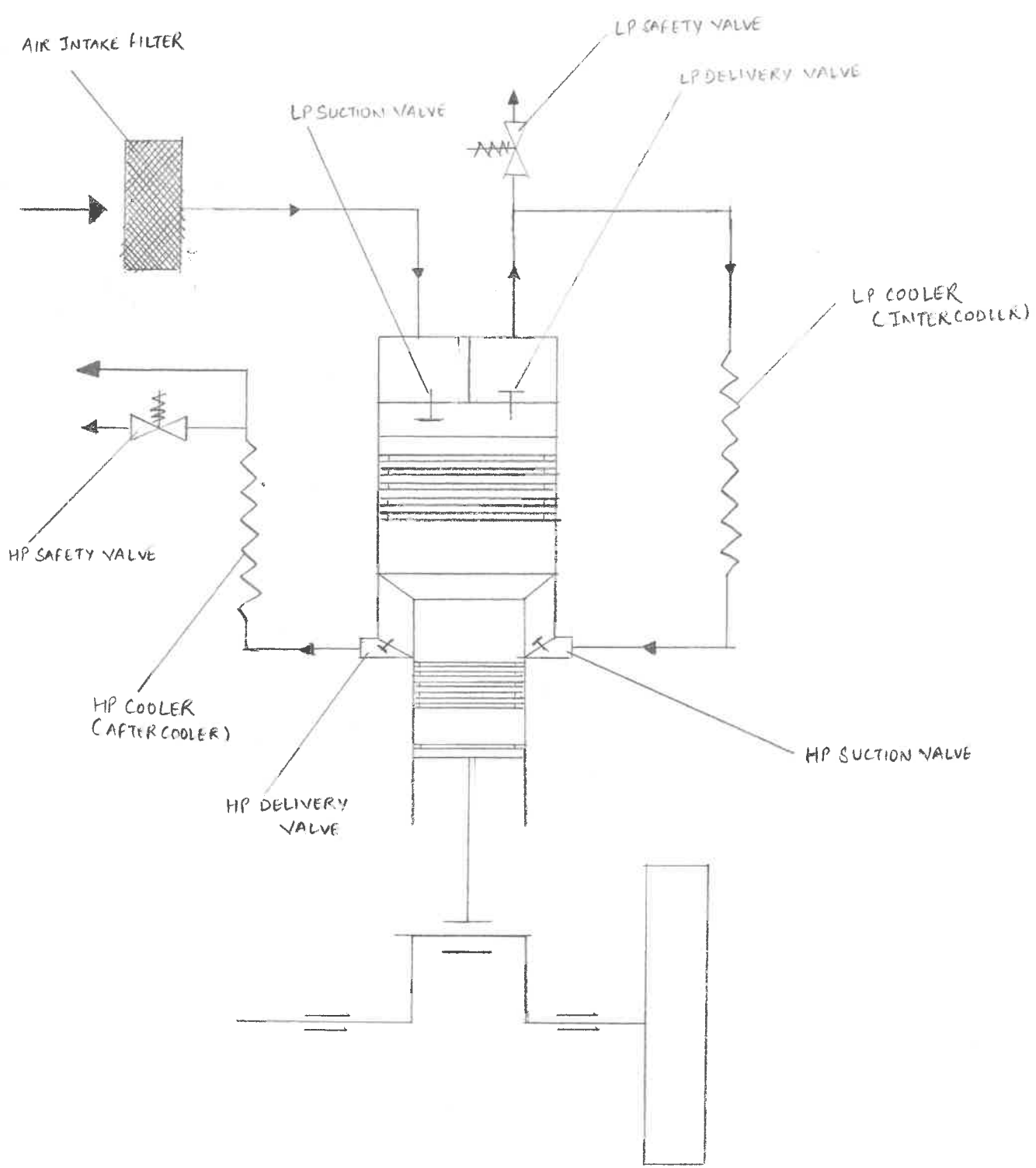
Nadeep Lamba

Engine Cadet

Date:

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.



Main air compressor

❖ Description:

The main air compressor is a two cylinder two stage single acting water cooled compressor. The flow of air is through the air filter into the LP (low pressure) stage cylinder through the suction valve when the piston is moving downwards. When the piston travels up the discharge valve opens and the air flows into the tubes of the intercooler. The LP discharge piping has a safety valve installed. From the intercooler the air enters the HP cylinder through the HP suction valve and then as the HP piston moves up the HP discharge valve opens and the air is discharged to the tubes of after-cooler and then through a non-return valve into the main air bottles. The HP discharge line also has a safety valve after the after-cooler. All bearings are pressure lubricated by means of a shaft driven gear pump. The coolers are replaceable from the cylinder block and the cooling water is common to the coolers and the cylinder jacket. The No.1 main air compressor is fitted with a separate cooling pump which is motor driven. This compressor has supply from emergency switchboard. This compressor is used to build up pressure of 30 bars and can be used to build up a pressure of 35 bar maximum. The compressor is driven by an electric motor via elastic coupling. The compressor flywheel acts as one half of the elastic coupling. Oil and air filters are present. Oil filter is located after the lub oil pump. There are two main air compressors which follow a lead and lag sequence through pressure switches.

❖ Safety equipment:

Safety valves are fitted after first and second stage of compression. The safety valves are pre adjusted by the manufacturer according to the pressure requirement of user. A bursting disc is mounted on the cooling water mantle of the cylinder block which ruptures if the coolant chamber is subjected to abnormally high pressure. This can occur on the event of leakage of compressed air through the inter cooler or after cooler tubes. Low lube oil pressure trip is included and its value is 0.8 bars. Manual and solenoid operated unloaders are provided for the safe operation of the electric motor during starting of the compressor; to protect against high starting current. Solenoid valve opens to release air pressure from the intercooler and after coolers for 5 seconds during

start Up and the cycle is repeated after every 30 minutes if the compressor is running. This also drains any condensation.

❖ **Alarms and trips:**

1. AMS- No.1 Main air compressor fail; No.2 Main air compressor fail.
2. Low Lube oil pressure trip.
3. High (HP) air temp trip.
4. Over current of compressor motor trip.
5. Cooling water pump motor over current trip.

The compressor's first stage is often referred to as the low pressure (LP) stage, and the second stage is called the high pressure (HP) stage. The circulation of air through the compressor is shown in Figure 2.2.

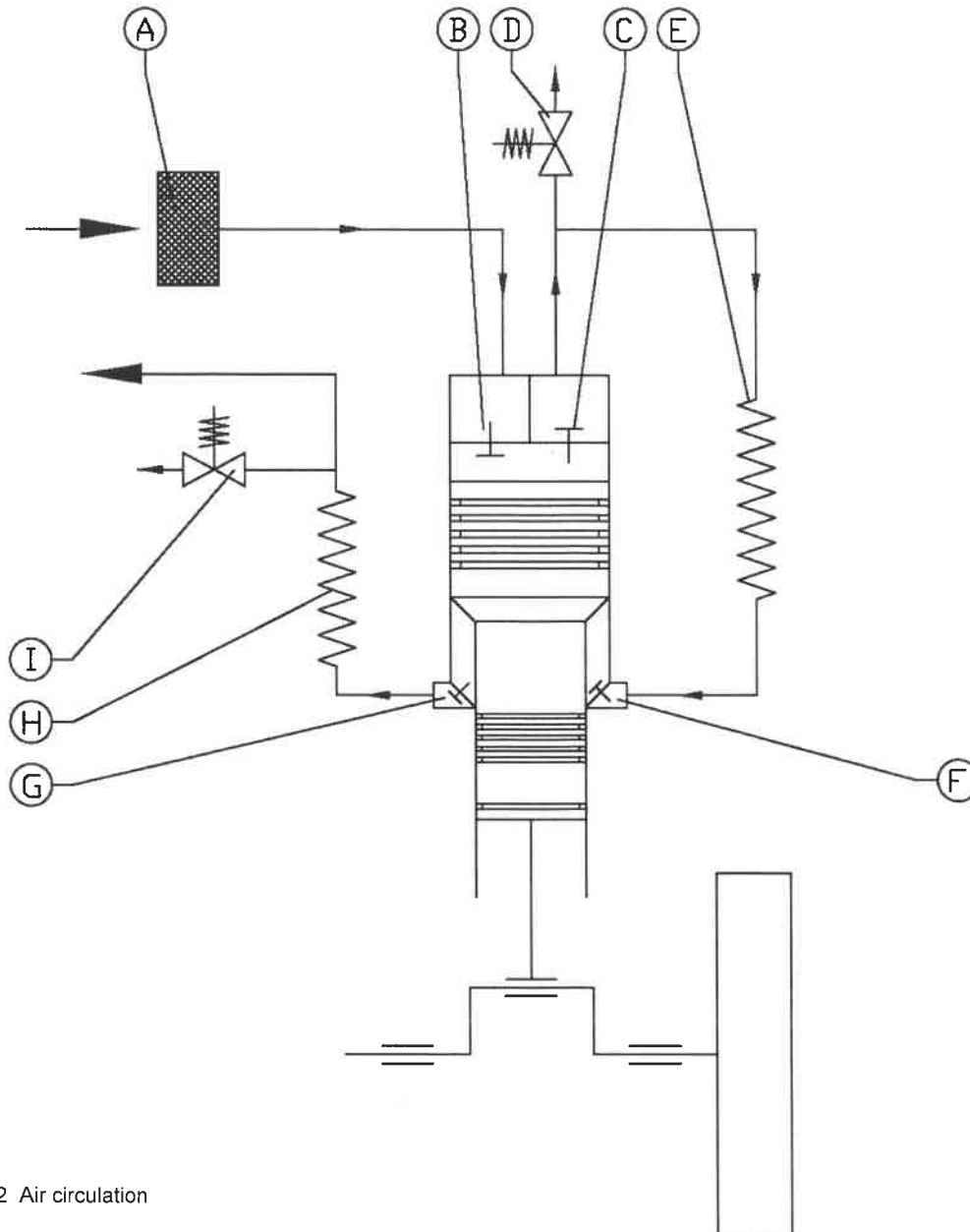


Fig. 2.2 Air circulation

Explanation of symbols:

- A Air intake filter
- B LP suction valve
- C LP delivery valve
- D LP safety valve
- E LP cooler (intercooler)
- F HP suction valve
- G HP delivery valve
- H HP cooler (aftercooler)
- I HP safety valve



Self priming System

Nadeep Lamba

Engine Cadet

Date:

Signature:



Relief Valve

Nadeep Lamba

Engine Cadet

Date:

Signature:



Fire Detection System

Nadeep Lamba

Engine Cadet

Date:

Signature:

A handwritten signature in blue ink, appearing to read "Nadeep Lamba".

FIRE DETECTION SYSTEM

- ❖ **Manufacturer:** Thorn Security
- ❖ **Model:** Minerva T2000

The T2000 fire detection system is a complete fire detection and alarm system, including combined fire alarm and operating panels, control units and power supply units, all contained in single cabinets. The master panel is fitted on the bridge with two remote repeater panels (T2000R). One is located at the port side fire control station on the upper deck and one in the engine control room. Fire and smoke detectors and manual call points are connected to the system in loop configurations.

There are a wide range of fire detectors and sensors fitted to suit different requirements and conditions, such as smoke, heat and flames, watertight, non-watertight and explosion-proof detectors. Manual call points, short-circuit isolators and timers are connected to the loop where required. A fault in the system or a false alarm is detected immediately, since the function of the detectors and other installed loop units are automatically and continuously tested. The relay outputs of the system can be used to control doors and ventilation systems.

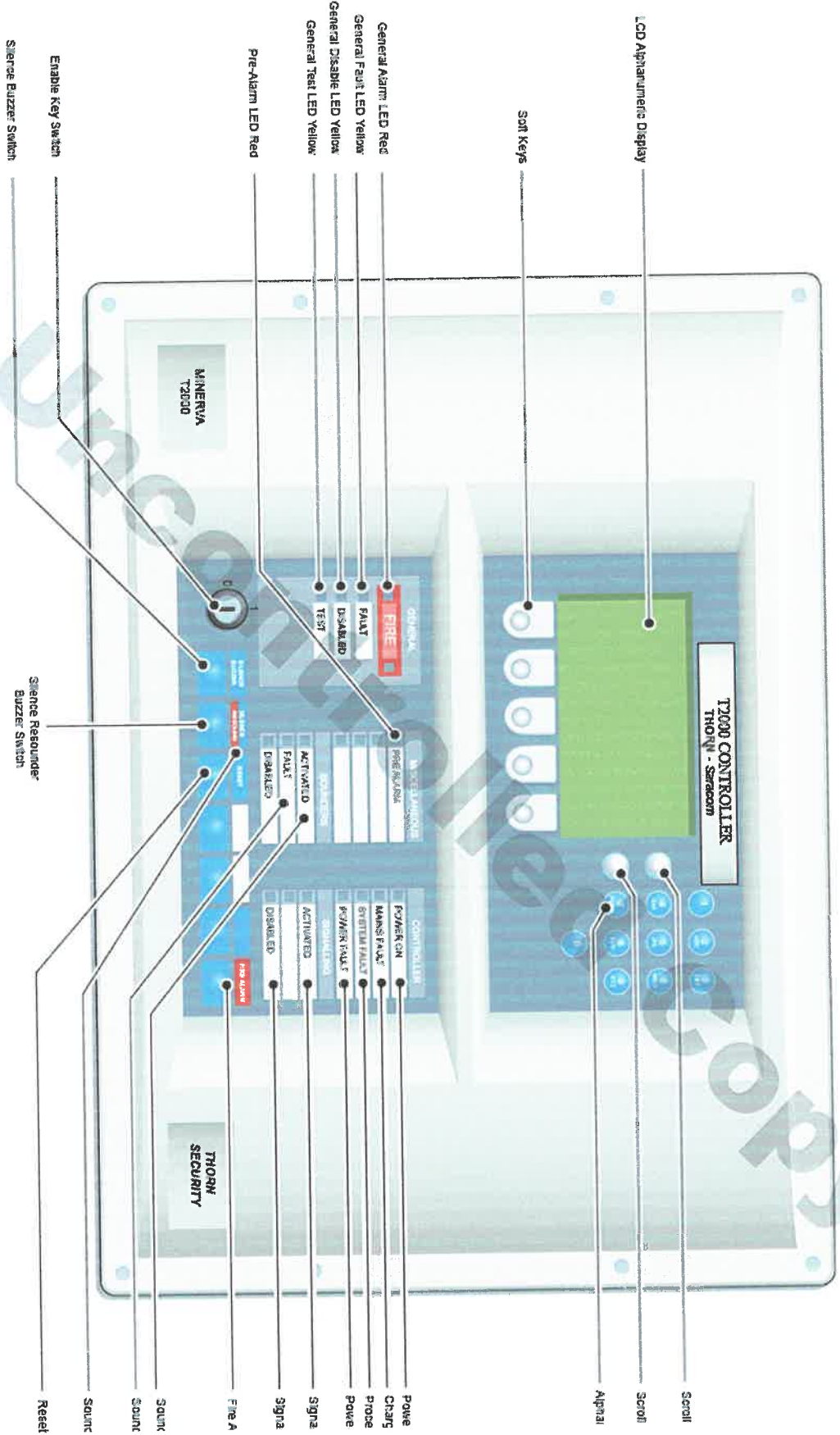
The system is split into four loops, A, B, C and D and thirteen zones as follows:

- Loop A (Zones 1 through to 5, which covers the accommodation area and passageways).
- Loop B (Zones 6 through to 7, which covers the emergency generator room, paint store, fire control station room and the steering gear room).
- Loop C (Zones 8 through to 12, which covers part of the engine funnel casing and engine room).
- Loop D (Zone 13, which covers the pump room).

❖ **Operation in Alarm:**

The sequence of events upon detecting a fire is as follows:

- a) The internal buzzer will sound in a continuous tone.
- b) The two 'FIRE' LEDs will illuminate.
- c) The sounders and signalling 'ACTIVATED' LEDs will illuminate.
- d) The LCD display will indicate the alarm zone message.
- e) At the controller the sounder and other configured outputs will be activated. If the alarm is not accepted by pressing 'INVESTIGATE DELAY' key, then all sounders will be activated.
- f) Investigate the cause of the alarm.
- g) To silence the alarms, insert the key and turn clockwise to the enable position (1).
- h) Press 'SILENCE/RESOUND' key.
- i) The sounders will be silenced and the sounder activated LEDs will be extinguished.
- j) The LCD display will show that the alarm has been silenced.
- k) To resound the alarms, press 'SILENCE/RESOUND' key.
- l) After silencing the alarms the system can then be reset by pressing the 'RESET' key. This will take about 20 seconds.



LCD Alphanumeric Display

Soft Keys

General Alarm LED Red

General Fault LED Yellow

General Disable LED Yellow

General Test LED Yellow

Pre-Alarm LED Red

Enable Key Switch

Silence Buzzer Switch

Silence Resounder Buzzer Switch

Reset

Scroll

Scroll

Alpha1

Power

Chime

Probe

Power Fault

Act/Deact

Disabled

Fire A

Silence

Silence

Silence

Silence

Silence

Silence

THORN SECURITY

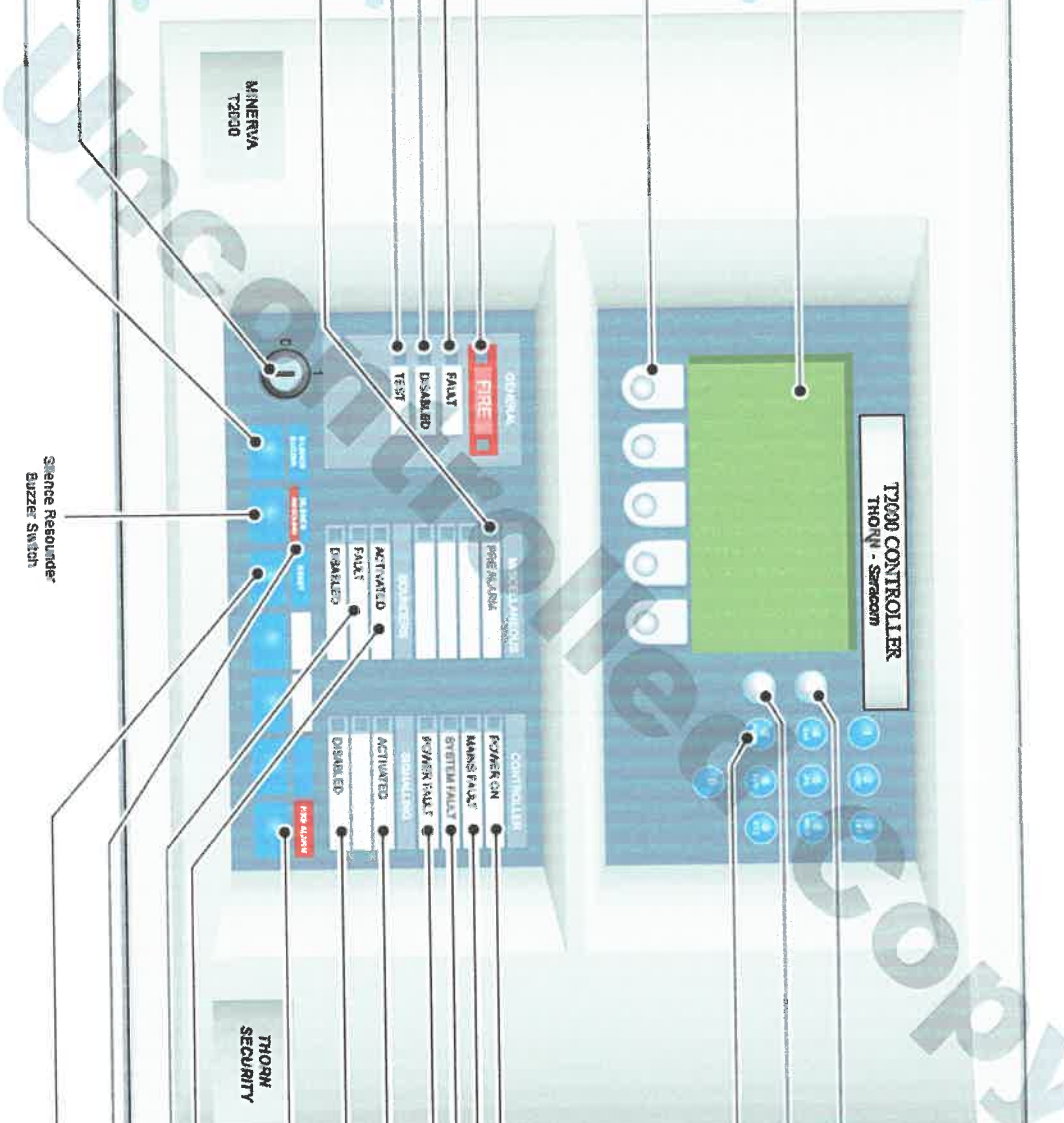
MINERVA T2030

THORN CONTROLLER
THORN - Silenced

OPERATIONAL
FIRE
FAULT
DISABLED
TEST

ALARM
ACT/DEACT
DISABLED

CONTROLLED
POWER ON
MANS FAULT
SYSTEM FAULT
POWER FAULT
ACT/DEACT
DISABLED



STARTING AIR VALVE

❖ OPERATION:

- Starting valve is fitted on the cylinder cover. It is controlled by control air (pilot air) from the starting air distributor.
- The upper portion of the Valve is large. This forms an air cylinder and a piston which is working inside the cylinder is attached to the starting air valve spindle. The top cover of the valve is connected through a control air pipe coming from the air distributor. When a distributor valve opens, compressed air flows through the piping to the upper side of the piston in the starting air valve, forcing the piston downwards and opening the starting air valve. The valve is connected to the starting air rail which provides air into the cylinder, pushing the cylinder down when it is supposed to go down from TDC i.e. the starting air waits under the underside of the piston and as soon as the valve opens due to pilot air the starting air goes to the cylinder. The main start air alone cannot open the valve as the area below and above the valve are same. So the forces exerted are also the same and hence the valve is kept in closed condition by action of spring.
- When the starting period is finished the, the chamber above the piston is vented, through the vent pipe of the starting air distributor, and the starting valve will be closed.

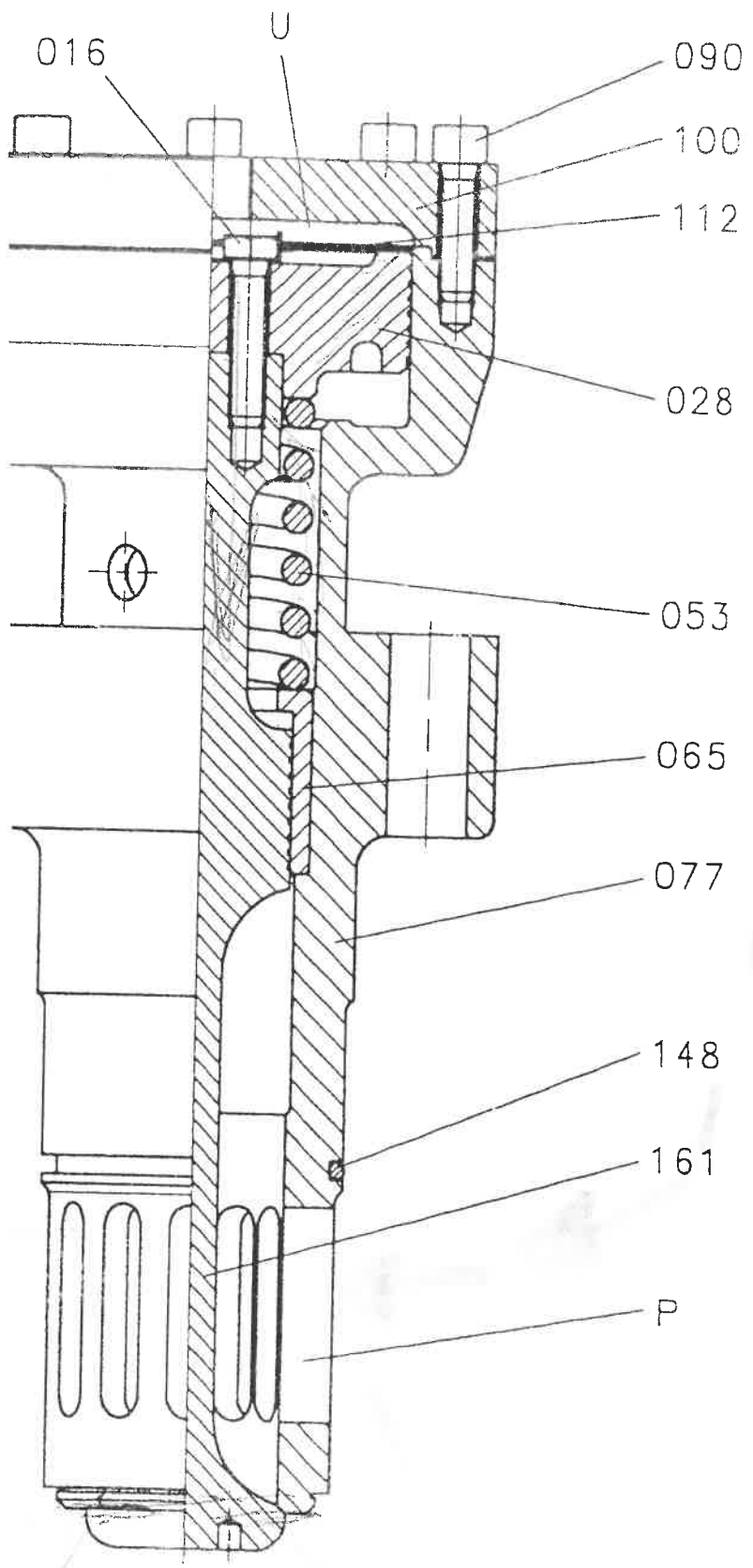
❖ DESCRIPTION:

- The top cover is attached to the Valve housing with the help of screws. The top cover also has the attachment for the control air supply for piston.
- The piston is attached to the valve spindle by two screws and a locking plate.
- The piston compresses the spindle against a spring which is mounted on a Bushing.
- A hole is provided on the valve body for venting out any leakage air from the underside of the piston and cylinder.
- A O-ring is provided for sealing between the valve housing and the hole provided in the cylinder cover for the valve assembly.

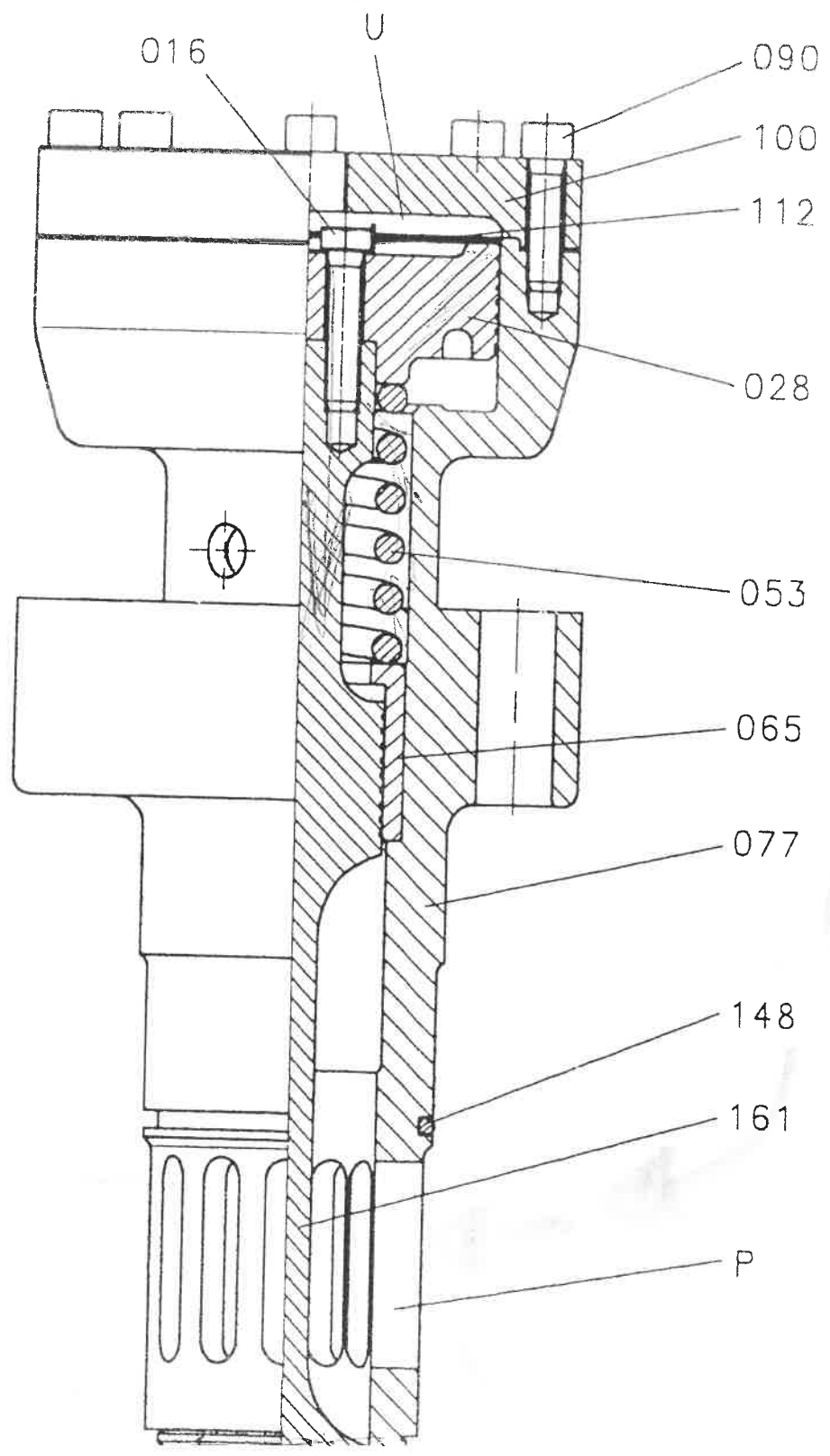
starting valve

Plate
90704-42

30 BAR
Pilot

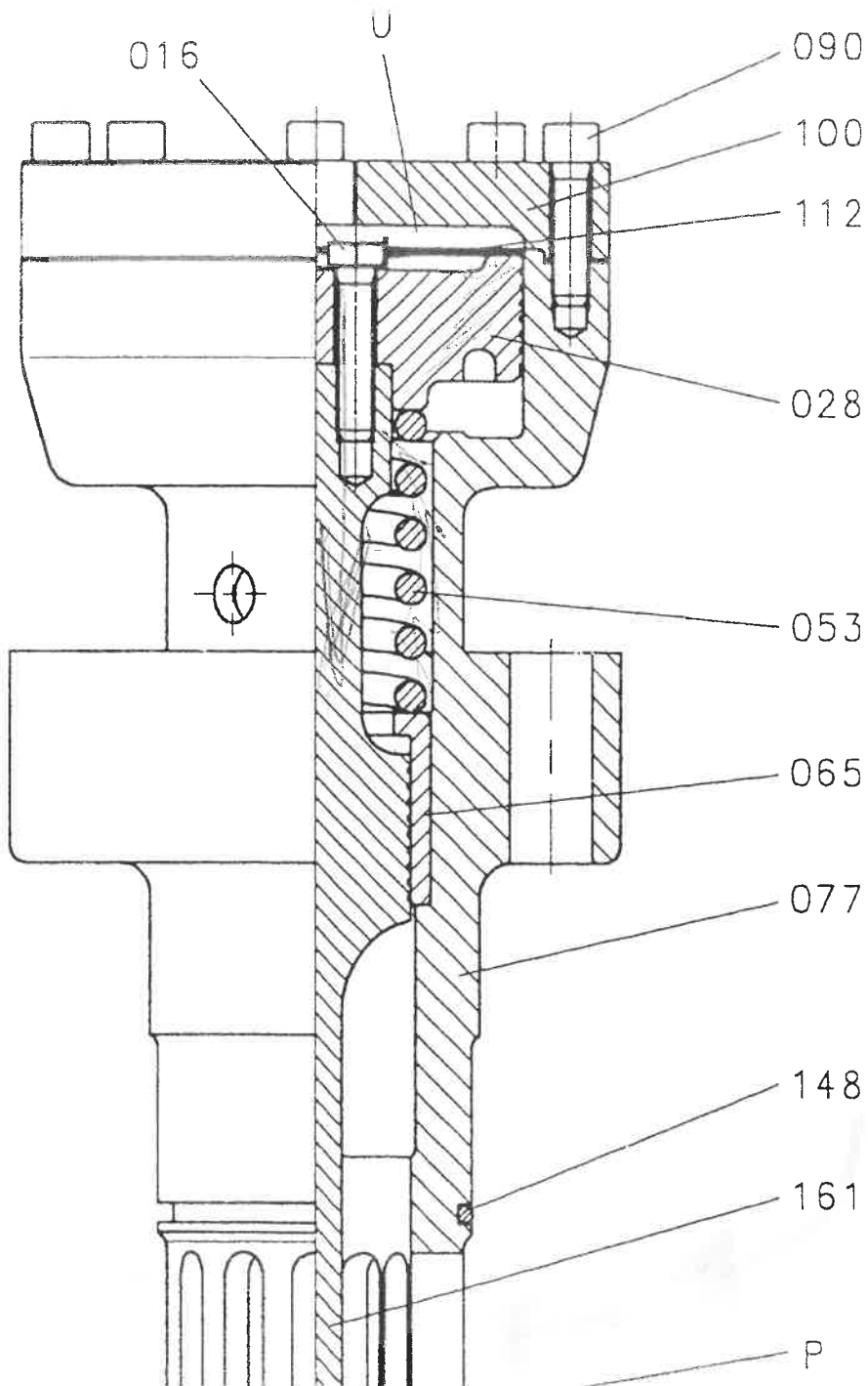


Handwritten notes:
30 bar
11/16"



Starting Valve

30 BAR
Pilot



Main Engine Reversing Mechanism

With crosshead engines, there are two main systems which need consideration when an engine is to be reversed, namely the fuel timing and the exhaust valve timing. By making the exhaust valve cams symmetrical, the exhaust valve operation is satisfied, yet the fuel pumps must be dealt with as they to be retimed for running in the reverse direction.

Reversing of the fuel pumps is achieved by moving the cam follower relative to the cam. An air cylinder, connected to the top of the reversing link, is actuated in order to reverse the fuel pumps and this causes the cam follower to be moved which repositions the fuel plunger. Drive for the fuel pump plunger is from the cam, through the follower to the reversing link, and then to the guide and finally the pump plunger. The reversing link is self locking when in either the ahead or astern position therefore no external force is needed once the link is in the desired position.



Incinerator

CARRICORN VOYAGER
OF. No. 9000143
GRT: 8442
NET: 8008
HP : 13420

Date: 23/03/17

Signature: Signed (IN)

INCINERATOR ON YOUR SHIP:

1. Give a brief description of arrangements for collection of garbage and its disposal?

Onboard garbage is collected in

- **Accommodation:** segregated bins for collecting garbage :
 - Plastics garbage
 - Tins and cans
 - General garbage

- **Engine room :** segregated bins for collecting garbage :
 - Plastics garbage
 - Aerosol cans
 - Paper garbage
 - Oily rags and dirty rags
 - Slightly used rags
 - Used battery
 - Metal gaskets/ garbage

- Sludge collected in SBOT #1,SBOT#2 and incinerator waste oil tank which comes from HFO overflow tanks, scavenge drain tank, HFO sludge tank, GE LO sludge tank etc. – All these are burnt in incinerator or transferred to shore facilities.

- **Garbage is disposed as**
 - Shore facility – glass bottles, tins, cans, bulbs, aerosols, ash, steel /metal
 - Incinerated- plastics, paper, oily rags, sludge
 - Overboard – food waste comminuted or grounded i.e. after being passed through a grinder

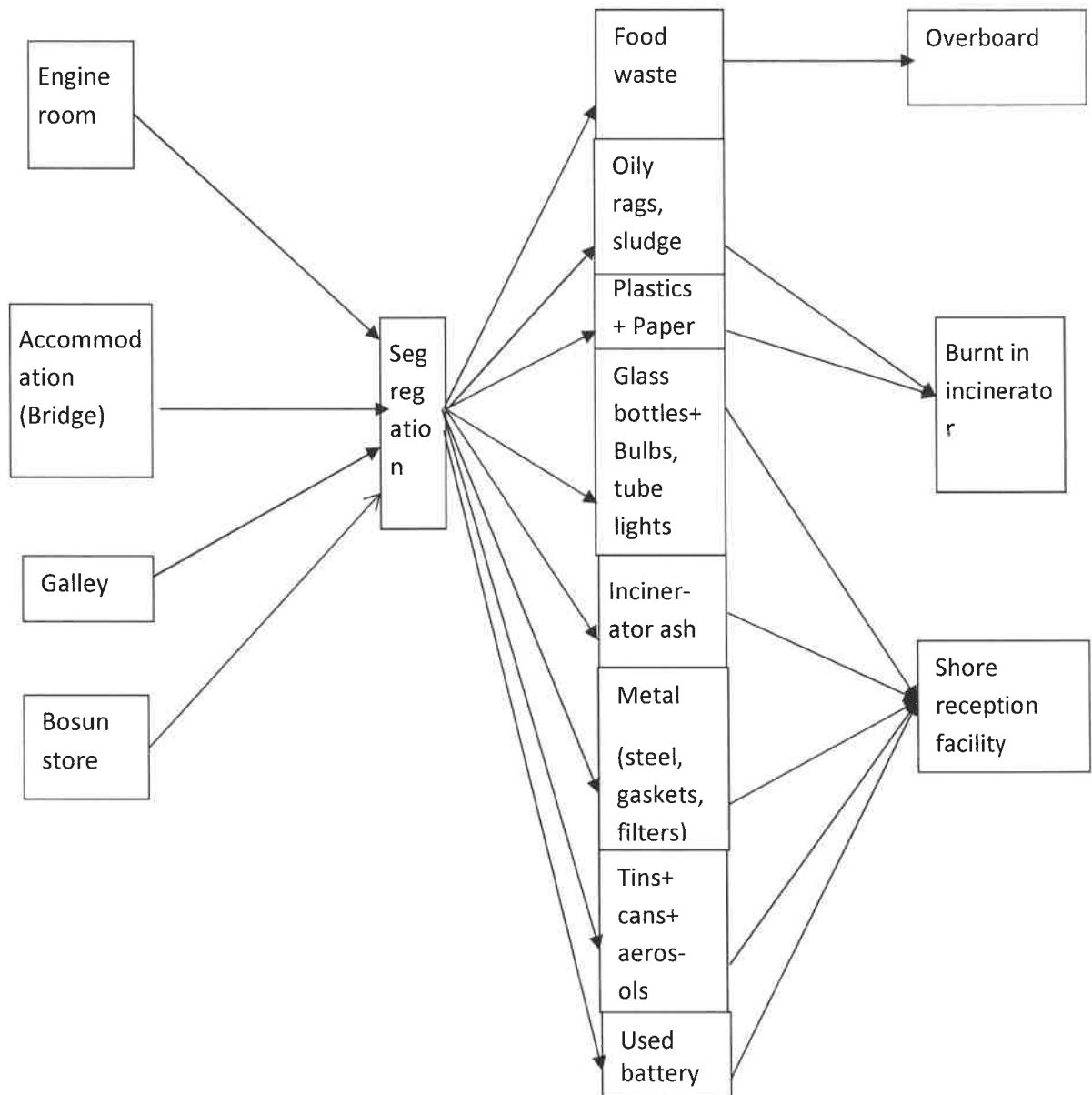
2. List the common hazards when working with garbage and operation of incinerators?

- Hand injury due to cuts by sharp edges
- Burns
- Wrong line up of the incinerator
- Overloading of the incinerator
- Fire
- Equipment damage
- Miscommunication
- Contact with garbage, oil

3. What are the precautions to be taken?

- Follow posted procedure
- Avoid overloading
- Face shield
- Thermal gloves
- Apron
- Record-keeping
- Inform bridge
- Radio use
- Secure area
- Correct line up
- Monitor parameters

4. Sketch the complete garbage management from the origin to disposal or burning?



3/E KM
23/3/17

➤ **For Incineration :**

❖ As per Marpol When garbage is incinerated:

- Date and time of start and stop of incineration
- Position of the ship (latitude and longitude)
- Estimated amount incinerated in cubic metres
- Signature of the officer in charge of the operation

➤ Also :

- Annex I , II and III cargo residues and related contaminated packing materials.
- Polychlorinated biphenyls(PCB's)
- Garbage containing more traces of heavy metals (annex V , 73/78)
- Refined petroleum products containing halogen compounds
- Explosive materials , closed containers and aerosols .



VOP-04-08 Disposal of Engine Space Waste

Applicable To	Critical Safeguard	Version
All vessels	No	01 Sep 2015

Requirements

- None.

PROCEDURE STEPS

The Chief Engineer is responsible for this procedure:

- If a step specifies who must do a task, that person must do the task.
- If a step does not specify who does a task, the Chief Engineer can do the task or delegate it.

Transfer and Disposal of Oily Residue and Sludge Accumulated in Machinery Spaces

The Chief Engineer is responsible for the transfer of oily residues accumulated in the engine room and other machinery spaces. This transfer can be to another tank, barge, vessel or a shore facility.

1 The Chief Engineer must write instructions for the transfer of oily residues that includes:

- Transfer to a designated Bilge Holding Tank.
- Pumping overboard in permitted areas according to *MARPOL* Annex I, Regulation 15 and The Waste Management Plan.
- Discharge to a barge or a vessel.
- Discharge to a shore reception facility.

Caution! Only applies to vessels with an Integrated Bilge Water Treatment System

- Discharge of the Clean Drain Tank directly overboard without the oily water separator by using the White Box System.

2 The VMT must be aware of the guidelines in *MARPOL* Annex 1 and Resolution MEPC.107(49).

3 The draining of oil or hazardous material from an external source into an engine bilge space is not permitted (33 *CFR*, 155.770).

- Machinery space bilges are pumped directly to the designated holding tank. At terminals with reception facilities, bilges and holding tanks can be pumped ashore. For disposal, follow *MARPOL*. Make relevant Oil Record Book and log entries regarding handling and disposal of oily residues in engine spaces.
- Clean water collected in bilge holding tanks may be discharged at sea where permitted by *MARPOL* and local regulations through the vessel's oily water separator in accordance with

MARPOL.

4 The Engineer Officer of the Watch (EOOW) must understand and follow the procedure for the agreed method of transfer.

- Vessels compliant with the Integrated Bilge Water Treatment System (IBTS) are allowed to pump contents of the Clean Drain Tank directly overboard without the use of the oily water separator. However, a means to monitor overboard discharge along with automatic stopping device shall be provided. This may consist of an oil content monitor with a three-way valve arrangement. The oil content of the effluent without dilution should not exceed 15 ppm.

Engine Room Sludge Transfer System

5 The Chief Engineer must choose one of the following options to dispose of sludge:

- Incinerate the sludge.
- Transfer the sludge to a slop tank that is listed on the IOPP Certificate of the vessel.
- Offload the sludge to a shore reception facility.
- Get approval from the Voyage Manager and transfer the sludge to a cargo slop tank to be comingled with cargo or for load-on-top. Refer to the Waste Management Plan.
- Use only approved equipment or systems to transfer sludge to a cargo slop tank.

6 The Engineer Officer of the Watch (EOOW) must:

- Transfer sludge in the engine space using only dedicated sludge transfer pumps and system piping.
- If the sludge transfer pump fails, a portable pump with short lengths of transfer hose may be used. If a portable pump is used, the hoses must meet the requirements of AIR-02-02, Reliability Centered Maintenance, Engine Room Sludge Transfer System.
 - Failure of the sludge pump must be recorded in the Oil Record Book

7 Engine room staff must:

- Inspect hose couplings for damage and conductivity before they are used.
- Hydro-test transfer discharge piping annually to the allowable MAWP.
- Hydro-test all hoses annually to their rated working pressure.
- Test all hoses for conductivity as necessary but at least annually and follow guidelines in ISGOTT, Electrical Continuity and Discontinuity Tests.
- Hydro-test transfer discharge piping to 150% MAWP during each UWILD and Planned Periodic Overhaul.

Oil Record Book and Logbook Entries

8 The Engineer Officer of the Watch (EOOW) must:

- Make entries in the Oil Record Book promptly and accurately as per guidelines contained in the flag state issued Oil Record Book.

- Make an entry in the Oil Record Book, Part I and the OPS-9, *Engine Log Book* when oil residue is transferred to or from a holding tank that is listed in Part 3 of the IOPP Certificate of the vessel.
- If oily residue accumulated in the engine room spaces is transferred to a cargo slop tank, the quantity must be recorded in the Oil Record Book, Part II and the OPS-5, *Deck Log Book*.
- Record bunker loading, bilge and sludge transfers in the Oil Record Book, Part 1. Follow the regulations in *MARPOL, Annex 1, Appendix III*.
- For guidance refer to Intertanko's *A Guide for Correct Entries in the Oil Record Book (Part I - Machinery Space Operations)* and IMO's *Guidance for the Recording of Operations in the Oil Record Book (Part 1 - Machinery Space Operations)*.

9 The Chief Engineer must make sure the Oil Record Book (Part I only) is completed correctly before giving it to the Master to sign.

Oily Water Separator (OWS)

10 The Chief Engineer must:

- If the OWS equipment fails, repair it as soon as possible.
- Record a failure of the equipment in the Oil Record Book and in the OPS-9, *Engine Log Book*.
- Report the failure of equipment to the flag state, the port state and the applicable Engineering Superintendents and Marine Superintendents.
- Consult with the Master and the Engineering Superintendent to form a contingency on plan how to handle bilge water while the equipment is being repaired.

White Box System and Enviropilot

The White Box System and Enviropilot is a control and monitoring system for bilge water discharge in accordance with IMO Resolution MEPC.60 (33) or IMO Resolution MEPC.107 (49).

The White Box System is installed between the OWS and the overboard dump valve as a fail-safe system to prevent the accidental overboard discharge of bilge water.

All signals from the White Box System and the Enviropilot are recorded with the vessel's position and the time in a digital tamper-proof recorder that is installed in Engine Control Room.

If necessary, the Enviropilot diverts the overboard discharge back to bilge holding tank to make sure that the vessel complies with the IMO rules for discharge overboard.

The three-way valve of the White Box System automatically closes when the vessel speed falls below requirements or enters a Special Area, in which discharge is not permitted.

11 The Chief Engineer must:

- Personally control the key to the White Box System cabinet.
- Make the Recorded data available to USCG, SIRE, and class or port state as proof of compliance.
- Retain the recorded data according to VOP-01-01/Attachment 1, Records Retention Guidelines.
- Record regular maintenance in Maximo PM Work Orders (7283-3 month and 7284-12

month).

12 If the equipment fails, the Engineer Officer of the Watch must:

- Stop the overboard discharge of water.
- Refer to the manufacturers' manual for corrective action.
- If the problem cannot be corrected, ask the vessel's Engineering Superintendent for help.
- Bypass of the White Box System is permitted only with Assistant Fleet Manager's approval.

Overboard Discharge Valve from Oily Water Separator

13 The OWS Overboard Discharge Valve must be included in the controlled valve list as per SAF-02-10, Controlled Valve Procedure.

14 The Chief Engineer must:

- Lock the overboard discharge valve from the oily water separator in the closed position at all times when the OWS is not in use.
- Personally control access to the key of the lock of overboard discharge valve.
- Make an entry in the OPS-9, *Engine Log Book* when the lock is removed and the valve opened prior to a planned discharge and when the valve is locked after discharge is completed.

Disposal of Economizer and Boiler Wash Water

If possible, wash the economizer or the boiler at sea.

15 When the economizer or the boiler is washed, the EOOW must make sure that:

- The soot residue is within the acceptable limits for discharging at sea as per the guidance in section one (1) of this procedure.
- Wash water is discharged at sea, outside Special Areas and more than 50 nautical miles from land.
- Make sure the soot is not oily and if in doubt, consider it as oily residue and treat as described in section 1 of this procedure.
- If the vessel is on a fuel saving program such as RTA with Weather News International (WNI), the stopping of the vessel to conduct the wash must be notified to WNI.

CAUTION. Discharge of wash water in port limits is not permitted.

16 If the economizer or the boiler must be washed in port, the Chief Engineer must consult with the Engineering Superintendent and plan the operation:

- Pump the wash water to a cargo slop tank, if permitted by the Charter Party and record the transfer in the Oil Record Book Part 1 and Part 2.
- Consult with the Voyage Manager, Marine Superintendent and Engineering superintendent and discharge the wash water to a shore reception facility for final disposal.
- Store the wash water in a dedicated soot-collecting tank and discharge overboard at sea taking into account MARPOL restrictions.

- Record the operation in the OPS-9, *Engine Log Book*.

Bilge System

17 The Chief Engineer must make sure that:

- The bilge system piping is tested or inspected annually.
 - The Direct bilge suction valves are tested or inspected annually.
 - After test or inspection, that bilge suction valve is fitted with a numbered, easily breakable seal, in compliance with the requirements of the Controlled Valve Procedure.
 - Record the seal numbers in the OPS-9, *Engine Log Book*.
 - Remove and test all bilge alarm ball floats for leaks annually.
- For records retention guidelines, refer to [VOP-01-01/Attachment 1, Records Retention Guidelines](#).

Records and Checklists

Waste Management Plan

OPS-9, *Engine Log Book*

Oil Record Book

OPS-5, *Deck Log Book*

Referenced Documents

SOLAS

MARPOL

A Guide for Correct Entries in the Oil Record Book (Part I - Machinery Space Operations), Intertanko

Guidance for the Recording of Operations in the Oil Record Book (Part 1 - Machinery Space Operations), IMO

ISGOTT

33 CFR, 155.770

IMO Resolution MEPC.60 (33)

IMO Resolution MEPC.107 (49)

Procedure Owner	Assistant Fleet Manager
Functional Responsibility	Manager, Fleet Operations

Uncontrolled Copy

Standard Operating Procedure (SOP)



Title of Procedure: Incinerator Operation – Garbage Burning

SOP#: SOP-CPV-

Note: MOC Required for any proposed amendments to this document.

Vessel: Capricorn Voyager

Revision Date: 10 Mar 17

Revision No: 1

Next Revalidation Due: 10 Mar 18

Department: Engine

Equipment: Incinerator

System: Waste

Requirements

Specific PPE	Specific Equipment
• Face Shield	• Radio
• Goggles	•
• Thermal Gloves	•
• Apron	•
•	•

Pre-requisite Requirements

• Ensure that this job is on OPS 56 and discussed during safety morning meeting.
• Review C/E's Standing Orders on OPERATION OF INCINERATOR.
• Inform OOW on the Bridge and get permission for starting Incinerator.
• Fill up Incinerator D.O. Service tank if needed.
• Emergency stop to be tested prior to start Incinerator and Log to E/R Log book.
• Check if all safety devices are in place and functioning properly – Log inside E/R Log book - never by-pass any of safety devices. If safety devices are not in place and not working STOP Incinerator immediately and inform C/E or 1/AE.
• Check Radio communication between Incinerator Operator, 3/AE and OOW on Bridge.
• Two People to be present at Incinerator during Garbage Burning (1 Oiler and 1 Cadet) both of them with Radios.
• Inform OOW on the Bridge when Incinerator was stopped.
• Inform OOW on the Bridge of type and amount of waste incinerated.

Title of Procedure: Incinerator Operation – Garbage Burning

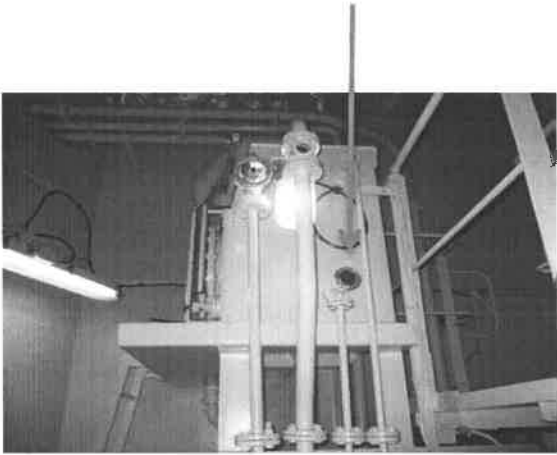
SOP#: SOP-CPV-

Start Up Procedure

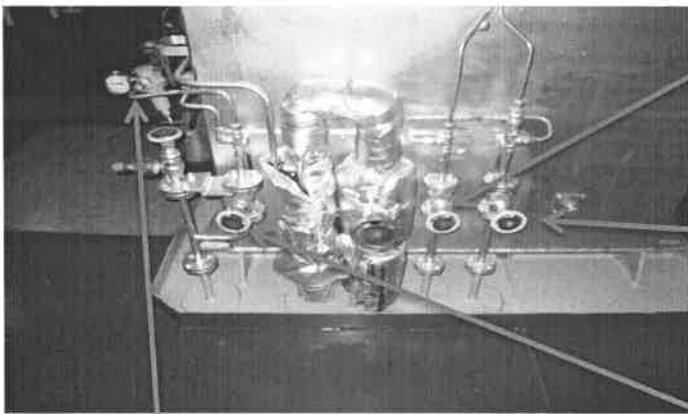
Step/Action

Hazard Symbol

1. Open D.O. outlet valve (OD341F) from the incinerator D.O. Service Tank.



2. Open the Following Valves:



D.O. Return Valve
(OD343F)

D.O. Supply Valve
(OD342F)

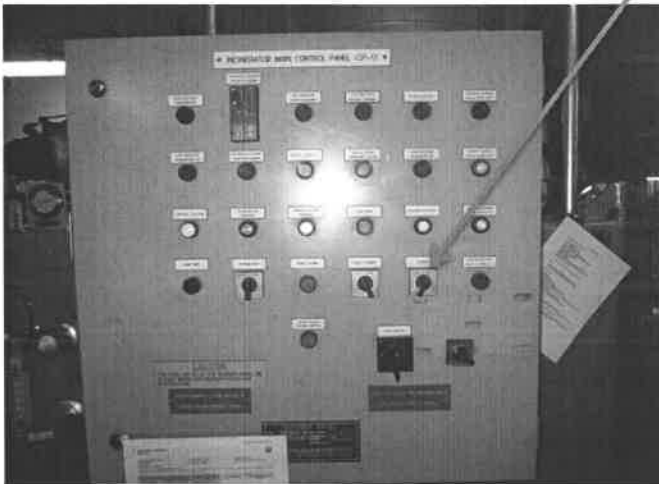
GS Air Supply Valve
(AR033F)

GS Air supply pressure to be 2.5
bar

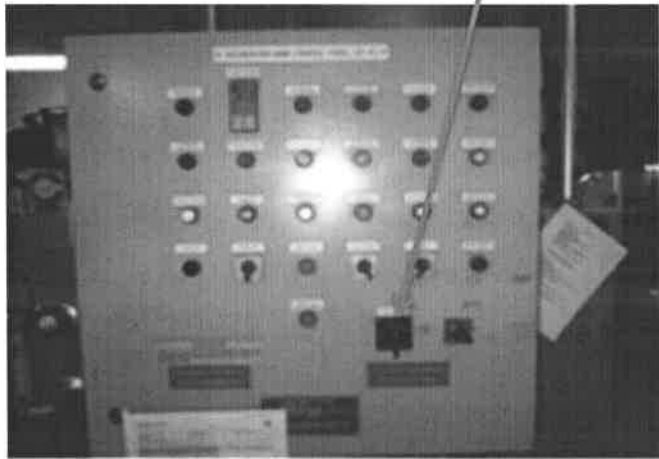
Title of Procedure: Incinerator Operation – Garbage Burning

SOP#: SOP-CPV-

- On the Control Panel, ensure that the switch under the Sludge Selection is "OFF".



- Main Switch change from 0-"OFF" to 1- "ON" position.



- RESET all visual alarms.

CAUTION

- To Start Incinerator, under the Incinerator Selection, switch to "START"
- D.O. pressure for Primary burner will maintain between 09-12 Bar.

NOTE


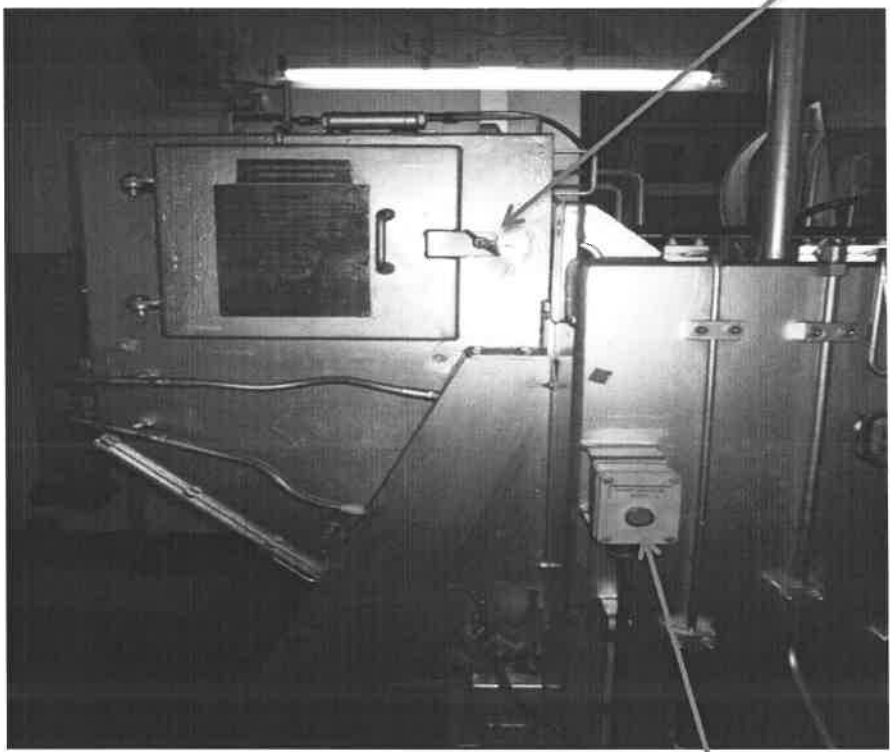


- The Primary burner will then be activated which will operate within set temperature (850-950 Deg C.).

- If the flame goes out, reset Incinerator by means of "**Reset Flame Failure Burner**".

CAUTION

Title of Procedure: Incinerator Operation – Garbage Burning

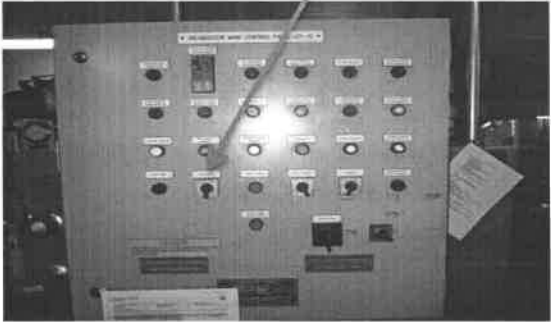
SOP#: SOP-CPV-

Steady State Procedure	
Step/Action	Hazard Symbol
<p>1. Once Chamber reach temperature between 850-950 Deg. C Solid Waste Chamber Door will allow you tu fill up Chamber with Solid Waste. (Do not overfill chamber with solid waste).</p>	
<p>2. Once Solid Waste Chamber doors are closed lock door with butterfly nut.</p>	
	
<p>3. Than introduce Solid waste to the chamber using the "Sluice" by activating the push button of "START SLUICE IN ACTION".</p>	
<p>4. Before adding another set of Solid Wastes, check first if the Incinerator is ready to receive more by looking throught the sight glass, if it is ready continue with step 5.</p>	
<p>5. When Green light is on on Sluice botton Solid Waste Chamber Door will allow you to refill chamber with Solid Waste.</p>	
<p>6. Once Solid Waste Chamber doors are closed lock door with butterfly nut.</p>	
<p>7. Than introduce Solid waste to the chamber using the "Sluice" by activating the push button of "START SLUICE IN ACTION".</p>	

Title of Procedure: Incinerator Operation – Garbage Burning

SOP#: SOP-CPV-

Shut Down Procedure (If Required)

Step/Action	Hazard Symbol
<p>1. Activate the switch "Incinerator Stop"</p> 	
<p>2. When Chamber temperature drops below 100 Deg. C. the Incinerator blower will stop automatically.</p>	
<p>3. When the Incinerator has stopped, switch "OFF" the Main Switch on Control panel.</p>	<div style="background-color: black; color: white; padding: 5px; display: inline-block;">NOTE</div>





Consequence of Deviation

Condition (Flow Rate, Level, Pressure, Temperature, Voltage, etc.)	Normal Operating Range	Potential COD for operating outside of Safe Operating Limits	Required Actions
Primary Burner need to Stop when Combastion Chamber reache 950 Deg.C	850-950 Deg.C	Overheating anddamage of Incinerator, fire	Stop Incinertator by prerssing emergeny stop and investigate problem.
Solenoid valve for Solid Waste Chamber door blociking is not functioning	Operating automaticly	Fire, Personal injury	Immediately STOP the incinerator do not fill up incinerator with solid waste, and call your Supervisor.

Title of Procedure: Incinerator Operation – Garbage Burning

SOP#: SOP-CPV-

Abnormal Conditions / Mitigations:


Condition	Mitigation	Hazard Symbol
DO Pressure low below 9 bar	Check if is properly line up and check DO pump	
Low negative pressure	Re-adjust pressure switch, close air nozzle	
DO pressure to high above 12 bar	Check burner nozzle, re-adjust pressure on the pump	
Negative pressure inside chamber below -60 mmAq	Exhaust gas funnel damper need to be completely open	
DO not Overload the Incinerator	MAX: 500,000 Kcal/h	


Procedure Approved By Signatures

Name	Review Type	Position	Signature	Date
	Initial Rewiew	VMT		
	Fleet team Review	Superintendent		
	Approval	FM / AFM		

Document Number		Revision	
Document Owner		Department Owner	

Hazard Symbols:

	The operator should take note of the comment prior to performing this step.
--	---

	The operator should apply caution when performing this step.
--	--

⚠ WARNING

Performing this step incorrectly could place the operator in danger.

ENVIRONMENT

Performing this step incorrectly could result in environmental impact.

⚠ DANGER

Performing this step incorrectly could place the vessel in danger.



Temperature Controlling Valve

Nadeep Lamba

Engine Cadet



Date:

Signature:

Nadeep Lamba

Temperature controlling valve

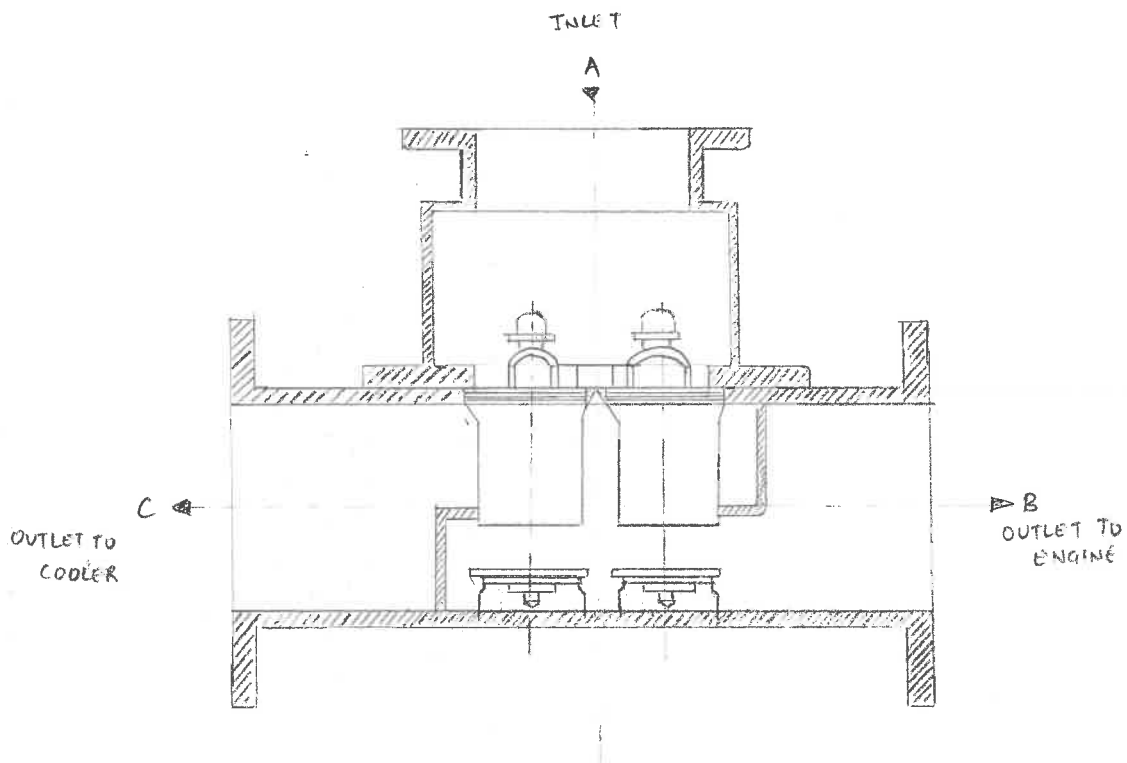
The Thermostatic valve is designed as T- piece with the inlet in the cover (A) under which the thermostatic elements are located.

The outlet to the engine (B) and outlet to the cooler is marked (C) .In the warming up period the oil is bypassing the cooler.

When the oil from the engine reaches to the normal temperature a controlled amount of oil passes through the cooler.

The thermostatic elements must be replaced if the temperature during normal operation deviates.

The valve cannot be set or adjusted, and it requires no maintenance.



THERMOSTATIC VALVE



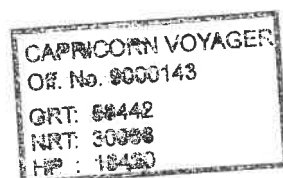
Governor
Nadeep Lamba

Engine Cadet

Date: 24/05/17.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.



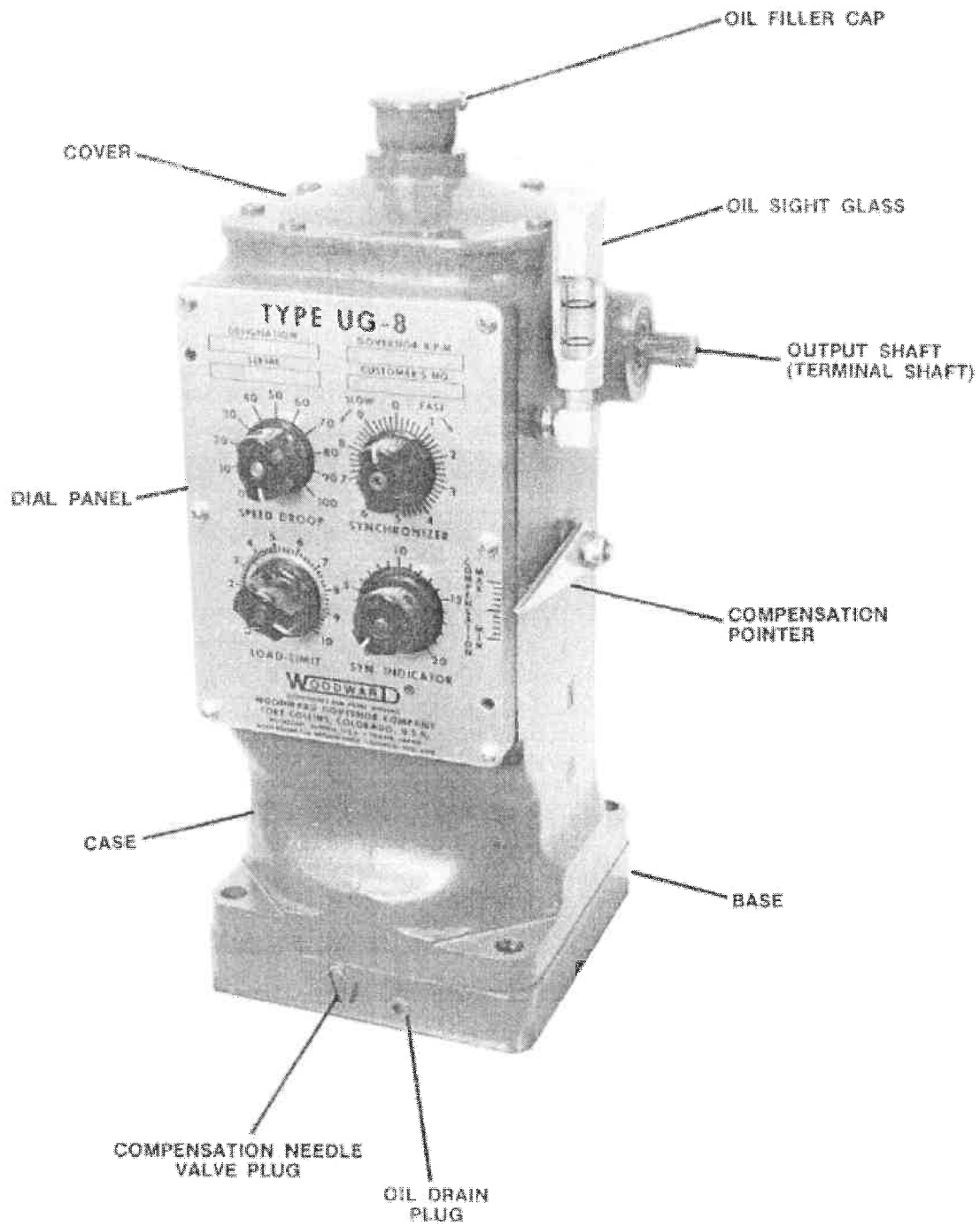


Figure 1-1. UG-8 Dial Governor

Governor

❖ Model : UG - 8 Dial Governor

The engine speed is controlled by a hydraulic governor.

The purpose of the governor is to regulate the rate of delivery from the fuel pumps, so that the engine speed is kept within certain limits, depending on the load.

The governor is mounted on the flywheel end of the engine and is driven from the camshaft via a cylindrical gear wheel and a set of bevel gears.

Normally The UG governor operates At constant speed regardless of load on the engine.
A load limiter



When the engine speed rises the governor overrides the fuel lever and reduces the fuel injected into the cylinders, thus preventing the engine speed from rising further. Similarly, if the engine speed decreases then it allows more fuel into the cylinder thus preventing the speed to decrease further.

❖ INCREASE IN LOAD

- As speed decreases, the centrifugal force of the flyweights decreases and the opposing speeder spring force is now greater than the centrifugal force of the flyweights.
- The flyweights tip inward and lower the speeder rod and the right end of the floating lever.
- This lowers the pilot valve plunger, opening the control port in the rotating bushing. Pressure oil is released through the control port into the lower cylinder of the power piston.
- The power piston is forced upward by the pressure oil acting on the larger lower surface area of the power piston and the governor output shaft is rotated in the increase fuel direction.
- Linkage from the governor output shaft lifts the compensating adjusting lever, which rotates the fulcrum, lowering the large dashpot compensation piston.
- Pressure oil is applied to the bottom side of the small dashpot compensation piston, raising the left hand of the floating lever.
- This raises the pilot valve plunger closing the control port.
- As sump oil flows through the needle valve from the dashpot compensation piston assembly, the small dashpot compensation piston is returned to its normal centered position by the compensation spring at the same rate as the speeder rod. This keeps the pilot valve plunger in its centered position.
- The control port in the rotating bushing is kept closed by the land on the pilot valve plunger.

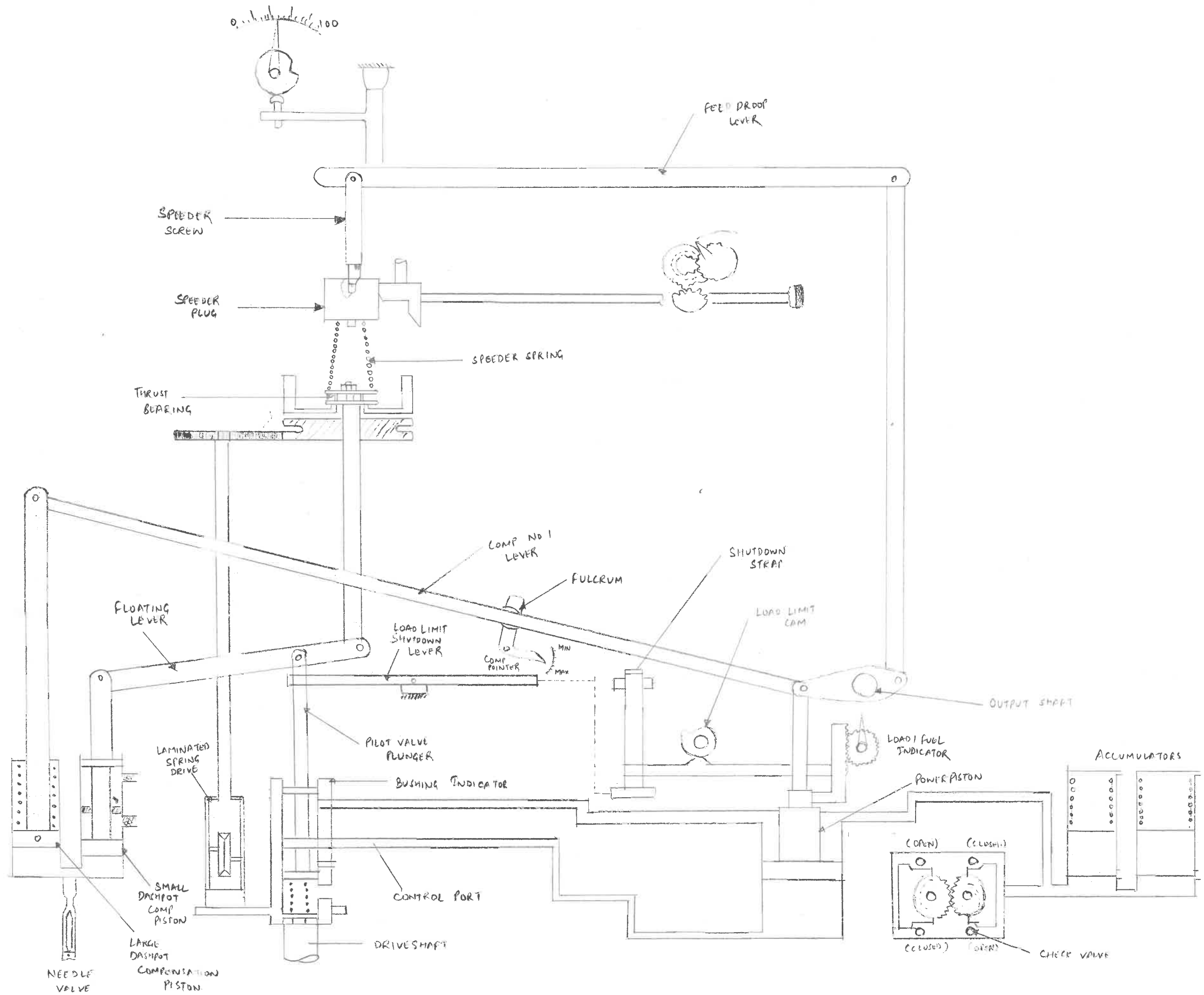
This stops the governor output shaft and power piston movement in the new increased fuel position. This is the position needed to run the prime mover at the selected speed setting with the new load.

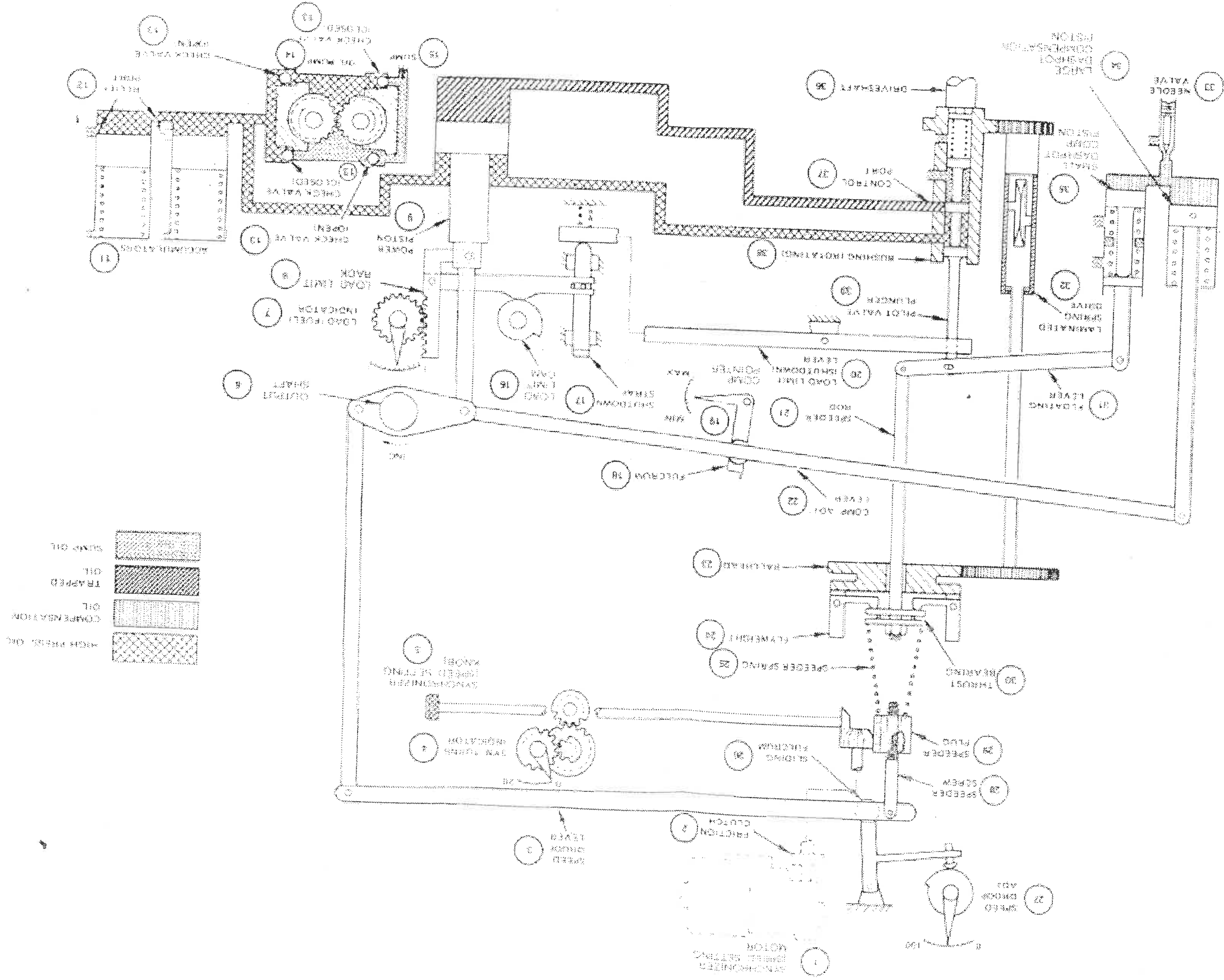
❖ DECREASE IN LOAD:

- As speed increases, the centrifugal force of the flyweights increases and becomes stronger than the force of the speeder spring.
- The flyweights tip outward and raise the speeder rod and the right end of the floating lever.
- This raises the pilot valve plunger, opening the control port in the rotating bushing. Oil is released from the bottom of the power piston to the sump.
- Pressure oil on the top side of the power piston moves it downward, rotating the governor output shaft in the decrease fuel direction.
- Linkage from the governor output shaft lowers the compensation adjusting lever, which rotates the fulcrum, raising the large dashpot compensation piston.
- Suction is thus applied to the chamber of the small dashpot compensation piston, lowering the left hand of the floating lever.
- This lowers the pilot valve plunger closing the control port.
- As sump oil flows through the needle valve from the sump into the dashpot compensation piston assembly, the small dashpot compensation piston is returned to its normal centered position by the compensation spring at the same rate as the speeder rod. This keeps the pilot valve plunger in its centered position.
- The control port in the rotating bushing is kept closed by the land on the pilot valve plunger.
- This stops the governor output shaft and power piston movement in the new decreased fuel position. This is the position needed to run the prime mover at the selected speed setting with the new load.

As in both cases a decrease and increase in load , the compensation system operates in opposite directions. The compensation or amount of movement of the large dashpot compensation piston is controlled by the compensation adjustment i.e. , the fulcrum position.

The rate at which the small dashpot compensation piston is returned to normal is controlled by the needle valve adjustment i.e. , the rate of flow of oil through the needle valve.



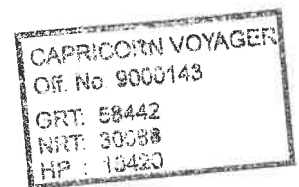




Piston

Nadeep Lamba

Engine Cadet



Date: 25 APRIL 2017

Signature:

Nadeep Lamba

PISTON, PISTON ROD AND STUFFING BOX

1. Piston Crown

- 1.1 The upper part of the piston is curved in concave form so as to act as a self supporting member and also form the lower part of the combustion chamber. This concave surface does not go under fatigue due to cyclic pressure changes.
- 1.2 The Piston is made of Steel which is generally used for the pistons in such slow speed engines.
- 1.3 The Piston is oil cooled with the oil being fed at a pressure through the centre of the Piston Rod and after cooling the crown and the skirt it comes down through an annular space.
- 1.4 The Piston is attached to the Piston Rod with the help of a bolt which can be seen from the bottom side of the piston. These bolts are tied together by a locking wire so that they do not loosen due to vibrations and fall down.
- 1.5 The Piston Crown holds four sealing rings.
- 1.6 Two D-rings prevent any piston cooling oil from leaking out of the cooling space either sideways towards the liner or downwards.

2. Piston Skirt

- 1.1 The piston crown is also provided with a Skirt so as to take the thrust caused by Connecting Rod angularity and transmits it to the side of the Cylinder liner. This helps in sharing the load along with Crosshead guides.
- 1.2 The Skirt is made of Alloy Steel and is attached to the Piston crown by bolts at the bottom side.
- 1.3 The Piston Skirt holds the Scrapper Ring.

3. Piston Rings

- 1.1 There are four piston rings in total, three on the Piston Crown and the scrapper ring on the skirt.
- 1.2 All the rings are made of Cast Iron.
- 1.3 The Scrapper Ring serves two functions; firstly it prevents

4. Stuffing Box

- 1.1 The Stuffing Box consists of a series of rings which scrape the oil of the Piston Rod while it moves down, so as to prevent the contamination of the crankcase oil from the gases and the cylinder oil which is of higher TBN value.
- 1.2 The first ring is the Top Scrapper Ring supported by the Pack Sealing Ring. After that, two Cover Sealing Rings are provided which are also supported by Pack Sealing Rings.
- 1.3 Four more Scrapper Rings are provided with different cross section. The bottom four rings also have lamella for scraping off the oil. All the Rings are kept in compression by springs for better sealing.
- 1.4 All these are housed in a housing which is further mounted on a Flange which is attached to the engine frame by bolts.

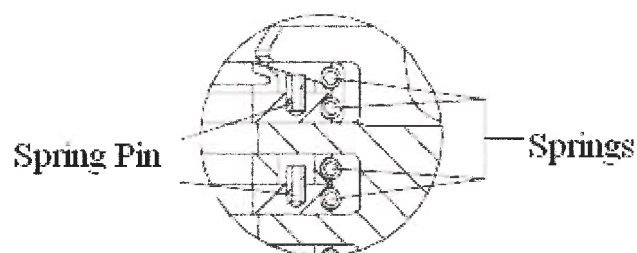


Fig: Top Ring Profile

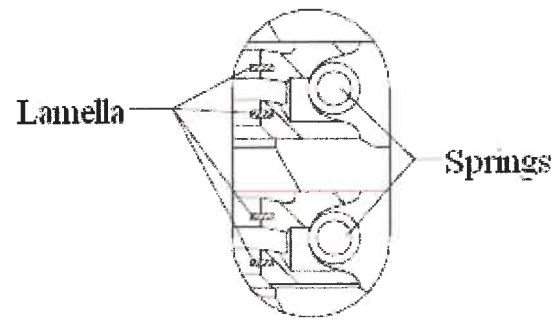
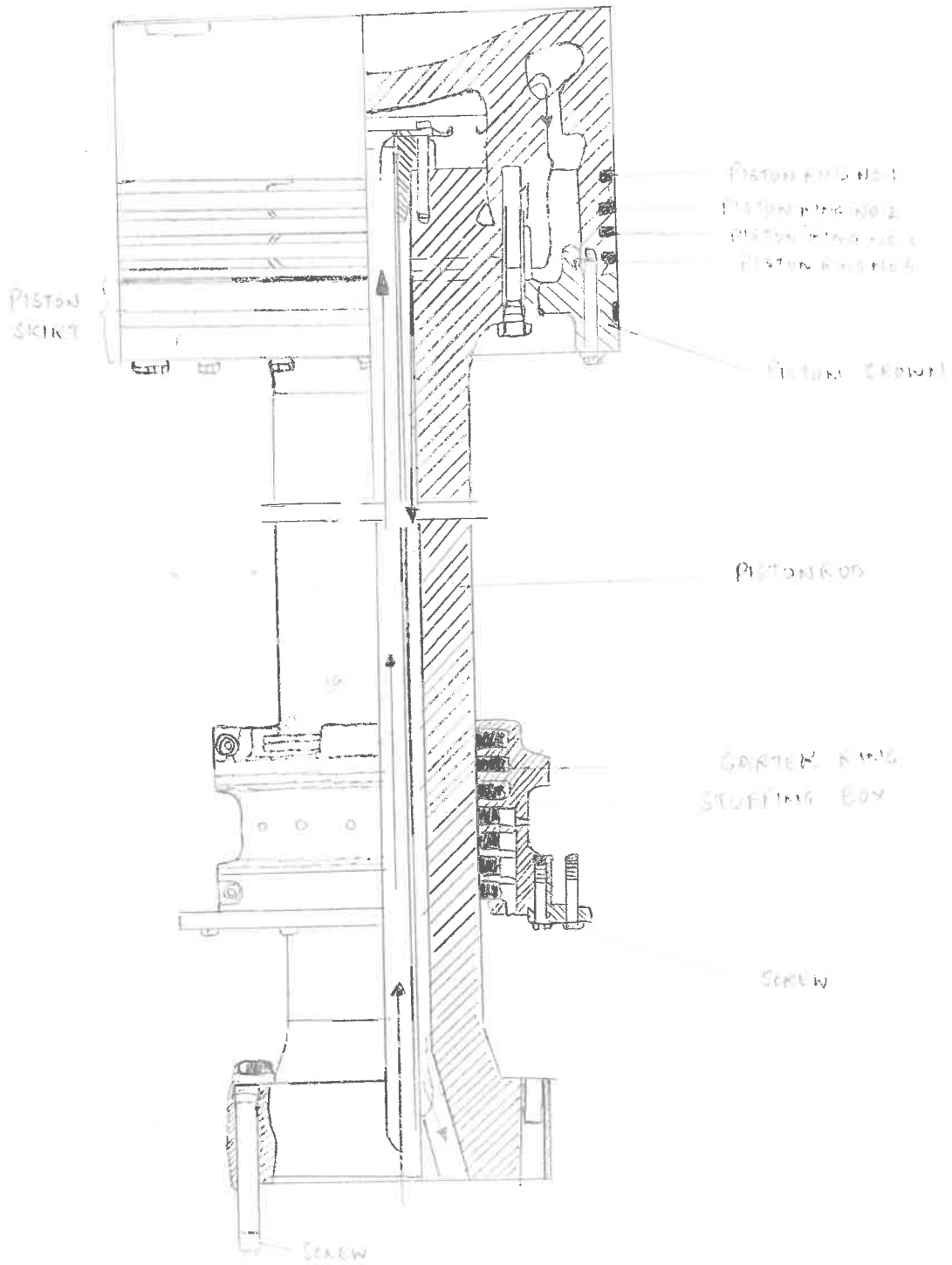


Fig: Bottom Four Rings Profile



PISTON



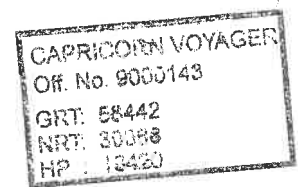
Piston



VARIOUS FUSES AND APPLICATION TWO OVERLOAD PROTECTION SYSTEM

Nadeep Lamba

Engine Cadet



Date: 04 JUNE 2017

Signature:

A handwritten signature in black ink, appearing to read "Nadeep Lamba".

❖ Describe the various fuses and application:

A fuse is a protective device which is there to prevent overloading. If too heavy a fuse or if the fuse is overridden then there is a possibility of overheating, deterioration of insulation and failure.

High current flow through a thin fuse wire will raise its temperature, causing it to melt and break the circuit before the current excess reaches a level sufficient to damage other, more substantial parts of the system. Melting temperature depends on the material used (Tinned copper in rewirable fuses melts at 1080 C, the silver in cartridge fuses at 960 C). The wire is sized so that the normal current is carried without overheating but, due to the resistance of the relatively small wire, that excess current will produce heat sufficient to melt it. Current rating gives the normal current that may be carried. Minimum fusing current is the smallest current that will cause melting.

➤ Minimum fusing current:

A fuse will melt much quicker with very large fault current than when the value of fault current is only just above the minimum fusing current. Time/Current characteristics are found by testing six or more of the same type of fuse at different currents and plotting the results. The bottom current for the test is not more than 1.05Xminimum fusing current, and the top current is one that will melt the wire in not more than 0.5 second. The other test currents are equally spaced between these. Fuses are rated for particular A.C or D.C voltages.

➤ Materials :

Tin, Lead, or silver having low melting points. Use of copper or iron is dangerous, though tinned copper may be used.

Unlike some other forms of circuit protection devices (oil switches for instance), which are suitable for A.C. only, solid filled cartridge fuses have an approximately equal breaking capacity for D.C. and A.C. and the action of the fuse does not depend on breaking circuit at the zero point on the current cyclic wave

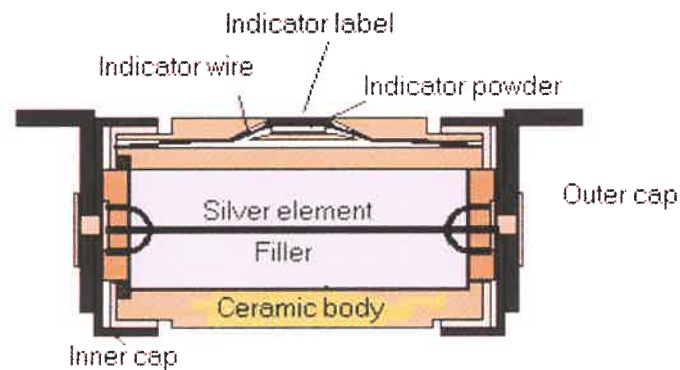
➤ **Requirements of a fuse:**

- Have a high cut off speed on short circuit
- Operate on a sustained overload
- Make a complete break after operation with high insulation resistance between terminals
- Be mechanically robust and capable of withstanding the large magnetic and gaseous forces exerted during operation under short circuit conditions

➤ **A fuse must not:**

- Operate on continuous full load
- Operate on momentary overload
- Deteriorate under continuous operation at full load
- Burst or emit flame or otherwise damage the fuse carrier and base when it operates

➤ **Cartridge Fuses:**



High rupture capacity (HRC) fuses have silver wire enclosed in a quartz-powder-filled ceramic tube with metal end-caps. Arcing when this type of fuse blows is buried in the powder, fusion of which in the arc path helps to extinguish it.

HRC fuses can be used for very high fault levels. Deterioration is negligible. They have accurate time/current characteristics and reliability for discrimination. They are safer if accidentally inserted on a fault. There is no issue of smoke or flame. Cartridges are sized to ensure that the correct value fuse is fitted.

Semi-enclosed fuses:

The rewirable fuse has an insulated carrier for safe handling and containment of the wire in an asbestos-lined tube. The wire is easily replaced after operation, but the design is open to abuse as too heavy a wire can be used which masks a fault and also cause could severe arcing if it did operate. Another fault is that of premature failure if the wire is made thinner by oxidation or contact with air, or by being stretched when fitted.

❖ **Describe two overload protection system:**

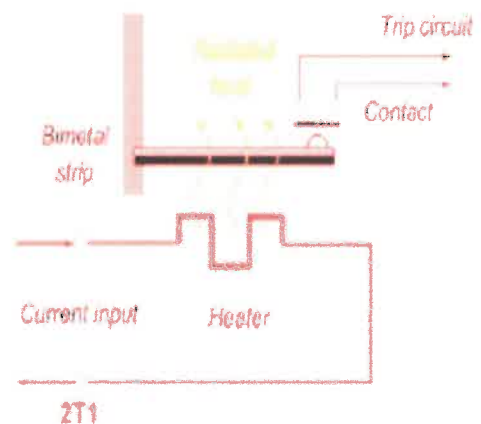
There are two types of overload protection. They are :

- Electronic
- Thermal

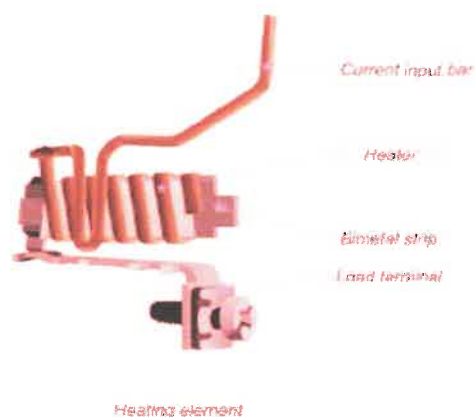
Thermal relay utilizes the bending action of the bimetallic strip (one per each phase) to operate a set of incorporated contacts, which are in turn intended to trip a contactor or circuit breaker. Full load current will flow through the coil, wired in series with each phase of the load. This coil heats up the bimetallic strip, which is used as a trip lever. In the event of overload, the current increases and heat radiated by the coil rises. This causes the bimetallic strip to bend, triggering the trip mechanism and the NC contacts opens.

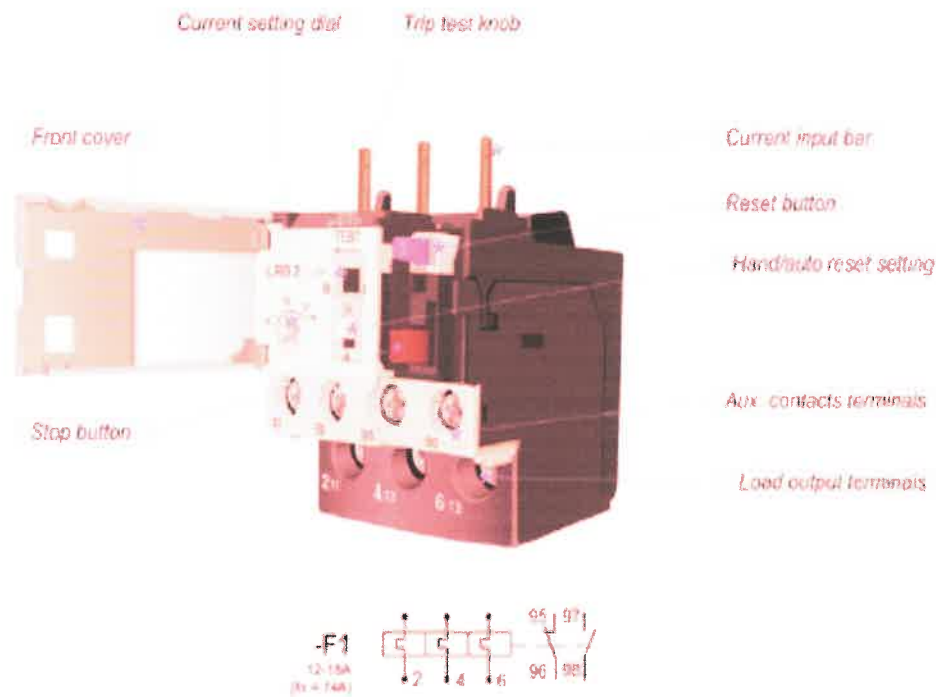
A mechanical bell-crank trip arrangement can also operate with unbalanced (differential) currents. This is particularly effective with a single phasing motor fault. In this case, two of the bimetal strips bend further in the normal direction with increased line current, while the other cools down allowing this strip to move relatively backwards (differential action).

The time taken to heat the bimetal strip to cause sufficient bending fixes the required time to trip. Resetting the relay can only be achieved after the strip has cooled down back to the ambient temperature. The inverse 1/t overcurrent characteristic of a thermal relay is very useful for the indirect temperature protection of motors. Its thermal time delay is, however, far too long for a short-circuit fault so instantaneous protection must also be used in the form of fuses or a circuit breaker.



Indirectly heated





*Telemecanique thermal overload relay LRD
and relative diagram's symbol*

Thermal relays are commonly fitted in MCCBs and MCBs to give a 'long time' thermal overcurrent trip in addition to a magnetic action for an instantaneous trip with a short-circuit fault.

An electronic overcurrent relay usually converts the measured current into a proportional voltage. This is then compared with a set voltage level within the monitoring unit, which may be digital or analogue. In an analogue unit, the time delay is obtained by the time taken to charge up a capacitor. This type of relay has separate adjustments for overcurrent and time settings, together with an instantaneous trip. The electronic amplifiers within the relay require a low voltage DC power supply.

Here, the input from a line current transformer(CT) is rectified to produce a DC voltage that is proportional to the line current. This voltage charges capacitor C2 at a rate set in conjunction with potentiometer R5, which determines the inverse time characteristics for the relay. When this capacitor voltage exceeds the predetermined level, the detector circuit drives power transistor T1 to operate the output electromagnetic relay RLA, which switches trip and alarm contacts in the external circuits.

An instantaneous trip operation is obtained by applying the output of the bridge rectifier directly to the input of the amplifier with a voltage set by R4. Therefore, for higher values of fault current, the inverse time delay circuit is bypassed.



Capricorn Voyager

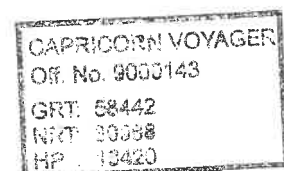
**MAIN ENGINE
AIR STARTING VALVE
SECTIONAL DIAGRAM AND BRIEF
DESCRIPTION**

ENGINE CADET

NADEEP LAMBA

DATE : 25 APRIL 2017

SIGNATURE : 3/e KH



STARTING AIR VALVE

Casted body with smaller lower part fits into the engine cover. Larger part forms air cylinder, and the piston working in this cylinder is fitted to starting valve spindle. The cover has a supply of pilot air from the distributor which when opens forces the piston downward opening the valve. Spring gives the required force for closing the valve.

Starting air valves are fitted to the cylinder head for admitting starting air for the cranking of the engine. The air starting valves are connected across the start air rail which supplies the starting air at 30 bars.

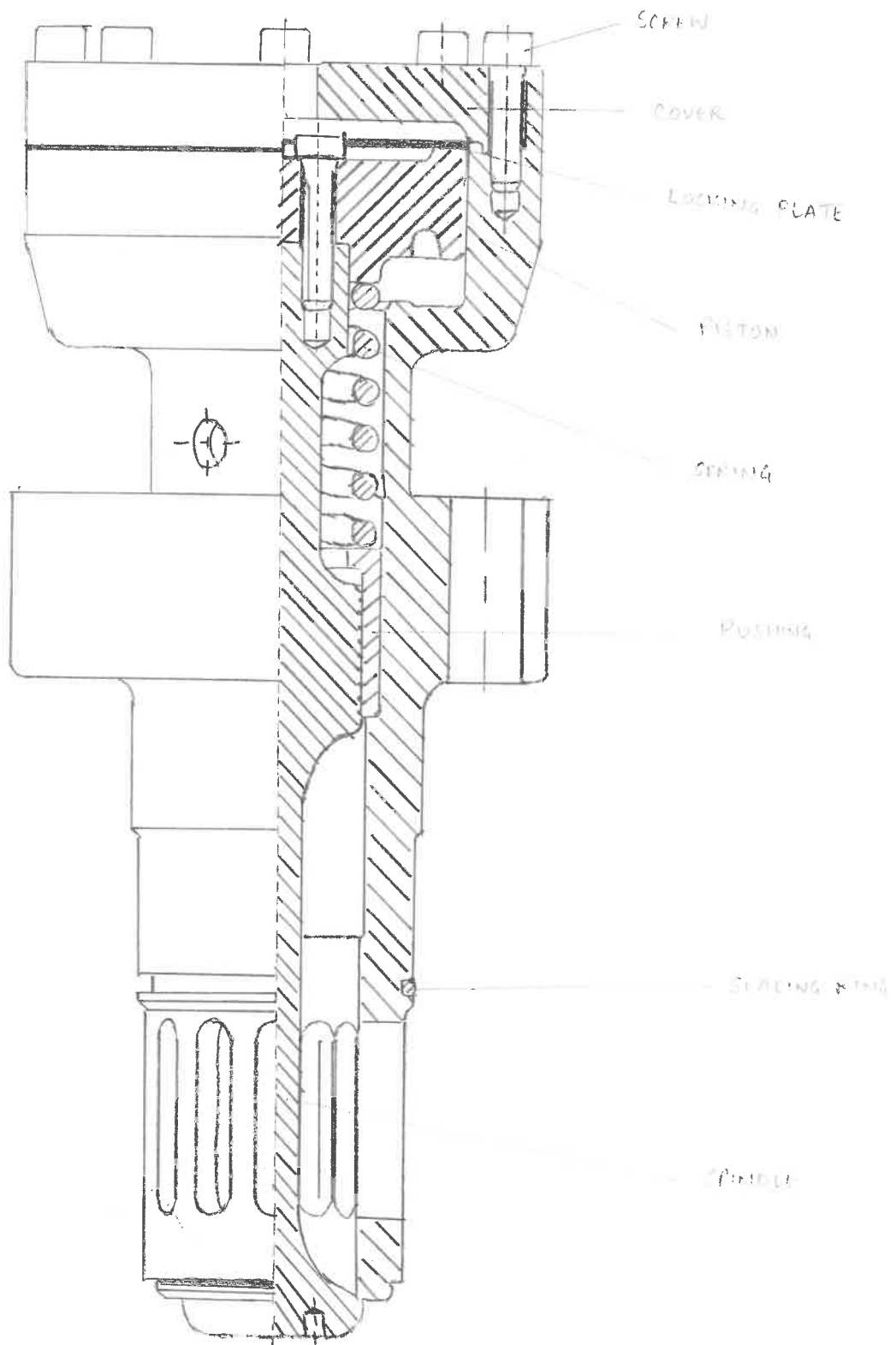
The starting air is led to the space in between the balance piston and valve itself. The area of both the balance piston and valve is the same so no resultant force is exerted by the starting air.

On the top of the valve there is a pilot piston and a connection for the pilot air line. This pilot air line is also of the order of 30 bars and is directed by the distributor.

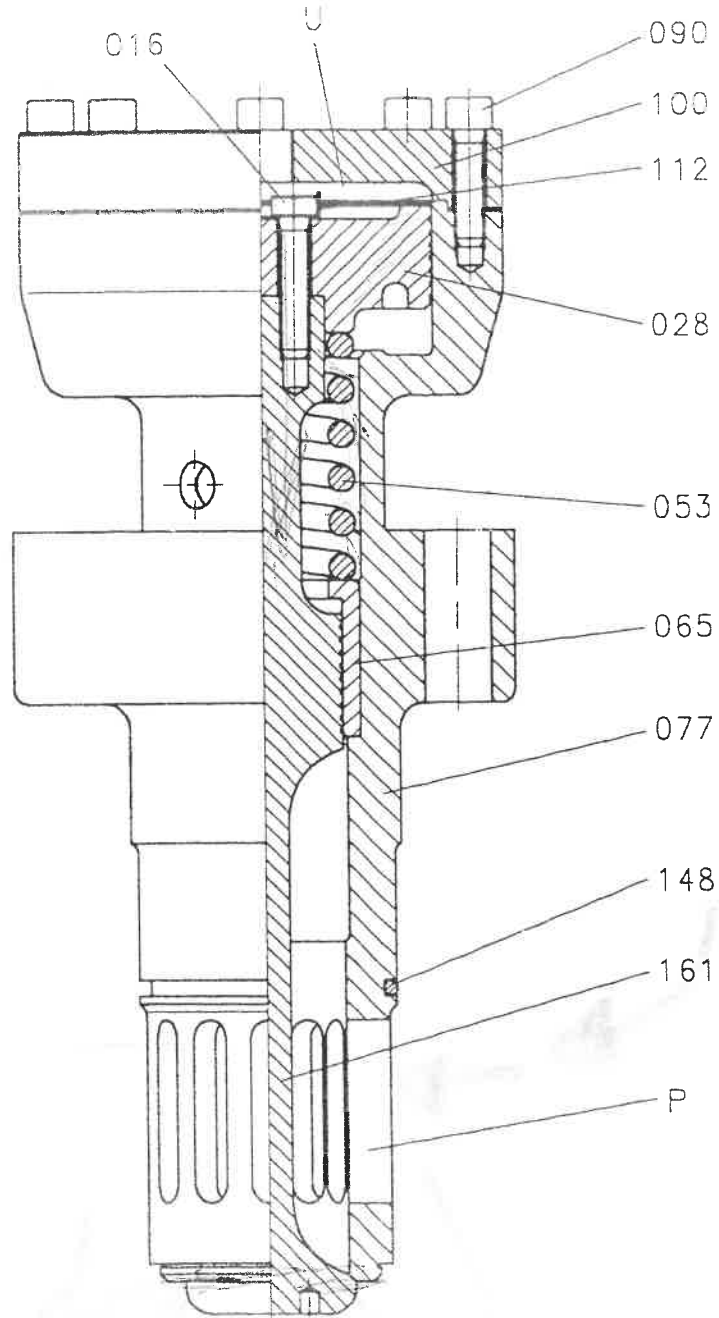
As per the firing order, the crankshaft orientation and the ahead or astern order, the air distributor directs the air pilot air to the air start valve of the required cylinder. As the pilot air applies force on the pilot piston, the spindle moves down and the starting air, which was waiting under the balance piston, is admitted in the cylinder. When the distributor cuts off the supply of pilot air, the valve closes due to the action of the spring.

In the same process the air is admitted in the next cylinder as required by the air distributor. When the air is being admitted the fuel is not admitted. Only after the engine has developed required cranking speed then the fuel is admitted and the starting air valves are shut off.

In case the starting air valve is leaking and the hot gases are entering the start air manifold, there is a chance of starting line explosion. To prevent this accident the starting line is provided with bursting discs and flame arrestors.



AIR STARTING VALVE





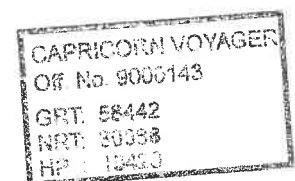
Main Engine Exhaust Valve

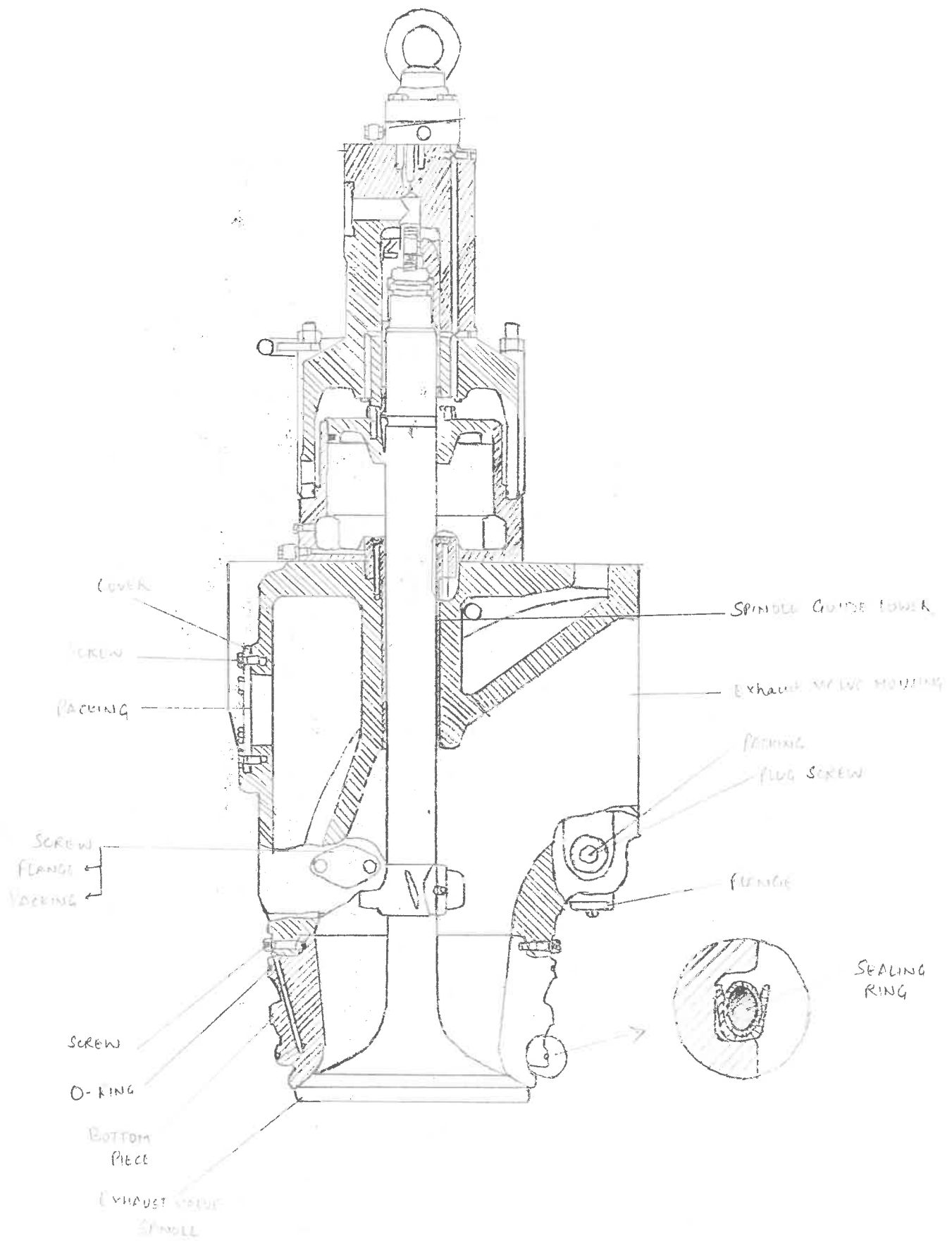
Nadeep Lamba

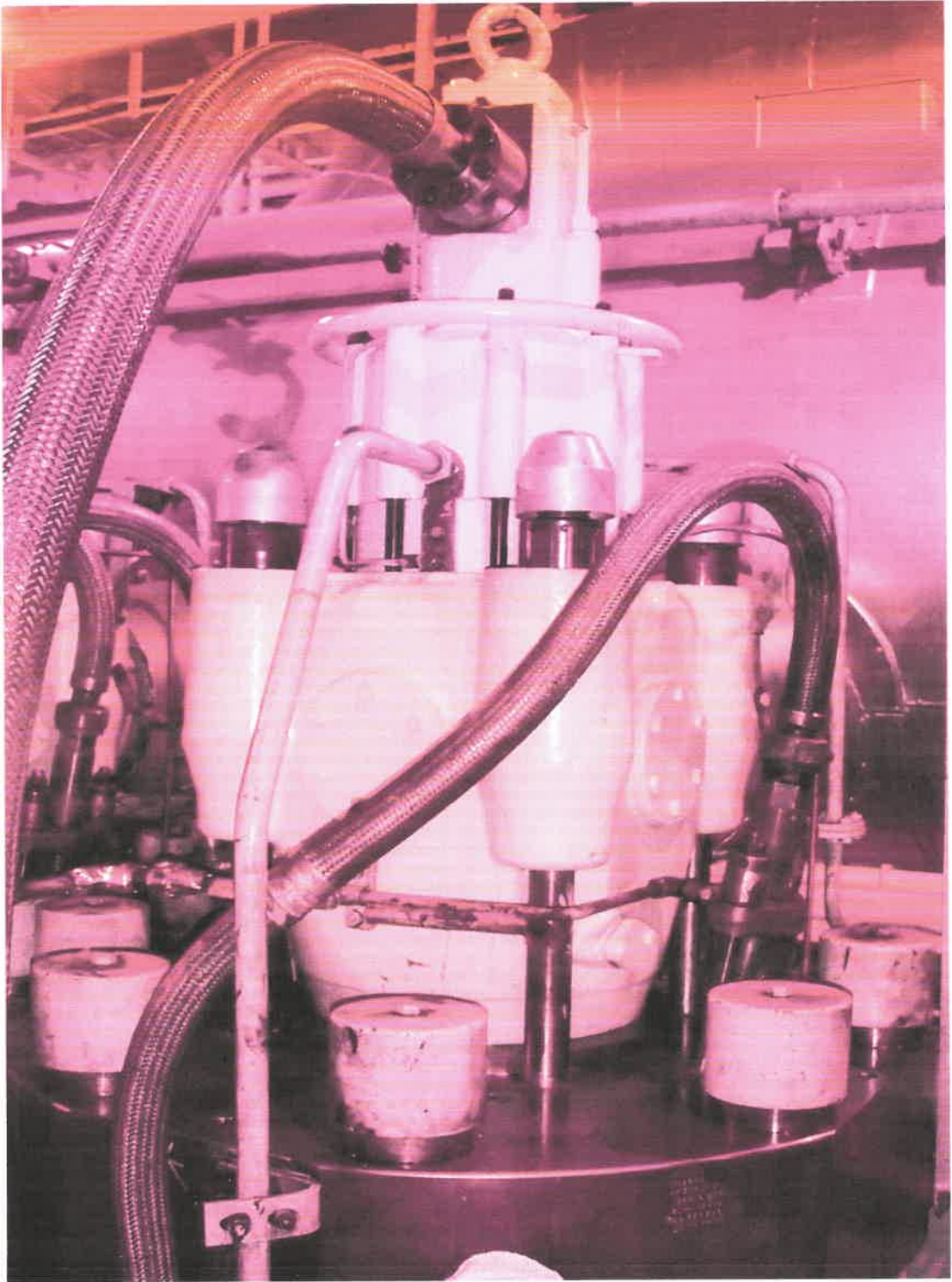
Engine Cadet

Date: 24 APRIL 2017

Signature: 3/E *NL*







MAIN ENGINE EXHAUST VALVE



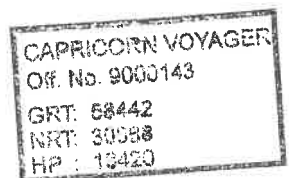
Steering gear Ram

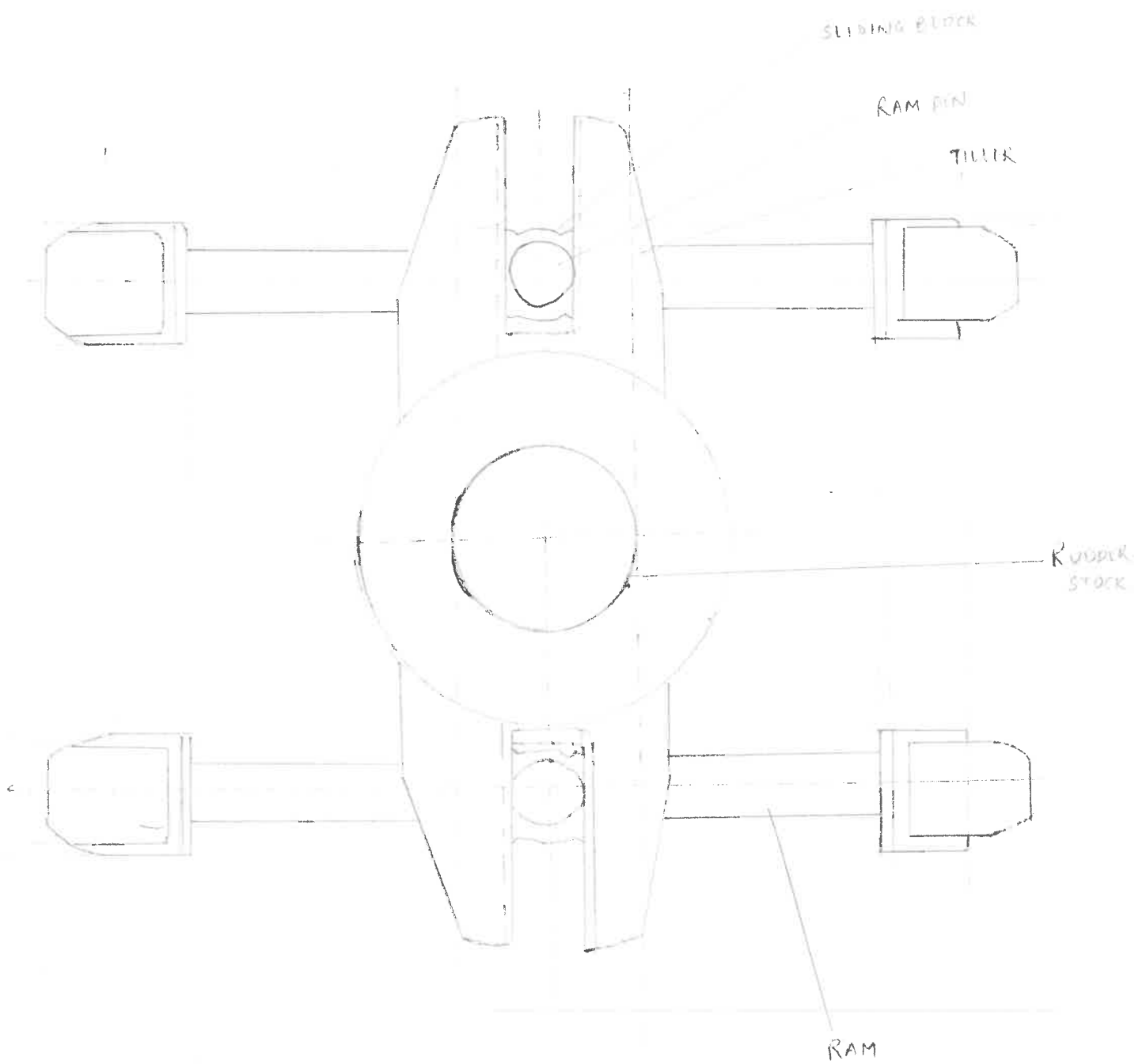
Nadeep Lamba

Engine Cadet

Date:

Signature: 3/e *[Handwritten Signature]*





RAMSOM SLIDE ARRANGEMENT



Crosshead Guide and slipper

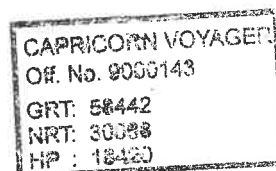
Nadeep Lamba

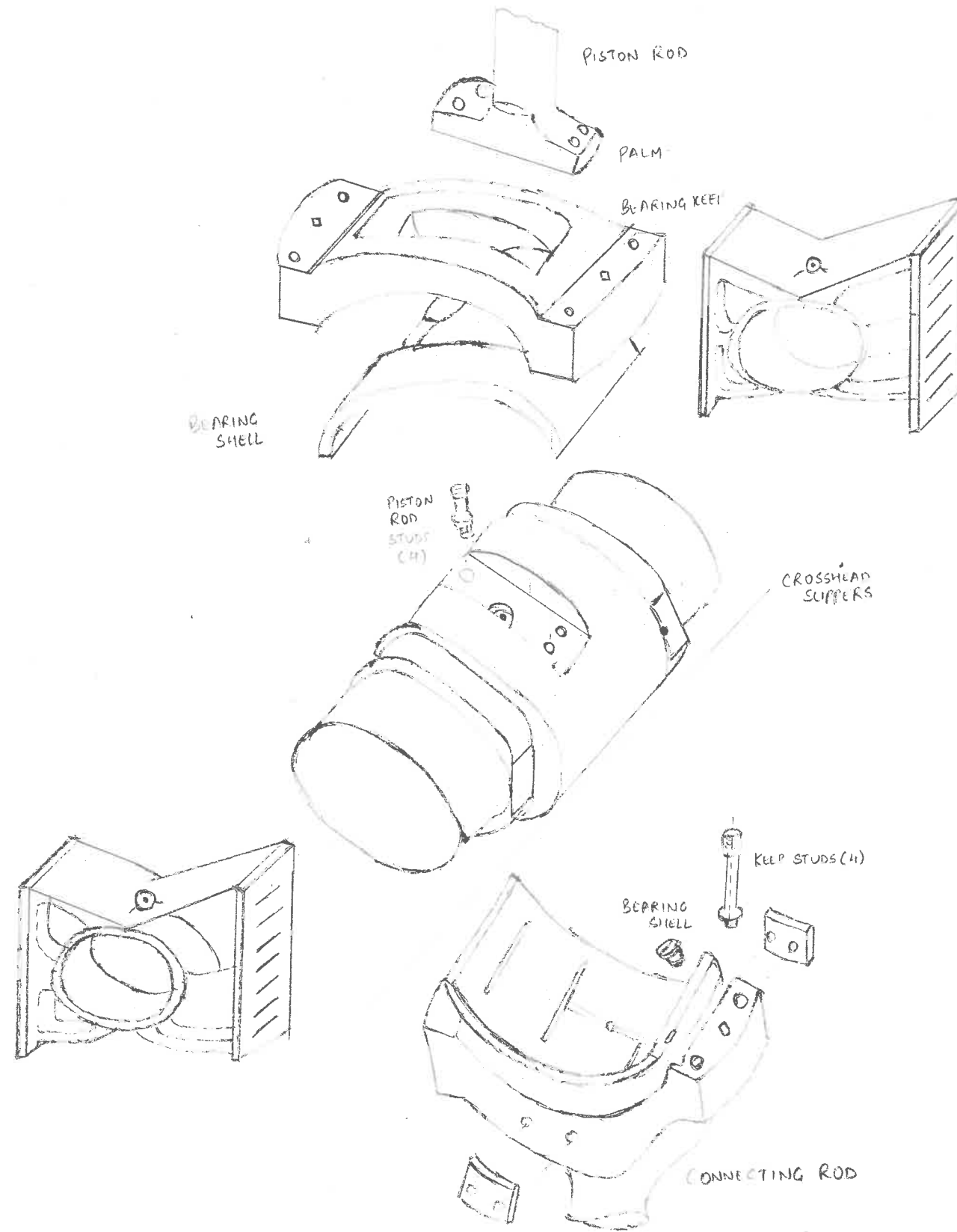
Engine Cadet

Date: 17.05.17.

Signature:

A handwritten signature in blue ink, appearing to be "Nadeep Lamba", with a horizontal line underneath. Below the signature, the initials "CTO" are written in black.





CROSSHEAD, GUIDE AND SLIPPERS

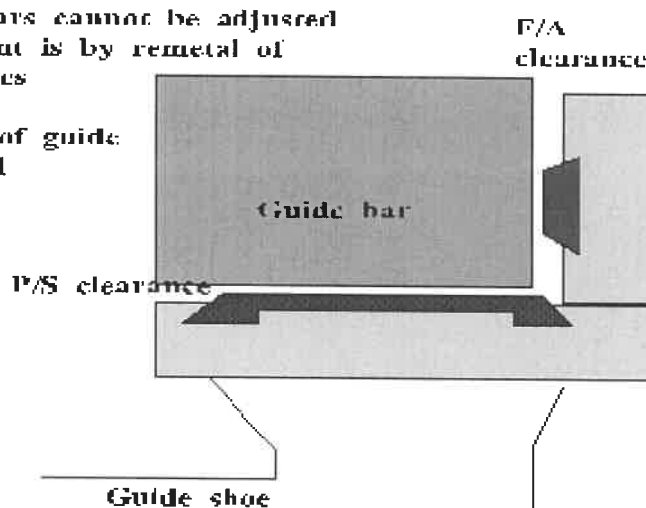
❖ Crosshead:

The crosshead is connected to the piston rod on the top side and to the connecting rod on the bottom side so as to translate the reciprocating motion of the piston into the semi-rotary motion at the connecting rod. It accommodates a bearing and guide shoes. Connections to the crosshead also provide lubricating oil supply for lubrication of bearing and guide shoes, bottom end bearing and for piston cooling through the piston rod. The crosshead pin is hardened and has a very high surface finish and provides a full width surface for bearing.

Two faces are required as the thrust acts in opposite directions during power and compression stroke. Guide shoes positioned at the extreme ends of the crosshead pin provided a large area and minimize risk of twisting.

**Fixed guide bars cannot be adjusted
-any adjustment is by remetal of
guide shoe faces**

**Rubbing face of guide
bar is polished
hardened steel**

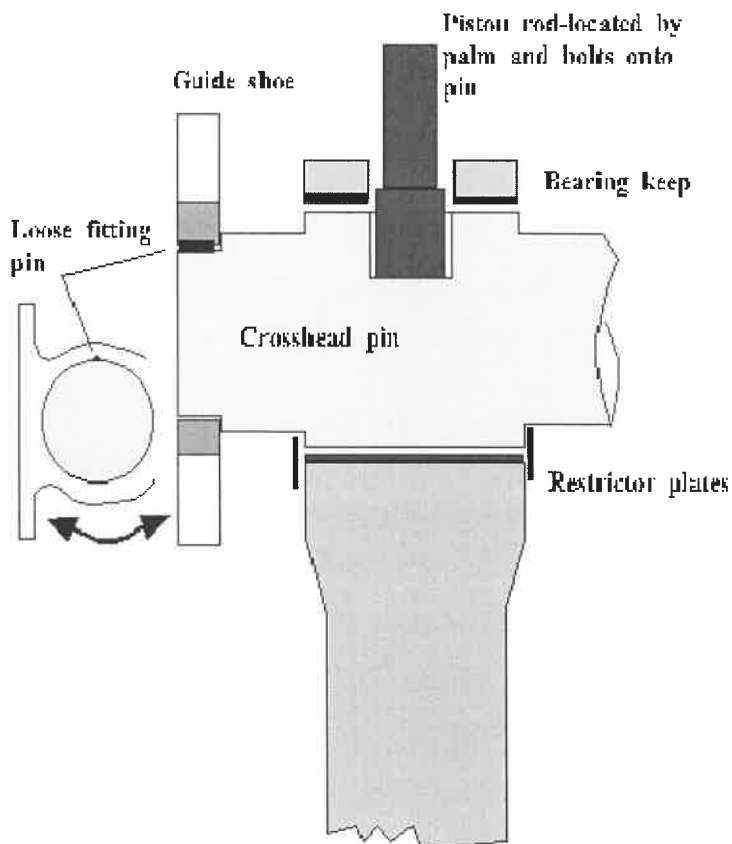


The guide bar, which is fixed to the A-frame may be shimmed to reduce the P/S clearance

❖ Crosshead Bearing Lubrication:

The maximum load on the crosshead bearing comes during the compression and firing and there is no relative movement between the pin and the bearing, so the lubrication is done by a separate high pressure lubrication system because no hydrodynamic lubrication can take place due to the absence of wedge formation. The hydrostatic lubrication gives a sufficient bearing lift during this period.

In order to minimise the risk of bearing failure the actual force on the oil within the bearing should be kept within reasonable limits this can be achieved by having as large a bearing area as possible. Increasing the diameter of the pin and hence the bearing will minimise the problems as this not only allows for a large bearing area but it also avoids the problem of pin bending. Pin bending is further prevented by means of a continuous bearing. This also avoids the loss of oil which can take place with short bearings. Most modern engines tend to have single continuous bearings. Oil loss from the ends of bearings is prevented by means of restrictor plates. Cross heads do not have complete rotary motion and so a complete oil wedge does not form. The means for preventing oil loss are therefore useful in maintaining an oil film between pin and bearings.



The crosshead pin is fitted with a loose fitting pin. This pin allows a small degree of movement (about 1mm) between the guide shoe and the pin giving better alignment.

❖ Guide shoes:

Guide shoes float on cylindrical extensions to the crosshead pin, the float allowing for a limited degree of rotation of the shoes relative to the pin, the rotation being restricted by stop screws. The float ensures that an oil wedge can be formed between the shoes and guide bar in both ahead and astern direction.

Slippers:

The guide strips project from the shoes and contact the sides of the guide bars or slippers. These are firmly mounted in the engine frame. Rubbing surface of the guide shoes are lined with white metal on cast iron.

❖ Function of the crosshead:

The crosshead converts the reciprocating motion of the piston into a semi rotary motion of the connecting rod on crosshead type of engines. The crosshead pin connects the piston rod to the connecting rod. On either side of the crosshead pin are mounted the crosshead slippers. The slippers run up and down in the crosshead guides as the piston and rod are reciprocating and prevent the top of the connecting rod from moving sideways.

Crosshead pins are of as large diameter as possible to accommodate high downward load and to ensure effective lubrication. It also gives a large bearing surface to keep the bearing pressure at an acceptable level.

❖ Crosshead lubrication

The load on the pin is always downwards, so it is the bottom half of the bearing which is subject to wear. Because of the high loads the bearing material is a tin-aluminium alloy bonded to a steel shell. The pin is highly polished to a mirror finish.

The crosshead on a slow speed 2 stroke engine is a difficult bearing to lubricate effectively. The load is continually downward and because the con rod swings about the pin, changing direction each stroke, true hydrodynamic lubrication cannot take place. Instead the lubrication starts as boundary, and as the rubbing speed increases, a hydrodynamic film is built up. As the rubbing speed decreases the lubrication becomes boundary once again.

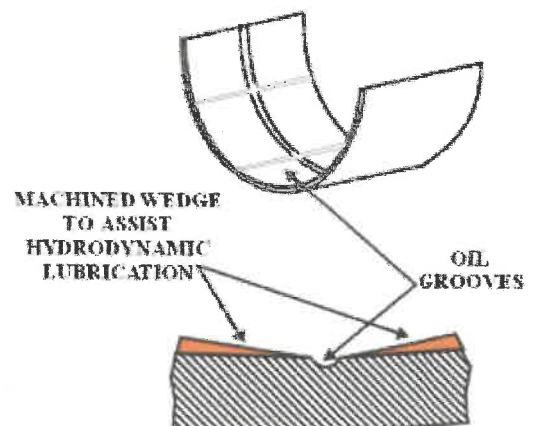
The lower half of the bearing housing is formed by the top end of the connecting rod. It supports the crosshead pin over its entire length, the piston rod being bolted to the top half of the crosshead pin through a cut out in the bearing top half. Oil supply to the crosshead is via an annular pipe from the main LO supply line at a pressure of about 2.4 bars.

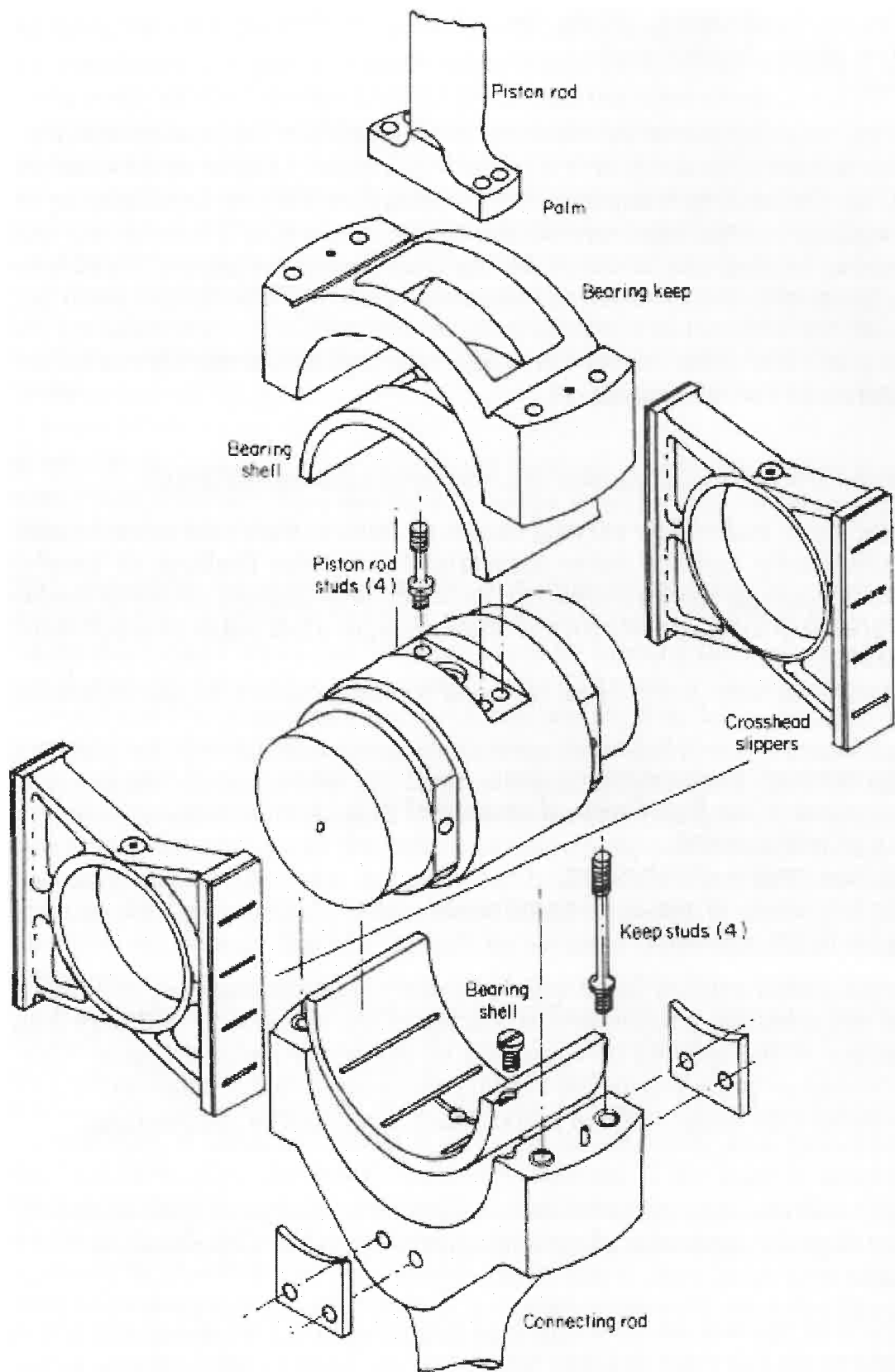
The lower bearing shell (tin aluminium with overlay) has oil grooves with machined wedges. The oil enters via the cut out channel in the centre. The grooves extend right to the edges of the bearing to ensure a flow of oil, thus cooling the bearing.

MAN B&W supply oil to their crosshead at system pressure. Modern engines have closed crankcases and a much higher bearing load - hence the need for oil cooling.

A crosshead bearing is only oscillating and the lower shell is always loaded. The cooling oil must be injected between shaft (crosshead pin) and lower bearing.

In MAN B&W engines, a set of channels have been machined in the lower crosshead bearing, in which the cooling oil can pass. The geometry is designed in such a way that all the loaded square centimeters of the pin are flushed with cooling oil twice every engine cycle.







Fuel Pump

Nadeep Lamba

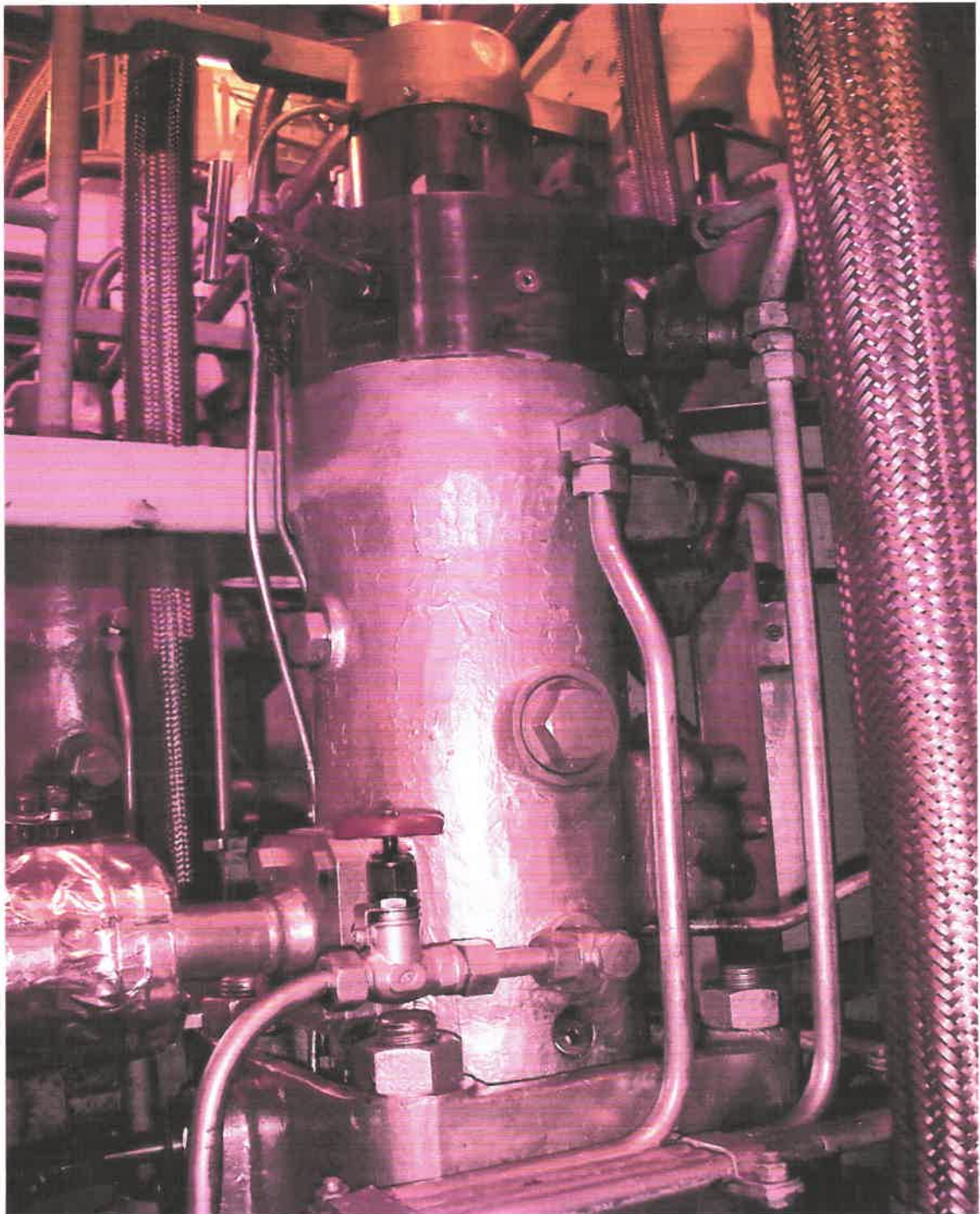
Engine Cadet

Date: 04/05/17

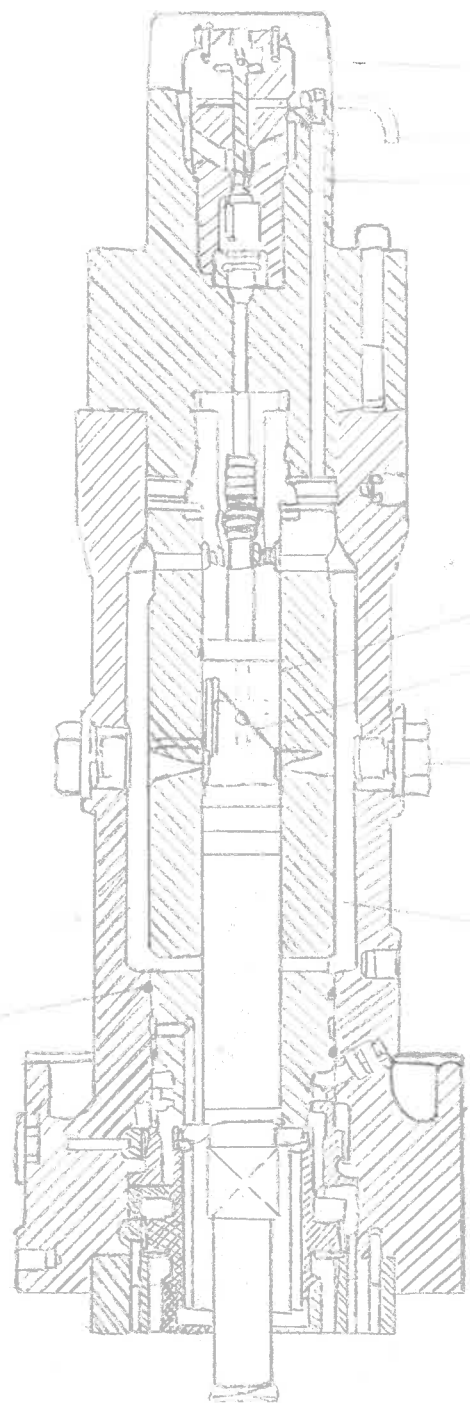


Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", with the initials "CFO" written below it.



Main Engine Fuel Pump



PROTECTIVE CAP

PIPE

SCREW

PUMP BARREL

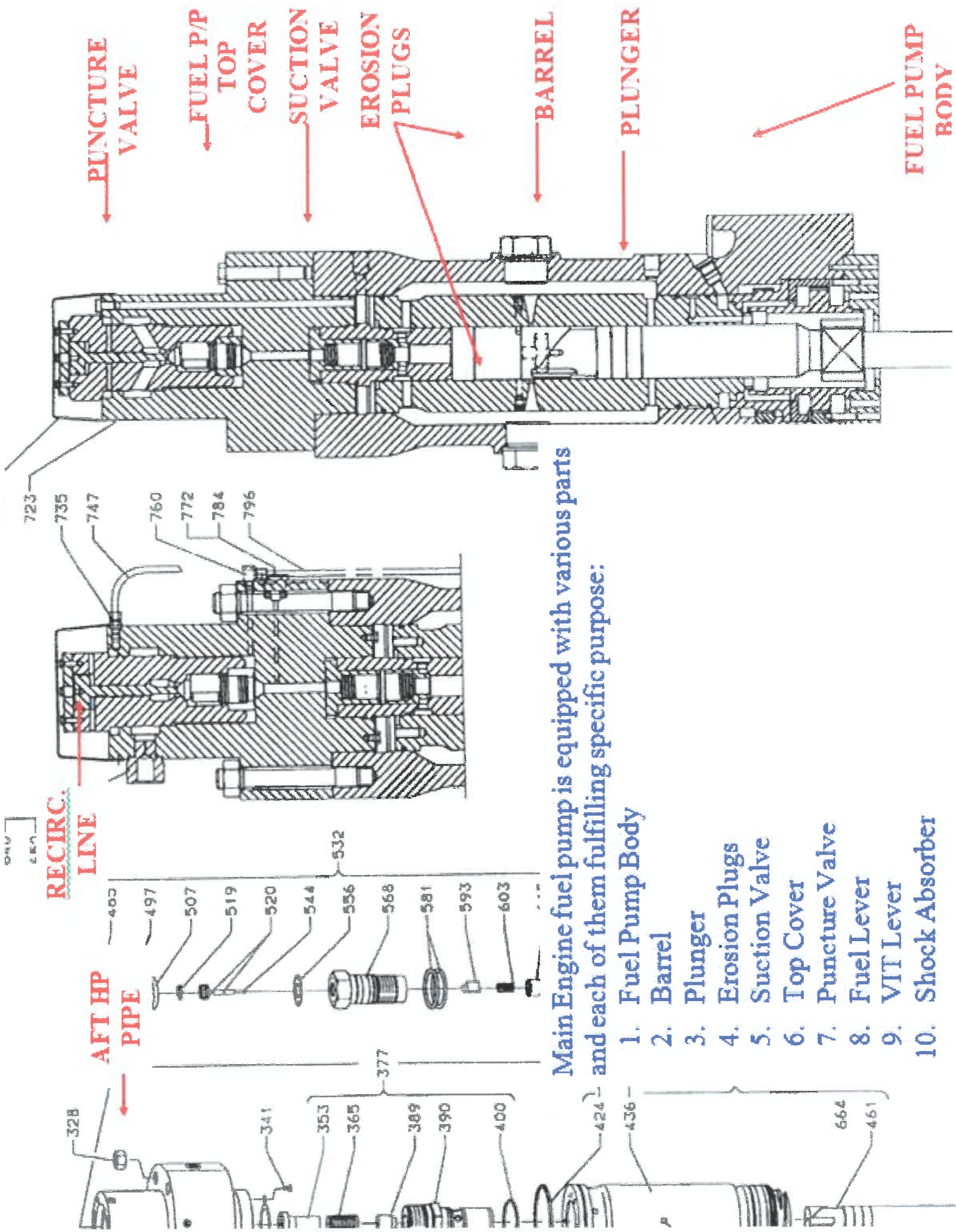
PLUNGER

PLUG SCREW

RETURN FUEL LINE

SEALING RING

FUEL PUMP



Main Engine fuel pump is equipped with various parts and each of them fulfilling specific purpose:

1. Fuel Pump Body
2. Barrel
3. Plunger
4. Erosion Plugs
5. Suction Valve
6. Top Cover
7. Puncture Valve
8. Fuel Lever
9. VIT Lever
10. Shock Absorber

FUEL PUMP

There is one pump for each cylinder. Fuel is pumped by a ram working in a sleeve , the ram being operated on the pumping stroke by a cam , and on the return stroke by a spring. It works on a constant stroke , and the amount of fuel delivered is varied by varying the point in the stroke at which the pressure side of the ram is put into communication with the suction side.

When this point is reached the pressure drops suddenly, fuel ceases to be delivered to the engine cylinder and for the remainder of the stroke of the ram oil is merely pumped back to the suction side of the pump. The means of putting the pressure side of the ram into communication with the suction side is a helix – shaped groove on the side of the ram , registering with a hole in a sleeve, according to the rotational position of the ram the helix – shaped groove will register with the hole early or late in the stroke of the ram.

➤ The requirement of the fuel pump design are as follows:

- 1) The need to build up to full pressure very rapidly at the beginning of injection so as to ensure full atomization .
- 2) The need to cut- off ram pressure as suddenly as possible to prevent dribble.
- 3) The need to deliver extremely small quantities of fuel when the engine is running light , with the same requirements of rapid build- up , rapid cut- off, and full atomization.

When the cut – off points occurs and fuel discharge stops , the rapid drop of pressure causes a shock on the inlet line to the pump. This may be damped out by a shock absorber fitted on the side of the fuel pump and connected with the oil supply line to the pump. Guard plate are fitted round at the bottom of the ram to prevent fuel oil leakages going into the engine lubrication system.

Some fuel pumps are fitted with delivery valves. Where delivery valves are fitted the wings on the valve are not cut through to the valve mitre ; this part of the valve acts as a piston . When the delivery valve opens , a large lift is required to

give its opening area ; when delivery stops ,the volume of the space between the pump and the injection valves is increased rapidly as the pump delivery valve closes.

This sharp increase in volume allows the injection valve to seat quickly and prevents dribble.

The parts of the fuel pump are robust to withstand the discharge pressures built up in the fuel system .These pressures may be up to 450 bars.

The rotation of the fuel ram to meter the volume of fuel delivered by the fuel pump may be controlled by a governor , in generators and alternators , or by the fuel lever , in propulsion engines.



ME Performance Test

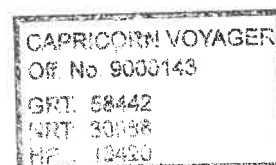
Nadeep Lamba

Engine Cadet

Date: 16 MAY 2017

Signature:

Nadeep Lamba



ME Performance Test

❖ Safety Procedures followed during performance of actual job:


Job information	Primary hazards that could result in injury or damage	Additional control measures including work permits, required PPE, specialized safety equipment or measures.
ME performance test OPS 55- JHA OPS 44- safety device bypass permit OPS 45- safety device bypass log	Equipment Damage, hot surface, burns, hot gas, miscommunication, fire hazard, eye/hand injury, pinch points, STF	Follow procedure, face shield, thermal gloves, inform bridge, reset the system, good communication, secure the area, good housekeeping, recordkeeping

❖ Main engine type: MAN B&W 6S60MC-C

❖ Procedure:

- Obtain the permission from chief engineer to perform the test.
- Isolate the fire detector zones , 10, 11 and advise bridge OOW and local fire sprinkler system off. Fill OPS 44 and OPS 45.
- Inform the bridge to increase the RPM to get a sufficient increase in ME load. A RPM of 102 at load was maintained.
- Let the engine stabilize for 20-25 minutes before starting the engine and take the ME fuel counter. Before and after the performance test.
- Attach collecting beakers underneath the stuffing box drain pipes. Collect the sample for one hour and log the amount of drains per two hours in the performance test log.
- Prepare the diesel doctor kit and connect the charger and crank angle detection cable to the device. Select main engine on the monitor and 'memory 1' for cylinder 1. Enter the local scavenge air pressure into the device.

- Open the indicator cock caps and blow through each cylinder one by one by opening the indicator cocks and then close them after a few seconds of blowing through.
- Connect the pressure sensor Thompson adapter to the diesel doctor and indicator cock on the first cylinder. Tighten the adapter on the indicator cock using the spanner provided.
- Open the indicator cock completely and press 'GO' on the monitoring device.
- Close the indicator cock after the readings have been recorded and then remove the adapter.
- Repeat the same procedure for all cylinders and store the values in different memory locations. Take the readings again if required.
- Log the main engine parameters as required and compare with previous month's parameters.
- Upload the readings from the device into the software on computer. Calculate and enter the indicated and effective specific fuel oil consumption.
- Take the required readings from bridge and inform them after finishing the test so that the load can be reduced back to normal.
- Take the print out of the entire report.
- Enable the isolated fire detectors and enter in OPS 45.

SERVICE DATA	Engine Type: S60MC-C	Name of vessel: Capricorn Voyager				
	Engine Builder: HSDENG	Engine No.: ML1689	Yard: Samsung Heavy Industries Co. Ltd			
Layout kW: 13560	Layout RPM: 105	Sign.:			Test No.: 1	
Turbocharger(s)	No. of TC: 1	Serial No.		No. of Cyl.: 6	Bore, m: 0.60	Stroke, m: 2.400
Make: MITSUB	Type: MET71SE II	1	9966	Cylinder Constant (kW/bar): 1.1310	Mean Friction. Press., bar: 1.00	
Max. RPM: 12800	Max. Temp., °C: 580	2		Lubrication Oil System (Tick box)		
Compr. Slip Factor: 0.690	Compr. Diam., m: 0.7900	3				
TC specification: FV3H35DD65J2	4		<input type="checkbox"/> Internal <input checked="" type="checkbox"/> External from M. E. System <input type="checkbox"/> External from Gravity Tank			

Observation No:

Fuel Oil Viscosity: 350	at: 50 °C	Brand	Type
Bunker Station: SINGAPORE		Cylinder Oil	FAMM
Oil Brand: HFO	Heat value, kcal/kg: 40	Circulating Oil	FAMM
Density at 15 °C: 0.99	Sulphur, %: 3.22	Turbo Oil	FAMM
			TARO SPECIAL HT 70
			VERITAS 800 MARINE 30
			VERITAS 800 MARINE 30

Test Date (yyyy-mm-dd)	Test Hour (hh:mm)	Load %	Ambient Pressure mbar	Engine RPM	Total Running Hours	Governor index	Speed Setting bar	VIT Control bar
2017-05-12	9:00:00 AM	72.0	999	102.0	57994.0	69	29.0	5
Effective Power kW	Indicated Power kW	Eff. Fuel Consumption g/kWh	Indicated Fuel Consumption g/kWh		Draft Fore, m	Log Knots	Wind, m/s	Direction, °
					6.2	15.8	5.0	E
9576	10268	197.26	183.97		Draft Aft, m	Obs. Knots	Wave Height, m	Direction, °
					9.1	15.8	0.6	E

Cylinder No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Ave.
Pi, bar	14.97	14.94	15.07	14.70	14.71	14.62													14.84
Pmax, bar	129.0	132.0	129.0	129.0	129.0	130.0													129.7
Ref. Pmax, bar																			
Pcomp, bar	97.0	97.0	96.0	96.0	95.0	96.0													96.2
Fuel Pump Index	70.0	73.0	72.0	71.0	73.0	72.0													71.8
VIT index	8.9	8.9	8.9	8.9	8.9	8.9													8.9
Exhaust Gas Temp., °C	310	300	310	305	300	300													304.2
Cooling Water Outlet Temp., °C	82	82	80	81	81	82													81.3
Piston Outlet Lub. Temp., °C	53	55	54	53	53	54													53.7

Cooling Water Temperature, °C				Exhaust Gas Temp., °C				Exhaust Pressure		Turbo Charger RPM	Aux. Blower On/Off	Scavenge Air Pressure		
Air Cooler		Main Engine		Turbine		Receiver	Turb. Outl.	mmWC	mm			▲ p Filter	▲ p Cooler	Receiver
Inlet	Outlet	Inlet	Turb. Outlet	Inlet	Outlet	bar	mmWC			mm	mm	mmWc	mmWc	bar
1	1	76	1	1	1	2.10	1	1	1	Off	1	1	1.90	
36	50	Seaw. Temp.	2	410	280	mmHg	70	10305	2	Axial Vibration	70	180	mmHg	
		30	2	2	2	1575	2	2	2		2	2	1425	
3	3		3	3	3		3	3	3	mm	3	3		
4	4		4	4	4		4	4	4	0.98	4	4		
Ave.	Ave.		Ave.	Ave.	Ave.		Ave.	Ave.	Ave.		Ave.	Ave.		
36	50			410	280		70	10305			70	180		

Scavenge Air Temperature, °C				Lubricating Oil				Fuel Oil Pressure
Scavenge Air Temperature	Inlet Blower	Before Cooler	After Cooler	Pressure, bar	Temperature, °C	Temperature, °C		bar
				System Oil	Inlet Engine	TC Inlet / Blower end	TC Outlet / Turb. end	Before Filter
	1	1	1	2.40	47.0	1	1	8.0
	42.0	170	40	Cooling Oil	Inlet Cam	45.0	65.0	After Filter
41	2	2	2	2.40	45.0	2	2	7.9
	3	3	3	Cam Shaft Oil	Outlet Cam	48.0		Temperature, °C
	4	4	4	2.70	48.0	3	3	Before Pumps
				Turbine Oil	Thrust Segment	1.80	58.0	124
	Ave.	Ave.	Ave.			4	4	
	42.0	170	40					
						Ave.	Ave.	
						45.0	65.0	

Remarks:



LUBE OIL ANALYSIS

Date: 03 APRIL 2017

Signature: *3/E KLL*

CARRICOIN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30058
HP : 18420

MONTHLY LUBE OIL ANALYSIS
(DG #1, DG #2 , DG #3, M/E CRANKCASE, STERN TUBE L.O)

❖ **Safety Procedures followed during L.O.Analysis:**

Job information	Primary hazards that could result in injury or damage	Additional control measures including work permits, required PPE, specialized safety equipment or measures.
Auxiliary boiler pilot burner cleaning	Oil spill, oil pressure, equipment damage, oil contact, wrong sample point, burns	Assistance, follow procedure, good house keeping, avoid hot surface

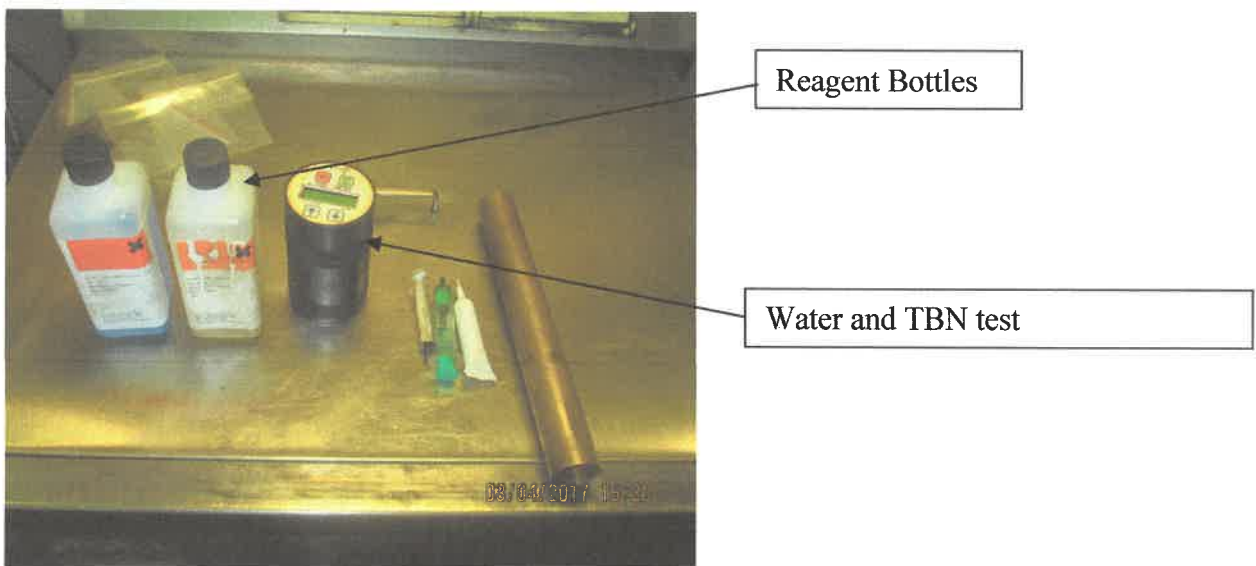
❖ **OIL SAMPLING PROCEDURE:**

- Prepare the sample bottles for sampling. Sample bottle must be clean.
- Make sure the system is running to get correct sample.
- Open the sampling cock slowly to ensure no splashing of oil and can also lead to tripping of machine.
- Drain about 0.5 to 1 liter of oil before collecting sample in the sample bottle.
- Always make sure sample is taken from the same sample point every time. (All the sampling points are stenciled in the engine room.)
- Carry the sample bottles carefully to avoid any dropping of oil on the floor in the engine room.
- Mark the sample bottle with correct name to avoid mixing of samples.
- Collect samples of D.G L.O, M/E CRANKCASE OIL, STERN TUBE L.O

❖ CARRY OUT THE FOLLOWING TEST –

➤ TBN TEST :

- Open the testing equipment, check if it is cleaned.
- Fill up the small chamber with 5 ml of used oil, but make sure you shake this sample before putting.
- Fill the large chamber with 10 ml of TBN REAGENT.
- Close the testing equipment, and switch on the power and select the mode (TBN-1 for M.E. And TBN – 2 For DG)
- Shake it for 2 minutes and after that note down the reading.



❖ TBN Gives the alkalinity level in oils to neutralize the acids being formed during corrosion.

➤ Reason for increase/ decrease of TBN –

- An decrease in TBN indicates excessive acids being formed.
- An decrease in TBN indicates fuel oil leak(through fuel pumps, cam shaft).
- An increase in TBN indicates, that the feed rate needs to be reduced.(can result in caustic corrosion)

➤ **WATER CONTENT TEST :**

- Open the testing equipment, check if it is cleaned.
- Fill up the small chamber with 5 ml of used oil, but make sure you shake this sample before putting.
- Fill the large chamber with 20 ml of REAGENT.
- Add H₂O paste on the lip around chambers.
- Close the testing equipment, and switch on the power and select the mode (water).
- Shake it for 3 minutes and after that note down the reading.

❖ The presence of excessive water in L.O will –

- Result into corrosion of parts and thereby increase in roughness of bearing journals, etc.
- Accelerates oxidation of L.O
- Load bearing capacity of oil decreases.
- Tend to form tin oxide on white metal
- Can enhance the conditions for bacteriological attack
- Indicates excessive condensation
- Indicates leaks in LO cooler
- Indicates leaks in liner.

➤ **DENSITY TEST :**

- Fill up 30 ml water into the preheating equipment; check whether water is already inside.
- Fill up 200 ml of lube oil into the test tube for analysis and heat up to 50 degrees. During heating check the temperature by thermometer.
- Insert the hydrometer into the test tube and directly read the value.



For Density

For Viscosity

❖ Density should be :

- Important parameter for lubrication of bearing.
- Should be within limits

➤ **VISCOSITY TEST :**

- Check the tube if it is clean
- Keep one side of the tube open and insert the correct ball (19.75 mm for Lube oil)
- Fill the tube within 2 mm from the top rim of the oil to be tested
- Clean any spill oil outside the tube
- Put the cap but not the vent plug
- Insert the tube in the VISCOMAR (apparatus)
- Select the position to 1 for LO (temperature range = 40 deg. C).
- Enter the density which you have already obtained from the test
- Put the vent plug make sure it is tight to avoid leakage
- Invert the tube and replace it into unit. After a short period of time the display shows the viscosity. Take 4 to 5 readings and then take the average of it.

❖ Viscosity is tested as :

- Viscosity must be sufficient enough for forming a film for lubrication.
- The viscosity increases with oil oxidation
- The viscosity increases with contamination with cylinder oil, heavy fuel or water
- A decrease in viscosity may be due to dilution with diesel oil.

Monthly L.O. Analysis

Sample	D/G #1	D/G #2	D/G #3	M/E	Stern
Date	30-Mar	30-Mar	30-Mar	30-Mar	30-Mar
Current Running Hours	44977	44167	39013	57509	57509
Running Hours Last Tested	44733	43684	38663	57166	57166
Running Hours Since Last Test	244	483	350	343	343
Oil Added Since Last Test	110	100	90	800	
Total running hours this month	244	483	350	343	343
Number of days run this month	10.17	20.13	14.58	14.29	14.29
Total oil added this month	110	100	90	300	0
Consumption per 24hrs	10.82	4.97	6.17	20.99	0.00
Last Oil Change Running Hours	44175	42975	37977	0	30527
Date Oil Renewed					
Oil Hrs Since Last Oil Change	802	1192	1036	57509	26982
Density (MT/m3)	0.920	0.920	0.920	0.905	0.915
Ave. Viscosity	110	109	138	106	
Water (%)	0	0.01	0	0.01	0.02
TBN	20	17	21	9	

LUBE OIL SPECIFICATION AND LIMITS		
OIL TYPE / NEW OIL	WATER CONTENT	TBN
VERITAS 800 MARINE 30	0.2	5
TARO 30 DP 30		30

WARNING
WARNING

OIL TYPE / LIMITS	WATER CONTENT	TBN
VERITAS 800 MARINE 30	0.1 - 1.0	5 - 8
TARO 30 DP 30	> 0.2	10 - 15

This specification and limits were based on Famm oil lists of standards Fast oil Analysis



Variable Injection Timing

Nadeep Lamba

Engine Cadet

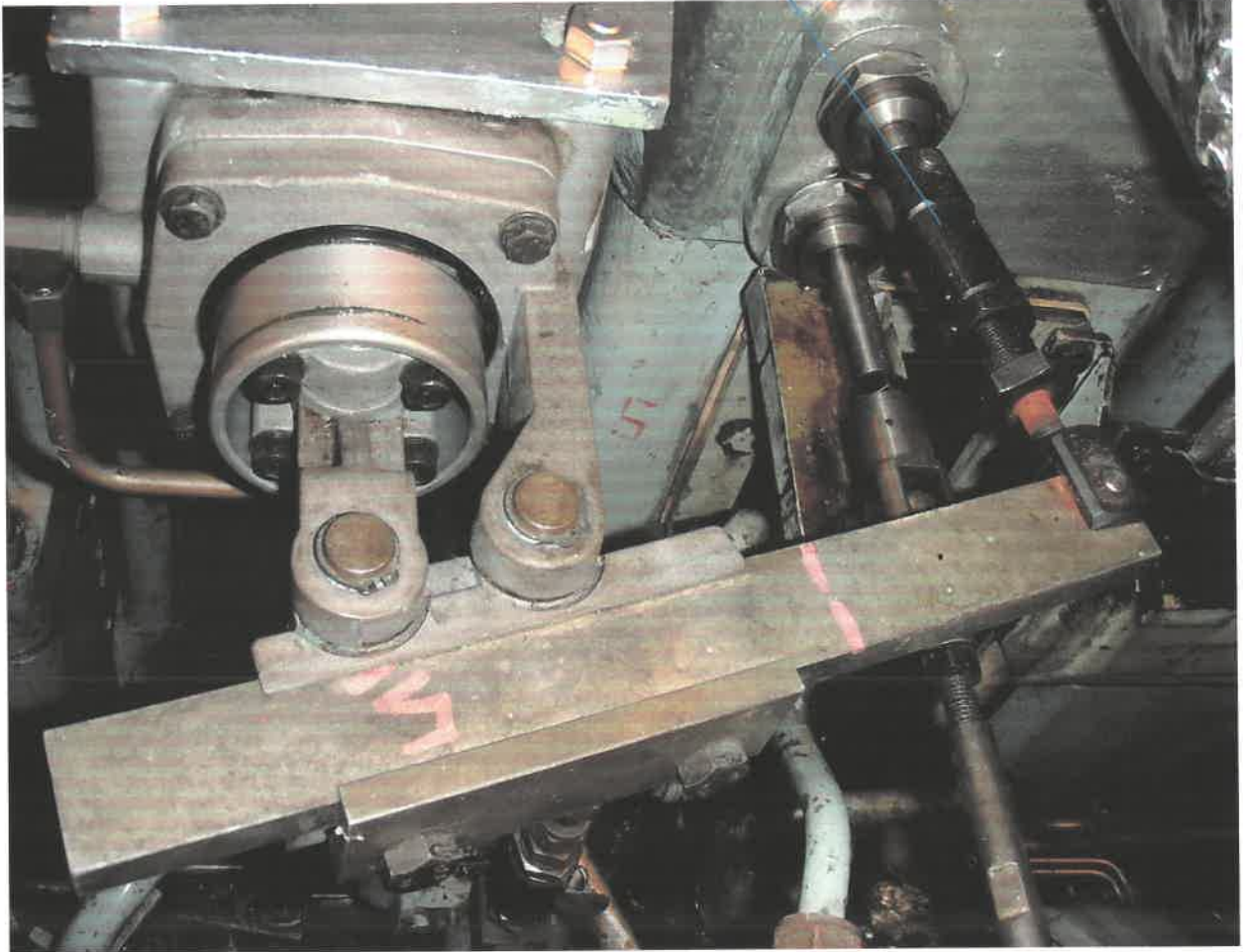
Date: 11/05/17

Signature:

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Variable Injection Timing



VARIABLE INJECTION TIMING

Variable injection timing is a form of fuel pump control enabling an engine to operate with the designed maximum cylinder firing or combustion pressure from approximately 75% power output to maximum power output. This improves the thermal efficiency and reduces the specific fuel consumption for the engine.

The fuel consumption for an engine at any load will be related to the expansion ratio of the combustion gases from their maximum pressure to the commencement of the exhaust blow-down.

In a normal engine the maximum cylinder pressure is reached only at full load conditions, whereas with VIT the maximum cylinder pressure can be attained at about 75% load and onwards. The expansion ratio for the gases is therefore increased when the engine is operation with light loads right up to the full load.

In a normal engine the cylinder pressure is plotted against the engine load is nearly a straight line with sloping upwards and reaching its maximum value at the full load. For an engine with VIT, the cylinder pressure is maximum at 75% of the load and remains constant. This increases the efficiency and flattens the Specific Fuel Consumption (SFC) curve for the engine.

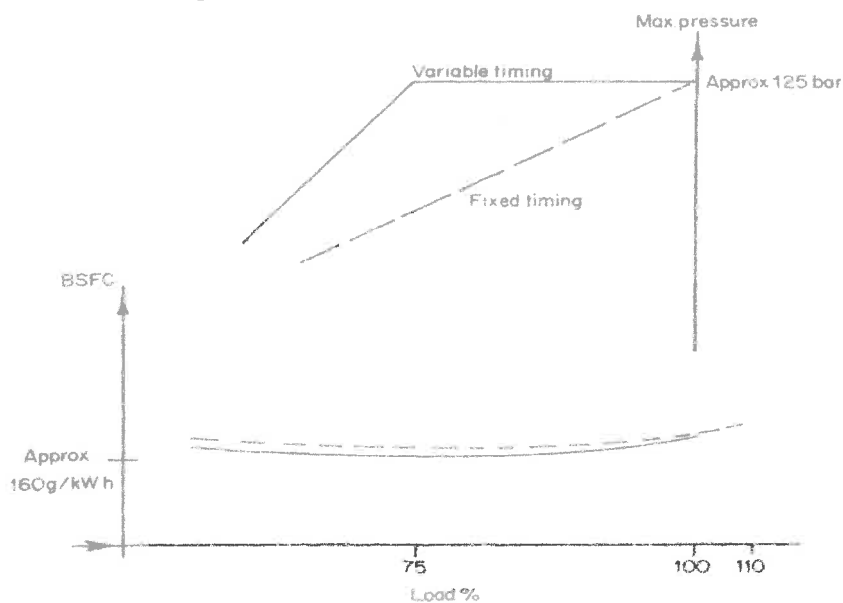


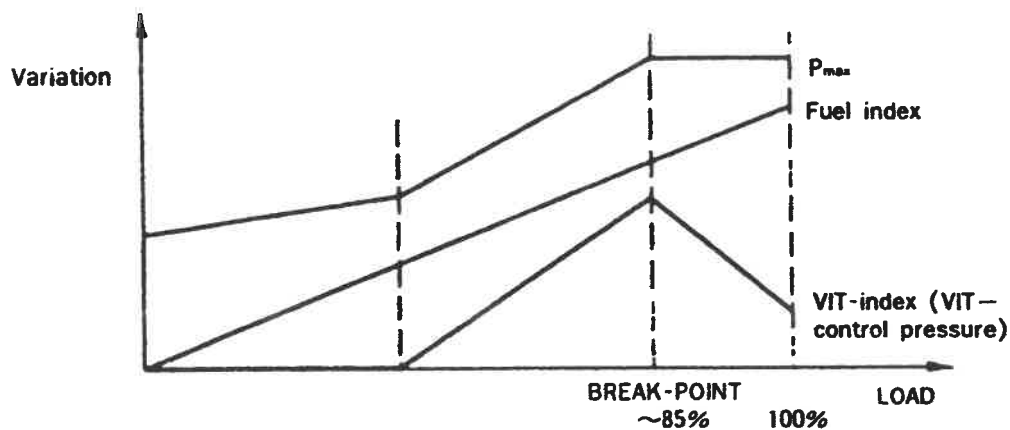
Fig. 4.5 Cylinder pressure plotted against engine load.

The pre-specified part load is also known as break point. For our engine the break point is 85%. As the control system senses the load has reached the VIT system adjusts the pump barrel so that such an injection timing is reached with which the maximum cylinder pressure is obtained.

The pump barrel is moved up and down in relation to the plunger with the help of rack and pinion arrangement.

The VIT rack setting is itself controlled via the regulating shaft position according to the engine load. When running at low-loads the cylinder will be at a low position giving an early injection and the specified maximum cylinder pressure.

During maneuvering the VIT system is out of operation to avoid the frequent changes to the VIT index (pump lead) due to frequent load changes.



The diagram showing the variation of various parameters w.r.t load



ME Exhaust Valve Overhauling

Nadeep Lamba

Engine Cadet

Date: 18.05.17.

Signature:

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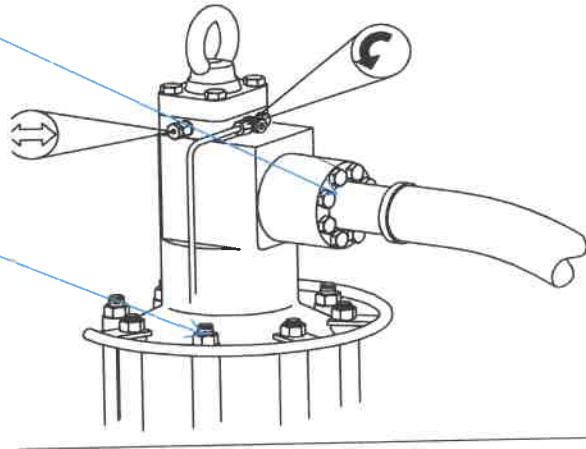
ME Exhaust Valve Overhauling

❖ **PRIMARY HAZARDS:** Gravity: Heavy exhaust valve parts,
Mechanical: Pinch points, hand
fingers injury, eye injury, Equipment damage
Chemical: Oil contact, soot inhalation

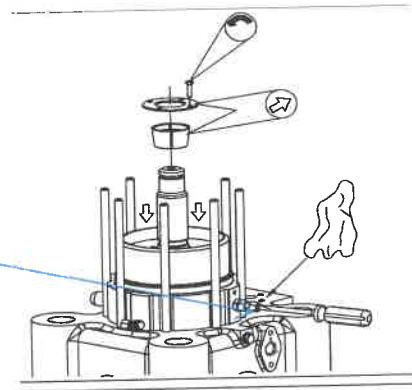
❖ **ADDITIONAL CONTROL MEASURES:** Gravity: Check lifting tools before use,
hard heads, certificated crane operator
Mechanical: Use leather gloves, awareness
while dismantling valve parts , Use face shield & goggles ,
Follow instruction manual
Chemical: Use dust mask while cleaning , rubber gloves

Procedure:

- Unscrew sealing oil pipe for (spindle sealing) and disconnect it.
- Remove the eight nuts and the safety strap from the oil cylinder. Lift away and place the oil cylinder on a wooden support.



- Relieve the air pressure through the non-return valve from below the piston. Use a small screwdriver to press the ball into the non-return valve. Cover the non-return valve with a rag to catch the oil drops.



Remove the four screws from the flange on top of the air piston, and dismount the flange. Loosen the air piston from the conical locking ring by means of a tin hammer, and remove the conical locking ring



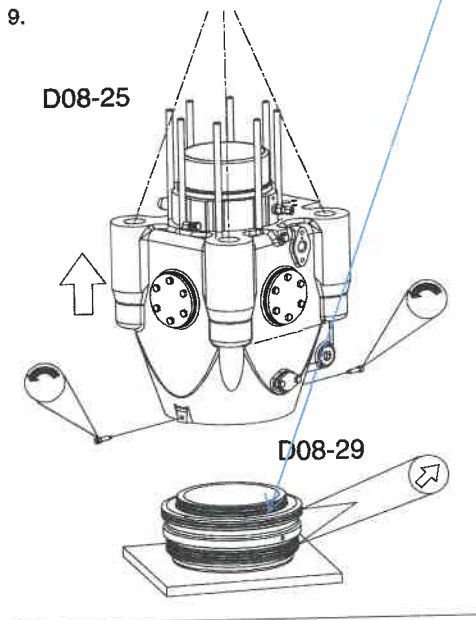
Valve spindle is removed by tilting the housing assembly (90 degrees to floor surface)



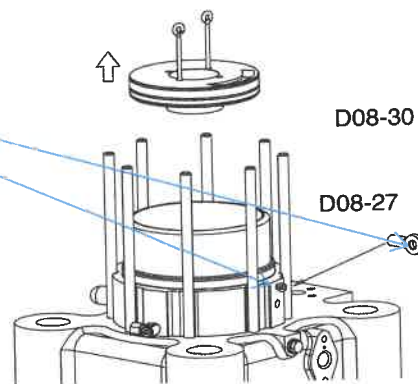
After removing of the spindle it is put into the detergent water drum for proper cleaning of the spindle



Next , the lock screws to be removed and the bottom piece is removed.



Two eye bolts are bolted in the air cylinder and the air cylinder is dismantled.



Now to remove the sealing oil unit the screws were loosened up and lifting eye is removed from the oil cylinder so that we can get onto the orifice plug and sealing unit. It is followed by cleaning of the orifice plug.

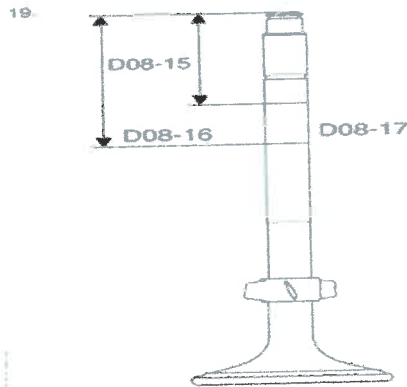
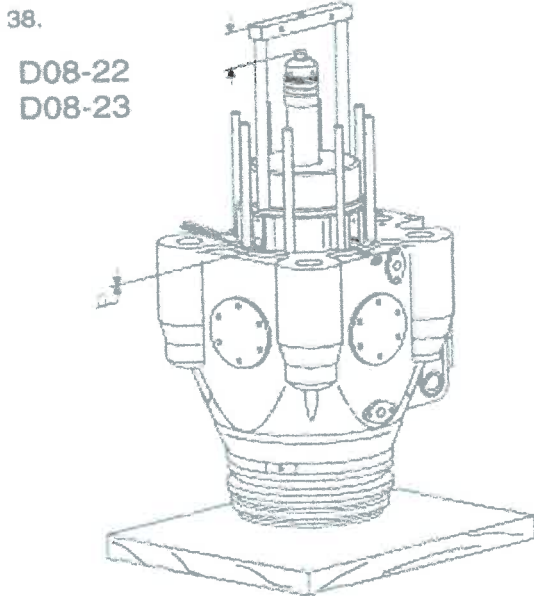
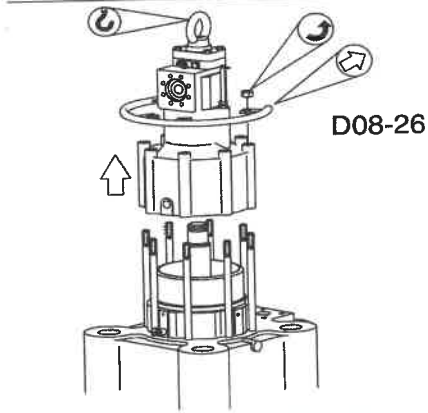
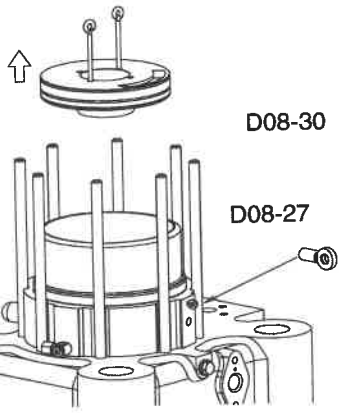
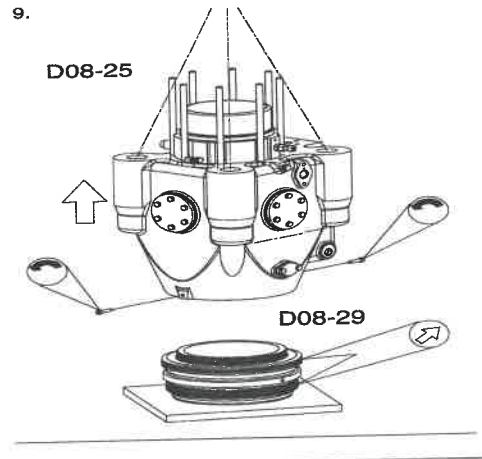
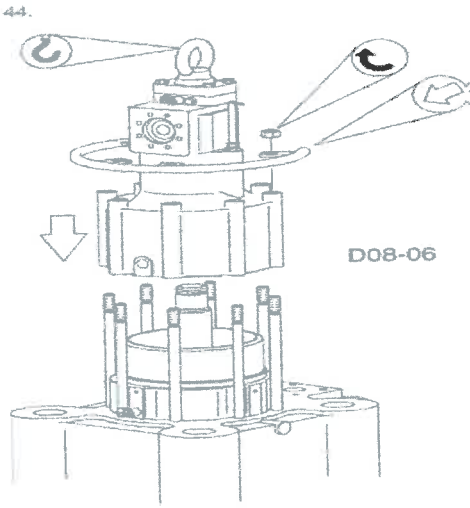


Put the cylinder in horizontal position and
Now remove the piston by removing the flange
Now at last inspect the cylinder for the scorings etc.



Check the measurements as per manufacturers instructions

(See attachment)





Work Order Details

CPV174994: Overhauling Of Spare Main Engine Exhaust Valve

Asset: 1152472 VALVE: M/E EXHAUST

Location: 060101-25012 EXHAUST VALVE FOR CYLINDER SECTION NO 1

CI:

Sched Start:		Site: CPV
Sched Finish:		Priority:
Target Start:		Work Type: CM
Target Finish:		Status: CLOS
Actual Start: 5/8/17		Parent:
Actual Finish: 5/8/17		Failure Class: VI XII
Report Date: 5/8/17		Problem Code:
Reported By: DDMI		GL Account: 071A~K~SCOCAPRICO

Supervisor:	
Lead:	
Vendor:	
Owner:	DDMI
Owner Group:	
Service:	
Service Group:	
Classification:	

Task ID	Description	Status	Measurement Point	Value	Date	Observations
10	Overhauling Of Spare Main Engine Exhaust Valve	CLOSE		0		

Task ID	Craft	Skill Level	Labor	Vendor	Contract Num	Regular Hours	Premium Hours	Regular Rate	Premium Rate	Line Cost
10	ENGINE CDI		ENGINE CDI			16:00	00:00	0.00	0.00	0.00
	LABOR		DDMI			16:00	00:00	0.00	0.00	0.00
	OTHER 1		OTHER			08:00	00:00	0.00	0.00	0.00
Total Actual Labor:										0.00

Task ID	Item	Description	Storeroom	Qty	Unit Cost	Line Cost
	308370	VALVE:NON-RETURN	060101-25012	1	20.11	20.11
	244079	SCREW:	060101-25012	1	18.22	18.22
	308628	RING:SEALING	060101-25012	2	4.61	9.22
	308629	RING:SEALING	060101-25012	1	4.59	4.59
	308624	RING:SEALING	060101-25012	1	39.79	39.79



Work Order Details

CPV174994: Overhauling Of Spare Main Engine Exhaust Valve

Task ID	Item	Description	Storeroom	Qty	Unit Cost	Line Cost
	308354	RING:SEALING, ID215.3MM, OD240.8MM, TITANIUM/VITON	060101-25012	1	98.25	98.25
	308362	RING,PISTON:	060101-25012	2	36.66	73.32
	308270	O-RING:	060101-25012	1	5.76	5.76
	308359	RING:SEALING	060101-25012	1	6.76	6.76
	308353	RING:SEALING	060101-25012	1	103.73	103.73
	308638	PACKING:	060101-25012	1	4.59	4.59
Total Actual Materials:						384.34

Date	Class	Created By	Subject	Description	Long Description
5/8/17	WORKORDER	DDMT	Overhauling Of Spare Main Engine Exhaust Valve		May,06,2017.

The exhaust valve completely dismantled, all parts inspected, cleaned and assembled as per manufacturer's instructions step by step. Function of the exhaust valve rotation indicator checked & found normal. Sealing oil control unit was found in cleaned condition. All the passages and bores cleared with compressed air. Orifice plug bore was also clear & blown through with compressed air & fitted with new gasket.

The piston in the oil cylinder inspected. The tension of the damper piston found satisfactory. No scratches or marks noted inside of the oil cylinder bore of the piston or on the piston. D08-22 & D08-23.....Mesh of the damper piston height relative to the oil cylinder = 51.2 mm D08-20.....Oil cylinder inside diameter = 84.9 mm.....max = 85.4 D08-21.....Piston rings thickness = 3.57 mm.....min = 3.2 mm Piston rings replaced with new spare and oil cylinder O ring renewed. Non return valve replaced with new spare.



Work Order Details

CPV174994: Overhauling Of Spare Main Engine Exhaust Valve

Date	Class	Created By	Subject	Description	Long Description
					Air piston, air cylinder, and their running surfaces, conical locking rings found in good condition without any scratch or mark. All fitted with new sealing rings.
					BOTTOM PISTON : Seat contact -- inner contact parallel to full circumference, no blow by, no dent marks, no cracks, No burn marks, no high temp. corrosion. Maximum carbon deposit thickness in duct approx. 1 mm, deposit in chamber 1 mm at stbd side, half mm fwd and aft & negligible port side. Bell hole was choked which was cleared & blown through. After thorough cleaning and removing all deposits measurements taken by template -- D08-09.....G3 -- 0.95 on all side, G2 -- 2.5 mm on all side.
					VALVE- SPINDLE : Seat contact to full circumference, no blow by, no cracks, no dent marks, No cracking or peeling of chrome plating or coating on any surface. Course emery type surface is noted on the cylinder side of the valve. After thorough cleaning measurements were taken with template -- F1 -- 1 all around, G1 -- 0. HOUSING: Max coke deposit thickness -- negligible, No corrosion at area A, B and C. Spindle guide was not found any unusual marks. Dia measured -- Spindle guide (bushing) not removed but inspected in place. D08-18...../2.1 mm top D08-19...../2.2 mm bottom
					All O rings / sealing rings renewed with new spares and assembled the exhaust valve as per



Work Order Details

CPV174994: Overhauling Of Spare Main Engine Exhaust Valve

Date	Class	Created By	Subject	Description	Long Description
					manufacturer's instructions. Approx. 0.5 lit lub oil filled up in the groove on top of the flange & lower part of the air cylinder as specified in the instruction book. After complete assembly valve tested in place with compressed air as per manufacturer's instruction and found working properly. DDMT



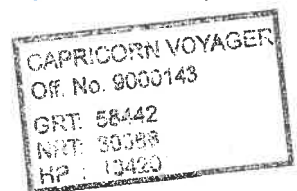
Fuel Injector

Nadeep Lamba

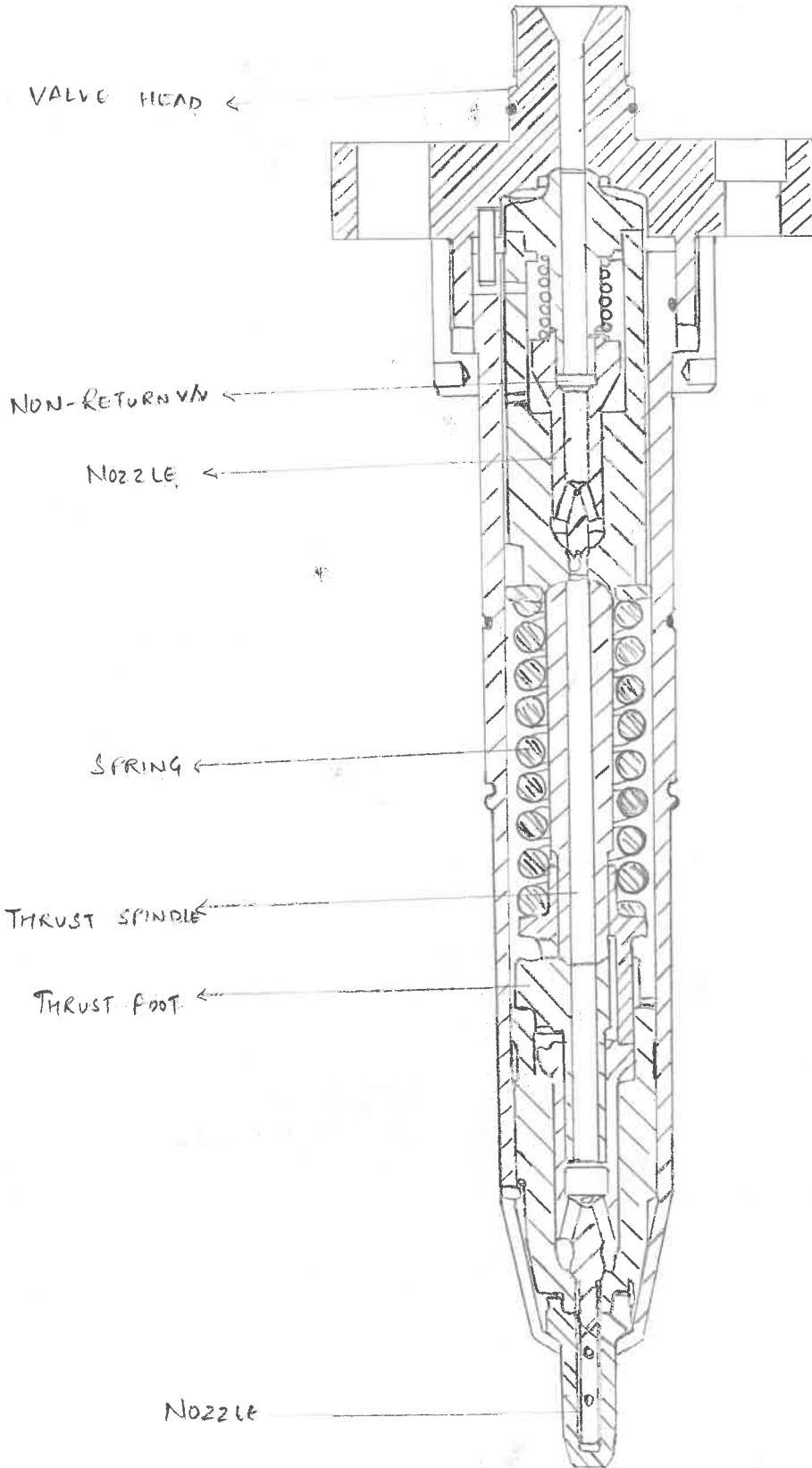
Engine Cadet

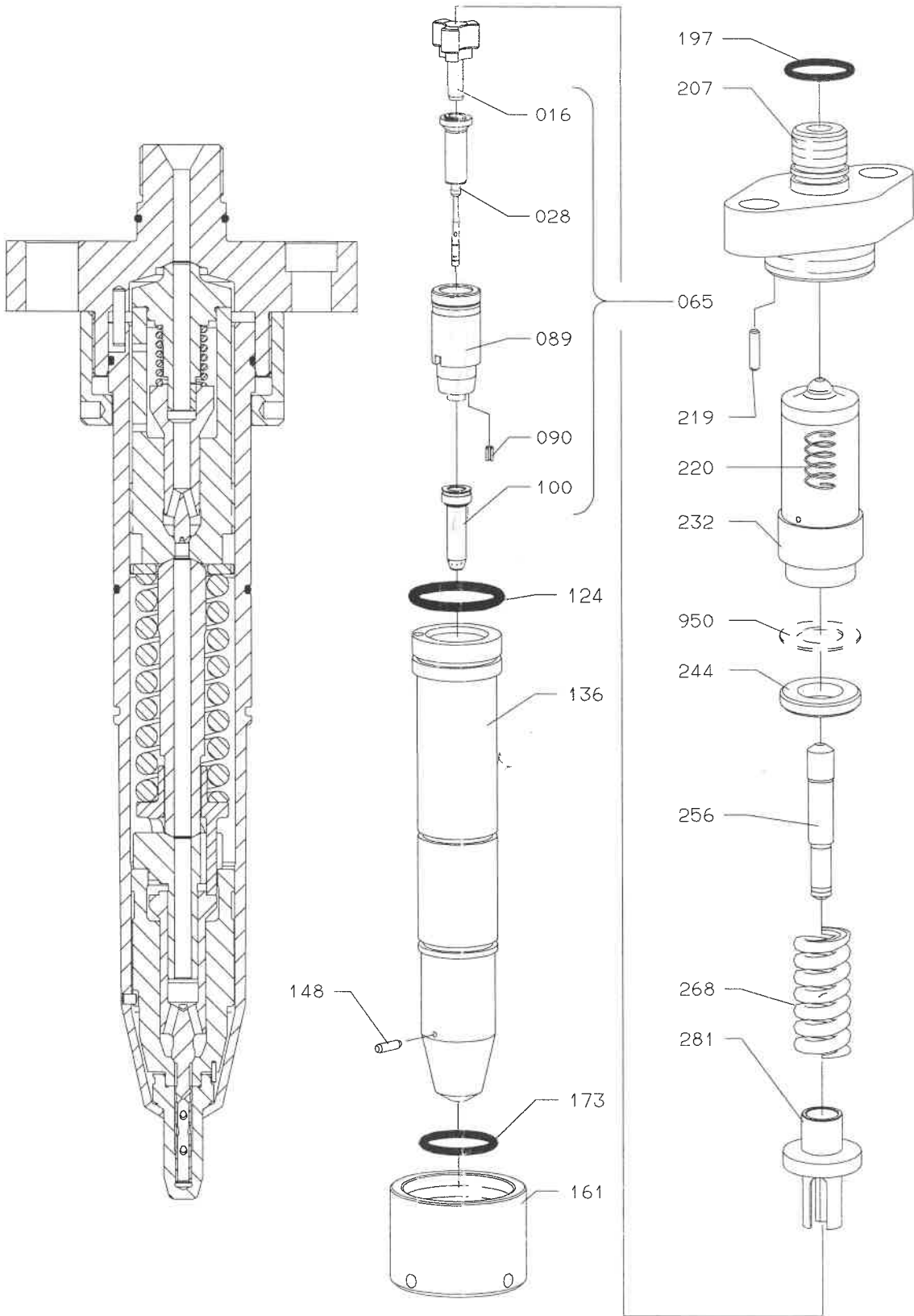
Date: 08 May 2017

Signature: 3/EVA



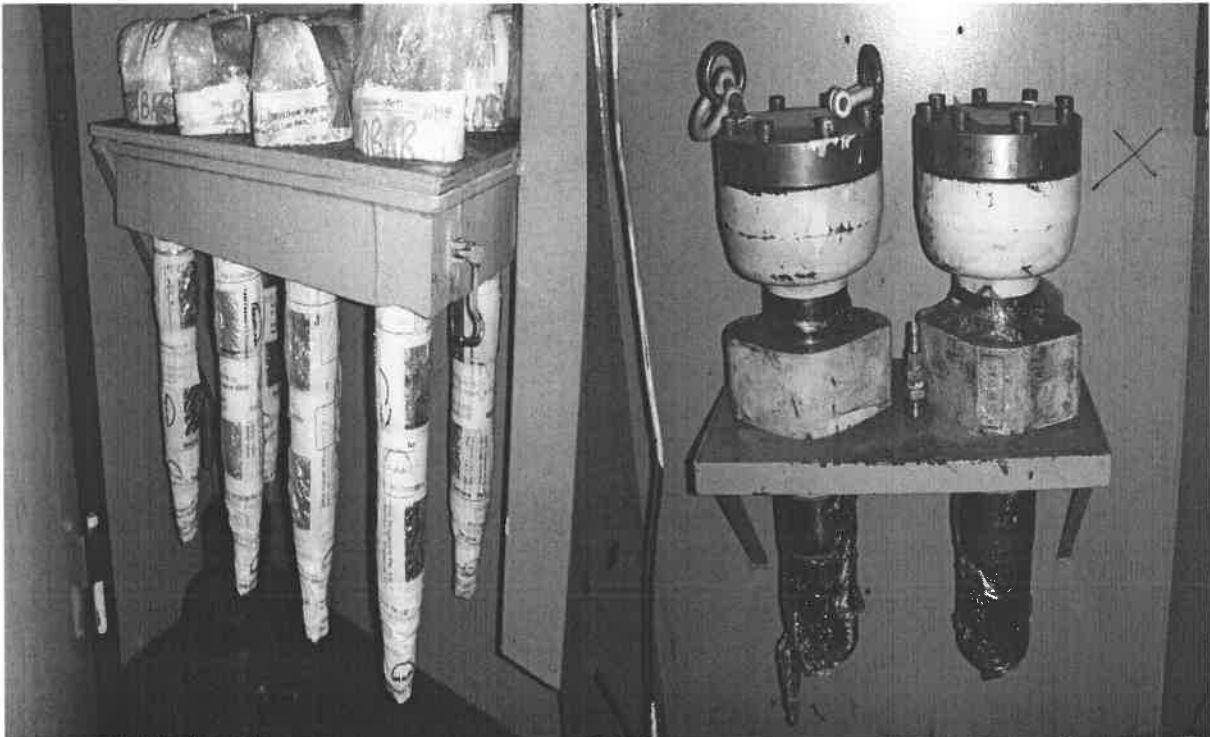
FUEL INJECTOR





Item No.	Item Description
016	Thrust piece
028	Cut-off shaft
065	Spindle guide, complete
089	Spindle guide
090	Spring pin
100	Nozzle
124	O-ring
136	Holder
148	Guide
161	Union nut
173	O-ring
197	Sealing ring
207	Valve head
219	Guide pin
220	Spring
232	Non-return valve
244	Disc
256	Thrust spindle
268	Spring
281	Thrust foot
950	Disc*
	Note:
	Note: Optional extras

Item No.	Item Description





Dear Sirs

As the leading supplier of marine diesel engines we are constantly working on new developments and improvements of our products to the benefit of the environment as well as to the owners and operators of MAN medium speed four-stroke diesel engines.

We are therefore pleased to inform you that a new low sac nozzle is released for engine type L21/31.

IMO No. 1724 will remain the same for the new low sac nozzle as for the previous nozzle type.

New nozzles ordered in accordance with the original spare part plate will be of the new type, and are fully interchangeable with the former nozzle type and still in compliance with the technical files.

The following advantages are obtained with the new design:

- Less contamination of the lube oil
- Less building-up of coke deposits in combustion chamber and on piston/piston rings and valve spindles
- Lower wear rates on cylinder liner and piston ring grooves
- Less coke deposits on turbocharger nozzle ring
- Cleaner engine in general

If you have any questions regarding this Service Letter, please feel free to contact us by writing to one of following e-mail addresses:

GenSet engines : PrimeServ-hol@mandieselturbo.com
 Propulsion engines: PrimeServ-frh@mandieselturbo.com

Yours faithfully


Mikael C. Jensen
 Vice President
 Engineering


Jens Christensen
 Manager
 Operation

Action code: **WHEN CONVENIENT**

New Low Sac Nozzle

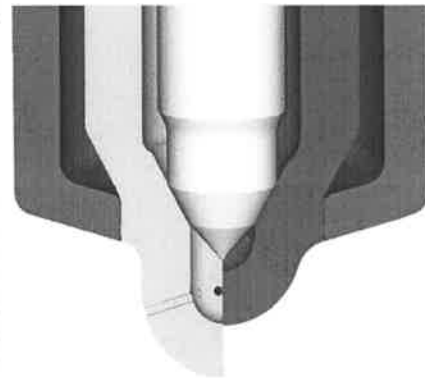
SL12-556/KEL
 February 2012

Concerns

Owners and operators of MAN four-stroke diesel engines.
 Type: L21/31 Tier I,
 GenSet and Propulsion

Original design

Optimised design



Normal sac

Low sac

OEM Service Letter – Information Only

Manufacturer: MAN Diesel & Turbo

Service Letter Reference #: SL2016-628/KEL

Date Issued: October 2016

To VMT,

The following manufacturer service letter has been reviewed by shoreside MTT and determined to be information only.

Please note that there **are not** required actions.



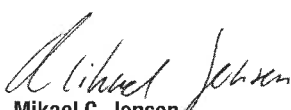
Dear Sirs

Based on experience from visits and supervision onboard seagoing vessels, MAN Diesel & Turbo has observed the following issues regarding fuel injection valves:

- Premature inspection of fuel valves i.e. before scheduled inspection according to the Planned Maintenance Programme causing maintenance induced failures and extra cost.
- Short lifetime of fuel nozzles (expected lifetime 8000 hours according to instruction manual).
- Broken fuel nozzle springs as a result of excessive pretensioning by repeatedly readjusting the opening pressure to new value causing dynamic overloading of the spring.
- Repair/Re-condition of fuel injection valves (not recommended by MAN Diesel & Turbo).
- Incorrect cleaning of nozzle tips causing damage to the injection nozzle.

This Service Letter describes the criteria for removing the fuel injection valves, replacement of nozzles before expected lifetime & cleaning of the fuel nozzle element.

Yours faithfully


Mikael C. Jensen
 Vice President
 Engineering


Jan Johansson
 Superintendent Engineer
 Operation

Action code: **WHEN CONVENIENT**

Fuel Injection Valve Condition

SL2016-628/KEL
 October 2016

Concerns

Owners and operators of
 MAN four-stroke diesel engines.
 Type: L16/24, L23/30H, L21/31, L27/38,
 L28/32H, V28/32S

Summary

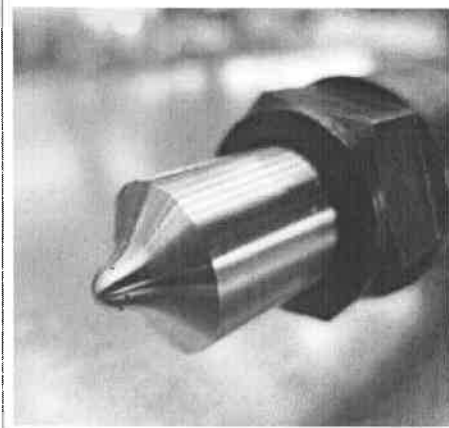
Accelerated wear/damage to nozzle tips are in most cases caused by poor fuel oil quality i.e. fuel contamination and this will cause poor combustion which in turn will result in poor engine performance and eventually may result in major damage to the engine.

Reference is made to:

Planned Maintenance Programme

Attachment:

A Quick Guide for inspection of the fuel injection valve condition



Recommendation:

The fuel injection valve should be operated for 8000 hrs without removal, unless a specific reason dictates so. To ensure safe operation, MAN Diesel & Turbo's heavy fuel oil operating instructions and treatment of fuel oil must be strictly observed including correct filtration.

Opening pressure must be adjusted according to latest guide lines, in order to prevent breakage of the spring.

New: With the engine equipped with the latest requirement of filters, i.e. common **10µm abs.** automatic back flush filter for the auxilliary engines and a **25µm abs.** fuel safety filter fitted to each GenSet, a maintenance interval of at least **8000** hours for fuel valves can be expected.

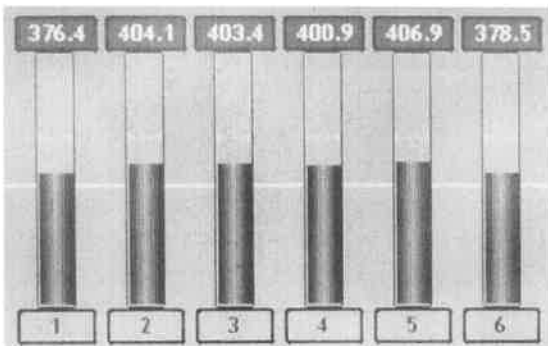
However, at the below stated indications, inspection of the fuel valves are mandatory.

- Deviation of more than 40°C of exhaust gas outlet temperature measured at cylinder head among cylinders.
- Exhaust gas temperature inlet turbocharger has increased to 10°C below alarm limit.
- Black smoke is observed during normal static load.

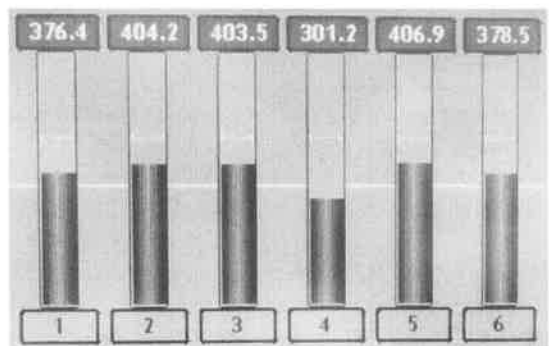
Therefore performance check is strongly recommended at least once a week.

NOTICE	Do not remove one or more of the fuel injection valves from the engine for checking the function and performance without a specific reason
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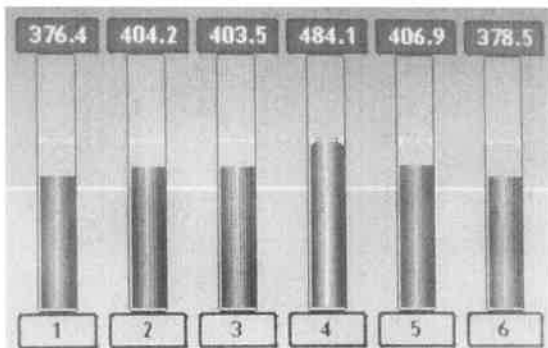
Any question regarding this Service Letter can be forwarded to leo7-hol@mandieselturbo.com



Not a criterion to remove any fuel injection valves for pressure testing, adjustments or overhaul.
Fuel valves should remain in engine unless other indications dictate so.



Low exhaust gas temperature at cyl. no. 4.
If the temperature decrease is related to the fuel injection valve the cause is most likely sticking needle in fuel nozzle. Fuel injection valve should be removed for checking.



High exhaust gas temperature at cyl. no. 4.
If the temperature increase is related to the fuel injection valve the cause is most likely leaking or worn fuel nozzle. Fuel injection valve should be removed for checking.



NOTICE

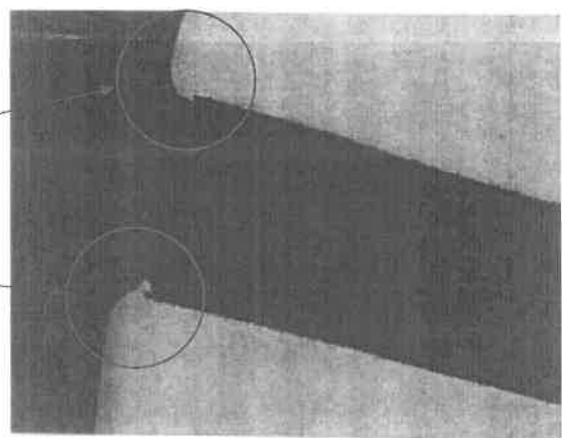
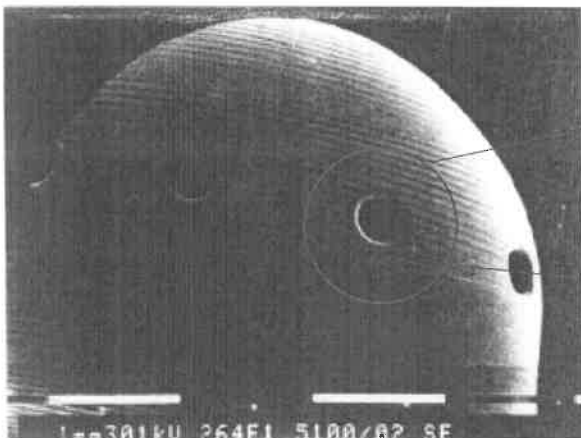
Correct cleaning procedure of the nozzle is necessary to ensure proper atomisation of the fuel in the combustion chamber



Steel brush including rotating steel brush will destroy the nozzle spray holes and a new nozzle element is required.

NOTICE

Consequence by using rotating steel brushes:



Example of a nozzle tip cleaned by a rotating steel brush causing edges in the nozzle bores which destroy the atomisation. Complete and clean combustion is a function of fuel atomisation.

**NOTICE**

Carbon deposit accumulation around the fuel injection nozzle can be cleaned with a nylon sponge and diesel oil as this will not harm the nozzle holes

The fuel injection valve should be cleaned from the outside i.e. without dismantling the fuel valve, check should be done in fully assembled condition.

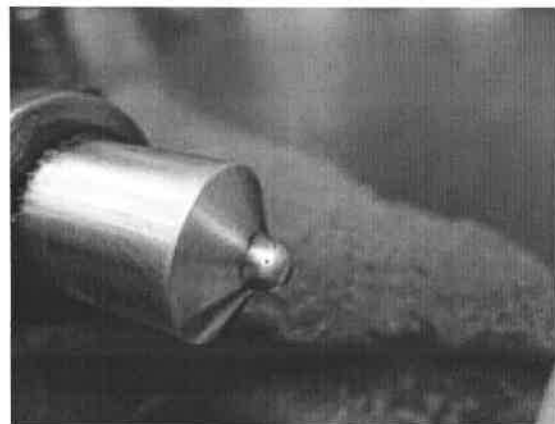
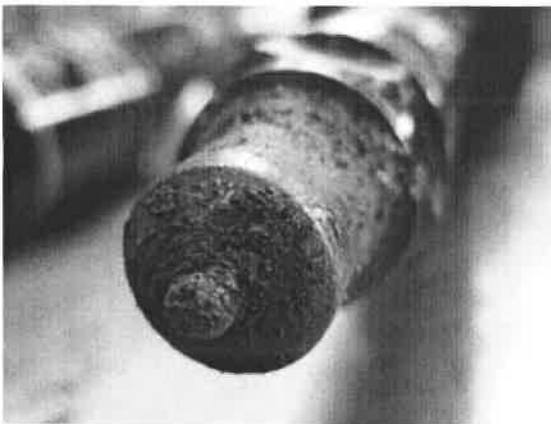
For judgment of the fuel nozzle condition, only opening pressure and leakage should be used as criteria for acceptance or rejection.

Spray pattern test should not be used as a criterion, as the test bench injection capacity is too small to produce the same condition as exists in the engine.

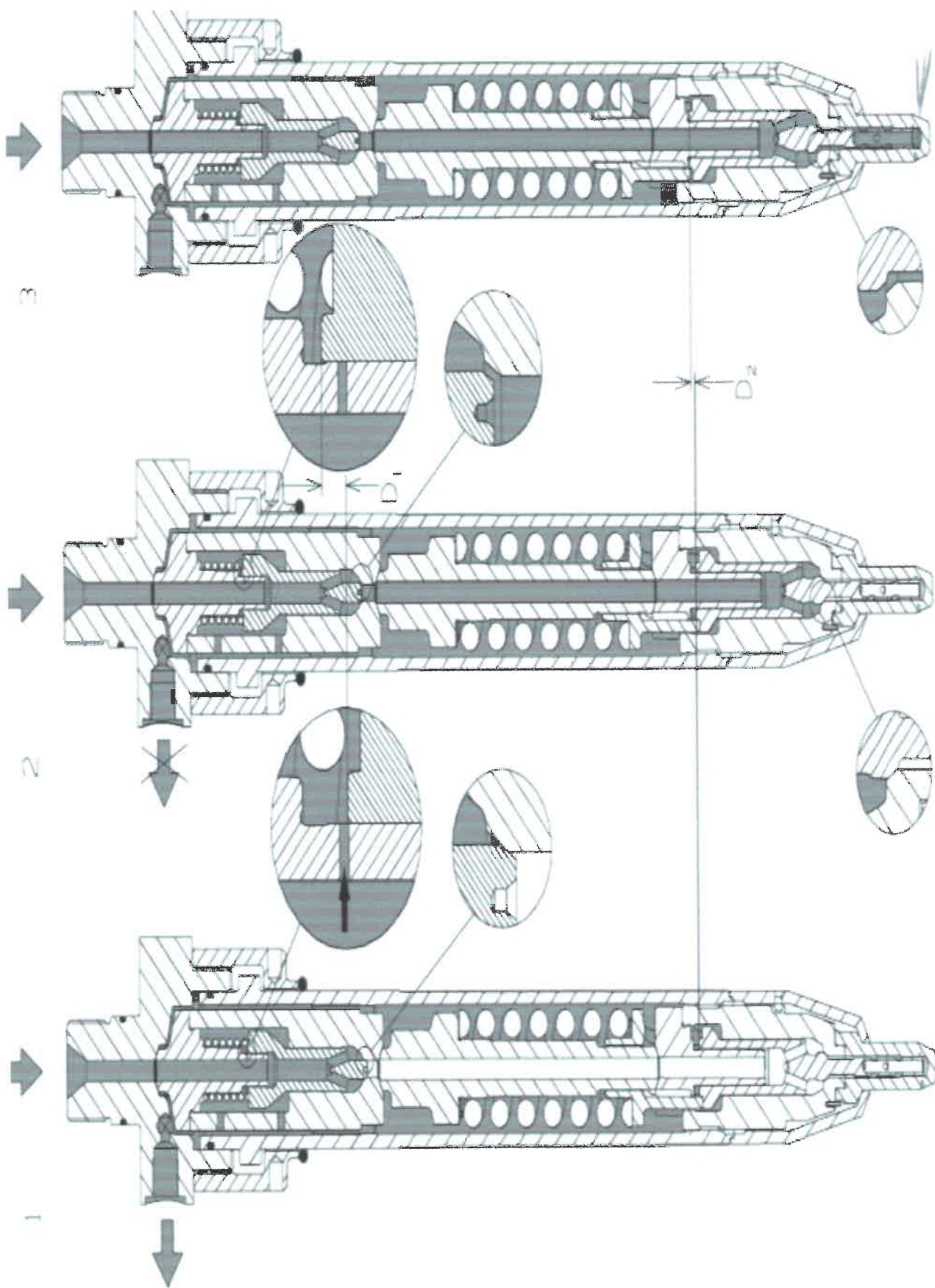
Drop in opening pressure is typically caused by wear in the needle seat in the fuel injection valve or setting of the spring. Setting of the spring cannot be avoided, however wear in the seat area is the result of wear from abrasive particles and can be reduced by proper treatment of the fuel.

In case of leakage or low opening pressure, the valve should be opened for internal check of parts.

If leakage is the reason for opening the fuel valve, typically the nozzle will have to be replaced as a minimum, while a low opening pressure normally dictates a replacement of the spring. In both situations replacement of other parts may be required based on condition.



Nozzle condition before cleaning & after cleaning with a nylon sponge.





Boiler Sectional view

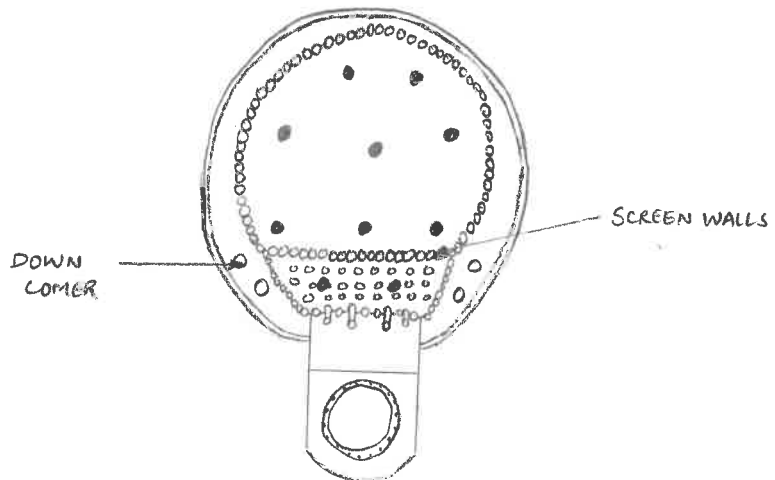
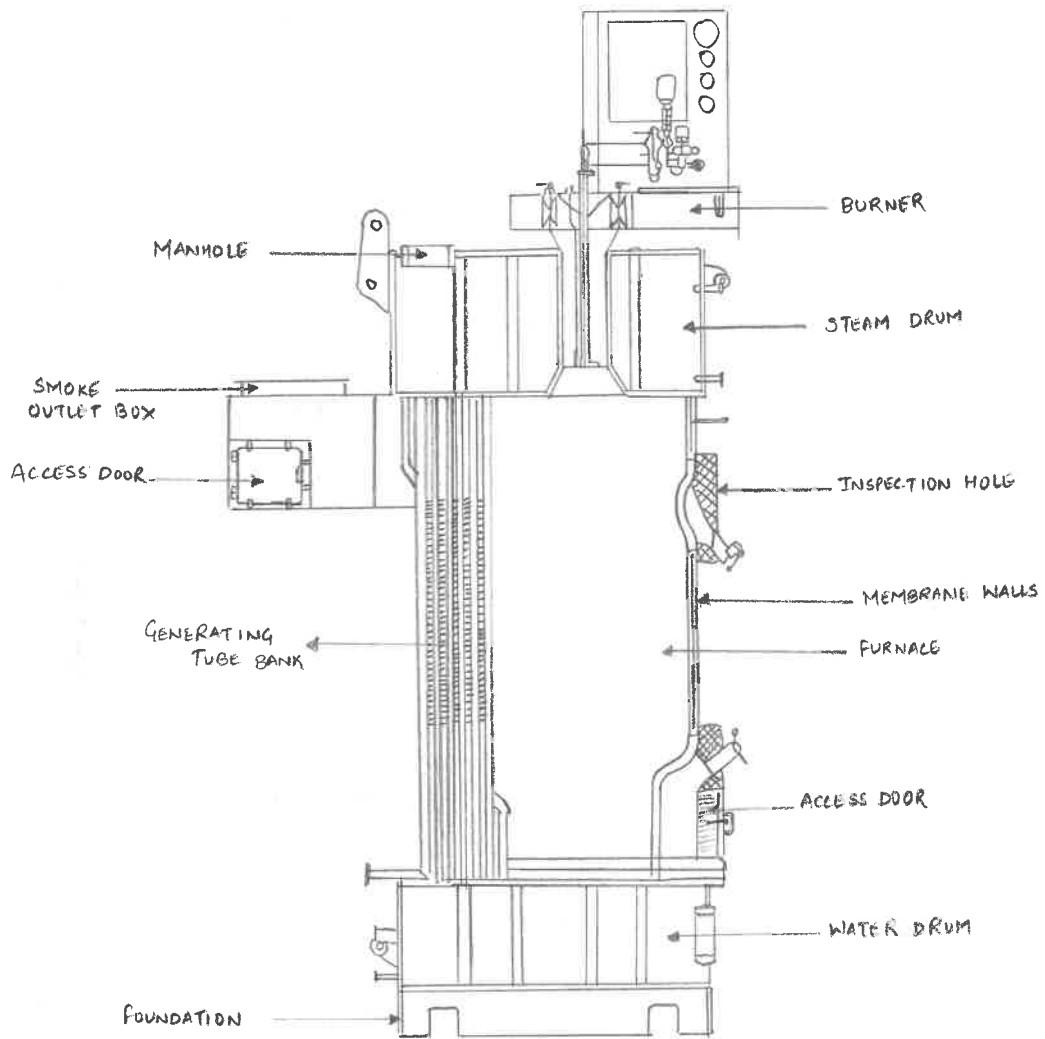
Date: 03 APRIL 2018

Signature:



Signature
ME
CHARLES ROBERTS
03 APRIL 2018

AALBORG- MISSION OL BOILER





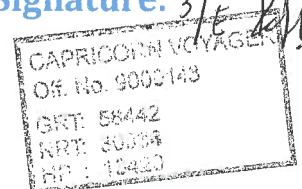
Boiler Safety Valve

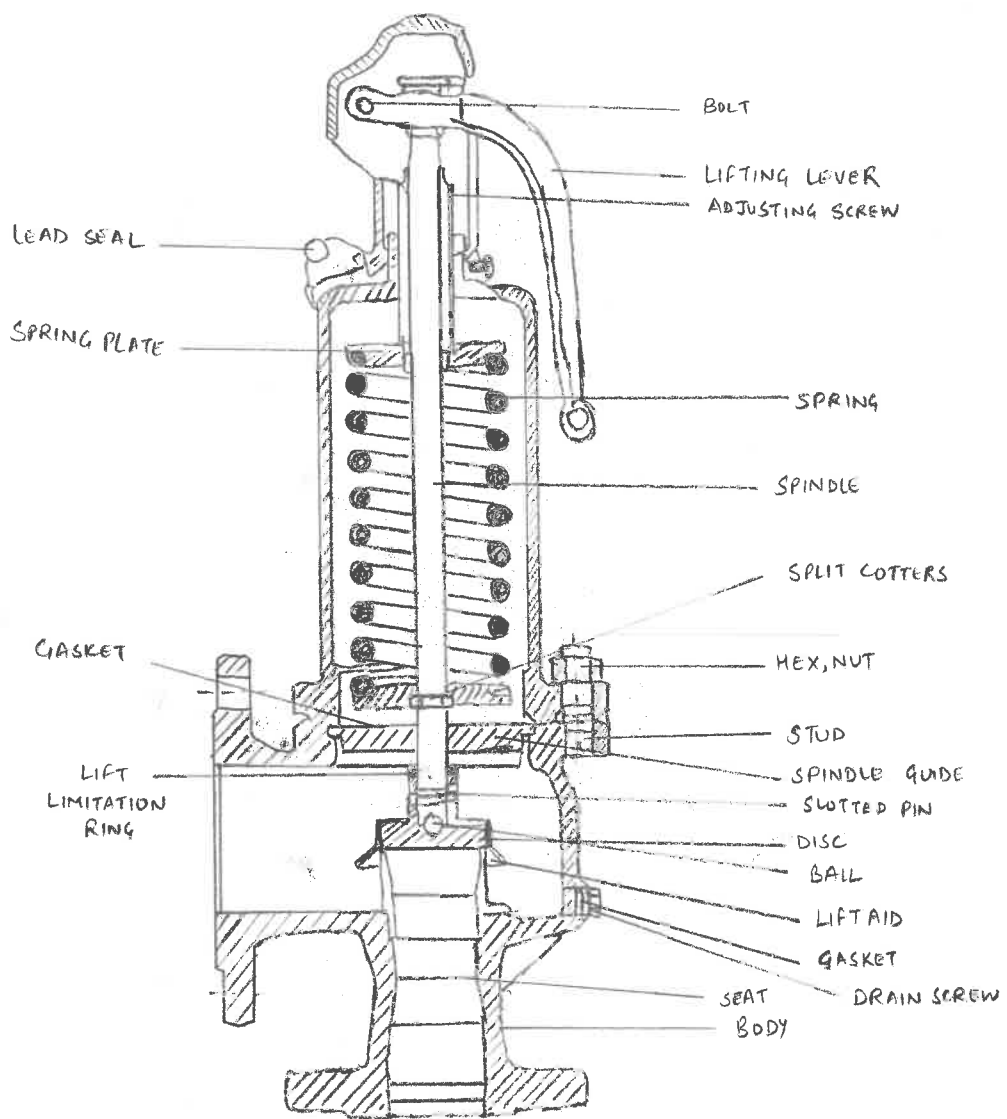
Nadeep Lamba

Engine Cadet

Date: 12 APRIL 2017

Signature: *3/E KH*





BOILER SAFETY VALVE



Steam Trap

Nadeep Lamba

Engine Cadet

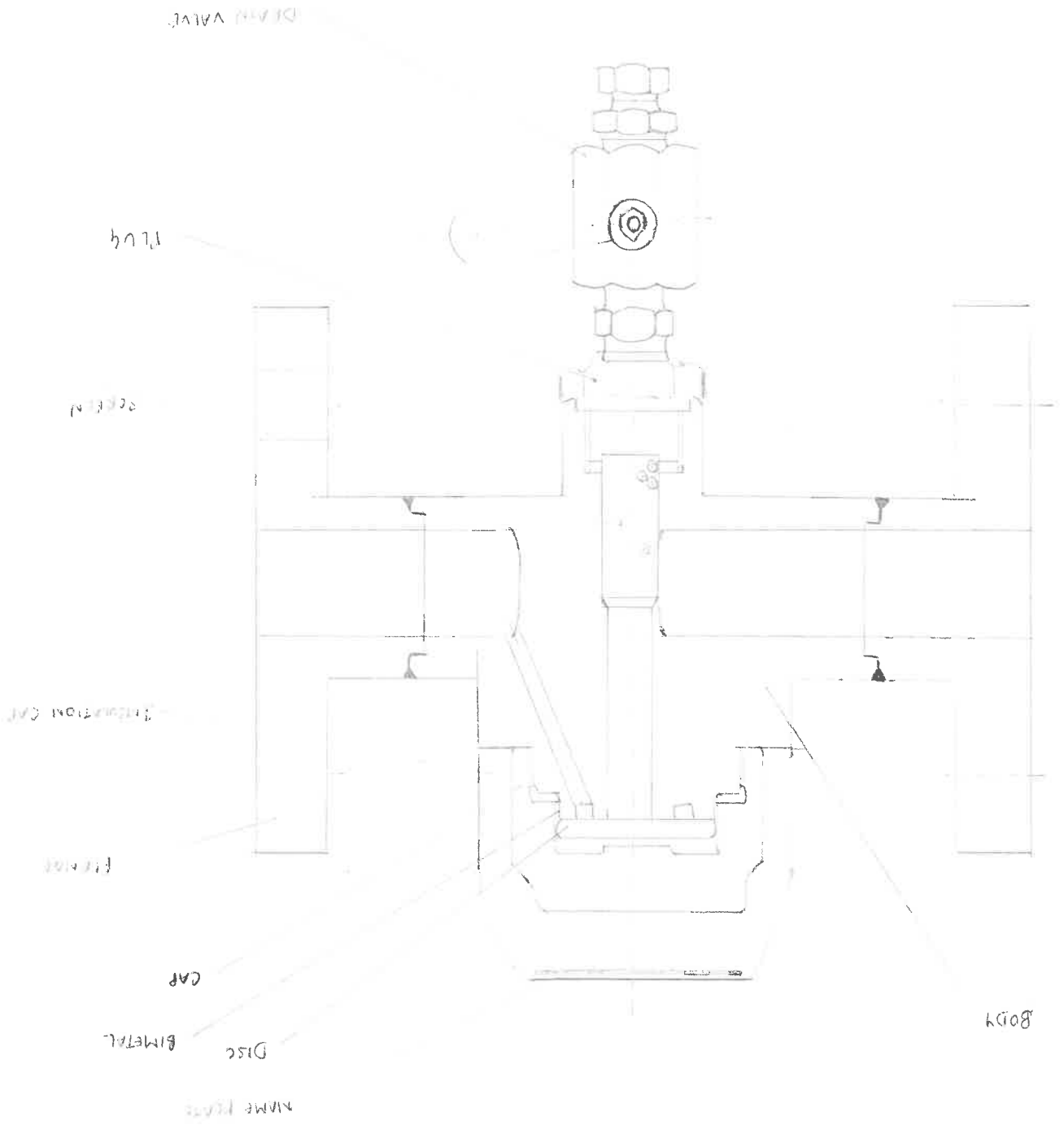
Date: 04/05/14.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30088
HP : 18420

STEAM TRAP



STEAM TRAP

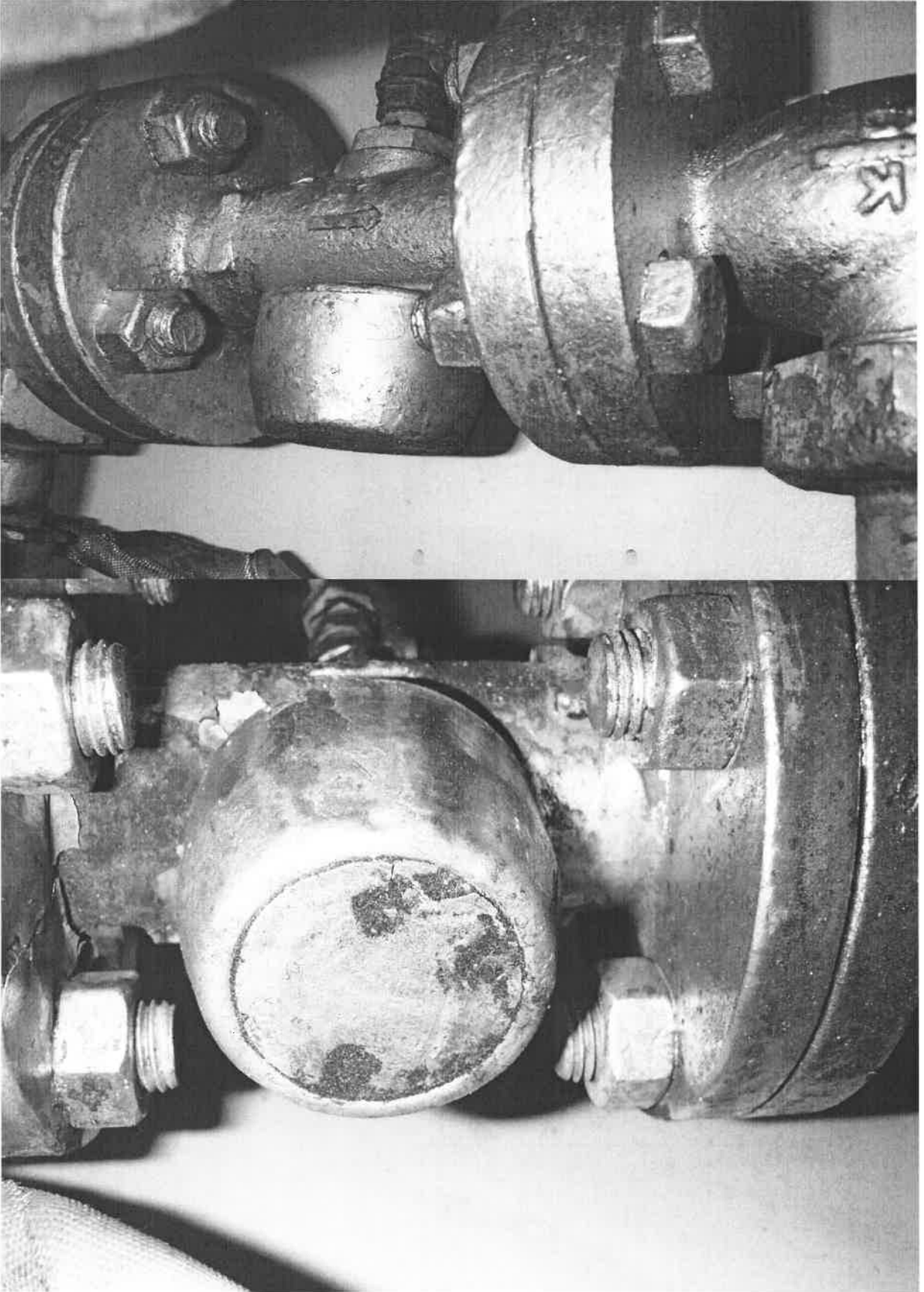
❖ DESCRIPTION:

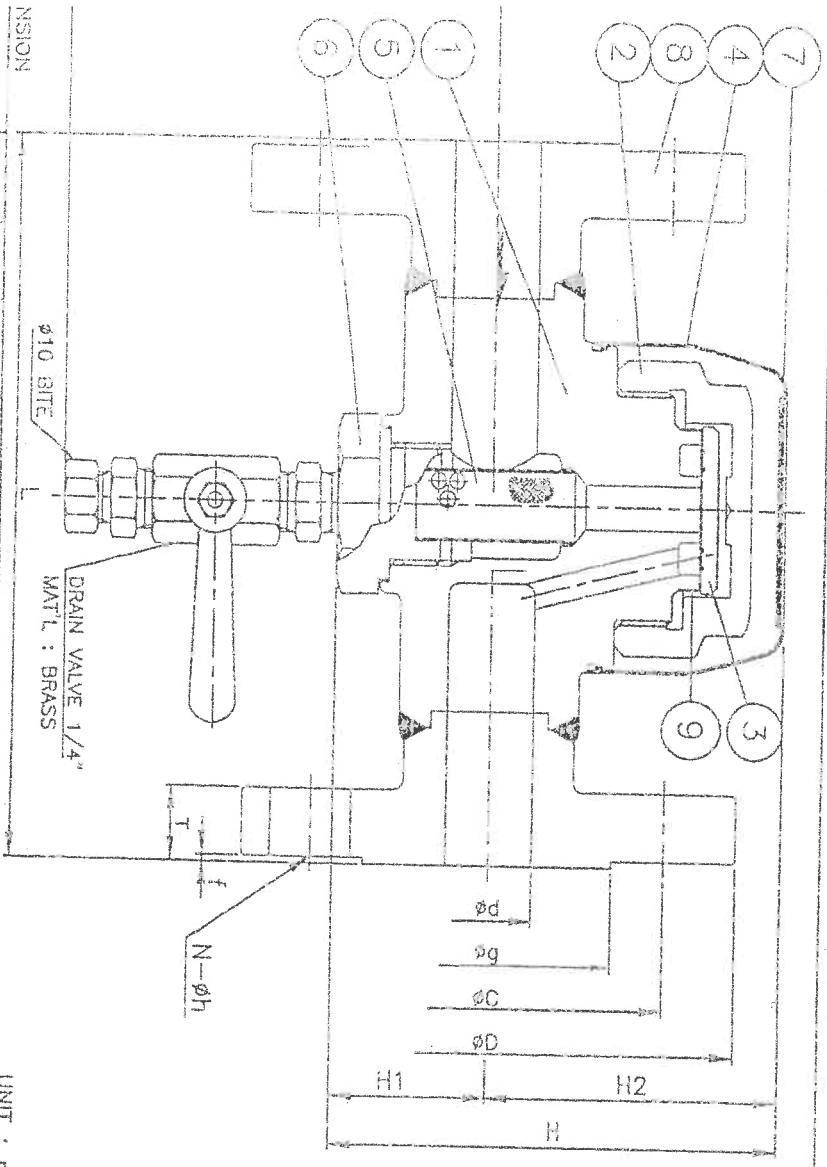
This type of trap uses the pressure energy of the steam to close the valve which consists of a simple metal disc.

The sequence of operation is as follows:

- Disc is raised from seat rings by incoming pressure allowing discharge of air and condensate.
- As the condensate approaches steam temperature it flashes to steam at the trap orifice. This means that the rate of fluid flow radially outwards under the disc is greatly increased. Which in turn reduces the static pressure and the seat is drawn in.
- The disc will never seat alone due to this, however the steam can flow round the edge of the disc resulting in a pressure build up in the chamber above it. So when the steam pressure acting over the chamber above (at a large area) exceeds the incoming pressure of the condensate (over a relatively smaller area) the steam trap snap shuts over the orifice. This snap action is important as it removes any possibility of wire-drawing the seat , ensuring no leakage.
- When the incoming pressure i.e. is the condensate pressure exceeds the chamber pressure, the disc will be raised up allowing the cycle to start up again.

The trap will usually open after 15-25 sec. The condensate is removed virtually as soon as it is formed.





ATINC	SIZE	J	L	H1	H2	H	FLANGE JIS B 2210							W/T (kg)	Q'TY (Set)
							D	C	g	T	f	N-H			
K FF	15A	15	110	30	59	89	80	60	-	9	-	4-12			
	20A	20	120	30	39	89	85	65	-	10	-	4-12			
	25A	25	125	35	64	99	95	75	-	10	-	4-12			
JK,20K FF	15A	15	120	30	59	89	95	70	-	14	-	4-15			
	20A	20	130	30	59	89	100	75	-	16	-	4-15			
	25A	25	135	35	64	99	125	90	-	16	-	4-19			
JK,20K RF	15A	15	120	30	59	89	95	70	51	14	1	4-15			
	20A	20	130	30	59	89	100	75	56	18	1	4-15			
	25A	25	135	35	64	99	125	90	57	16	1	4-19			
JK,20K RF	15A	15	140	30	59	89	115	80	55	20	1	4-19			
	20A	20	140	30	59	89	120	85	60	20	1	4-19			
	25A	25	150	35	64	99	130	95	70	22	1	4-19			

UNIT : mm

JOKWANG L.L.I. CO., LTD.

NO	PART NAME	MATERIAL	Q'TY	REMARK
1	BODY	SCS 2	1	
2	DISC	SUS 420J2	1	
3	INSULATION CAP	SUS 304	1	
4	SCREEN	SUS 304	1	
5	PLUG	SUS 304	1	
6	NAME PLATE	SUS 304	1	
7	FLANGE	SF 440A	2	
8	BIMETAL		1	

DES	CHK	APP	DATE	2004.05.13
M.H.KANG	J.Y.LEE	B.W.MUN	SCALE	N S
D.W.G NAME		MODEL NO		
DISC STEAM TRAP		JTR-DF41 (JKD-41F)		
D.W.G NO	REV			
J.K		JKS-3171012 0		

JOKWANG L.L.I. CO., LTD.

J.K



Boiler Pilot Burner Overhauling

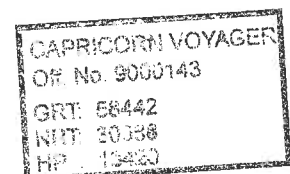
Nadeep Lamba

Engine Cadet

Date:

Signature:

2/E *Nadeep Lamba*



Maintenance work on Auxiliary Boiler

Job: Overhauling pilot burner

Started no: 14.05.2017

Completed on: 14.05.2017

Routine/Breakdown/Repair: Weekly routine job

Assisted by: 2/AE

Details of the work done:

1. Checked ignition electrode condition. It was found dirty and hence cleaned.
2. Checked ignition burner lance condition. It was in good condition
3. Checked ignition burner nozzle condition: It was found dirty. It was cleaned and blown with air.
5. Checked ignition electrode spark pattern. It was at the right place.
6. Measured the gap between electrode and nozzle for ignition burner. No change was required and was same as manufacturer's recommendation.

Precautions taken:

- Mechanical - follow procedure while taking out the burner and cleaning
- Pressure-Ensure zero energy by putting lock out and tag out
- Temperature- wear leather gloves to protect from hot surfaces
- Gravity- use proper lifting techniques, assistance if required while carrying the pilot burner to workshop
- Chemical- wear appropriate(hyflex) gloves while cleaning

Materials used: none

Tools used: Allen key, air hose

Test carried out: Aux. boiler no. 1 fired and tested for ignition and the ignition was found to be proper.





Boiler Gauge Glass Overhauling

Date: 05 APRIL 2018

Signature:

CARRICORN VOYAGER
OF No 9000149
GRT: 58442
NRT: 30388
HP : 12420

[Handwritten signature]
2/5

Overhauling Boiler Gauge Glass

Job Done : Overhauling of the boiler gauge glass

Location : Engine room workshop

At : sea

Time : Day

Status : Repaired

❖ Difficulties Faced in carrying out the job :

- There were deposits on the gauge glass , they had to be cleaned as by the scrapper. Extreme care was required to be taken so as not to scratch the glass.
- The gasket condition is also not appropriate so it was replaced successfully.

❖ Risk Involved in carrying out the job and precautions taken:

➤ Risk Involved : Improper tightening resulting in breakage of glass , Hand injury , eye injury , cuts , falling objects , pressure

➤ Precautions taken :

- The nuts were tightened in a particular order according to the manufacturers instructions . Also the torque spanner was used to avoid over tightening .
- Focus on task is practiced.

➤ Problems involved in testing and trying out :

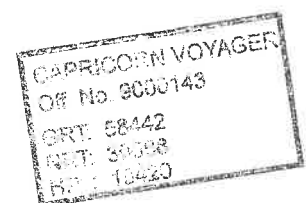
- Before testing , proper tightening of nuts was ensured . No problems were observed while testing the gauge glass.
- At last the overall efficiency of the job was Excellent as there was no leakage found in the gauge glass after overhaul.



Boiler Water Test Analysis

Date: 09 APRIL 2017

Signature: 3/E *HL*



Boiler Water Test Analysis

Cooling water valve



Port drum water boiler valve

Port feed water boiler valve

Starboard feed water boiler valve

Sampling valve

Starboard drum water boiler valve

❖ **Phosphate test**

❖ **Testing procedure:**

- Fill the sample to the 25ml mark with boiler water.
- Place the phosphate ampoule's taped tip in the notch at the base of the sample cup and break the tip.
- Remove the ampoule from the cup and invert it several times, allowing the bubble to move towards each end.
- Wait 5 minutes for full color development.
- Match the color developed with the comparator and note the PPM of phosphate.

❖ **DEHA Test:**

➤ **Testing procedure:**

- Fill the sample up to 25ml of feed water.
- Add two drops of activator solution and stir gently with the "DREWPLEX OX corrosion inhibitor" ampoule.
- Snap the tip of the ampoule immediately by pressing in the notch of the bottom of the sample cup and then remove the ampoule.
- The feed water fills the ampoule immediately and reacts with the chemical therein. Mix the contents of the ampoule by inverting the ampoule several times allowing the small bubble to move to either end each time.
- Wait exactly ten minutes for full color development.
- Match the color developed using the comparator and note the PPM content.

➤ **Means of adjustment:** DREWPLEX OX Corrosion Inhibitor.

➤ **Test result dosage adjustment:**

- < 0.4 PPM increase the dosage by 25%.
- 0.4-0.8 PPM - no dosage adjustment necessary.
- 0.8 PPM decrease the dosage by 25%

❖ **Chloride test:**

- Take 10ml of boiler water.
 - Add 3 drops of phenolphthalein indicator.
 - Add sulphuric acid to neutralize.
 - Add 6 drops of potassium chromate.
 - Add silver nitrate, one drop at a time, shake and add till it turns orange.
-
- ✓ 1 drop- 10 ppm
 - ✓ Normal – 20-70 ppm Max:300 ppm
 - ✓ If higher – blowdown

❖ **Neutralized conductivity**

➤ **Testing procedure:**

- Take approximately 150 ml of cooled boiler water in a beaker.
- Add 2 drops of phenolphthalein to it and stir. The sample turns pink.
- Add small amounts of Gallic acid powder and stir with the probe/cell of the meter till the sample turns colorless.
- Submerge the cleaned cell of the conductivity meter into the boiler water sample (no bubbles should be stuck. Tap it once in boiler water).
- Switch on the meter and note the conductivity reading.

Means of adjustment: Blow down.

❖ **Hydrate Alkalinity Test**

➤ **Testing procedure:**

- Rinse and fill the plastic titration vial to the 12ml indication with cooled boiler water sample.
- Pipette 2ml of Barium Chloride 10% into the vial and swirl to mix.
- Add 2 drops of phenolphthalein indicator and if the sample does not turn pink the hydrate alkalinity is zero. If the sample turns pink, counting the drops, add sulfuric acid N/10 until the sample is colorless.
- Number of drops of sulfuric acid (N/10) x 10 = PPM of Hydrate alkalinity as OH.

➤ **Means of adjustment:** DREWPLEX AT Chemical.

➤ **Test result dosage adjustment:**

- < 30 PPM increase dosage by 25%.
- 30-65 PPM no dosage adjustment necessary.
- > 65 PPM decrease dosage by 25%.



Capricorn Voyager

PROCEDURE FOR OPERATING OILY WATER SEPARATOR

Date of completion: *31/3/17*

Signature: _____

A handwritten signature in black ink, consisting of a large, stylized loop followed by a horizontal line.

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30088
HP : 12420

Procedure for pumping the bilge holding tank through the oily bilge separator:



- ❖ **Assuming that the separator is filled with water before starting:**
- Obtain the permission from OOW of the bridge and chief engineer to pump the bilge water through OWS. Obtain the keys from chief engineer to remove the lockout tag-out (LOTO) on the overboard discharge valve.
 - Obtain the details from the bridge about the vessel's position and enter this in oil record book together with the clean bilge holding tank sounding. Also note the time of starting the bilge pumping operation.
 - Make sure that the Environmental navigation panel of white box present in ECR is enabled and set to "EnviroPilot in control".
 - Open the control air supply valve to the OWS located stbd to the auto backwash L.O. filter.
 - Open the isolating valves of the suction strainer of the OWS bilge pump.



- Open the fresh water supply valve to the pump priming line and also open the ball valve which supplies FW to the flushing side of the OCM.
- Then open the ship side overboard discharge valves.



Overboard valves



- Put the manual discharge valve of the OWS on recirculation back to the Bilge holding tank.
- Switch on the OWS breaker from the starter panel and ensure power supply is present to the OWS monitor as well as the white box.



- After approximately a minute the monitor display shows some reading of ppm content.
- Open the sample 'outlet valve' from the monitor and then put the three way valve on the monitor on to FW side (flushing). At this moment check whether the three way pneumatic valve shuts and redirects the flow back to the holding tank irrespective of the manual discharge valve position.



FW side

- Start the bilge pump of OWS. Open the inlet to the 15ppm monitor and put the sample three way valve on 'sample' side.
- After steady reading below 15ppm ,Put the manual discharge valve of the OWS to overboard position(black handle)
- open the inlet valve going to the white box and the outlet valve from the white box(red in colour).



Inlet valve of white box



Outlet valve of white box

- Change the manual discharge valve position to overboard discharge. The time of removing overboard discharge valve LOTO is recorded along with time of opening the valve in E/R logbook and OPS9.
- Check for the flow indication and ppm of bilge water in the white box. Also check the flow in the siemen's flowmeter in the white box.

❖ **Stopping sequence:**

- Take the clean bilge holding tank sounding and stop the OWS pump p/p before it loses suction which would occur probably at 15cm of bilge water in the tank.
- Set manual discharge valve to recirculation position.
- Switch off the pump and shut the OWS suction strainer isolating valves.
- Shut the overboard valves and padlock (LOTO) the ship side valve.
- Close the inlet and outlet valves of white box.
- Shut the sampling line inlet valve to the monitoring cell.
- Flush the monitoring cell with FW sample to make sure the cell is clean.
- Outlet valve of the sample from the monitoring cell is shut.

- Shut control air.
- Switch off the OWS breaker from the panel.
- Inform bridge about the completion of operation and note the ORB entries.

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GRT: 58442
NRT: 30058
HP : 18420



CTO

31/3/17.



VOP-04-08 Disposal of Engine Space Waste

Applicable To	Critical Safeguard	Version
All vessels	No	01 Sep 2015

Requirements

- None.

PROCEDURE STEPS

The Chief Engineer is responsible for this procedure:

- If a step specifies who must do a task, that person must do the task.
- If a step does not specify who does a task, the Chief Engineer can do the task or delegate it.

Transfer and Disposal of Oily Residue and Sludge Accumulated in Machinery Spaces

The Chief Engineer is responsible for the transfer of oily residues accumulated in the engine room and other machinery spaces. This transfer can be to another tank, barge, vessel or a shore facility.

- 1 The Chief Engineer must write instructions for the transfer of oily residues that includes:
 - Transfer to a designated Bilge Holding Tank.
 - Pumping overboard in permitted areas according to [MARPOL](#) Annex I, Regulation 15 and The Waste Management Plan.
 - Discharge to a barge or a vessel.
 - Discharge to a shore reception facility.

Caution! Only applies to vessels with an Integrated Bilge Water Treatment System

 - Discharge of the Clean Drain Tank directly overboard without the oily water separator by using the White Box System.

- 2 The VMT must be aware of the guidelines in [MARPOL](#) Annex 1 and Resolution MEPC.107(49).

- 3 The draining of oil or hazardous material from an external source into an engine bilge space is not permitted (33 [CFR](#), 155.770).

- Machinery space bilges are pumped directly to the designated holding tank. At terminals with reception facilities, bilges and holding tanks can be pumped ashore. For disposal, follow [MARPOL](#). Make relevant Oil Record Book and log entries regarding handling and disposal of oily residues in engine spaces.
- Clean water collected in bilge holding tanks may be discharged at sea where permitted by [MARPOL](#) and local regulations through the vessel's oily water separator in accordance with

MARPOL.

- 4 The Engineer Officer of the Watch (EOOW) must understand and follow the procedure for the agreed method of transfer.
- Vessels compliant with the Integrated Bilge Water Treatment System (IBTS) are allowed to pump contents of the Clean Drain Tank directly overboard without the use of the oily water separator. However, a means to monitor overboard discharge along with automatic stopping device shall be provided. This may consist of an oil content monitor with a three-way valve arrangement. The oil content of the effluent without dilution should not exceed 15 ppm.

Engine Room Sludge Transfer System

- 5 The Chief Engineer must choose one of the following options to dispose of sludge:
- Incinerate the sludge.
 - Transfer the sludge to a slop tank that is listed on the IOPP Certificate of the vessel.
 - Offload the sludge to a shore reception facility.
 - Get approval from the Voyage Manager and transfer the sludge to a cargo slop tank to be comingled with cargo or for load-on-top. Refer to the Waste Management Plan.
 - Use only approved equipment or systems to transfer sludge to a cargo slop tank.
- 6 The Engineer Officer of the Watch (EOOW) must:
- Transfer sludge in the engine space using only dedicated sludge transfer pumps and system piping.
 - If the sludge transfer pump fails, a portable pump with short lengths of transfer hose may be used. If a portable pump is used, the hoses must meet the requirements of [AIR-02-02, Reliability Centered Maintenance](#), Engine Room Sludge Transfer System.
 - Failure of the sludge pump must be recorded in the Oil Record Book
- 7 Engine room staff must:
- Inspect hose couplings for damage and conductivity before they are used.
 - Hydro-test transfer discharge piping annually to the allowable MAWP.
 - Hydro-test all hoses annually to their rated working pressure.
 - Test all hoses for conductivity as necessary but at least annually and follow guidelines in [ISGOTT](#), Electrical Continuity and Discontinuity Tests.
 - Hydro-test transfer discharge piping to 150% MAWP during each UWILD and Planned Periodic Overhaul.

Oil Record Book and Logbook Entries

- 8 The Engineer Officer of the Watch (EOOW) must:
- Make entries in the Oil Record Book promptly and accurately as per guidelines contained in the flag state issued Oil Record Book.

- Make an entry in the Oil Record Book, Part I and the OPS-9, *Engine Log Book* when oil residue is transferred to or from a holding tank that is listed in Part 3 of the IOPP Certificate of the vessel.
- If oily residue accumulated in the engine room spaces is transferred to a cargo slop tank, the quantity must be recorded in the Oil Record Book, Part II and the OPS-5, *Deck Log Book*.
- Record bunker loading, bilge and sludge transfers in the Oil Record Book, Part 1. Follow the regulations in [MARPOL, Annex 1, Appendix III](#).
- For guidance refer to Intertanko's [A Guide for Correct Entries in the Oil Record Book \(Part I - Machinery Space Operations\)](#) and IMO's [Guidance for the Recording of Operations in the Oil Record Book \(Part 1 - Machinery Space Operations\)](#).

9 The Chief Engineer must make sure the Oil Record Book (Part I only) is completed correctly before giving it to the Master to sign.

Oily Water Separator (OWS)

10 The Chief Engineer must:

- If the OWS equipment fails, repair it as soon as possible.
- Record a failure of the equipment in the Oil Record Book and in the OPS-9, *Engine Log Book*.
- Report the failure of equipment to the flag state, the port state and the applicable Engineering Superintendents and Marine Superintendents.
- Consult with the Master and the Engineering Superintendent to form a contingency on plan how to handle bilge water while the equipment is being repaired.

White Box System and Enviropilot

The White Box System and Enviropilot is a control and monitoring system for bilge water discharge in accordance with IMO Resolution MEPC.60 (33) or IMO Resolution MEPC.107 (49).

The White Box System is installed between the OWS and the overboard dump valve as a fail-safe system to prevent the accidental overboard discharge of bilge water.

All signals from the White Box System and the Enviropilot are recorded with the vessel's position and the time in a digital tamper-proof recorder that is installed in Engine Control Room.

If necessary, the Enviropilot diverts the overboard discharge back to bilge holding tank to make sure that the vessel complies with the IMO rules for discharge overboard.

The three-way valve of the White Box System automatically closes when the vessel speed falls below requirements or enters a Special Area, in which discharge is not permitted.

11 The Chief Engineer must:

- Personally control the key to the White Box System cabinet.
- Make the Recorded data available to USCG, SIRE, and class or port state as proof of compliance.
- Retain the recorded data according to [VOP-01-01/Attachment 1, Records Retention Guidelines](#).
- Record regular maintenance in Maximo PM Work Orders (7283-3 month and 7284-12

month).

12 If the equipment fails, the Engineer Officer of the Watch must:

- Stop the overboard discharge of water.
- Refer to the manufacturers' manual for corrective action.
- If the problem cannot be corrected, ask the vessel's Engineering Superintendent for help.
- Bypass of the White Box System is permitted only with Assistant Fleet Manager's approval.

Overboard Discharge Valve from Oily Water Separator

13 The OWS Overboard Discharge Valve must be included in the controlled valve list as per [SAF-02-10, Controlled Valve Procedure](#).

14 The Chief Engineer must:

- Lock the overboard discharge valve from the oily water separator in the closed position at all times when the OWS is not in use.
- Personally control access to the key of the lock of overboard discharge valve.
- Make an entry in the OPS-9, *Engine Log Book* when the lock is removed and the valve opened prior to a planned discharge and when the valve is locked after discharge is completed.

Disposal of Economizer and Boiler Wash Water

If possible, wash the economizer or the boiler at sea.

15 When the economizer or the boiler is washed, the EOWW must make sure that:

- The soot residue is within the acceptable limits for discharging at sea as per the guidance in section one (1) of this procedure.
- Wash water is discharged at sea, outside Special Areas and more than 50 nautical miles from land.
- Make sure the soot is not oily and if in doubt, consider it as oily residue and treat as described in section 1 of this procedure.
- If the vessel is on a fuel saving program such as RTA with Weather News International (WNI), the stopping of the vessel to conduct the wash must be notified to WNI.

CAUTION. Discharge of wash water in port limits is not permitted.

16 If the economizer or the boiler must be washed in port, the Chief Engineer must consult with the Engineering Superintendent and plan the operation:

- Pump the wash water to a cargo slop tank, if permitted by the Charter Party and record the transfer in the Oil Record Book Part 1 and Part 2.
- Consult with the Voyage Manager, Marine Superintendent and Engineering superintendent and discharge the wash water to a shore reception facility for final disposal.
- Store the wash water in a dedicated soot-collecting tank and discharge overboard at sea taking into account [MARPOL](#) restrictions.

- Record the operation in the OPS-9, *Engine Log Book*.

Bilge System

17 The Chief Engineer must make sure that:

- The bilge system piping is tested or inspected annually.
 - The Direct bilge suction valves are tested or inspected annually.
 - After test or inspection, that bilge suction valve is fitted with a numbered, easily breakable seal, in compliance with the requirements of the Controlled Valve Procedure.
 - Record the seal numbers in the OPS-9, *Engine Log Book*.
 - Remove and test all bilge alarm ball floats for leaks annually.
- For records retention guidelines, refer to [VOP-01-01/Attachment 1, Records Retention Guidelines](#).

Records and Checklists

Waste Management Plan

OPS-9, *Engine Log Book*

Oil Record Book

OPS-5, *Deck Log Book*

Referenced Documents

[SOLAS](#)

[MARPOL](#)

[A Guide for Correct Entries in the Oil Record Book \(Part I - Machinery Space Operations\), Intertanko](#)

[Guidance for the Recording of Operations in the Oil Record Book \(Part 1 - Machinery Space Operations\), IMO](#)

[ISGOTT](#)

33 [CFR](#), 155.770

IMO Resolution MEPC.60 (33)

IMO Resolution MEPC.107 (49)

Procedure Owner	Assistant Fleet Manager
Functional Responsibility	Manager, Fleet Operations

Uncontrolled Copy

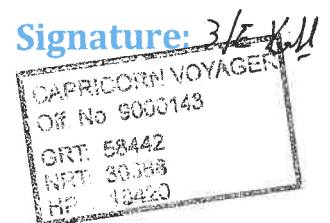


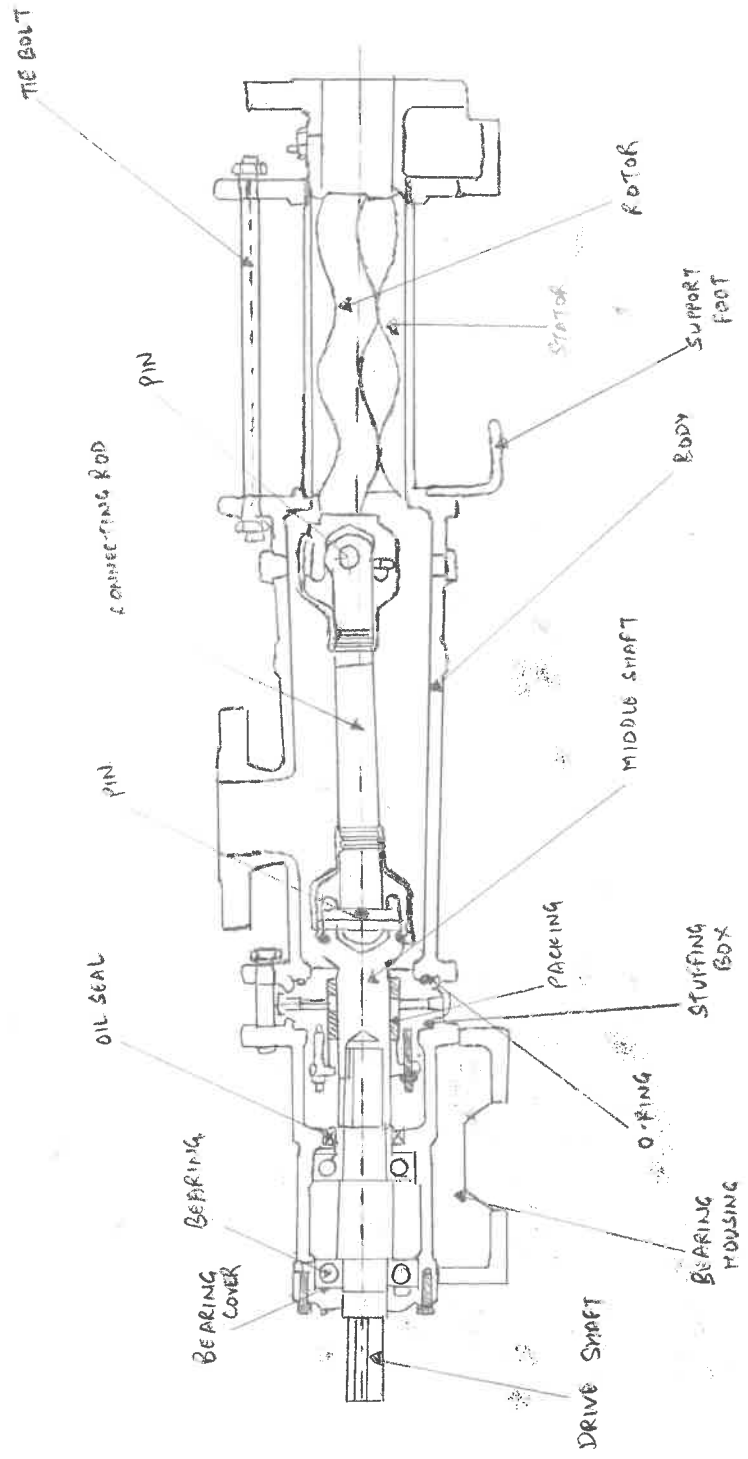
Bilge and sludge pump

Nadeep Lamba

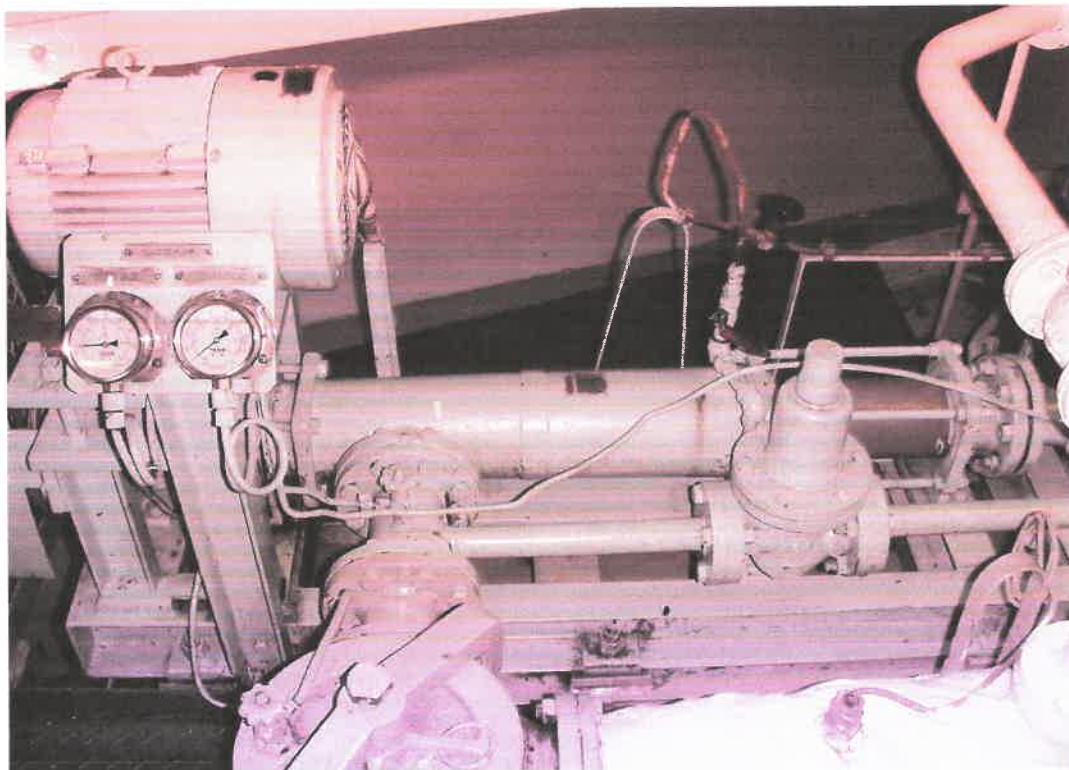
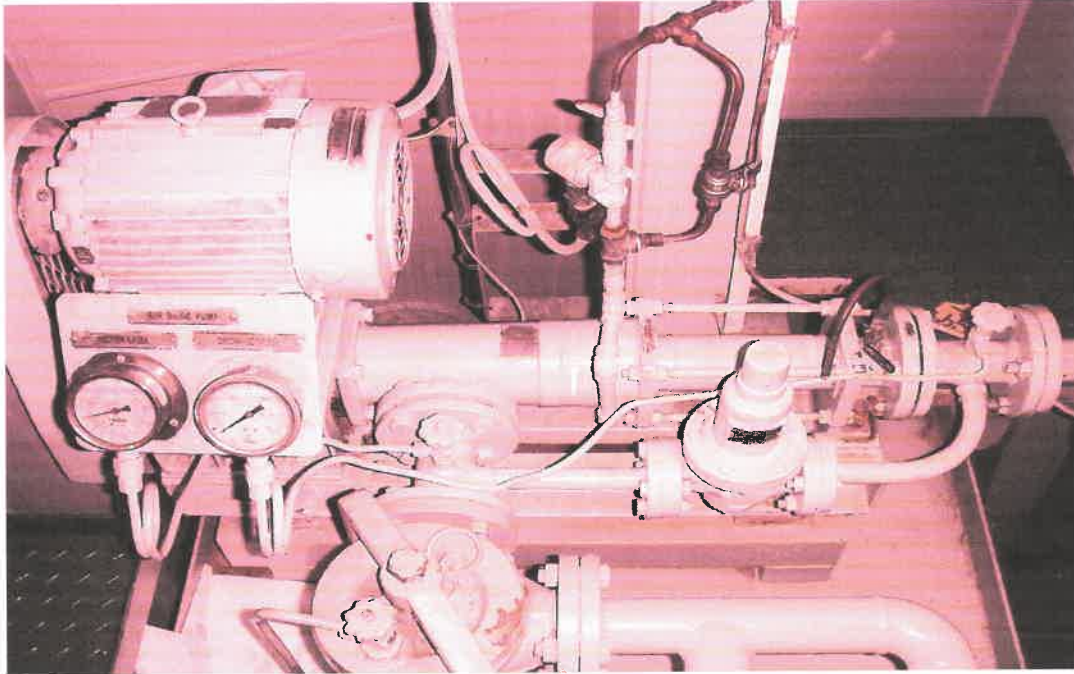
Engine Cadet

Date: 18 APRIL 2017





MONO SCREW PUMP



Screw Pump

FAMILIARISATION WITH BILGE SYSTEM

1. Is there anything special about the valves in the bilge system ? State reasons.

- All the valves in the bilge system are screw down non return valves. This is done so that the suction side of the bilge line to the bilge pump is filled in water and so it will assist in the priming of the bilge pump.
- To prevent the backflow of bilge water into the bilge wells.
- To prevent water from entering the bilge wells from the MSW crossover line if the valves are leaking.

2. With the help of a diagram, describe the function of a strainer or Mud box fitted on the bilge line?

- Strainer – It is a simple device made up with a single layer of coarse gauze, a very coarse wire mesh or a drilled or perforated plate. This is used to hold large foreign objects which could cause damage or blockage. It consists of a cylindrical basket with removable lid in which a perforated basket is inserted such that the fluid must pass through the perforations.

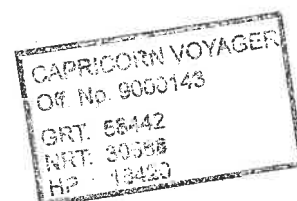
3. What is the function of direct bilge?

- Direct bilge suction is connected to the Fire and G/S pumps. The main bilge line is connected to the suction side of fire and G/S pumps through a non return valve.
- This is used in case of ER flooding, to pump out the bilges overboard.

4. State at least six reasons for a bilge pump failing to draw water from a particular location.

- Non-priming of the pump
- Excessive air intake into the suction pipe due to defective piping or loose connection
- Negative suction i.e. Bilge well level too low
- Incorrect line up i.e. valve at suction not open
- Strainer clogged
- A solid particle or a piece of cloth or string drawn in with the liquid into the closed capacity between rotor and stator
- Motor damaged i.e. not starting or not running at rated RPM.
- Excessive belt slip.

5. Mention two of the common problems which occur on your ship during pumping out bilges?



- The measuring Cell of the oil monitoring device was not showing the ppm reading (shows EE) and hence the OMD was giving a false high ppm alarm. Due to which the treated water was directed back to the bilge holding tank.
- Wrong line up

Maintenance of Shell and tube type Heat Exchanger:

Tube cleaning:

- 1) Remove end covers and use long handled nylon/metal brush and push through each individual tube until the brush exits the other side. Water wetting and rinsing during the brushing needs to be done.
- 2) Clean it chemically by either soaking the tube stack in chemical or by circulating chemical through the tube stack.

Shell cleaning:

- 1) Can be done by chemical soaking and then circulating chemical through the shell using a pump.

Leak detection:

In case of any leak use the following procedure:

- 1) Remove end cover of the floating end tube plate side and blow compressed air to dry all tubes.
- 2) Fill the shell with liquid/water and pressurize it.
- 3) Check for the leaking tube from the floating end tube plate.

Repairs/Plugging of tubes:

- 1) Tube plugs of conical shape made out of hard wood or soft metal can be used to plug on both sides.
- 2) If the leakage is from the expanded part – re expand the tube with an expand tool.
- 3) In case of large no. of tubes are leaking renew the tubes.

MAINTENANCE OF PLATE TYPE HEAT EXCHANGER

Principle:

A plate type heat exchange consists of a frame; which consists of head cover, follower cover, support pillar, carrying bar, guiding bar, and a number of tightening bolt. In between head and follower cover, a number of plates are pressed together. Heat is transferred from one medium to other through alternate metal plates, which have been pressed into a special pattern so that the hot and cold fluids alternate between each of the plates. The heat transfer rate is high because of large surface area and high transfer efficiency of plates.

Maintenance:

The central cooler is subjected to fouling because of the use of seawater. Fouling occurs in ports and the plate's entry region. It can increase the pressure drop and reduce the flow rate resulting in inefficient heat transfer. So cleaning is necessary to remove these fouling which can be done either manually or by Cleaning in Place (CIP). The cleaning section consists of four parts:

1. Manual Cleaning-

The plate heat exchanger is separated and the plates are pulled out one by one and numbered properly. A soft cleaning material like nylon or other soft scrubbing brushes should be used with suitable detergents like acetone which do not contain Chlorine. If the scale is too thick, the pates are put in a vat with qualified cleaning material.

2. CIP Cleaning

This means cleaning of the exchanger without reassembly. It can be done more frequently but periodic inspections are still necessary. A circulation system in which a suitable detergent can be circulated is used. If the product in the exchanger is of

high viscosity like oil, the circulating quantity should be high enough to reach a sufficient speed for flushing and the solvent should not attack plates.

Examples of CIP are – Rinse with cold or tepid water, warm cleaning fluid circulates.

3. Cleaning Materials

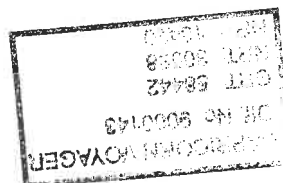
The cleaning material should remove the scales from the plates without damaging the plates. Stainless steel has a passivated film and this should not be destroyed because this inhibits the corrosion of stainless steel.

4. Control of Cleaning

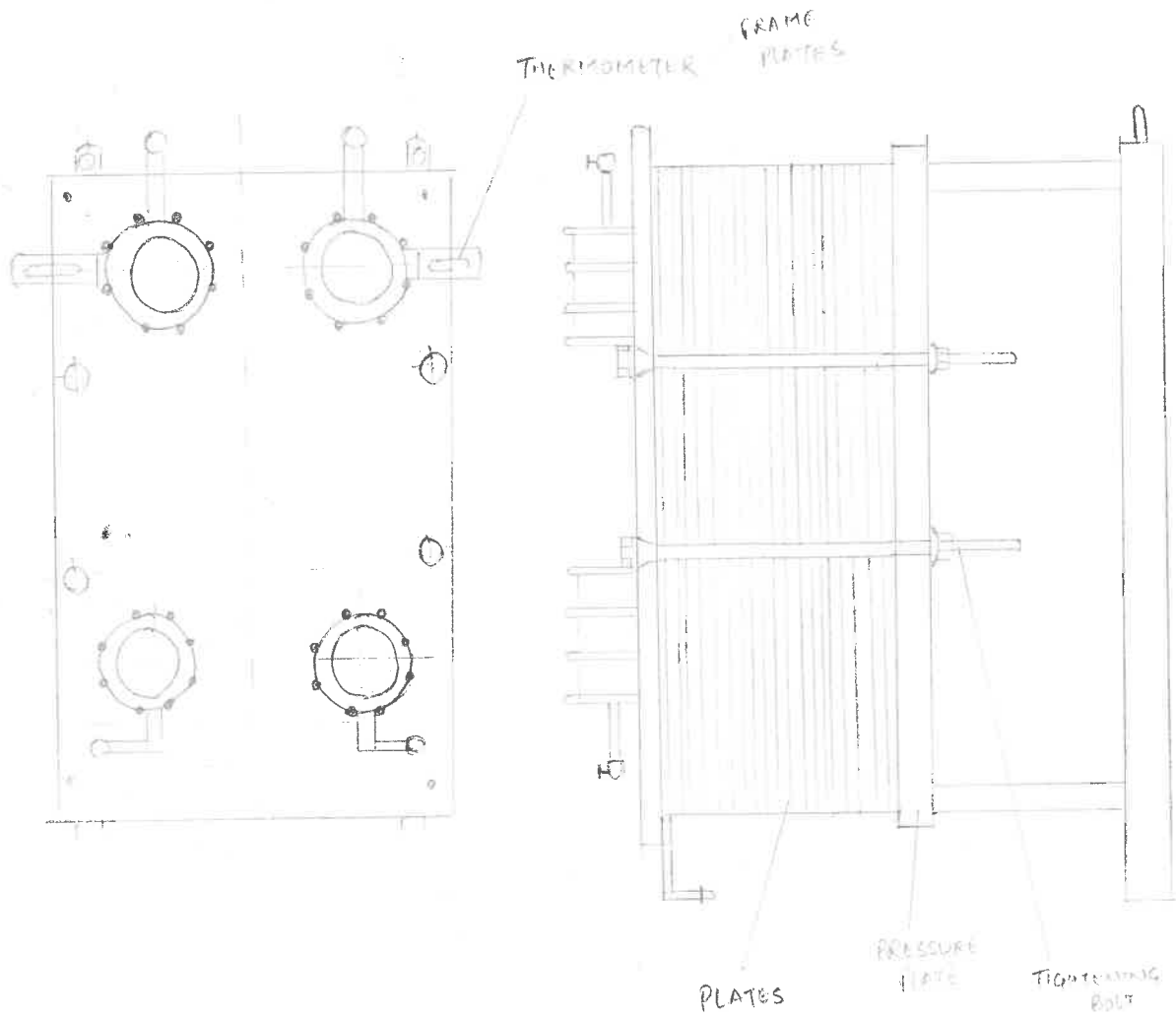
Cleaning influences the effectiveness of the plate heat exchanger. Therefore the plate heat exchanger should be separated for inspection. The following parameters are to be taken into account while cleaning:

- Too short cleaning period
- Too low chemical consumption compared to the scaling of the plates
- Too low running intervals between the cleanings.

If the plate exchanger is out of operation for a long time, it should be emptied; the plates should be separated and cleaned. Then the plate exchanger should be clamped together lightly and left covered to protect the gaskets against the effect of light and dirt.



Sigden
SOCIÉTÉ GAZELLE
01 APRIL 2012



HEAT EXCHANGER

CAPRICORN VOYAGER
OF. No. 9000143
CRT. 58442
NET. 30088
HP. 10420

MARINE GROWTH PROTECTION SYSTEM

PRINCIPLE OF OPERATION:

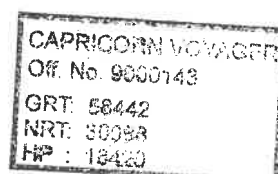
- The principle of operation is to pass a low DC voltage with high current through the generating cell assemblies.

WORKING OF MGPS:

- The generating cells are made up of inert materials of polyvinyl chloride, glass reinforced polyester and titanium with a generating surface of platinum.
- Sea water passing through the generating cells enables a current to flow between the positive platinum plated cell and the negative titanium cell.
- In doing so the sea water dissociates due to the action of the current flow, this reaction generates the sodium hypochlorite.
- The outlet from the generating cell assembly is directed into the in-service sea chest where it mixes with the incoming sea water to act as a biofouling and sterilizing control agent.
- The sodium hypochlorite generation is governed directly by the current flowing through the water.
- The flow of sea water through the unit has been designed with a turbulent flow in order to assist in maintaining the surfaces of the cells in a clean condition.
- It is necessary to maintain a constant flow over the generating cells, if the flow rate drops to 5.5m³/h, the system will automatically shut down.
- In the case of an automatic shutdown, the unit will restart automatically once the cause of the shutdown has been corrected and the flow re-established above the minimum value.

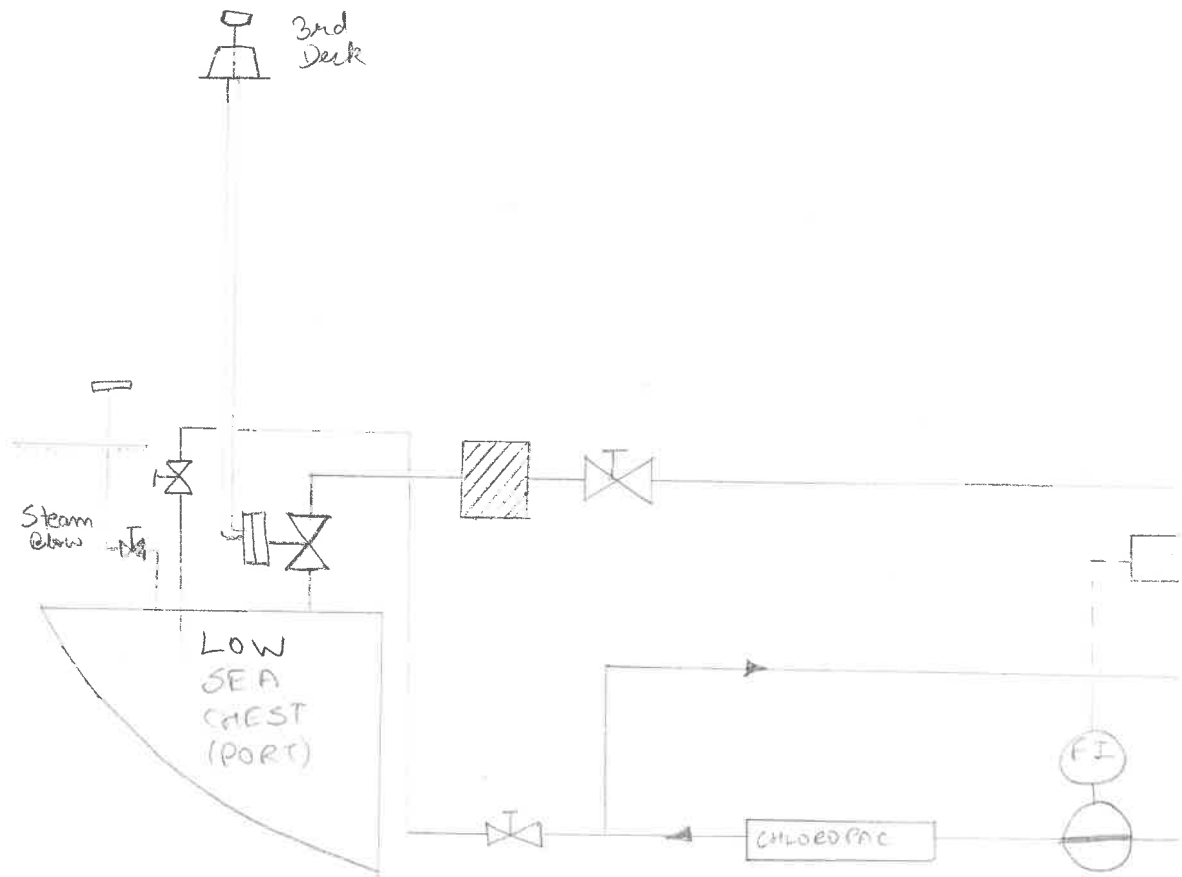
CAUTION:

Over chlorination can cause damage due to corrosion, while under chlorination could cause marine fouling.

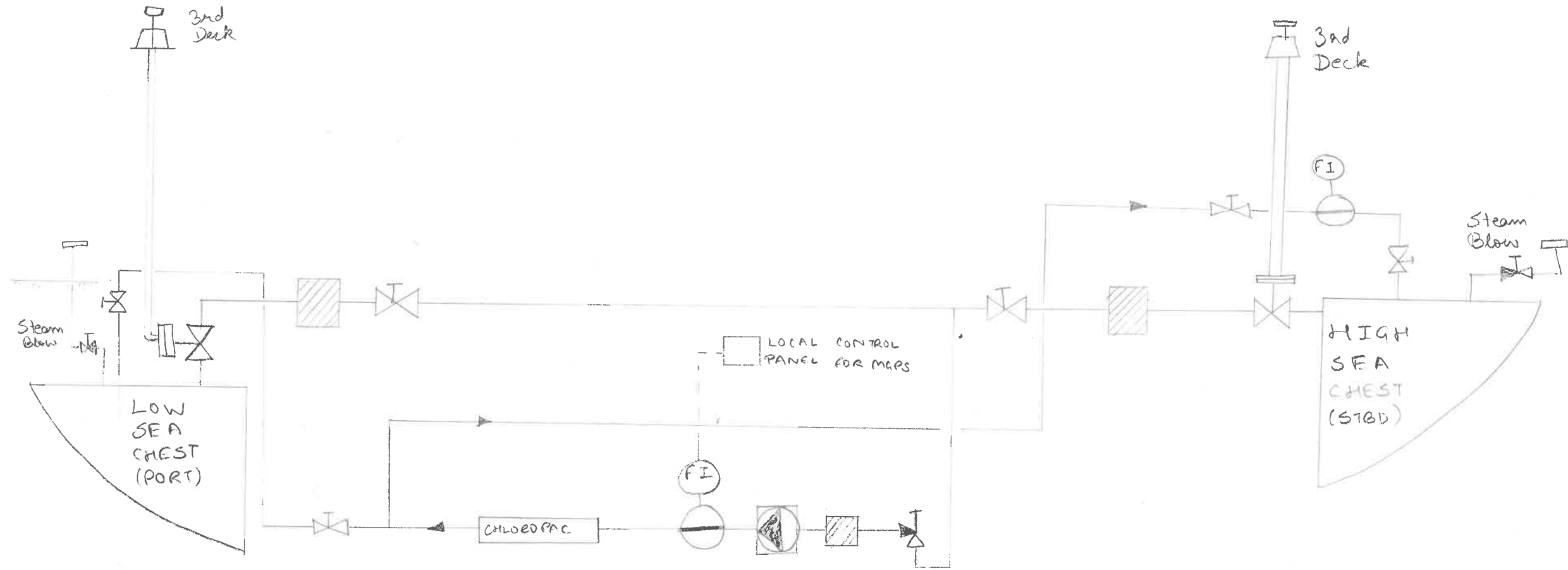


Signature
CHANNIE COBSETE
21E APRIL 2017

MARINE GROWTH



MARINE GROWTH PROTECTION SYSTEM



CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442 CTO
NRT: 30088
HP: 13450 01/09/17

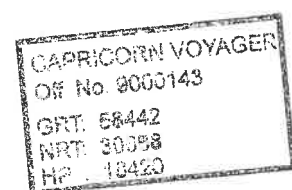


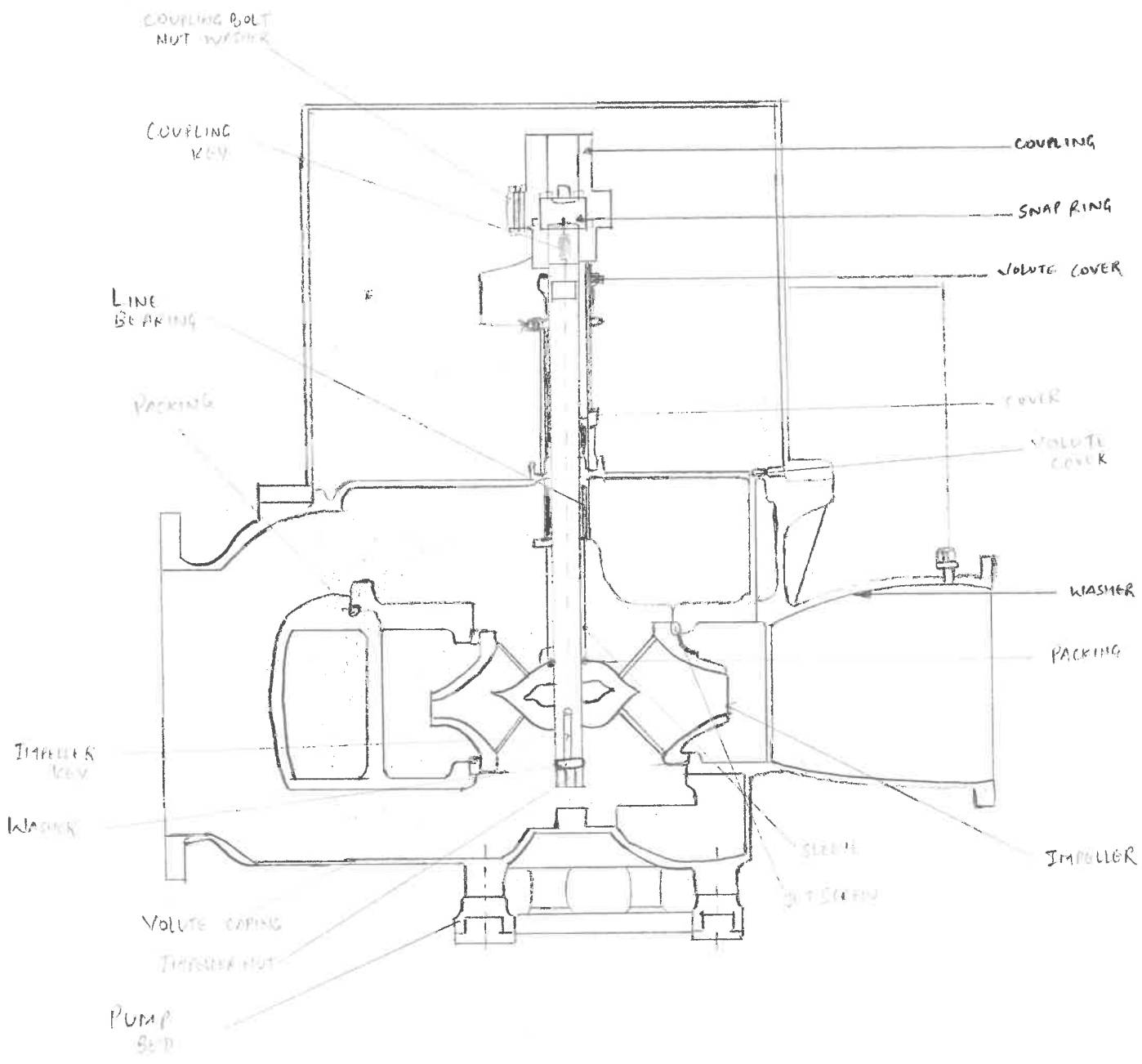
Capricorn Voyager

SECTIONAL VIEW OF CENTRIFUGAL PUMP

Date: 02 APRIL 2017

Signature: *3/E KH*





CENTRIFUGAL PUMP

Reasons for low efficiency of Centrifugal pump

1. Discharge valve closed or discharge pipe clogged
2. Cavitation in the impeller
3. Impeller not sufficiently submerged
4. Air is mixed with water in large amount
5. Too low rotational speed
6. High viscosity of the fluid being pumped
7. Suction filter clogged
8. Reverse direction of motor
9. Wear ring clearance more so the liquid will go back to suction side reducing discharge.
10. Net positive suction head low

Remedies:

1. After starting the pump the discharge valve must be opened.
2. The impeller needs to be replaced
3. Prime the pump before starting to submerge the impeller
4. The suction pipe should be fully submerged in the liquid
5. Check the motor voltage
6. Avoid pumping too high viscosity fluid by centrifugal pump
7. Clean the suction filter
8. Check for the connection of motor and change if wrong
9. Replace the wear ring
10. Check for manufacturer's recommendation and ensure head of fluid to the pump.



Viscosity F.O Controller

Nadeep Lamba

Engine Cadet

Date: 18.05.17.

Signature:

CAPRICORN VOYAGER
Off. No. 9000149
GRT: 56442
NRT: 30398
HP : 15420

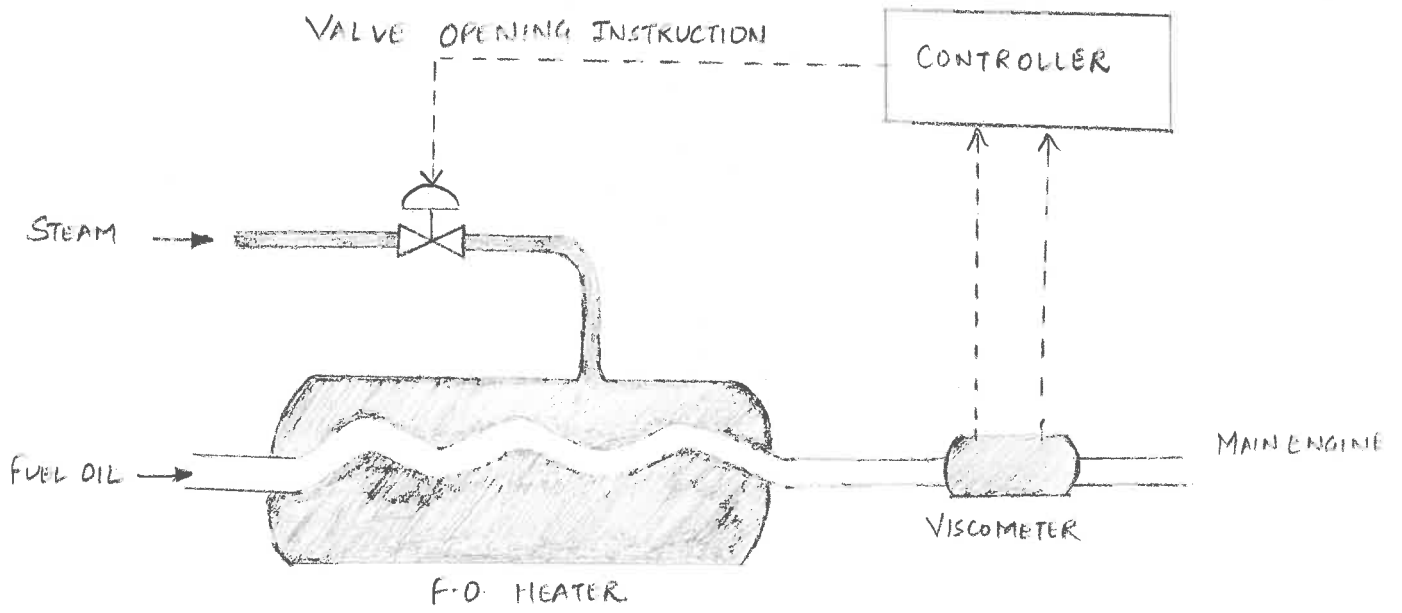
A handwritten signature in black ink, appearing to be "Nadeep Lamba", with the initials "cto" written below it.

Viscosity Fuel oil Controller

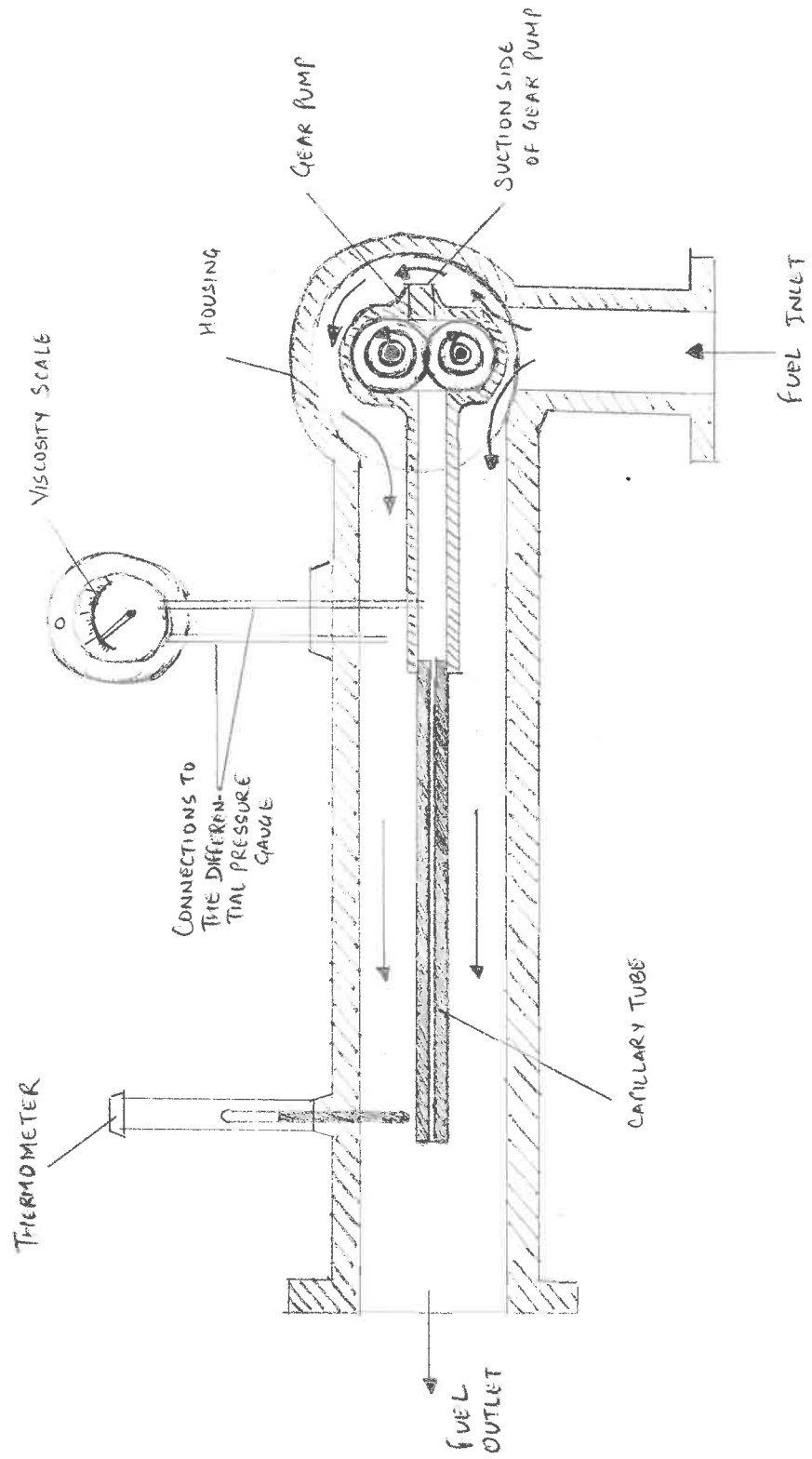
The F.O. heater is installed to lower the viscosity of the fuel oil supplied to the main engine from fuel oil service tank. In the F.O. Heater, the fuel oil is heated by using steam. When the amount of steam supplied to the F.O. heater is large, the fuel oil is heated and its viscosity becomes less. On the contrary, when the amount of steam supplied is low since the fuel oil temperature does not rise, the viscosity of the fuel oil increases. Therefore the viscosity of the fuel oil can be adjusted by changing the amount of steam. Hence it is necessary to measure the viscosity of the fuel oil at the F.O. heater outlet.

The viscometer calculates the viscosity data by leading part of the fuel oil into small tubes and measuring the differential pressure before and after it. To measure the differential pressure in the Sensor part, the sensor and the controller are connected by two connecting pipes or electric signal lines. When the viscosity of the fuel oil is measured and if the measured value is found to be less than the specified value, it is advisable to widen the opening of the motor valve of the steam system. Moreover, when the measurement value is higher than the specified value, the opening of the motor valve in the steam system is reduced.

MISSING SENSOR WHICH
GOING TO ECR AMS



VISCOSITY F.O. CONTROLLER



VISCOTHERM VISCOSITY MONITORING DEVICE

Viscotherm Viscosity Monitoring Device

The basic principle of the viscotherm Viscosity monitoring device is the diagram (attached).

A continuous sample of the fuel is pumped at a constant rate through the fine capillary tube. As the flow through the tube is laminar, pressure drop across the tube is proportional to viscosity.

In this unit an electric motor drives the gear pump through the reduction gear at a speed of 40 rpm. The pump is positioned in the chamber through which fuel is passing from the heater to the fuel pumps or combustion equipment. Tapping points are provided to enable the pressure difference to be measured by means of a pressure differential gauge. The gauge is calibrated directly in terms of viscosity. Parts in contact with the fuel are of stainless steel for corrosion resistance.

A differential pressure transmitter provides an analogue of viscosity to a pneumatic controller, which regulates the supply of fuel heating steam through a control valve.

Differential pressure Transmitter:

The DPT transmitter converts the differential pressure developed across the capillary assembly of the viscosum sensor into a proportional 0.2-1 bar (3 - 15 psi) control signal. This control signal is fed to the viscosity control station and the auxiliary equipment.

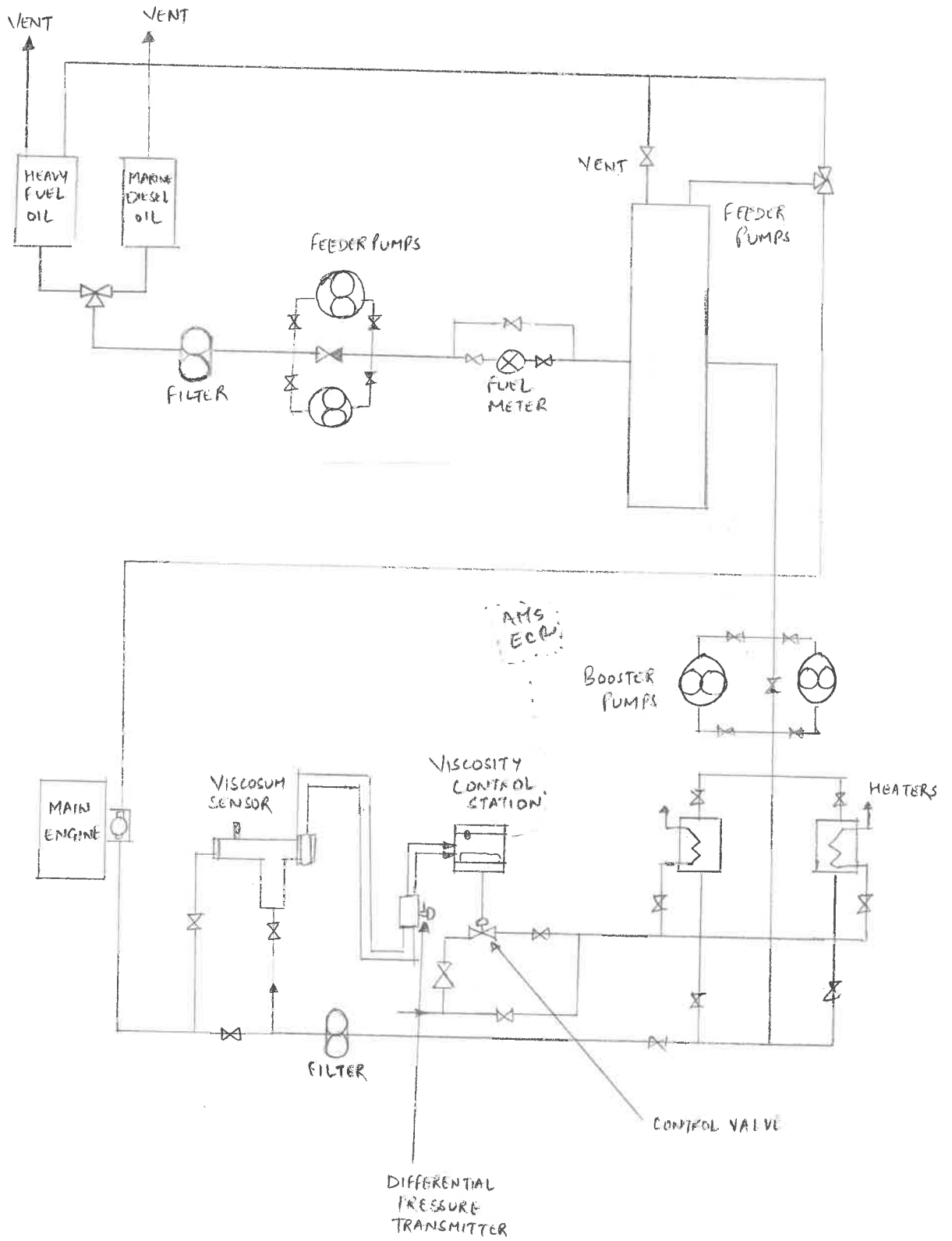
The pressure from the positive side of the viscosum sensor is connected to the high pressure side of the DPT.

The pressure from the negative side is connected to the low pressure side. Any pressure difference between the two sides will exert a force on diaphragm assembly.

The force exerted by the diaphragm assembly is thus opposed by the force which is exerted on the range rod by the feedback bellows. The force exerted by the feedback bellows on the range rod depends on the output pressure of the transmitter. In its turn the output signal is controlled by the flapper-nozzle assembly produces a minute displacement of the flapper in respect to the nozzle.

This pressure variation is amplified by the pneumatic relay, resulting in a change of the force that the feedback bellows exerts on the range rod.

This change counteracts the original movement and the flapper will be moved to a position where a force balanced is reached.



VISCOSUM SYSTEM CONTROLLING FUEL OIL



Fuel oil Transfer Pump

Nadeep Lamba

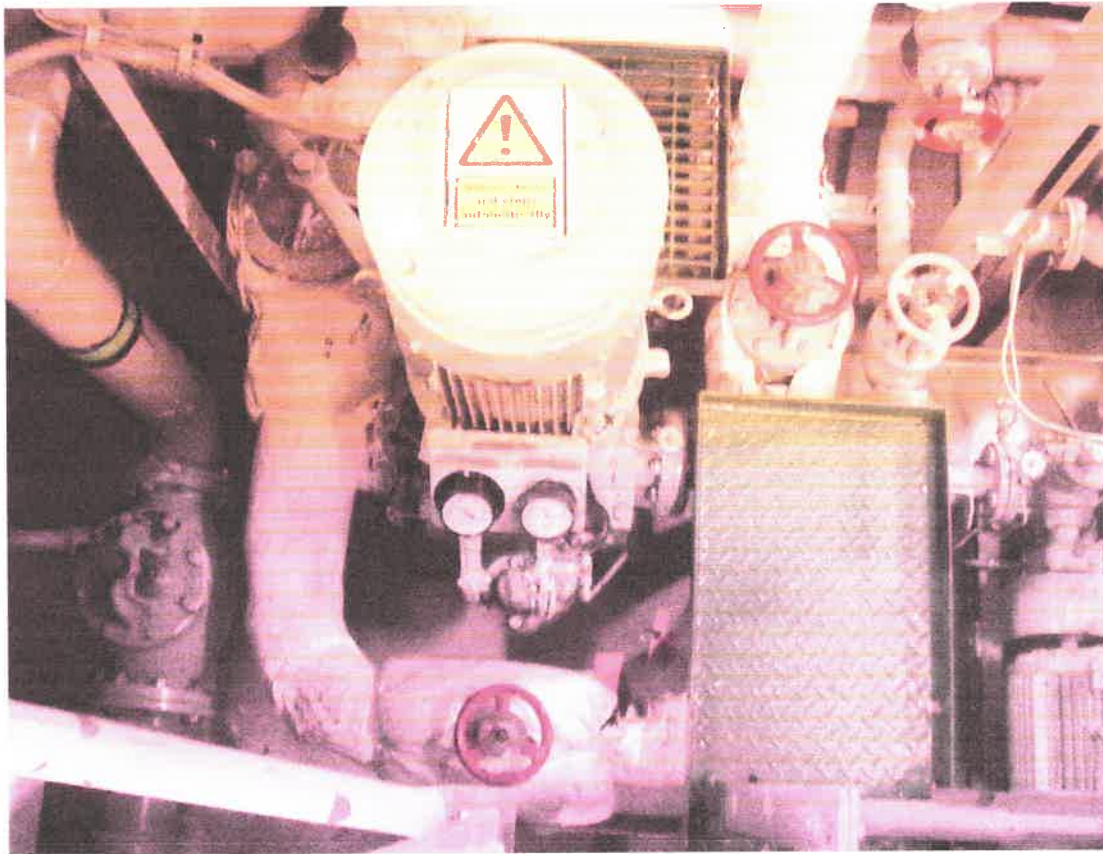
Engine Cadet

Date: 20/09/17.

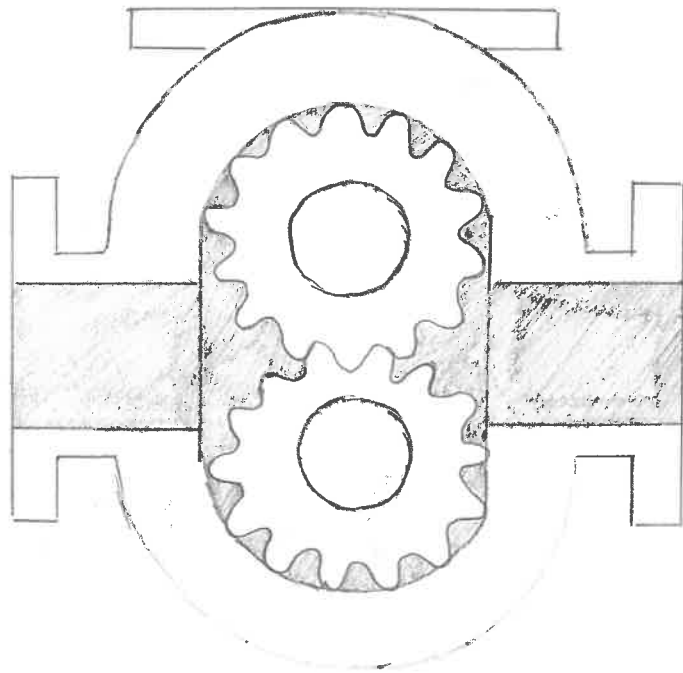


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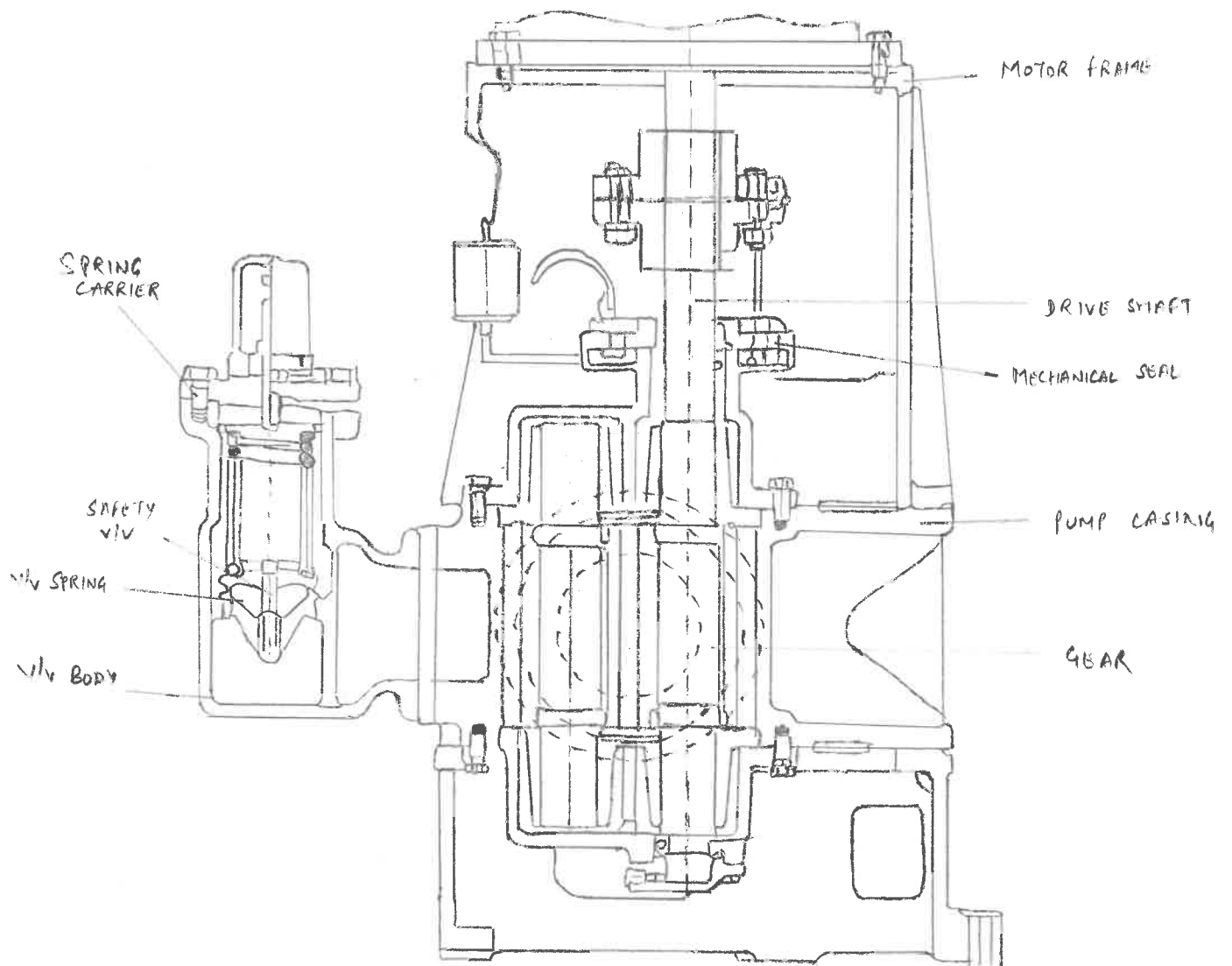
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H.F.O Transfer Pump



FUEL OIL TRANSFER PUMP



HFO TRANSFER PUMP



Sounding computation

Nadeep Lamba

Engine Cadet

Date: 04/05/14

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.

CAPRICORN VOYAGER
Off. No. 8000143
GRT: 58442
NRT: 30008
HP : 18430

Sounding of tanks and computation of contents

Date of sounding : 2 May 2017

Port/At sea: At sea

List:0

Draft fwd : 13.05m

Draft aft: 14.15m

Trim : 0.2m by Aft

For Heavy oil :

Density 0.9888 @ 15°C

Tank No.	Ullage/ Sounding	Density @15 *C	Tank temp. Degree Celsius	Trim	Total observed volume	Density@ temp	weight
1P	4.12	0.9888	42	0.2	856	0.9815	830.5
1S	2.66	0.9901	40	0.2	743.7	0.9829	723.7
2S	—	0.9888	—	—	—	—	—
HFO sett	6.77	0.9888	75	0.2	41.70	0.9586	39.4
HFO ser	5.83	0.9888	80	0.2	68.56	0.9551	64.74

For Diesel oil :

Density 0.8597 @ 15°C

Tank No.	Ullage/ Sounding	Density @15 *C	Tank temp. Degree Celsius	Trim	Total observed volume	Densit y@ temp	weight
2P	11.16	0.8597	38	0.2	487.8	0.9810	411.4
SETT	4.40	0.8597	25	0.2	102.42	0.9918	87.32
SERV	3.82	0.8597	25	0.2			

Noon

Fuel Oil

Name	Cargo	USource	Ull/Snd m	Temp deg C	UTrim m	%Full %	TOV m3	Dens MT/m3	Weight MT
1 HFO STOR P	0.9888	ULLAGE TABLE	4.120 U	42.0	0.200A	74.34	855.71	0.9705	830.5
1 HFO STOR S	0.9901	ULLAGE TABLE	2.660 U	40.0	0.200A	86.00	743.65	0.9732	723.7
2 HFO STOR P	0.8597	ULLAGE TABLE	11.160 S	38.0	0.200A	84.82	486.29	0.8434	410.2
2 HFO STOR S	0.9888	ULLAGE TABLE	10.636 U	44.0	--	--	0.00	0.9691	0.0
HFO SETT S	0.9888	ULLAGE TABLE	6.770 U	75.0	0.200A	70.00	41.61	0.9479	39.4
HFO SERV S	0.9888	ULLAGE TABLE	5.830 U	80.0	0.200A	96.00	68.60	0.9444	64.8
Fuel Oil Totals				42.3		71.94	2,195.85		2,068.5

Diesel Oil

Name	Cargo	USource	Ull/Snd m	Temp deg C	UTrim m	%Full %	TOV m3	Dens MT/m3	Weight MT
DO STOR S	0.8597	SOUNDING TABLE	4.400 S	25.0	0.200A	87.76	102.42	0.8527	87.3
DO SERV S	0.8597	LEVEL GAUGE	3.820 S	25.0	0.300A	83.08	48.81	0.8527	41.6
Diesel Oil Totals				25.0		86.19	151.23		128.9

Total F.O onboard = 1658.3 MT

Total D.O onboard = 539.1 MT

747.84
4.09

Heavy Fuel Oil

Tank	Density at 15	Ullage	Temp	Trim	TOV	Density to Volume Correction Factor Table 54B	Metric Tons
1 Port	0.9888	4.12	42	0.2	856	0.9815	830.7
1 Stbd	0.9901	2.66	40	0.2	743.7	0.9829	723.7
2 Stbd	0.9888	11.4					
SETT	0.9888	6.77	75	0.2	41.20	0.9586	444 3952
Service	0.9884	5.83	80	0.2	68.56	0.9551	64.74

Diesel Oil

Tank	Density at 15	Ullage	Temp	Trim	TOV	Density to Volume Correction Factor Table 54B	Metric Tons
2 Port	0.8597	11.16	38°C	0.2	487.83	0.9810	410.27
Storage	0.8597	4.40	25°C	0.2	102.42	0.9918	87.328
Service	0.8597	3.82	25°C	0.2			

10
0.7

1.9

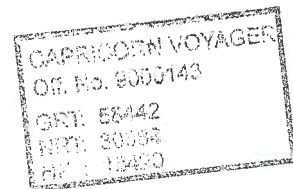




Capricorn Voyager

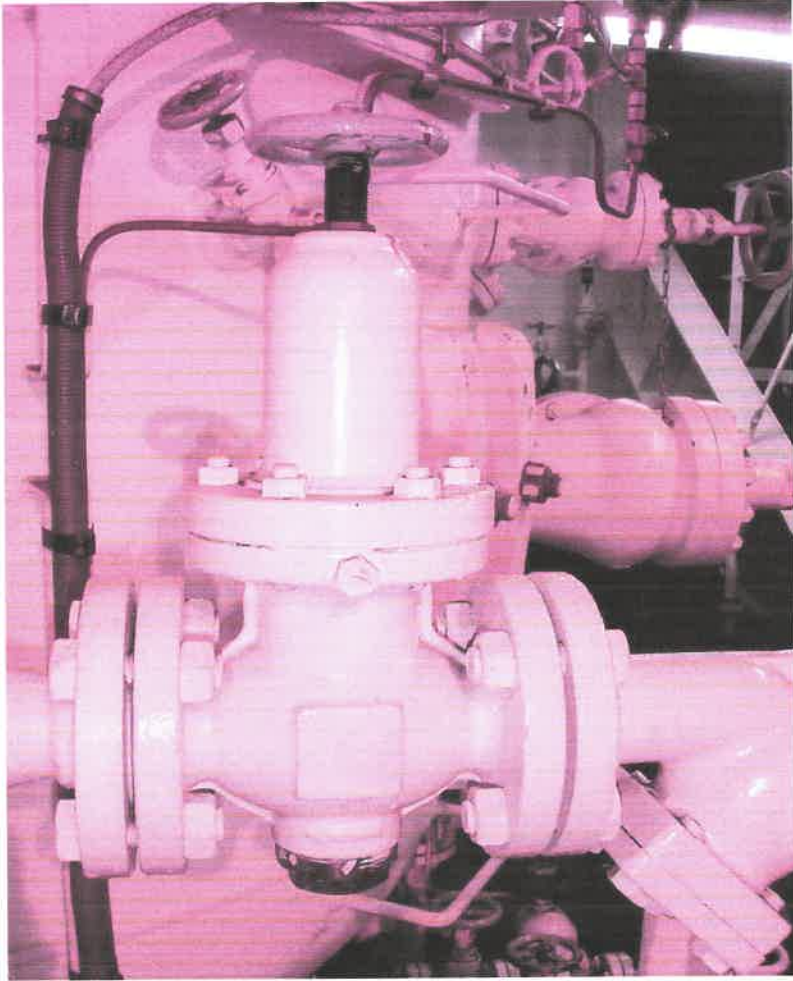
PRESSURE REDUCING VALVE

Date: 27 APRIL 2017



Signature:

Budhi



Pressure Reducing Valve

Pressure Reducing valves :

❖ Specifications:

- The pressure reducing valve available on board for 30 bar compressed air line:
 - Manufactured by: Mt.H
 - Model: HRD-FA
 - Used for: general air service and control air service
 - Quantity: one each for control and general service air line from main air reservoir with a common valve between the outlets of the pressure reducing valves in the event of failure of one.
 - Working pressure: Max 33 Min 10 Normal 30
 - Setting pressure: 30 bar to 7 bar for G/S air line
30 bar to 5.5 bar for control air line

❖ Description:

This valve is a single seated reverse valve. The inlet/primary side high pressure acts in closing direction of the valve. The area on which this pressure acts is minimal due to the presence of a disc holder. This area is only the edge of the disc holder. The force generated by the primary pressure is nullified by the initial compression force of the spring. Hence the opening of the valve is not governed by the inlet pressure. The outlet pressure acts on the underside of the diaphragm through a bore provided in the body. When the outlet pressure is as required the force it generates on the underside of diaphragm is balanced by the spring force. When the outlet pressure reduces the force it generates also reduces & the valve opens by downward force of the spring. Note that the area on which the spring pressure and the outlet pressure acts is constant and equal. The valve must be installed in vertical direction. The valve stem is bored so that the outlet air pressure acts on the underside of disc holder and as the area of disc washer and underside of disc holder equal the forces are balanced.

❖ **Adjusting the pressure setting:**

When the manual handle is turned in clockwise direction the spring gets further compressed and the force it applies on the diaphragm also increases. So the outlet pressure is higher for the equilibrium position to be achieved (i.e shut position). Similarly to decrease the setting pressure turn the manual handle in anticlockwise direction.

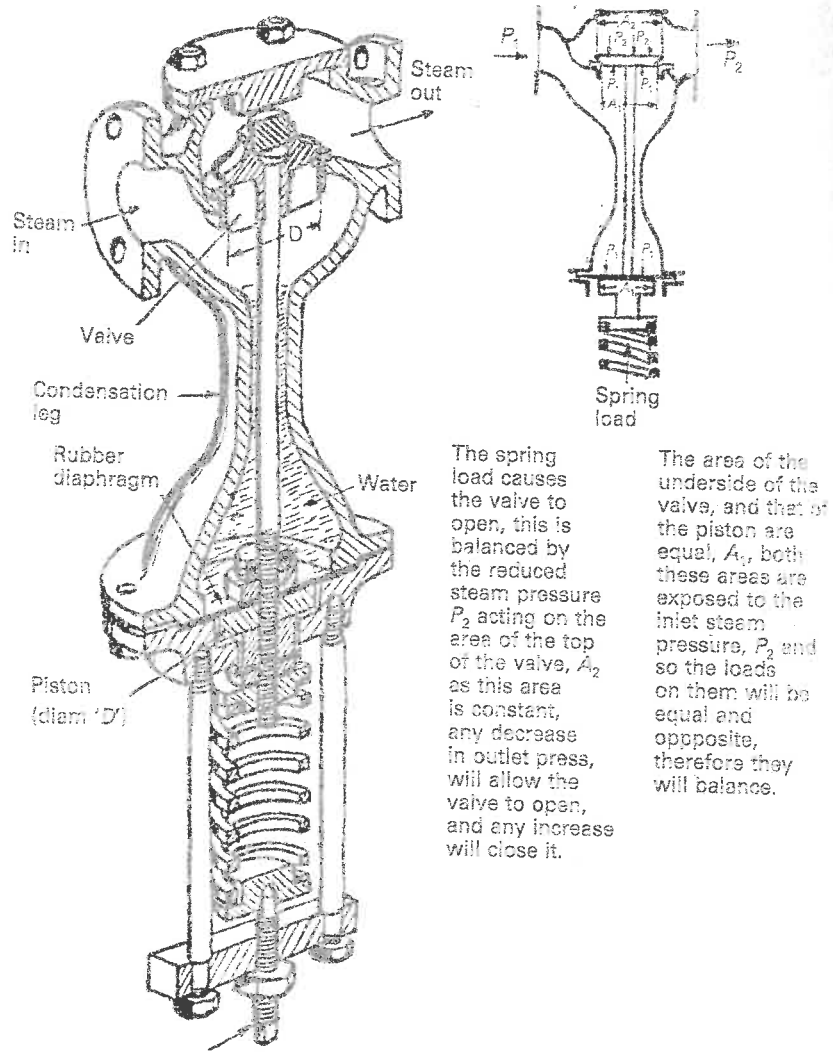


Figure 4.16 Pressure reducing valve



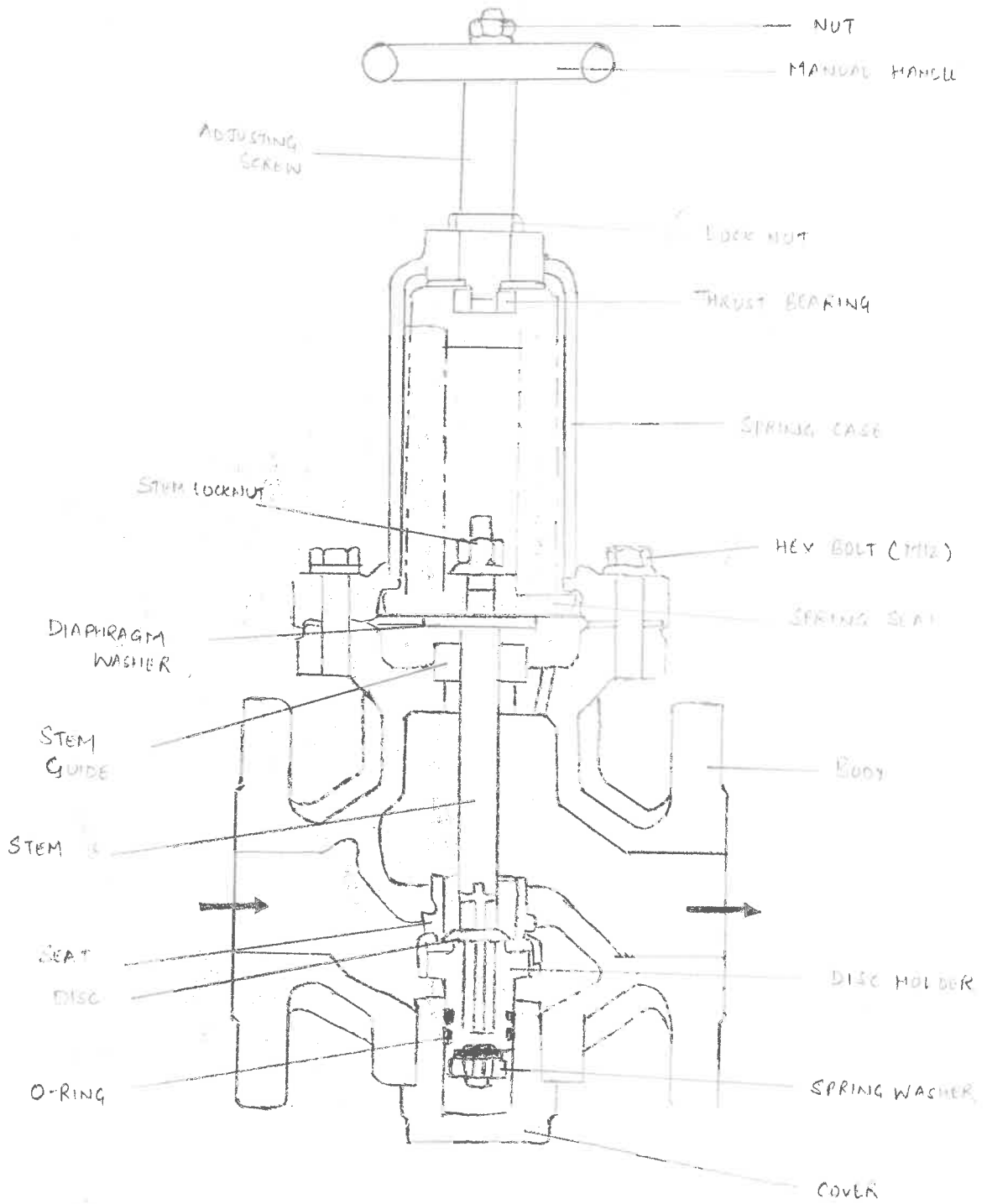
SPECIFICATION FOR
PRESSURE REDUCING VALVE

CODE No.

HRD-FA01

DATE

U S E C O N D.	Used for	G/S AIR SERVICE			CONTROL AIR SERVICE		
	Quantity	1SET(S)/SHIP			1SET(S)/SHIP		
	Valve No.	AR001F			AC018F		
	Fluid	COMP. AIR			COMP. AIR		
	Work. Temperature (°C)	Max. 50	Nor.	Min.	Max. 50	Nor.	Min.
	Working Pressure INLET/OUTLET (Kg/Cm ²)	Max. 33	Nor. 30	Min. 10	Max. 33	Nor. 30	Min. 10
	Differential Pressure (Kg/Cm ²)	Max. 26	Nor. 23	Min. 3	Max. 27.5	Nor. 24.5	Min. 4.5
	Required flow rate <input checked="" type="checkbox"/> M ³ /Hr <input type="checkbox"/> Kg/Hr <input type="checkbox"/>	150NM ³ /H			150NM ³ /H		
	Setting Pressure/ Range (Kg/Cm ²)	30K → 7K			30K → 5.5K		
	Nom. Connection Size	JIS 30K-40A, RF			JIS 30K-40A, RF		
V A L V E	Model	HRD-FA					
	Rated C _v or Flow rate	1223NM ³ /Hr					
	Material	Body/Trim	SC/SUS				
	Valve Type						
	Accessory	<ul style="list-style-type: none"> - Y-STRAINER (2EA) - SAFETY VALVE (2EA) (10K-15×25A, SETT:7.7K) - GLOBE V/V (1EA) (10K-65A) - S.D.N.R GLOBE V/V(2EA) (16K-40A) - GAUGE (PF³/₈" : 2EA) 					
	Application Code	<input checked="" type="checkbox"/> JIS <input type="checkbox"/> ASME <input type="checkbox"/>					
	Hydro Test Pressure (Kg/Cm ²)	45					
	Class Cer't	A.B.S APPROVAL					
	Painting	INSIDE : ACID PICKLING OUTSIDE : ACID PICKLING + SHOP PRIMER + WHITE PAINTING(125μ×2 COAT)					
	Remarks: 1. Allowable seat leakage : Max. 0.01% of rated Cv.						

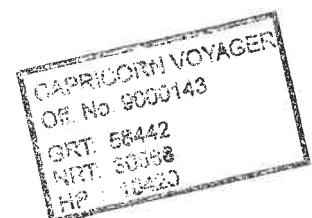


PRESSURE REDUCING VALVE

FAMILIARISATION WITH COMPRESSED AIR SYSTEM

Date : 03 APRIL 2017

Signature: *3/E KH*



Q.1 A) How many air reservoirs are provided on your ship?

Main air reservoirs x 2

General Service air reservoir x 1

Control air reservoir x 1

Auxiliary air reservoir x 1

B) What are the normal working pressures?

Main air reservoirs- 30 bar

General Service air reservoir- 7 bar

Control air reservoir- 7 bar

Auxiliary air reservoir- 30 bar

C) State their capacities?

Main air reservoirs- 5000 L

General Service air reservoir- 1000 L

Control air reservoir- 3000 L

Auxiliary air reservoir- 300 L

Q.2 why is it necessary to drain the air reservoirs?

During running of the compressors there is an accumulation of oil carried over from the cylinders and water from moisture precipitated in the coolers. Even if there are drain separators and drains from the coolers some amount of oil and water emulsion is carried over to the air reservoirs. Water may also be formed in the air reservoirs due to condensation especially in humid conditions. Moisture in air receivers can give rise to corrosion. As control system air can be derived from main air receivers it is further more important to drain the receivers regularly to prevent problems with reducing valve and critical control equipment with small clearances.

Q.3 What are the safety devices on the air reservoir of your ship? Mention the lifting pressures of the safety valves.

Safety valve lifting pressures:

Main air reservoirs- 33 bar

General Service air reservoir- 7.7 bar

Control air reservoir- 7.7 bar

Auxiliary air reservoir- 33 bar

Fusible plugs on each reservoir

Q.4

A) What are the safety devices on the air compressors?

Main air compressor:

The compressor is fitted with safety valves after first stage and second stage compression.

A bursting disc is mounted on the cylinder block's cooling water mantle which ruptures if the coolant chamber is subjected to abnormally high pressure. This can occur on the event of leakage of compressed air through the inter cooler or after cooler tubes. Low lub oil pressure trip is included and its value is 0.8 bar. Manual and solenoid operated unloaders are provided for the safe operation of the electric motor during starting of the compressor; to protect against high starting current.

Control and general service air compressors:

The compressor is fitted with safety valves after first stage and second stage compression.

A bursting disc is mounted on the cylinder block's cooling water mantle which ruptures if the coolant chamber is subjected to abnormally high pressure. This can occur on the event of leakage of compressed air through the inter cooler or after cooler tubes. Low lub oil

pressure trip is included and its value is 0.8 bar. Manual and solenoid operated unloaders are provided for the safe operation of the electric motor during starting of the compressor; to protect against high starting current.

B) Are there any arrangements for preventing damage on the waterside of air coolers?

Refer A.

Q.5 Is your ship provided with an automatic topping up system for air reservoirs? State its working range and other special features.

Main air reservoir:

Compressor cut in pressure- leading at 28 bar, lagging at 26 bar

Compressor cut out pressure- 30 bar

Control air reservoir:

Compressor cut in pressure- 6 bar

Compressor cut out pressure- 7 bar

General Service air reservoir:

Compressor cut in pressure- 6 bar

Compressor cut out pressure- 7 bar

Q.6 What checks must be made before starting an air compressor?

After a prolonged down time-

1. Check oil level.
2. Check that oil does not contain any water or other substances which will impair its quality.
3. Check the compressor valves and apply little oil to the cylinders.

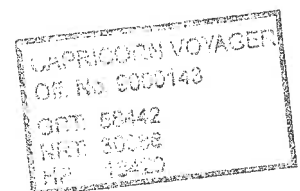
4. Turn the compressor by hand, removing the suction valve load by means of a manual unloader.
5. Check the cooling water circulation.
6. Check that the non-return valve between compressor and the air reservoir is open.
7. Start the compressor.
8. Check the energizing of solenoid valves for drains and unloader.
9. Set the unloader in horizontal position.
10. Monitor all parameters.

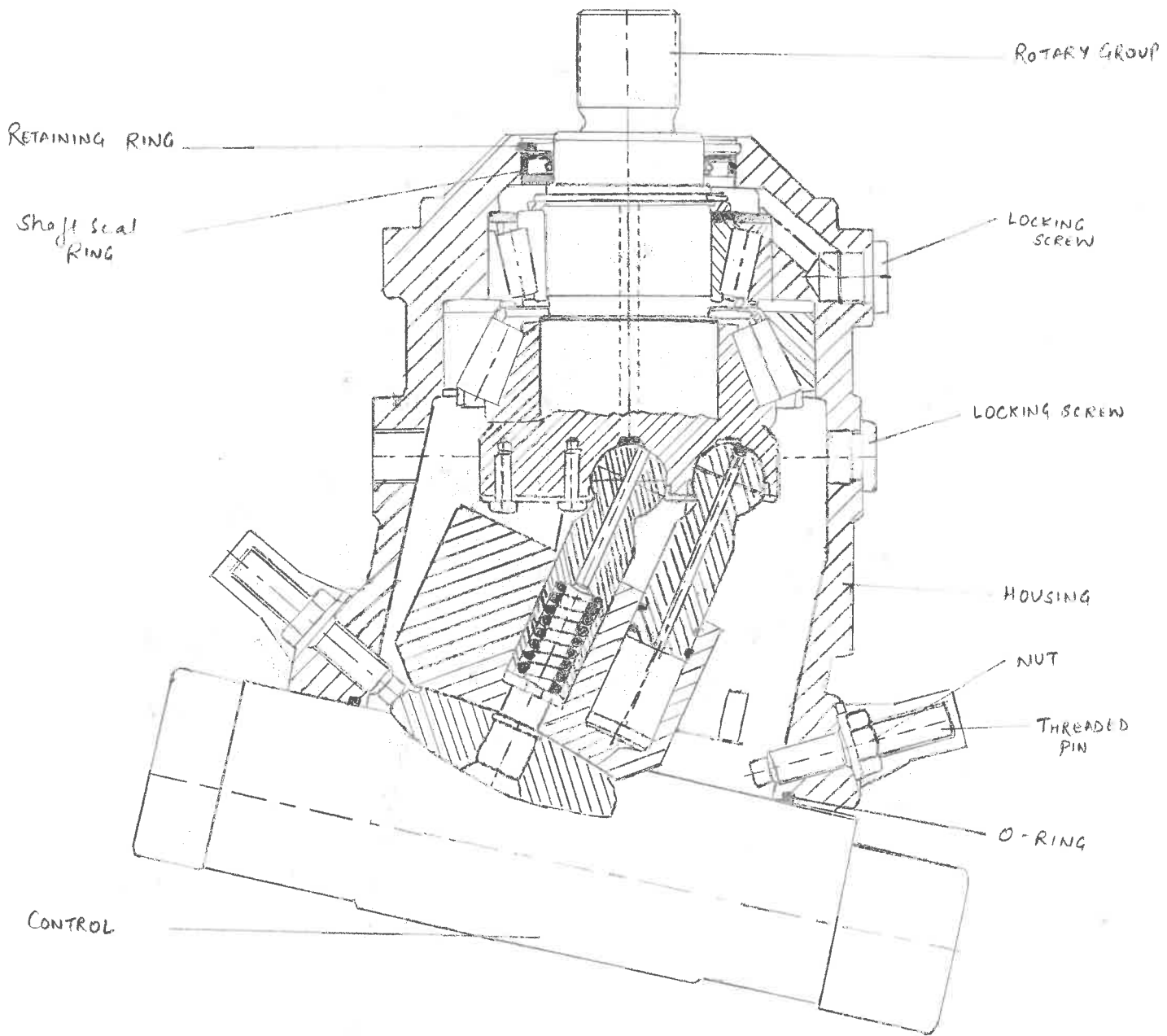


Hydraulic Motor for Windlass

Date: 08 APRIL 2017

Signature: *3/E KH*





HYDRAULIC MOTOR



Steering Gear System Familiarisation

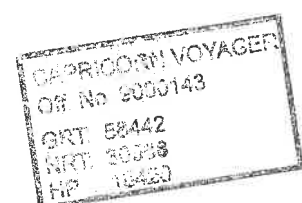
Nadeep Lamba

Engine Cadet

Date: 19 APRIL 2017

Signature:

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FAMILIARISATION WITH STEERING SYSTEM

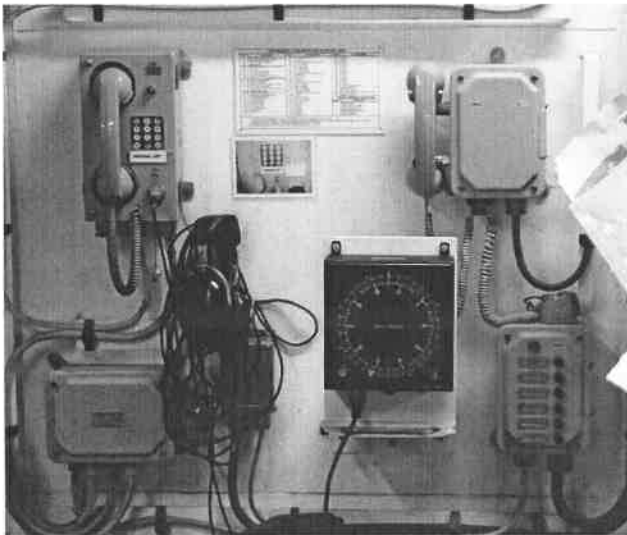
1. Describe the fail safe or rudder arresting arrangements for the steering system on your ship.

The rudder angle is limited to 35° port and 35° starboard by electrical limit switches, but under extreme loads can go to 37° in both directions where mechanical stops will prevent the rudder from turning any further.

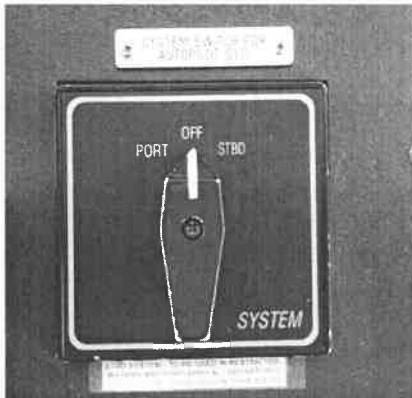
2. Emergency system to operate the steer gear from local station.

Operation from the Steering gear room-

- a) Contact the bridge by telephone and follow instructions regarding rudder movement. Establishing communication is very important



b) On the bridge, set the autopilot system switch to the OFF position.



c) Switch the steering gear motor control to LOCAL on the steering gear motor starter panel.



d) On the pump unit to be used, lift up the locking plate on the steering gear control panel and turn the LOCAL/REMOTE control switch to the LOCAL position, return the locking plate over the switch.



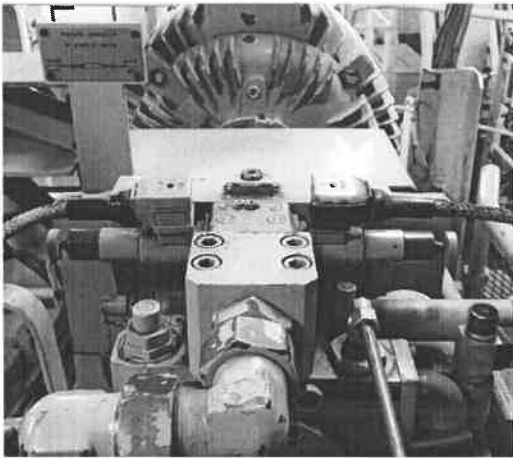
e) Start one of the hydraulic pump units if not already running.

f) Operate the NFU pushbuttons for the selected pump in order to direct oil so that the gear is moved in the desired direction, Port or Starboard. When the rudder is at the desired angle release the push button. Ensure that the rudder has moved to the desired angle by visually checking the rudder angle indicator.



Or

Operate the solenoid pushbuttons mounted on the steering gear hydraulic motor. When the rudder is at the desired angle, release the pushbutton. Ensure that the rudder has moved to the desired angle by visually checking the rudder angle indicator



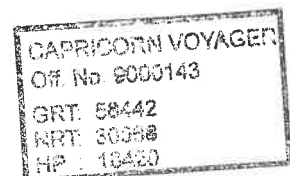


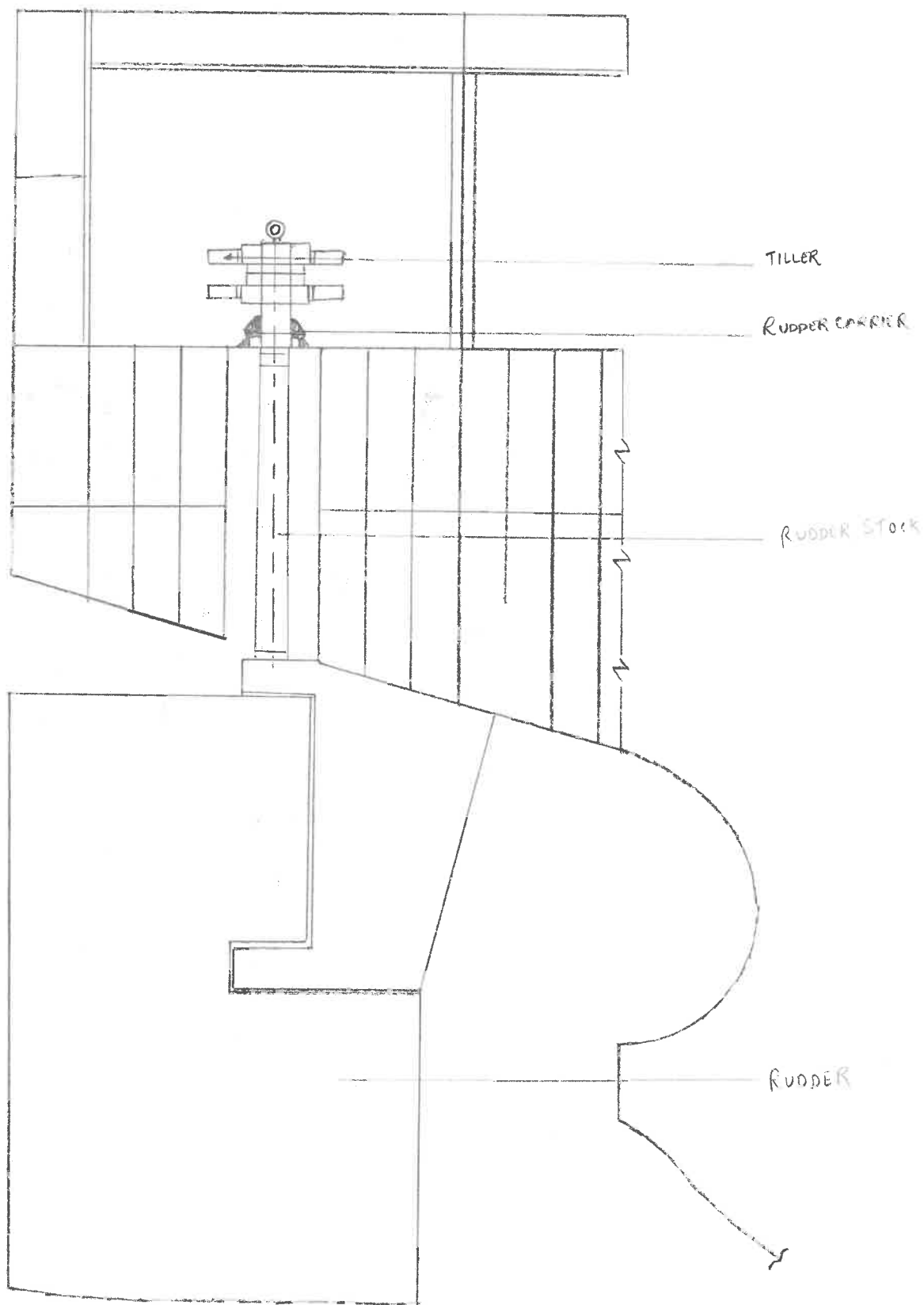
Capricorn Voyager

RUDDER DIAGRAM

Date : 06 APRIL 2017

Signature: *3/E KH*





RUDDER VIEW



Capricorn Voyager

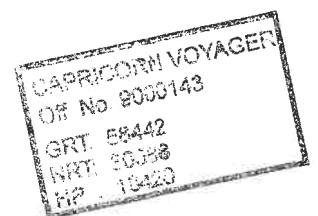
PURIFICATION (Fuel Oils)

Nadeep Lamba

Engine Cadet

Date : 11 APRIL 2017

Signature : 3/E *NA*



<p>What are the differences between Heavy oil and marine diesel oil?</p>	<ul style="list-style-type: none"> • Heavy oil is a mixture of residual and distillate fuels while marine diesel oil is homogenous • <u>Flash Point</u> : Heavy oil has higher flash point • <u>Density</u> : Density of Heavy oil greater than marine diesel oil. • <u>Viscosity</u> : Viscosity of Heavy oil is greater than Marine diesel oil. • <u>Sulphur</u> : Heavy fuel oil has higher sulphur content. • Sludge formation takes place in heavy oil
<p>What are the impurities we try to remove before injecting oil into the engine?</p>	<ul style="list-style-type: none"> • Particulate Matter • Water • Sludge
<p>What are the different methods of removing impurities from fuel oils?</p>	<ul style="list-style-type: none"> • Settling- in settling tanks • Purification and clarification • Filtration- by filters and strainers • Homogenization: By emulsification of water content in fuel with the fuel itself
<p>Can oil get contaminated while in storage tank? State with what?</p>	<ul style="list-style-type: none"> • Due to leakage of steam heating coils inside tank water content of oil increases • Condensation leads to increase in water content which might lead to microorganism growth • Contamination with incompatible grade of fuel can also lead to formation of sludge
<p>What will happen if temperature of oil in storage tank falls below its pour point?</p>	<ul style="list-style-type: none"> • If the oil in storage tank falls below its pour point then oil will become unpumpable and water formation will start.
<p>What is the difference between purifier and clarifier?</p>	<ul style="list-style-type: none"> • Purifier separate two liquids of different densities while clarifier separates out the solid impurities. • Clarification is done before purification • Clarifier is intended to separate only solids whereas purifier separates sludge and water
<p>How does pre heating oil help in purification?</p>	<ul style="list-style-type: none"> • Preheating changes oil density and viscosity. Low viscosity facilitates the separation and greater density difference between two liquids and facilitates optimum separation of two liquids.
<p>What is the difference between a strainer and a filter?</p>	<ul style="list-style-type: none"> • Strainer filters out large particles using a coarse wire mesh whereas , • Filter gets rid of fine particles using fine cartridges.

<p>What does blending mean?</p>	<ul style="list-style-type: none"> • Blending is the process of mixing two or more fuels, generally heavy residual fuels with lighter distillate fuels in order to reduce their viscosity and improve their combustion characteristics (i.e. compatible to use)
<p>What is meant by homogenizing?</p>	<ul style="list-style-type: none"> • Homogenizing is a process of mixing small % of water to emulsify the fuel for injection into the engine.
<p>What is meant by biodegradation and how can it occur on board?</p>	<ul style="list-style-type: none"> • Biodegradation means the decomposition of the fuel which is affected biologically by the bacteria present in the fuel itself or which may developed due to contamination.
<p>What will be the consequences if oil becomes biodegraded?</p>	<ul style="list-style-type: none"> • Filters might get clogged at frequent intervals. • Creation of sludge • There is a layer build up in pipes and on storage tank surfaces • As a result of large quantity of sludge, pumping the fuel becomes difficult.



Capricorn Voyager

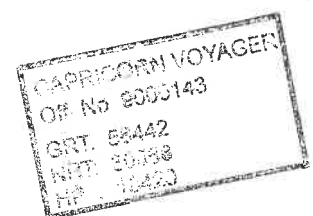
PURIFICATION (Lubricating oils)

Nadeep Lamba

Engine Cadet

Date : 11 APRIL 2017

Signature : 3/E *NH*



<p>State three functions of Lubricating Oil</p>	<ul style="list-style-type: none"> ● To reduce friction between moving parts ● To take away the generated heat and helps in cooling of parts ● To wash away worn out particles and reduce wear
<p>State five most important properties considered in selecting Lubricating oil for a particular application.</p>	<ul style="list-style-type: none"> ● Viscosity and Viscosity index ● Alkalinity (TBN) ● Density ● Grade ● Anti- oxidation property ● Detergency and dispersancy
<p>What are the impurities we try to remove from main engine Lubricating oil? How is it done?</p>	<ul style="list-style-type: none"> ● Soot , water , carbon , catalytic fines , worn out metal particles which have made their way to sump and form sludge. <p>These impurities can be removed by purifier , auto backwash filter , magnetic filters are used</p>
<p>Is there a partition within the main engine Lubricating oil sump?</p>	<ul style="list-style-type: none"> ● No.
<p>Trace the suction and discharge connection of purifier with oil sump and state its peculiarity.</p>	<ul style="list-style-type: none"> ● Sump to sump purification system and sump to tank system is used . The oil is always in circulation from sump through the purifier.
<p>Is there an auto clean filter in the system?</p>	<ul style="list-style-type: none"> ● An auto backwash filter in the line with a Bypass filter and a sludge checker filter is there.
<p>What are the arrangements for trapping ferrous metal particles?</p>	<ul style="list-style-type: none"> ● Magnetic Filters are used for trapping of the ferrous metal particles.
<p>Can lubricating oil get contaminated while in storage tank?</p>	<ul style="list-style-type: none"> ● Due to formation of microorganisms lubricating oil get contaminated in storage tank ● Also If leakage from heating coils will contaminate the lubricating oil ● If there is a crack in the adjacent bulkhead then it will contaminate the lubricating oil. ● Tank coatings damage can also contaminate the lubricating oil.
<p>Is there an arrangement to use purifier for generator engines?</p>	<ul style="list-style-type: none"> ● We have two generator engine Lubricating oil purifiers on board out

	of which one is kept running.
What is the difference in the life of main engine crank case oil and generator engine oil?	<ul style="list-style-type: none"> • As engine is operated in various conditions so it is very difficult for the manufacturer to predict the lifetime of lubricating oil.
Is bio degradation possible for lubricating oils? What will be the consequences if it occurs?	<ul style="list-style-type: none"> • Yes. , it is possible. <ul style="list-style-type: none"> ➤ <u>Consequences</u> – • Clogging of Lube oil filters • Inability of separators to separate water due to stable emulsions • corrosive attacks on bearings • Bad smell of lube oil
State preventive measures against bio-degradation.	<ul style="list-style-type: none"> • Favourable temp (nearly 95-100 c) conditions to be maintained which prevent the growth of microorganisms. • Continuous circulation of oil to be maintained
Which Lubricating oil samples are landed ashore for testing?	Main engine LO, GE LO, Stern tube LO, Mooring winches LO, Anchor windlass LO, hose handling crane LO, Provision crane LO



Purifier Description

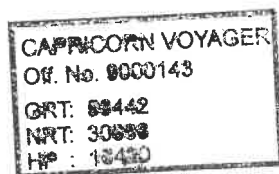
Nadeep Lamba

Engine Cadet

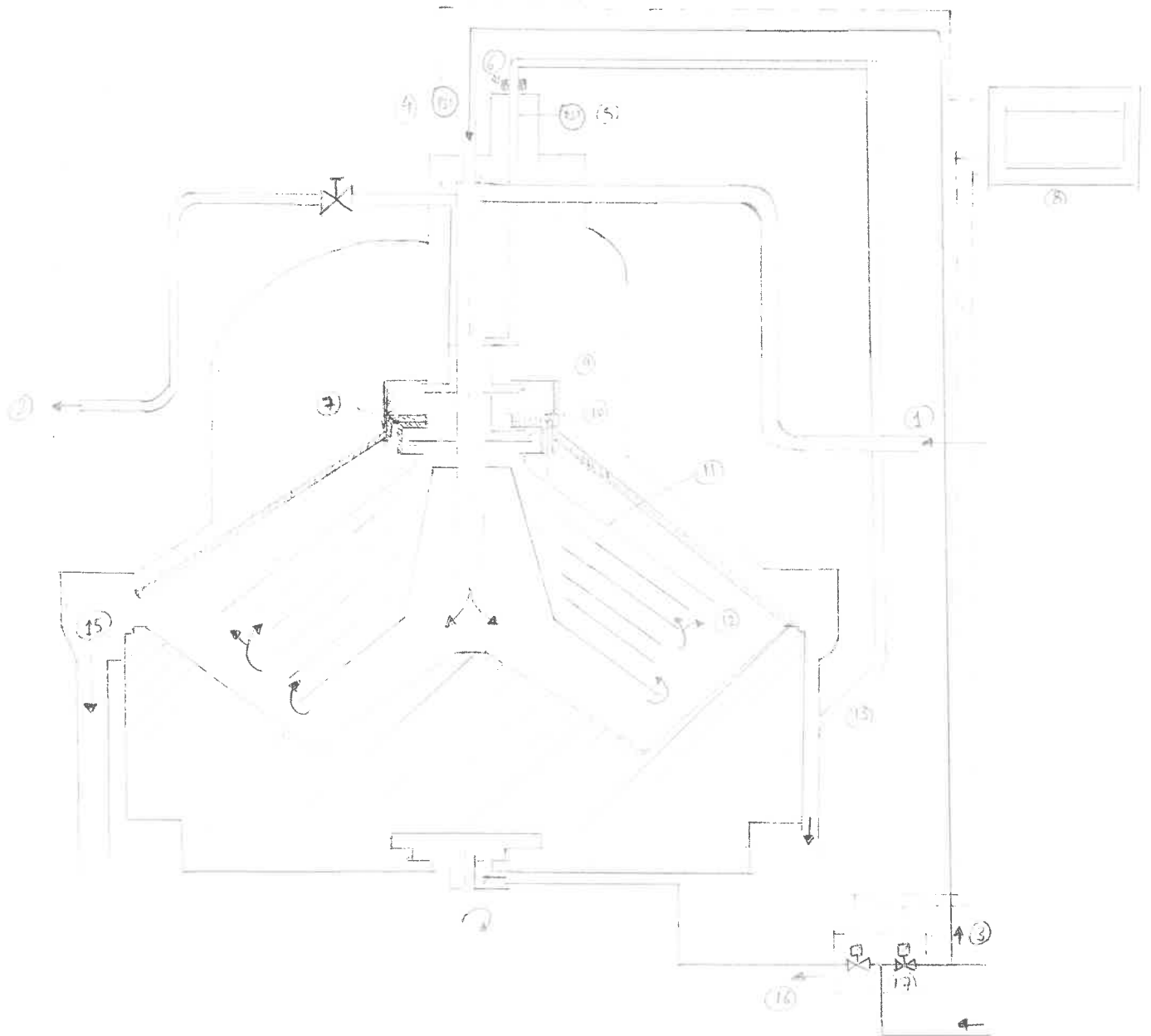
Date: 12/05/17.

Signature:

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LO PURIFIER



- 1 Dirty oil feed
- 2 Clean oil Discharge
- 3 Displacement water
- 4 Pressure Switch (Clean oil)
- 5 Pressure Switch (Water discharge)
- 6 Throttle
- 7 Regulating stop
- 8 Control unit
- 9 Sensing liquid line (Dirty water)
- 10 Centrifugal pump (Clean oil)

- 11 Sensing float
- 12 Solids holding space
- 13 Dirty water discharge
- 14 Operating water discharge
- 15 Solids discharge
- 16 Operating water feed
- 17 Salt and water lock

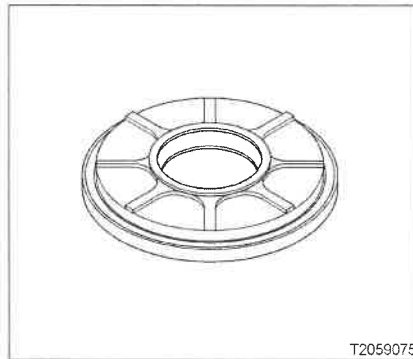


Fig. 51

In the case of the clarifier bowl:

- A centripetal pump chamber cover (without holes!) must be used for operation as a clarifier.
- Request the part number of the centripetal pump chamber cover from the supplier.

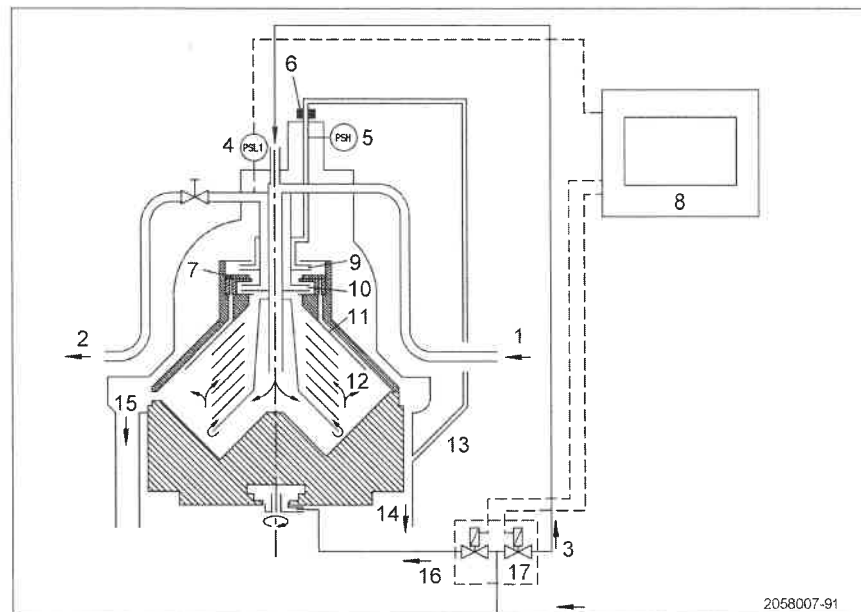
Operating principles of the separator

Fig. 52

- | | |
|-------------------------------------|------------------------------|
| 1 Dirty oil feed | 11 Separating disk |
| 2 Clean oil discharge | 12 Solids holding space |
| 3 Displacement water | 13 Dirty water discharge |
| 4 Pressure switch (clean oil) | 14 Operating water discharge |
| 5 Pressure switch (water discharge) | 15 Solids discharge |
| 6 Throttle | 16 Operating water feed |
| 7 Regulating ring | 17 Solenoid valve block |
| 8 Control unit | |
| 9 Sensing liquid pump (dirty water) | |
| 10 Centripetal pump (clean oil) | |

The fuel oil or lube oil is conveyed to the separator via a separate pump.

The product is fed in through a closed line system (1).

The dirty water is discharged (13) by sensing liquid pump (9) via a throttle (6).

The clarified clean oil is discharged (2) under pressure by centripetal pump (10).

OPERATION OF PURIFIERS

The main purpose of a Purifier is to remove impurities from fuel Oil before entering any machinery on board. Fuel oils can be contaminated with sludge and water and this will hinder an engines performance. Separators are used for the separation of liquid mixtures or for the separation of solids out of liquids or liquids mixtures. Under the influence of the centrifugal forces, separation of the liquid mixture or the ejection of the solids particles takes place most rapidly. The specifically heavier components are displaced to the bowl periphery, whereas the specifically lighter components are displaced towards the center of the bowl. The lighter components i.e. the clean oil is collected and pumped out through a centripetal pump mounted on the shaft. The water is pumped out through the liquid sensing pump. The high centrifugal force is produced by very high bowl speeds. The sludge collected is sent to a sludge tank.

So because the concept relies heavily on the mass of the liquids to separate them, it needs the oil to be heated. The temperature should be such that the difference in densities for the liquids to be separated is maximum.

The three parameters important for efficient purification are –

- The temperature of feed oil (90°C)
- The flow rate
- The back pressure

The high bowl speeds signify high efficiency whereas they also signify high material stressing of the separator.

HFO purifier onboard- Separator with water content monitoring system

The fuel oil is conveyed to the separator via HFO purifier feed pump. The clean oil is discharged under pressure by a centripetal pump. The bowl is automatically opened and closed for desludging at full bowl speed by means of a solenoid valve in the operating water line.

The partial flow directed from the bowl via the separating disk and the sensing liquid pump is monitored by conductivity sensor. When the sensor registers water, the solenoid valve (A) opens and the water is discharged through the dirty water outlet. When the conductance alters due to oil flow, solenoid valve (A) closes and the solenoid valve (B) opens intermittently. The partial flow is then recycled into the feed.

❖ **Part Functions:**

- **Bowl:** It produces high centrifugal forces through rotation making possible separation and clarification.
- **Distributor:** It accelerates the product fed in through feed to the rotational velocity of the bowl and then conveys it to the disk stack.
- **Disk stack:** Splits the liquid mixture consisting of a light and heavy phase, into its component. Each disk is provided with spacers so that precisely defined interspaces are formed between the individual disks. The smooth disk surfaces facilitate sliding of the solids and hence self cleaning of the disks.
- **Solids holding space:** Collects the solids separated in the disk stack.
- **Operating liquid:** In the rotating bowl the incoming, rotating operating liquid generates a high centrifugal pressure. This pressure is utilized for actuating the annular piston and the sliding piston which closes and opens the bowl.
- **Annular piston:** It rotates with the same angular velocity as the other bowl parts. It is axially movable
- **Sliding piston:** it also rotates with the same angular velocity as that of other bowl parts. It is also axially movable.
- **Centripetal pump:** It discharges the separated liquid under pressure.
- **Sensing liquid pump:** It works similar to the centripetal pump and conveys the sensing liquid to the monitoring system.

The bowl is automatically opened and closed for desludging at full bowl speed by means of a remote controlled solenoid valve (17) in the operating water line. The opening time of the solenoid valve is up to 3 seconds.

The control and monitoring unit (8) ensures unmanned operation.



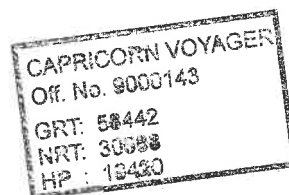
Various Control Inputs

Nadeep Lamba

Engine Cadet

Date: 24/05/17.

Signature:



A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.

2.1 Function

The illuminated 4-line LCD display provides information about the operating and fault conditions of the separator and displays corresponding process data, depending on programming.

In addition to the control cabinet and the D10 control unit, the control system includes all complete components which, following the installation of electrically connected equipment items, are subject to the influence of the control system either with a controlled or a monitoring function.

This includes:

- the product feed
- the water connection
- the control water connection
- with UNITROL additionally
 - the circulation and water discharge valve
 - the water sensor
 - and/or the pressure control device for the bypass line in SMS function

Options to be ordered separately:

- PT100 sensor with a two-wire circuit for min./max. monitoring in the product feed line
- Filling level switch for monitoring the water discharge
- Process-dependent control of an external feed pump
- Filling level switch for monitoring the sludge tank
- Min./max. level switch for controlling a sludge pump
- Signal horn for acoustic alarms

The standard control system is designed for single operation of separating or clearing separators.

If required, series operation can be pre-selected with two-stage HFO operation. This requires a corresponding pipework between the separators and the MPI interfaces of at least two control systems must be wired according to chapter 5.4 "Terminal diagrams".

The D10 control unit is in a ready-for-installation condition, is fitted into the door of the control cabinet and is programmed for the required control job.



Modifications to the program by the operator are not allowed.

The operator can use the keyboard to make the following settings:

- Machine-specific program preselection
- Timer values
- Counter values

2.2 Features

The D10 control unit has the following features:

- Display for machine observation and operation
- Function keys with LED status indication
- Control voltage 24V
- High functional reliability
- Long service life
- User program on Micro Memory Card (MMC)

2.3 Areas of application

Application	Description
Single - standard	The separator is operated in single operation as standard (-91-).
WMS (Water Content Monitoring System)	The separator is operated with an activated Water Content Monitoring System (-01-) (for more detailed information please refer to the separator instruction manual).
SMS-HFO (Sludge Monitoring System)	The separator is operated with an activated Sludge Monitoring System (-36-) (for more detailed information please refer to the separator instruction manual).
SMS-LO (Sludge Monitoring System)	The separator is operated with an activated Sludge Monitoring System (-96-) (for more detailed information please refer to the separator instruction manual).
WMS series (-01-)	The separator is operated as the first stage in series operation with a separator with SMS. Signal exchange is via the MPI interface.
SMS series (-36-)	The separator is operated as the second stage in series operation with a separator with WMS. Signal exchange is via the MPI interface.
WMS/SMS -HFO single-stage	In heavy oil treatment, the separator is operated with an activated Water Content Monitoring System (-01-) and Sludge Monitoring System (-36-).
WMS/SMS -LO single-stage	In heavy oil treatment, the separator is operated with an activated Water Content Monitoring System (-01-) and Sludge Monitoring System (-96-).

2.5 Technical data
2.5.1 Control unit D10

Technical data	
Type designation	6ES7613 - 1SB00 - 0AC0
Dimensions (width x height x depth)	215 x 165 x 88 mm
Installation / cut-out dimensions	202 x 152 mm (tolerance +1 mm)
Weight	1.35 kg
Display, LED background lighting	LCD display, background-lighted LEDs, 4 lines with 20 characters each, character height 5 mm
Keyboard	23-key membrane keyboard with 11 integrated LEDs
Interfaces	Standard MPI interface for programming device and network, P bus for S7 extension modules
Supply voltage	DC 24 V, range DC 20.4; DC 28.8 V
Protected against polarity reversal	yes
Power interruption	> 20 ms
Current input (in)	2.4 A
Integrated main memory	48 kByte
External memory	Plug-in Micro Memory Card (MMC)
Buffer	Ensured by Micro Memory Card (MMC), no battery required
Configuration software	Step 7 from version 5.1; service pack 4
HMI software	Integrated in Step 7
Inputs	<ul style="list-style-type: none"> • 24 digital, DC 24 V • 4 analogue, 4-20 mA / 0-10 V • 1 PT 100
Outputs	<ul style="list-style-type: none"> • 16 digital, 0.5 A each, total current 4 A • 2 analogue, 4-20 mA
Safety standard	DIN EN 61131-2/IEC 61131-2
Enclosure	<ul style="list-style-type: none"> • Unit front: IP 65 according to IEC 60529, NEMA 4X • Unit housing: IP 20 according to IEC 60529

Technical data	
Electromagnetic compatibility	A according to EN 55011
Climatic conditions	<ul style="list-style-type: none"> • Tested according to IEC 60068-2-1, IEC 60068-2.2 • Operation: 0 - 55 °C when installed vertically • Storage: -20 °C to +70 °C • Humidity: 5 - 95 % at 25 °C
Mechanical ambient conditions	<ul style="list-style-type: none"> • Vibration operation: Tested according to IEC 60068-2-6, IEC 60068-2.6 • Vibration storage/transport: 10 to 58 Hz, amplitude 0.075, 5 to 9 Hz • Shock operation: Half-sine: 150 m/s² (15 g), 11 ms, 18 shocks • Shock storage/transport: 250 m/s² (25 g), 6 ms, 1000 shocks
Fire resistance	<ul style="list-style-type: none"> • Plug connectors FV2 acc. to IEC 60707 • Basic connector FV0 acc. to IEC 60707
Approvals	<ul style="list-style-type: none"> • CE (EC directive EMC 89/336/EEC) • UL (Underwriters Laboratories UL 508) • CSA (Canadian Standard Association C22.2 No.142)
Type tests / classification societies	<ul style="list-style-type: none"> • GL (Germanischer Lloyd) • LRS (Lloyds Register of Shipping) • DNV (Det Norske Veritas) • BV (Bureau Veritas) • ABS (American Bureau of Shipping) • RINA (Registro Italiano Navale) • NK (Nippon Kaigi Kyokai)

2.5.2 Control cabinet

Technical data	
Mains voltage	115/230 V _{AC} (± 10 %), selectable
Frequency	50 to 60 Hz
Power consumption (max.)	100 VA
Control voltage	24 V _{DC}
Supply line fuse	16 A (slow-blow)
Ambient temperature	0 to 55 °C
Housing	Painted steel sheet, RAL 7032 Special version: stainless steel
Enclosure	IP 55 (when installed properly in accordance with the instructions stated in chapter 5 "Installation and connection")
Dimensions (width x height x depth)	380 x 600 x 350 mm
Cable entry	From below through the cable glands
Electrical design in accordance with EN 60204-1 (optional core identification)	
Ambient conditions 3C2 in accordance with EN 60721-3-3	

2.5.3 Parts numbers

Name	Number
Control unit C7-613	0005-4050-410
Installation frame	0005-4278-040
Micro Memory Card (MMC)	0005-3668-040
Connector set	0005-4050-420
Service pack	0005-4050-420
Instruction manual	8555-9000-000

2.5.4 Digital inputs/outputs

Name	Connection	Function
Inputs	DI 0.0	Separator in operation
	DI 0.1	Separator fault
	DI 0.2	PSL product discharge
	DI 0.3	PSH product discharge
	DI 0.4	FSH water discharge
	DI 0.5	WMS-UNITROL
	DI 0.6	SMS-UNITROL
	DI 0.7	LSHH sludge tank
	DI 1.0	Feed pump "operation"
	DI 1.1	Feed pump "fault"
	DI 1.2	Sludge pump "operation"
	DI 1.3	Sludge pump "fault"
	DI 1.4	LSH sludge tank for pump start
	DI 1.5	LSL sludge tank for pump stop
	DI 1.6	Vibration level 1
	DI 1.7	Vibration level 2
	DI 2.0 - DI 2.5	Spare for options
	DI 2.6	Limit switch steam valve
	DI 2.7	Emergency stop
	Outputs	DO 0.0
DO 0.1		Water valve
DO 0.2		Control water valve
DO 0.3		Steam valve / heater interlock (option)
DO 0.4		Circulation valve "UNITROL"
DO 0.5		Water discharge valve "UNITROL"
DO 0.6		Lamp test (option)
DO 0.7		Common alarm
DO 1.0		Separator "OFF"
DO 1.1		Feed pump "OFF"
DO 1.2		Sludge pump "OFF"
DO 1.3		TSL (Option)
DO 1.4		TSH (Option)
DO 1.5		Brake (option)
DO 1.6		PID open (option)
DO 1.7		PID close (option)

2.5.5 Analogue inputs/outputs (4 - 20 mA)

Name	Connection	Function
Inputs	AI 01	Motor current and ejection monitoring
	AI 02	Bowl speed (option)
	AI 03	Min./max. product temperature
	AI 04	Product temperature PID controller
	PT 100	PT-100 product temperature
Outputs	A00-I	Motor current
	A01-I	Temperature

2.5.6 Special versions

Special versions deviating from the versions described in this manual can be supplied:

- The housing can have other dimensions.
- The housing can be made of stainless steel.
- Parts of the control system can be integrated in a compact control cabinet (e.g. with separator motor control unit etc.) or in a central control unit.

3.1 Getting to know the controls

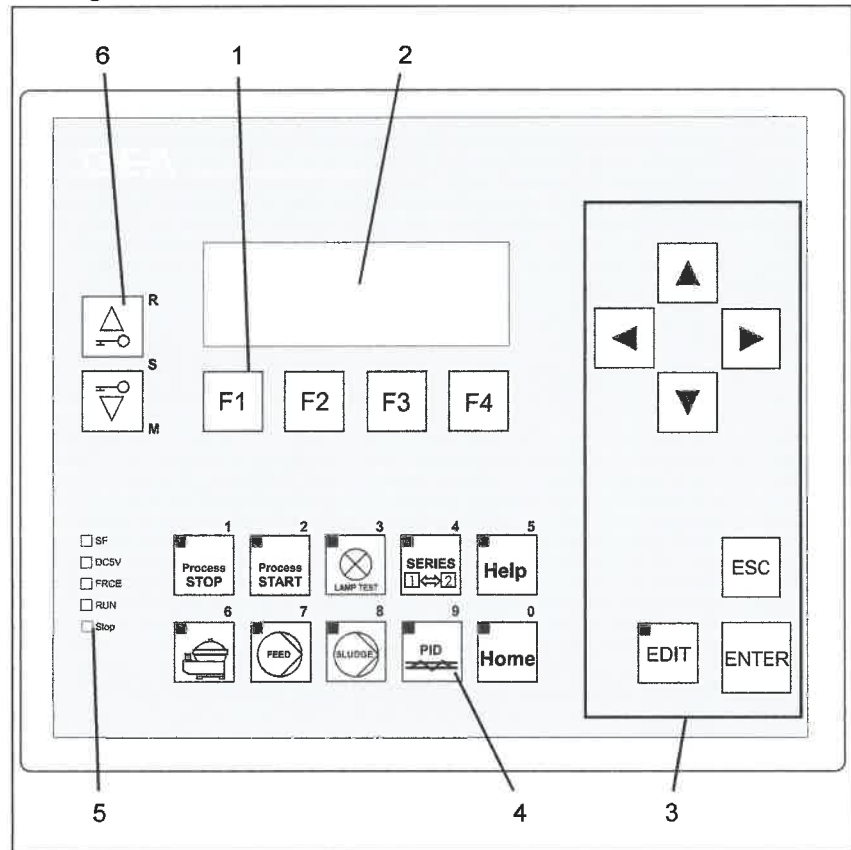







Fig. 12






The D10 control unit is integrated into the control cabinet door. The operating interface consists of:

- 1 Softkeys F1-F4 (depending on the current display)
- 2 Display (text display)
- 3 System keys
- 4 Function keys (when the Edit key has been pressed, numerical values can be entered.)
- 5 Status and fault indicator
- 6 Operating mode selector (start/stop of CPU)








3.1.1 Function keys

The function keys have a *global* function: The actions which can be triggered are independent of the text on the display. They each incorporate an LED which provides information on the state of the respective function.





Key	Key designation	Description
	Separation program "OFF"	In separating mode, this key closes the feed valve and ejects the bowl content. With OSC/OSD separators, there are two automatic total ejections. The LED lights up when the ejections are carried out.
	Separation program "ON"	This key starts the separation program. When the ejection program is complete, the feed valve is opened. When falling below the min. separating temperature or if the "LSHH sludge tank" level switch sends a signal, a program start is not possible. The LED goes on when the ejection and/or separation program is activated.
	Lamp test	This key starts a function test of the LEDs integrated in the keys and of any possible external indicator lights. The LEDs of status and fault displays are not tested.
	Series operation	With series operation of HFO separators, two D10 control systems can be pre-selected for this type of processing within the MPI network. To activate series operation, actuate the "SERIES" key on both D10 control units. The LED goes on when series operation is activated.
	Home	Direct jump to main menu (see chapter 3.6.1 "Display of program data/Main menu (Home)")

Key	Key designation	Description
	Fault message screen	<p>This key calls up the screen displaying an overview of the current fault messages or the fault message buffer.</p> <p>When a fault occurs, a list of measures for removing the fault appears after acknowledging the fault with the Enter key.</p> <p>If the LED flashes, information for removing the current fault is available after pressing F1.</p> <p>The LED flashes as long as an unacknowledged fault message is queued.</p>
	PID controller	<p>If the system is equipped accordingly, the product feed and temperature control can be activated when the "PID controller" key is pressed.</p> <p>The LED lights up when the control system is in automatic mode.</p> <p>For testing operation using manual adjustments, first deactivate the control system at the "PID controller" key. In the corresponding screen menu (see chapter 3.6.6 "Adjustment of PID controller"), close the motor valve using the softkeys F2/F3.</p>
	Feed pump status	<p>This key has no function. The LED in this key indicates the current feed pump status.</p> <ul style="list-style-type: none"> • Continuous light: Operation • Slowly flashing: Fault by motor protection • Fast flashing: Slowing-down phase
	Sludge pump status	<p>This key has no function. The LED in this key indicates the current sludge pump status.</p> <ul style="list-style-type: none"> • Continuous light: Operation • Slowly flashing: Fault by motor protection
	Separator status	<p>This key has no function. The LED in this key indicates the current separator status.</p> <ul style="list-style-type: none"> • Continuous light: Operation • Slowly flashing: Fault by motor protection • Fast flashing: Start-up phase

3.1.2 System keys

Key	Key designation	Description
   	Cursor up/down/right/left	<p>These keys are used to select the menus. If there are input fields in a menu, these keys are used to move the cursor from one field to the other. The next menu is selected after the last input field.</p> <p>These keys are also used to navigate through the fault messages in the message buffer or on the message level.</p>
	Esc (cancel)	<p>This key is used to cancel field inputs provided that they have not been confirmed using the Enter key. If the ESC key is pressed in a menu, the program returns to the preceding menu or to the message level. No further return is possible on the message level.</p>
	Enter	<p>This key</p> <ul style="list-style-type: none"> • confirms and completes an entry; • acknowledges an active fault message; • provides the transition from the message to the image level.
	Edit	<p>This key is used to edit parameters or timer/counter setpoints. The LED goes on when the editing mode is activated.</p>

3.1.3 Soft keys F1-F4

Key	Key designation	Description
   	Soft keys	<p>The soft keys have a local function. The actions which can be triggered depend on the pictures currently displayed and are assigned to the pictures.</p>

3.1.4 Parameter input

Numerical input e.g. for passwords or setpoint changes is by means of the function keys.

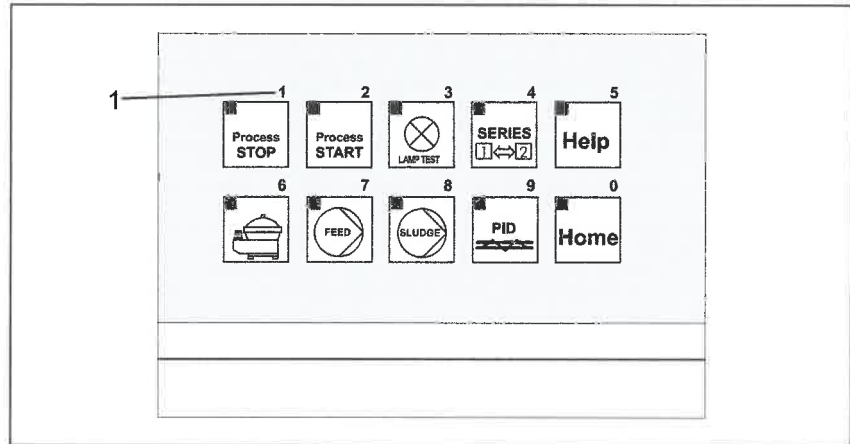


Fig. 13

The corresponding value (1) can be seen on the right above the respective function keys.

Note:

If by mistake you failed to properly actuate the Edit key when entering parameters, the function of the respective function key is active. You may now possibly change current separator operation.

Actuating the wrong key one more time brings you back to the initial separator function condition.

If entries are possible in a menu, this mode can be identified by the flashing cursor in the display.

Editing values:

- Press Edit key, the LED in the Edit key lights up.
- Enter the new value and/or the password using the function keys.
- Complete your entry by pressing the Enter key.



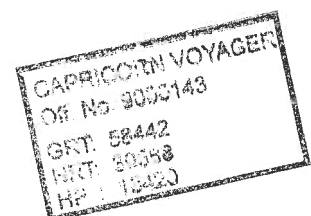
Purifier (General Info.)

Nadeep Lamba

Engine Cadet

Date: 27 APRIL 2017

Signature: 3/EKL



<p>1. State the details of purifiers in the right side column</p>	<p>Make: Westfalia (GEA) Models: OSD 35-0136-067 Flow rate: 2500 litres/hour(HFO) 1800 litres/hour(ME LO) 500 litres/hour(DG LO) How many: 2 For HFO purification 2 For ME LO purification 2 For DG LO purification</p>
<p>2. State the principle in which the centrifugal separators function</p>	<p>Centrifugal purifiers use the centrifugal force to separate the water from the fuel or lubricating oil. The separation takes place due to difference in densities.</p>
<p>3. In purifiers, state some of the possible causes, if oil starts coming from the waterside</p>	<p>If the separation interface between water and oil is formed at the periphery which allows mixing If water sensor is not functioning properly If solenoid valve for water discharge is leaky</p>
<p>4. State basic steps in starting centrifuges for fuel oils</p>	<p>Open outlet valve of settling tank to purifier feed line Open inlet/outlet valves of feed pump Open inlet/outlet valves of HFO heater Switch separator feed pump breaker to the ON position. Check the brake is released. Open sludge outlet valve to sludge tank Open recirculation valve to settling tank Open separator outlet valve to service tank Check main operating water valve is open Open operating displacement water valve on separator START HFO feed pump on recirculation mode. When pressure in the heater is 2 bar, purge the heater by opening air vent. Slowly OPEN manual steam inlet heater valve OPEN steam return valve Set heater controller temperature slowly up to 98 deg C Switch the separator power breaker ON and START the separator</p>
<p>5. State the possibility of contamination of diesel oil tanks with heavy oil.</p>	<p>Outlet valve from purifier is opened to DO Service tank Recirculation valve is line up to DO Settling tank If during internal transfer of bunkers the blank flange is removed</p>
<p>6. Notice the difference in flow rates between FO and LO through respective purifiers.</p>	<p>Flow rate for HFO purifier ranges from 2000-2500 lit/hr Flow rate for LO purifier ranges from 1500-2000 When the main engine is running the flow rate</p>

	<p>for HFO purifier is higher because of the continuous consumption of fuel oil while the LO purifier has lower flow rate because the lub oil is circulated from sump to sump and also lower flow rate gives better purification.</p>
<p>7. State basic steps before shutting down fuel purification ?</p>	<p>Perform three manual de-sludge cycles. 3 way valve changes to recirculation. Separator flow and back pressure reduces to zero. Stop the separator by pressing PROCESS STOP button. Reduce the set point of EPCON controller, set it to 40-50 deg. Close manual steam inlet to heaters. Close steam return valves. Stop HFO feed pump Close inlet and outlet valves of feed pump. Stop idling separator by pressing STOP button. Close operating water on separator. Close recirculation valve to settling tank Close separator outlet valve to service tank. Apply break by turning anticlockwise. Close sludge outlet valve to sludge tank.</p>
<p>8. State precautions before opening up a centrifuge?</p>	<p>Job hazards and control measures needs to be reviewed before carrying out the job. Before opening up it is to be seen that the purifier is in stopped condition and zero energy is ensured. Lock out tag out procedures needs to be followed in order to ensure zero energy. Lifting device is to be checked before use. It is to be ensured that all tools are available on site before opening up. Proper housekeeping measures such as covering the area around should be ensured.</p>
<p>9. State the extent of automation ?</p>	<p>D10 control unit is used for automatic ejection control and condition monitoring. There are two basic monitoring systems: WMS- Water Monitoring System SMS- Sludge Monitoring System WMS- The conductivity sensor senses the water the control system opens the solenoid valve to discharge the water SMS- If the sludge in the bowl becomes excessive, the system will activate the automatic desludging procedure.</p>

10. State fire detection and fire extinguishing equipment in and around purifier platform.

Fire fighting equipment in purifier room-

- Fixed foam fire fighting system
- Fixed local fire fighting system- water mist.
- Fire damper in vent duct.
- Remote control for FO quick closing valves.
- Portable fire extinguisher(9L foam)

-Fire detection Equipment-

4 smoke detectors and 1 flame detector

FRESH WATER GENERATOR

3. State the extent of automation on the system.

The extent of automation on the system is limited to the solenoid valve on the fresh water pump extractor discharge. The valve is energized (open) when the salinity is high and then drains the saline water to overboard.

During normal operation (low salinity) the valve is closed and water is filled in fresh water tanks.

4. State different alarms and shut down parameters.

There is an alarm for high salinity for the produced fresh water. The set point is 10ppm

5. How the salinity of water is checked?

The salinity of water is checked by the salinometer mounted on the discharge side of the freshwater pump. It consists of electrodes which are in contact with the flowing water. If the content of salt reaches the alarm set level. The alarm is activated and the ^{solenoid valve opens and} water is sent to ^{separator vessel overboard.} bilges. The salinity is sensed on the principle that the electrode conductivity of water is directly proportional to the salt content.

6. Is there any protective coating on the inner surfaces of evaporator casing?

Special coating for protection from corrosion.

7. Is there any chemical treatment for prevention of scales?

Drew marine ameroil CF is used to prevent scale formation.

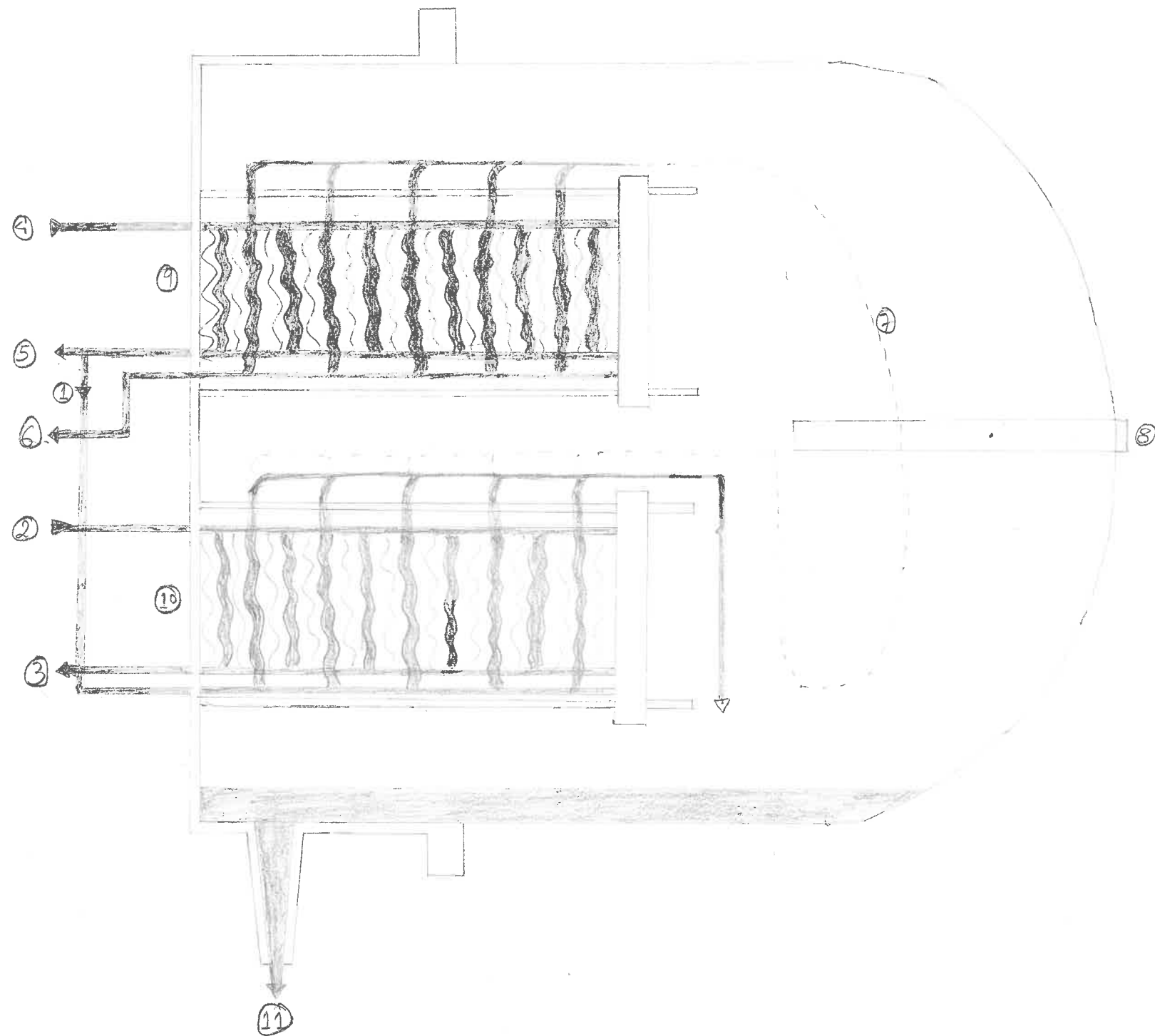
8. State any other item of interest you notice on the system on your ship or in the instruction manual.

The fresh water generator has plate type heat exchangers as Evaporator and condenser. It can be operated both on water and steam so when M/E is stopped we can use steam to produce fresh water.

Singh
Sale
CHARME GARDIE
01 APRIL 2017

CAPRICORN VOYAGER
OR No 9000143
ORT: 58442
NET: 20388
HP: 10420

FRESH WATER GENERATOR



- 1) SEPARATOR FEED
- 2) HEATING MEDIA IN
- 3) HEATING MEDIA OUT
- 4) SEAWATER COOLING IN
- 5) SEAWATER COOLING OUT
- 6) FRESH WATER OUT
- 7) EVAPORATED STEAM
- 8) DEMISTER
- 9) CONDENSER
- 10) EVAPORATOR
- 11) BRINE OUT

CAPRICORN VOYAGER
Off. No 9000143
GRT: 58442
NET: 20008
HP: 12420



Capricorn Voyager

SEWAGE TREATMENT PLANT

Date of completion: *31/3/17*

Signature:

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30088
HP : 18420

A handwritten signature in black ink, appearing to be a stylized name with a long horizontal stroke.

CFO

SEWAGE TREATMENT PLANT

1. Describe the sewage system on your ship. Give a simple diagram to show different components.

Vacuum System:

Manufacturer: EVAC

Type: Easy Fit

Sewage Treatment Plant:

Manufacture: DVZ Series

Type: Biological oxidation and discharge



The gray water are discharged directly overboard through a storm valve. The black water from hospital, port and starboard side sanitary fixtures and gray water from hospital goes to the sewage collecting tank.

The sewage system consists of a collecting unit and a sewage treatment plant. The sewage is transported from sanitary fixtures in accommodation and engine room, to a collection tank in a pipe by using vacuum. The vacuum is created by sewage powered ejectors. The sewage ejector pump circulates sewage through a ejector which creates vacuum in the line. This line is connected to all ship's toilet.

Soil pipes from the accommodation and the engine room toilet are directed to the sewage holding tank inlet under vacuum. Under normal circumstances, one of the pumps will be set to operate as a vacuum pump. The vacuum pump is started and stopped by a vacuum switch on the sewage inlet manifold, which is kept under vacuum by a non-return flap valve (Start at -40kpa and stop at -65kpa). A flap valve maintains vacuum inside the whole line.

The other pump is operated as a discharge pump to the sewage treatment plant. The discharge pump is started and stopped by means of float switches inside the holding tank, or via a timer unit. Alternatively, the sewage collected here can be discharge overboard directly or can be given to shore reception facilities by means of this pump. This plant consists of three chambers, namely

- Aeration tank
- Treatment tank (Clarification compartment)
- Disinfecting tank

The sewage enters the aeration tank where sedimentation or pretreatment takes place using oxygen, which is supplied by a fan. The pre-treated water passes/overflows to treatment tank where fine oxygen bubbles blown in by special disperser causes complete aerobic degradation of facial mass which is disinfected in the disinfecting tank. The treated water can be thrown overboard or to reception by a sewage discharge pump.

2. Notice if there is a by-pass arrangements to the sewage system. where does it lead to?

There is a bypass arrangement for the sewage system. The gray water can be discharged overboard directly. The black water must pass through the sewage holding tank. The sewage from here can be pumped to the STP or it can be directly thrown overboard or discharged to reception facilities.

3. What are "scupper" and a "storm valve"? What is so special about them? How and when are they overhauled?

Scuppers are drains from various save-alls. The scuppers from Sewage Treatment Plant and collection unit are lead to the bilge-holding tank

Storm valve- a storm valve is basically a swing check valve, with a closing device. The closing device is usually a hand wheel or a counter weight, but they can also be actuated. Storm valve are usually found on ships in sanitary piping system which have a ships side exit.

They prevent sea water entering the system during heavy weathers thereby maintaining the system integrity. They are overhauled only in dry dock.



Domestic Fridge Description

Nadeep Lamba

Engine Cadet

Date: 17/05/17.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a faint, illegible stamp.

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 52442
NRT: 30098
HP : 10420

DOMESTIC FRIDGE

❖ Give a brief description of the domestic fridge on your ship.

A. Compressors:

No. of sets: 2

Make: SABROE

Type: SBO 42, single stage, pressure lubricated

No. of cylinders: 4 cylinder, belt drive

V or in-line: V

Gas in use: R-404a

B. Controls:

Pressure operated switches for:

- High pressure control
- Low pressure control
- Oil differential pressure control
- Fresh water inlet (cooling water)

Various cut outs and trips:

- High pressure cut-out,
- low pressure cut-out,
- low oil level cut-out
- Cooling water inlet low pressure cut out.

C. Instruments:

Pressure gauges for:

- Discharge pressure
- suction pressure
- lubricating oil pressure
- cooling water pressure

Temperature indicators for:

- Cooling water inlet and outlet temperatures.

Alarms for:

- Reefer compressor abnormal (ECR)
- Meat room high temperature (ECR)
- Fish room high temperature (ECR)
- Vegetable room high temperature (ECR)
- Sub zero room high temperature (ECR)
- Dairy high temperature (ECR)
- Oil pressure low (indication-local panel)

- High pressure (indication-local panel)
- Water pressure (indication-local panel)

Other indicators:

- Temperature sensors for freezing room
- Temperature sensors for chilled room

D. Condensers:

No. of sets: 2

Type: Horizontal shell and tube

Make: CRKF

E. Oil separator position:

The float valve controlled oil separator is located just after the compressor

F. Receiver:

Condenser and receiver is one unit. The condenser has a sight glass to ascertain level of refrigerant.

G. Dryer:

Type: DCR 0487

Dryer is fitted just after the two condensers. It also has a liquid filling connection on it.

H. Cold rooms and required temperatures to be maintained:

1.	Meat room	-20 deg.C	-18
2.	Fish room	-20 deg.C	-18
3.	Sub-zero room	-20 deg.C	-18
4.	Dairy room	+2 deg.C	+4
5.	Vegetable room	+2 deg.C	+4

I. Type of expansion valve:

Thermostatic expansion valves are placed in each room before the evaporator. They are controlled by temperature sensing bulbs.

J. Location of solenoid valves on lines and their purpose:

Solenoid valves are present before the thermostatic expansion valves for each room. They are controlled by thermostats.

This provides an independent temperature control for each room and to also reduce the number of starts and running time of the duty compressor.

K. Arrangements for Automatic defrosting:

The air coolers in the freezing room are equipped with electrical defrosting. In this, the cooler block and the drip trays are provided with electrical heating elements. The frequency of defrosting is chosen by

means of a defrosting relay built into the switchboard. The fans in the freezing rooms stop working, but the fans in the chilled rooms continue to circulate hot room air. When the ice has melted, the refrigerant temperature rises in the freezing rooms. When the temperature reaches the set point (approx. +10 deg.C) of the defrosting thermostat, the heating elements are switched off.

Because the operating temperatures of the vegetable and dairy rooms remain at +4°C, the evaporator does not require defrosting, therefore no heaters are fitted.

L. Arrangements for manual defrosting:

Outside the space we have a push button to start manual defrosting.

M. Sensors for temperature indicators, expansion valve control, on/off thermostat:

- There are temperature sensors in the rooms for remote indication of the room temperature in the engine room.
- A thermostat is present inside each room which will activate the solenoid valve in the line depending on the temperature in the room.
- A thermostat is present at the outlet of the evaporator coil which controls the TEV. The TEV throttles the refrigerant flow, so that the required temperature is maintained inside the room.
- There is also a defrosting thermostat which will stop the electrical heating for defrosting i.e when temperature reaches set point of defrosting thermostat.

N. Arrangements for airtight sealing at cold room doors:

Special gaskets are provided which seals these rooms.

O. Arrangements for draining water from the cold rooms:

There are drip trays present beneath each of the evaporators which will collect all the drain water.

P. Location of alarm for a person getting trapped inside the cold room:

Inside each space there is an alarm just next to the door. The doors can also be opened from inside using push buttons.

Q. State different sources of cooling water supply for condensers:

The cooling water for the condenser comes from the L.T cooling water system.

R. Location of remote indications for on/off state of compressors:

The remote indication for the on/off state can be seen in the engine control room on the control console panel.



Oil Mist Detector

Nadeep Lamba

Engine Cadet

Date: 17.05.17.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30008
HP : 12420

OIL MIST DETECTOR

- ❖ Manufacturer: Kidde Fire Protection
- ❖ Model: Graviner Mk6

General Description:

The oil mist detectors that are fitted on our main engine are of the light scatter type. There are total of seven oil mist detectors, one for each unit of the engine and the seventh detector is for the gear box/thrust bearing space of the engine. As the detectors are of the light scattering type, this enables very small detectors to be used. Inside the detector is a sample chamber in which the sample from the engine is pushed in by the sample fan. As they each have their own means of sample acquisition, no sample pipes are required. There is a small light source at one end of the sample chamber and on the other end is the photo-sensitive cell. The entire inner surface of the sample chamber is a black surface. Each detector is fitted with three indicator lights:

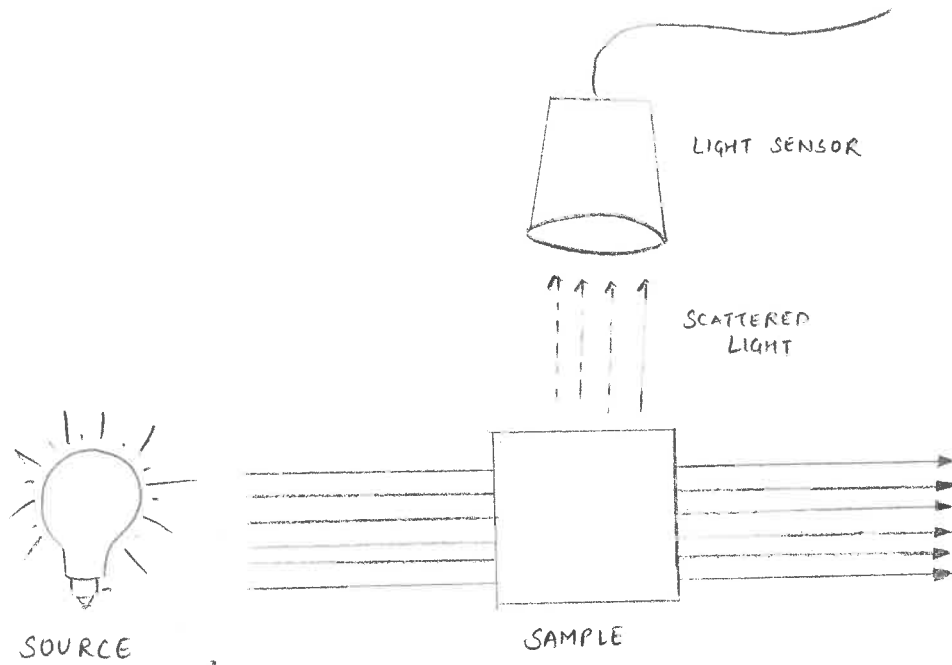
1. Green – Power on
2. Red – Alarm
3. Amber – Fault

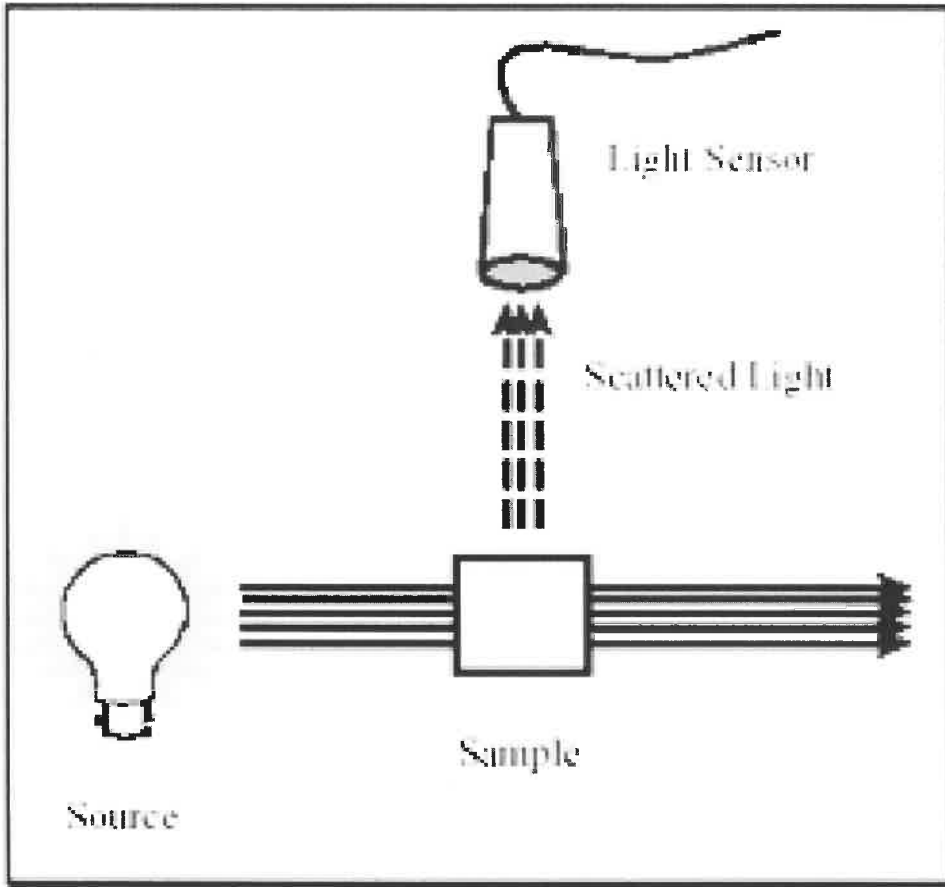
There is a control unit in the engine control room which constantly monitors the all the detectors. Each detector has its own unique address by which we can find out which unit detector has given the alarm

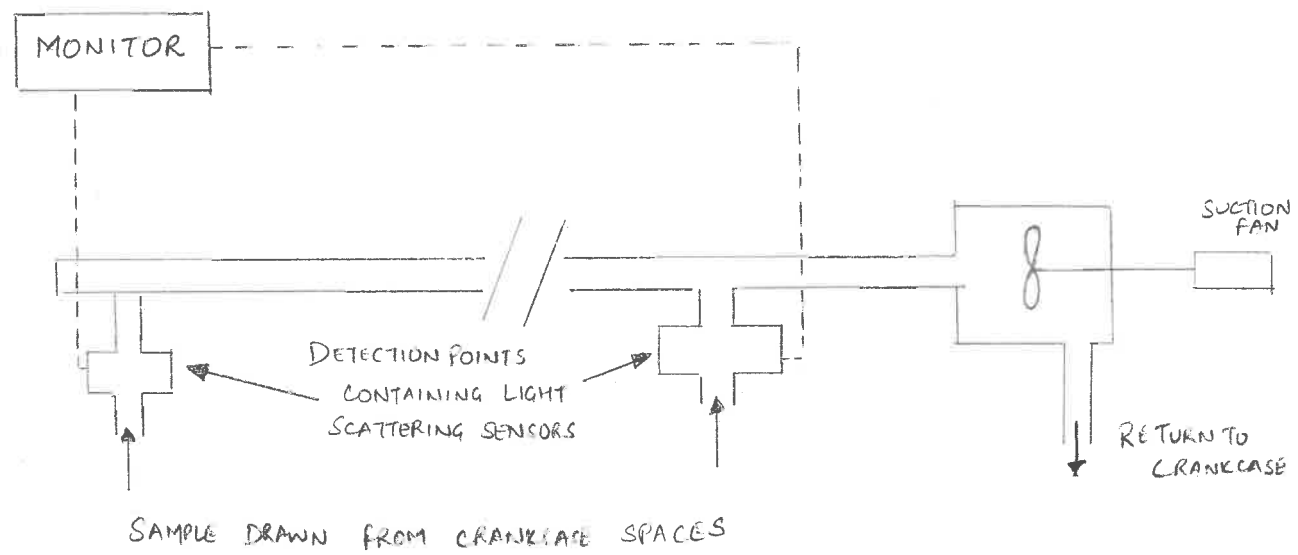
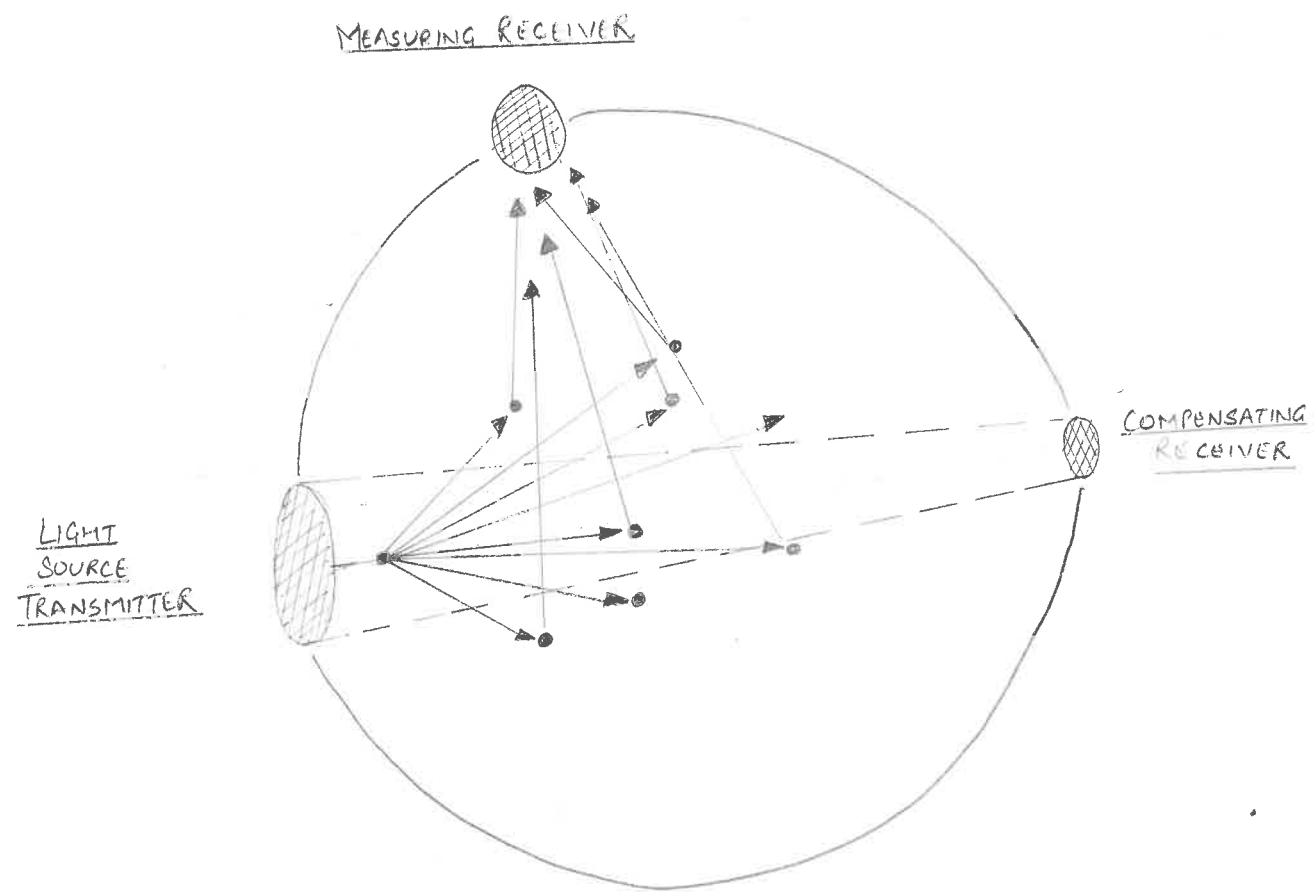
Operation:

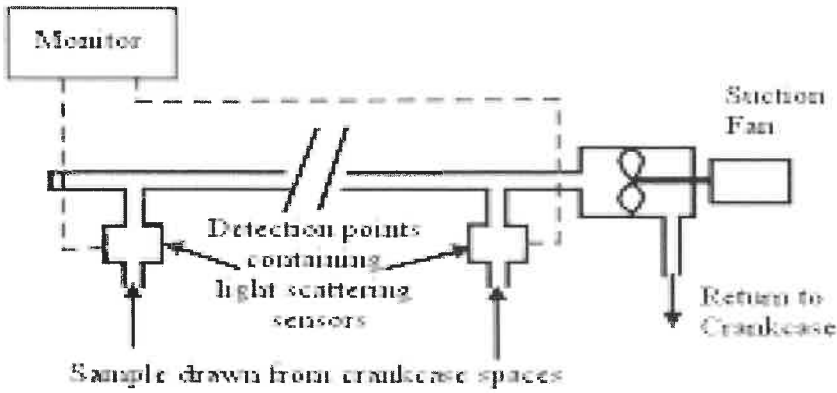
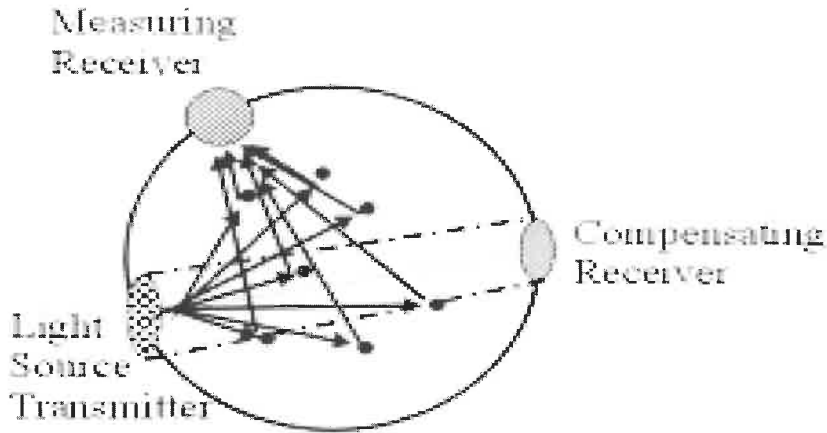
The light from the source falls onto the photo-sensitive cell. This generates a current in the photo-sensitive cell and this current is fed to the control unit. This control unit converts the input current signal into its proportional oil mist density. If the input current is more, less will be the oil mist density. The sample fan in the detector draws in the sample air from the crankspace to which it is connected and sends into the sample chamber. When the light beams strikes the oil mist in the sample air, it scatters and is absorbed by the black surface of the sample chamber. Due to this, the current output from the photo-sensitive cell decreases. In the control unit, the average oil mist density for the engine will be calculated and then

each detector signal is compared in turn with this average value. A positive difference is then compared with a pre-set reference value. If the positive difference is greater than the pre-set value, then an alarm will be given. The average value is also compared with a pre-set reference value. If this is also greater then an alarm will be given.











Alarms and Trips

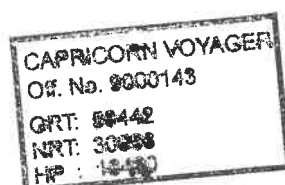
Nadeep Lamba

Engine Cadet

Date: 21/04/17

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.



HM.1583/84 LIST OF ALARM / MONITORING POINTS

CH. NO.	DESCRIPTION	CODE	SIGNAL TYPE	RANGE		UNIT	LARM (SET VALUE)				AL. GRP	BL. GRP	AC. GRP	TIME DELAY	DWG. EFT01.00 PAGE NO.	SUPPLIER	LCU NO.	REMARKS	REV	DWG. MB101.00 PAGE NO.
				MIN	MAX		L.L	L	H	H.H										
0401	M/E CYL. 1 EXH. GAS OUTLET TEMP	TIAH	PT100	0	600	Deg.C		430	450	03			11	2	3-19	M/E	10	SLOWDOWN : 450		
0402	M/E CYL. 2 EXH. GAS OUTLET TEMP	TIAH	PT100	0	600	Deg.C		430	450	03			11	2	3-19	M/E	10	SLOWDOWN : 450		
0403	M/E CYL. 3 EXH. GAS OUTLET TEMP	TIAH	PT100	0	600	Deg.C		430	450	03			11	2	3-19	M/E	10	SLOWDOWN : 450		
0404	M/E CYL. 4 EXH. GAS OUTLET TEMP	TIAH	PT100	0	600	Deg.C		430	450	03			11	2	3-19	M/E	10	SLOWDOWN : 450		
0405	M/E CYL. 5 EXH. GAS OUTLET TEMP	TIAH	PT100	0	600	Deg.C		430	450	03			11	2	3-19	M/E	10	SLOWDOWN : 450		
0406	M/E CYL. 6 EXH. GAS OUTLET TEMP	TIAH	PT100	0	600	Deg.C		430	450	03			11	2	3-19	M/E	10	SLOWDOWN : 450		
0407	M/E CYL. EXH. GAS MEAN TEMP	TI	-	0	600	Deg.C									3-19	AMS	-	BY SOFTWARE		
0408	M/E CYL. 1 EXH. GAS DEV. TEMP	TDIAH	-	0	600	Deg.C	-60	-50	50	60	03			2	3-19	AMS	-	BY SOFTWARE	1	42
0409	M/E CYL. 2 EXH. GAS DEV. TEMP	TDIAH	-	0	600	Deg.C	-60	-50	50	60	03			2	3-19	AMS	-	BY SOFTWARE	1	
0410	M/E CYL. 3 EXH. GAS DEV. TEMP	TDIAH	-	0	600	Deg.C	-60	-50	50	60	03			2	3-19	AMS	-	BY SOFTWARE	1	
0411	M/E CYL. 4 EXH. GAS DEV. TEMP	TDIAH	-	0	600	Deg.C	-60	-50	50	60	03			2	3-19	AMS	-	BY SOFTWARE	1	
0412	M/E CYL. 5 EXH. GAS DEV. TEMP	TDIAH	-	0	600	Deg.C	-60	-50	50	60	03			2	3-19	AMS	-	BY SOFTWARE	1	
0413	M/E CYL. 6 EXH. GAS DEV. TEMP	TDIAH	-	0	600	Deg.C	-60	-50	50	60	03			2	3-19	AMS	-	BY SOFTWARE	1	
0414	M/E T/C EXH. GAS OUTLET TEMP	TIAH	PT100	0	600	Deg.C		430	450	03				2	3-19	M/E	10			
0415	M/E T/C EXH. GAS INLET TEMP	TIAI	PT100	0	600	Deg.C		580	580	03				2	3-19	M/E	10			

HN.1583/84 LIST OF ALARM / MONITORING POINTS

CH. NO.	DESCRIPTION	CODE	SIGNAL TYPE	RANGE		UNIT	LARM (SET VALUE)			AL. GRP	BL. GRP	AC. GRP	TIME DELAY	DWG. EF701.00 PAGE NO.	SUPPLIER	LCU NO.	REMARKS	REV	DWG. MB101.00 PAGE NO.	
				MIN	MAX		L.L.	L	H											H.H
0201	M/E F.O. INLET PRESS	PIAL	4-20MA	0	15	KG/CM2	6.5			03	01		2	3-22	M/E	11	WITH GAUGE ON F.O.C	1		
0202	M/E F.O. INLET TEMP	TIAHL	PT100	0	200	Deg.C	95	160		03	03		2	3-21	M/E	9		1		
0203	M/E F.O. FILTER DIFF. PRESS	DPAH	B/(NC)							03			2	3-14	MKR	7		1		
0204	M/E F.O. LEAKAGE HIGH LEVEL	LAH	B/(NC)							03			2	3-21	M/E	9		5		
0205	M/E & G/E F.O. VISCOSITY HIGH	VAH	B/(NC)							03	03		2	3-14	MKR	7		9		
0206	M/E & G/E F.O. VISCOSITY LOW	VAL	B/(NC)							03	03		2	3-14	MKR	7		9		
0207	M/E & G/E F.O. CIRC. PUMP NO.1 RUN	XI	B/(NC)											3-14	MKR	7		1		
0208	M/E & G/E F.O. CIRC. PUMP NO.2 RUN	XI	B/(NC)											3-14	MKR	7		1	25	
0209	M/E & G/E F.O. CIRC. PUMP ST-BY START	XA	B/(NC)							03			2	3-14	MKR	7		1		
0210	M/E & G/E F.O. SUPPLY PUMP NO.1 RUN	XI	B/(NC)											3-14	MKR	7		1		
0211	M/E & G/E F.O. SUPPLY PUMP NO.2 RUN	XI	B/(NC)											3-14	MKR	7		1		
0212	M/E & G/E F.O. SUPPLY PUMP ST-BY START	XA	B/(NC)							03			2	3-14	MKR	7		1		
0213	M/E & G/E F.O. SUPPLY UNIT COMMON ABNR	XA	B/(NC)							03			2	3-14	MKR	7		1		
																		3		
																		5		

HN.1583/84 LIST OF ALARM / MONITORING POINTS

CH. NO.	DESCRIPTION	CODE	SIGNAL TYPE	RANGE		UNIT	LARM (SET VALUE)			AL. GRP	BL. AC. GRP	TIME DELAY	DWG. EF701.00 PAGE NO.	SUPPLIER	LCU NO.	REMARKS	REV.	DWG. MB101.00 PAGE NO.
				MIN	MAX		L.L	L	H									
0101	M/E MAIN L.O. INLET PRESS	PIAL	4-20MA	0	4	KG/CM2	0.7	0.9		03	02	12	3-22	M/E	11	SLOWDOWN : 0.7	1	31
0102	M/E MAIN L.O. INLET TEMP	TIAH	PT100	0	200	Deg.C		55		03			3-23	M/E	11		1	31
0105	M/E MAIN L.O. FILTER DIFF. PRESS	DPAH	B/(NC)							03			3-14	M/E	7		1	31
0106	M/E CRANKCASE OIL MIST HIGH	DAH	B/(NC)							03	07		3-20	M/E	MCU		1	31
0107	M/E OIL MIST DETECTOR FAIL	XA	B/(NC)							03			3-20	M/E	MCU		1	31
0108	ALPHA LUB.SYS. COMMON ALARM	XA	B/(NC)							03			5-8	M/E	MCU	Revised by a-lub.	6	31
0109	ALPHA LUB.SYS. MCU POWER FAIL	XA	B/(NC)							03			5-8	M/E	MCU	Revised by a-lub.	6	31
0110	ALPHA LUB.SYS. BCU IN CONTROL	XA	B/(NC)							03			5-8	M/E	MCU	Revised by a-lub.	6	31
0111	ALPHA LUB.SYS. BCU POWER FAIL	XA	B/(NC)							03			5-8	M/E	MCU	Revised by a-lub.	6	31
0112	ALPHA LUB.SYS. MCU FAIL	XA	B/(NC)							03			5-8	M/E	MCU	Revised by a-lub.	6	31
0113	ALPHA LUB.SYS. BCU FAIL	XA	B/(NC)							03			5-8	M/E	MCU	Revised by a-lub.	6	31
0114	NO.1 M/E MAIN L.O. PUMP RUN	XI	B/(NC)										3-26	MSB	MCU		1	31
0115	NO.2 M/E MAIN L.O. PUMP RUN	XI	B/(NC)										3-26	MSB	MCU		1	31
0116	M/E MAIN L.O. PUMP ST-BY START	XA	B/(NC)							03			3-26	AEYANK	MCU		1	31
0120	M/E THRUST PAD BEAR. L.O. OUTLET TEMP	TIAH	PT100	0	200	Deg.C	75	80		03	05		3-23	M/E	11	SLOWDOWN : 80	1	31
0121	M/E L.O. SUMP TANK LEVEL	LAL	B/(NC)							03			3-17	HANLA	8			30
0122	M/E P.C.O. INLET PRESS	PIAL	4-20MA	0	4	KG/CM2	0.7	1.1		03	04		3-22	M/E	11	SLOWDOWN : 0.7	1	31
0123	M/E P.C.O. INLET TEMP	TIAH	PT100	0	200	Deg.C		55		03			3-20	M/E	10			31
0124	M/E P.C.O. 1 OUTLET TEMP	TIAH	PT100	0	200	Deg.C		70	75	03	02		3-23	M/E	11	SLOWDOWN : 75	1	31
0125	M/E P.C.O. 2 OUTLET TEMP	TIAH	PT100	0	200	Deg.C		70	75	03	02		3-23	M/E	11	SLOWDOWN : 75	1	31
0126	M/E P.C.O. 3 OUTLET TEMP	TIAH	PT100	0	200	Deg.C		70	75	03	02		3-23	M/E	11	SLOWDOWN : 75	1	31
0127	M/E P.C.O. 4 OUTLET TEMP	TIAH	PT100	0	200	Deg.C		70	75	03	02		3-23	M/E	11	SLOWDOWN : 75	1	31
0128	M/E P.C.O. 5 OUTLET TEMP	TIAH	PT100	0	200	Deg.C		70	75	03	02		3-23	M/E	11	SLOWDOWN : 75	1	31
0129	M/E P.C.O. 6 OUTLET TEMP	TIAH	PT100	0	200	Deg.C		70	75	03	02		3-23	M/E	11	SLOWDOWN : 75	1	31
0130	M/E P.C.O. 1 NON-FLOW	FAL	B/(NC)							03	02	03	3-23	M/E	11		1	31
0131	M/E P.C.O. 2 NON-FLOW	FAL	B/(NC)							03	02	03	3-23	M/E	11		1	31
0132	M/E P.C.O. 3 NON-FLOW	FAL	B/(NC)							03	02	03	3-23	M/E	11		1	31
0133	M/E P.C.O. 4 NON-FLOW	FAL	B/(NC)							03	02	03	3-23	M/E	11		1	31
0134	M/E P.C.O. 5 NON-FLOW	FAL	B/(NC)							03	02	03	3-23	M/E	11		1	31
0135	M/E P.C.O. 6 NON-FLOW	FAL	B/(NC)							03	02	03	3-23	M/E	11		1	31
0137	M/E T/C L.O. OUTLET TEMP	TIAH	PT100	0	200	Deg.C		95		03			3-19	M/E	10		1	31
0138	M/E T/C L.O. INLET PRESSURE	PIAL	4-20MA	0	4		0.6	1.2		03	01		3-22	M/E	11		1	31

FIG. 1563/84 - LIST OF ALARMS / MONITORING POINTS

CH. NO.	DESCRIPTION	CODE	SIGNAL TYPE	RANGE MIN / MAX	UNIT	LARM (SET VALUE)			AL. GRP	BL. GRP	AC. GRP	TIME DELAY	DWG. EF701.00 PAGE NO.	SUPPLIER	LCU NO.	REMARKS	REV	DWG. MB101.00 PAGE NO.
						L.L.	L	H.H.										
0301	M/E A/C C.F.W. INLET PRESS	PIAL	4-20MA	0 6	KG/CM2	1.0			03	01		2	3-22	M/E	11		1	35
0302	M/E A/C C.F.W. OUTLET TEMP	TIAH	PT100	0 200	Deg.C	63			03			2	3-20	M/E	10		2	
0303	M/E C.F.W. AIR DETECTION	FAH	B/(NC)						03			15	3-14	HANLA	7		1	
0304	M/E JACKET C.F.W. INLET PRESSURE	PIAL	4-20MA	0 6	KG/CM2	1.5 2.0			03	01	08	2	3-22	M/E	11	SLOWDOWN : 1.5	5	
0305	M/E JACKET C.F.W. INLET TEMP	TIAH	PT100	0 200	Deg.C	57			03			2	3-20	M/E	10			
0306	M/E JACKET NO.1 C.F.W. OUTLET TEMP	TIAH	PT100	0 200	Deg.C	90 95			03		09	2	3-19	M/E	10	SLOWDOWN : 95		
0307	M/E JACKET NO.2 C.F.W. OUTLET TEMP	TIAH	PT100	0 200	Deg.C	90 95			03		09	2	3-19	M/E	10	SLOWDOWN : 95		
0308	M/E JACKET NO.3 C.F.W. OUTLET TEMP	TIAH	PT100	0 200	Deg.C	90 95			03		09	2	3-19	M/E	10	SLOWDOWN : 95		
0309	M/E JACKET NO.4 C.F.W. OUTLET TEMP	TIAH	PT100	0 200	Deg.C	90 95			03		09	2	3-19	M/E	10	SLOWDOWN : 95		
0310	M/E JACKET NO.5 C.F.W. OUTLET TEMP	TIAH	PT100	0 200	Deg.C	90 95			03		09	2	3-19	M/E	10	SLOWDOWN : 95		
0311	M/E JACKET NO.6 C.F.W. OUTLET TEMP	TIAH	PT100	0 200	Deg.C	90 95			03		09	2	3-19	M/E	10	SLOWDOWN : 95		
0312	MAIN C.S.W. PUMP OUTLET PRESS	PI	4-20MA	0 6	KG/CM2								3-16	DAEYANI	8			
0313	SEA WATER INLET TEMP	TI	PT100	0 200	Deg.C								3-16	CMR	8			
0314	NO.1 MAIN C.S.W. PUMP RUN	XI	B/(NC)										3-26	MSB	MCU			
0315	NO.2 MAIN C.S.W. PUMP RUN	XI	B/(NC)										3-26	MSB	MCU			
0316	MAIN C.S.W. PUMP ST-BY START	XA	B/(NC)										3-26	DAEYANI	MCU			
0317	L.T. C.F.W. LINE PRESSURE	PI	4-20MA	0 6	KG/CM2				03			2	3-26	DAEYANI	MCU		1	
0318	NO.1 LT C.F.W. PUMP RUN	XI	B/(NC)										3-16	DAEYANI	8		1	
0319	NO.2 LT C.F.W. PUMP RUN	XI	B/(NC)										3-26	MSB	MCU			
0320	LOW TEMP C.F.W. PUMP ST-BY START	XA	B/(NC)										3-26	MSB	MCU			
0321	NO.1 M/E J.C.F.W. PUMP RUN	XI	B/(NC)						03		2		3-26	DAEYANI	MCU		1	
0322	NO.2 M/E J.C.F.W. PUMP RUN	XI	B/(NC)										3-26	MSB	MCU			
0323	M/E J.C.F.W. PUMP ST-BY START	XA	B/(NC)						03				3-26	DAEYANI	MCU			
0324	C.F.W. EXP. TANK LEVEL	LAL	B/(NC)						03		15		3-7	HANLA	2			
0325	M/E C.F.W. OIL DETECTION	DAH	B/(NC)						03		2		3-17	MKR	8			
0326	M/E CYL-O-FLOW-FROM CYL-OIL-STOR-TK	FI	400RA/L						03				3-26	DAEYANI	MCU	Deleted by owner	6	31
0329	NO.1 CYL OIL STORAGE TK LEVEL	LAL	B/(NC)						03		15		3-26	HANLA	MCU	Added by piping dwg	11	31
0330	NO.2 CYL OIL STORAGE TK LEVEL	LAL	B/(NC)						03		15		3-26	HANLA	MCU	Added by piping dwg	11	31
0329	NO.1-ME-CYL-OIL-ALARM-CHAMBER-LEVEL	LAL	BIG						03		15		3-26	HANLA	MCU	Added by piping dwg	11	31
									03		15		3-26	HANLA	MCU	Deleted by owner	6	31



Concepts Of Maintenance

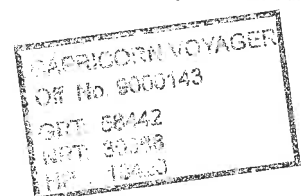
Nadeep Lamba

Engine Cadet

Date: 24 MAY 2017

Signature:

2/E Budhant



Concepts of maintenance

S. No.	Job Done	Machinery category	Planned or unplanned	Routine or overhaul	Running or shutdown	Survey
1	Control air compressor 1000 hours routine	AU	PM	RO	SM	No
2	Aux stbd boiler pilot burner cleaning	BR	PM	OV	RM	No
3	Fuel oil Circulating Pump overhaul	MS	UP	OV	SM	No
4	FWG condenser side cleaning	AU	UP	OV	SM	No
5	Cleaning of Fuel oil filters	MS	PM	RO	SM	No
7	Overhaul of Main air compressor & compressor valve	AU	UP	OV	SM	No
10	Sewage vacuum pump mechanical seal replacement	MS	UP	OV	SM	No
11	Control air drier filter replacement	MS	UP	OV	SM	No

12	Aux Boiler gauge glass overhaul	AU	UP	OV	SM	No
13	Aux boiler main burner and swirler cleaning	AU	UP	OV	SM	No
15	Boiler water circulating pump overhaul	MS	UP	OV	SM	No
17	IG Scrubber inspection and maintenance	MS	PM	RO	SM	No
20	ME governor lubrication	MS	PM	RO	SM	No



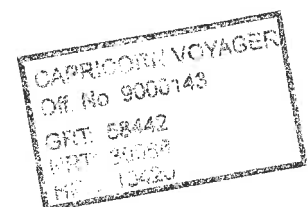
Engine Room Ventilation

Nadeep Lamba

Engine Cadet

Date:

Signature: *3/E NLM*



VENTILATION IN ENGINE ROOM

❖ Ventilation In engine room

1. Briefly describe the ventilation arrangement for engine room on your ship. (Number of fans, type, controls, ducting, flaps and deflectors)

Number of fans- 4 fans

#1 Fan for ER vents, ME and purifier room – Non-reversible

#2 Fan for ER vents and GE – Non-reversible

#3 Fan for ER vents, ME and purifier room -Reversible, *SUPPLY FROM ESB*

#4 Fan for ER vents and GE – Reversible

All the ER fans take intake from the fresh air intake room (Port and starboard)

Flaps are fitted on the discharge side and can be operated remotely and locally. In the event of ER fire, the discharge can be closed remotely from foam room. We have an emergency air bottle for this purpose.

2. State the routine maintenance carried out on fans, flaps, and remote controls

Daily Checking

The purpose of maintenance is to prevent possible fault by detecting and eliminating. A daily check of all the ventilation fans is to be carried out.

The flaps are exercised weekly. This is done locally. A person in the ECR switches ON and OFF the fans while the other exercises the vents.

Greasing of the bearings is done for the flaps.

3. State arrangements other than fans, if any, for ER ventilation on your ship.

Skylight is provided in the ER other than fans for ventilation.

4. Describe the ventilation arrangement in steering flats.

Steering flats have their separate inlet and exhaust fans on the poop deck. The fresh air is lead via duct. It has two exhaust ducts. This arrangement is given to isolate the steering room incase of steering gear room fire.

5. Describe the ventilation for fridge machinery spaces, store rooms, and battery room.

Store rooms- No separate ventilation arrangements is provided for store room. It is incorporated in the ER ducting plan.

Battery room-separate ventilation arrangement

6. Briefly describe the arrangements for 'control room' in ER.

Separate portable AC is provided for control room.

7. Describe ventilation arrangement for diesel engine crankcase (main and auxiliary)

Diesel engine- A breather is provided which is connected to the vent mist box. All such breathers join there and are lead to vent mist box.

Main engine – Two vents are lead to the vent mist box where all the lube oil is separated.

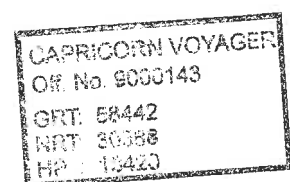
Foam room	<ul style="list-style-type: none"> - Start the ventilation fan before entering - Inform duty engineer / OOW before entering
Emergency fire pump space	<ul style="list-style-type: none"> - Ventilation is common with steering gear room ventilation duct - Inform duty engineer - Ensure standby person is present outside the space
Emergency generator room	<ul style="list-style-type: none"> - Separate ventilation arrangement (motor driven fan for supply and exhaust from a mushroom vent) - Ventilation can be shut off from outside of the room in case of fire
Emergency escape trunk	<ul style="list-style-type: none"> - No separate ventilation arrangement



AIR COMPRESSOR MAINTENANCE

Date: 04 APRIL 2017

Signature: 3/E KH



Maintenance work on Air Compressor

Job: Control air compressor 1000 hour service,- crankcase inspection and oil change

Started no: 04 April 2017

Completed on: 04 April 2017

Routine/Breakdown/Repair: Maximo routine job 1000 hour service

Assisted by: 3/AE

❖ **Details of the work done:**

➤ Running Hours: 35448

➤ Record results of the following condition checks:

- Condition of lubricating oil: Oil renewed Cetus de 100. No metal particles found while draining oil color slightly dirty (~~Blackish~~). *WATER CONTENT 0.02%.*
- Condition of valves: Performance checked. removed both LP and HP valves checked less carbon deposit, checked for leak found in good condition. Box up tighten and apply torque as per instruction manual. ~~All O-rings found in good condition.~~ *LP V/V OVAL KIT USED, CONTAINING 2 O-RINGS & GASKET*
- Check all bolts & nuts for tightness: All nuts and bolts are found in tight condition
- Check the condition of vibration dampers and hose connections
- Hose connections are in good condition/ No oil contact to vibration dampers.
- Condition of air filter: ~~removed cleaned with compress air.~~ *changed with new spare*
- Condition of piping connections (compressor running) no Leaking

Precautions taken:

Mechanical – follow instruction manual to overhaul, keep clear of rotating parts, monitor parameters while testing the compressor

Chemical -use rubber gloves to prevent oil contact while changing oil

Pressure-ensure zero energy by putting lock out and tag out in the compressor

Others- reset system back to normal

Materials used: Crankcase oil Cetus de 100

HP V/V CHANGED WITH NEW ONE, CU WASHERS CHANGED

05 April 2017

AIR COMPRESSOR SERVICE, 1000 HOURS

Running hours: 35448 hrs

1) Condition of lubricating oil: Oil renewed Cetus de 100. No metal particles found while draining oil colour slightly dirty.

Water content of old oil checked, found satisfactory

Visual inspection of bearing done found in good condition, con rod play checked result satisfactory, locking arrangement for con rod bolts intact and still in good condition.

Oil filter cleaned, oil level sight glass cleaned

2. Condition of valves: Performance checked. removed both LP and HP valves checked less carbon deposit, checked for leak found in good condition. Box up tighten and apply torque as per instruction manual.

Old LP valve used with o rings and valve cover gasket changed from LP overhaul kit

In discussion with 1st engineer HP V/V replaced with new spare

3. Check all bolts & nuts for tightness: All nuts and bolts are found in tight condition

4. Check the condition of vibration dampers and hose connections

Hose connections are in good condition/ No oil contact to vibration dampers.

5. Condition of air filter: slightly dirty and damaged, changed with new spare.

6. Condition of piping connections (compressor running) not Leaking

7. Cylinder surface condition as inspected from valve aperture

In clean & good condition, piston rings for HP piston inspected through HP v/v port found intact and free

8. Compressor Running hours since the last valve spring or valve replacement for below valves

Suction valve- LP, Discharge valve- LP, Suction valve- HP, Discharge valve- HP

Note: It is recommended that all springs be replaced after approximately 5000 operating hours, even if they do not appear damaged.

Changed on 26 July 2016

9. Compressor Running hours since the last valve replacement for below valves:

Suction valve- LP, Discharge valve- LP, Suction valve- HP, Discharge valve- HP

Changed on 26 July 2016

10 Performance check done:

a) Time (minutes and seconds) for the Compressor to fill air bottle from 4.5 Bar to 6.5 Bar - 7 min 30 sec

time taken to fill air bottle from 5.5bar to 6.5bar- 3min 45 sec

b) Amp of compressor motor (Loaded at 5.0 bar bottle pressure) - 22 Amps

c) Amp of compressor motor (Loaded at 6.5 bar bottle pressure) - 24 Amps

d) L.P. Gauge reading (Loaded 5.0 Bar bottle press) 3.7 bar

e) L.P. Gauge reading (Loaded 6.5 Bar bottle press) 4.0 bar

f) H.P. Gauge reading (Loaded 5.0 Bar bottle press) :5.6 bar

g) H.P. Gauge reading (Loaded 6.5 Bar bottle press) 6.7 bar

h) Oil Pressure Gauge Reading (Test Start) 1.7bar

i) Oil Pressure Gauge Reading (Test Finish) 1.7 bar

j)Cooling Water Temperature reading(Test Start) 34 deg C

k)Cooling Water Temperature reading(Test Finish) 37 deg C

Delivery Air Temperature 46 deg C

Cooling Water pressure-. 1.6 bar

Spares used :-


Maximo no	Part no	description	ROB	Used	Maximo ROB
556223	3913	HP Cu RING	12	1	12
551171	3712	AIR FILTER	7	1	5

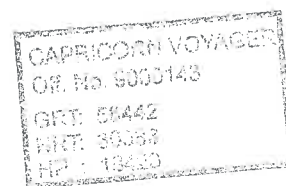
556220	4027	GASKET HP	1	1	1
315785	3032MK	V/V KIT LP	0	1	0
551163	3033	V/V HP	1	1	1
556222	3933	Cu GASKET 1/8	4	1	5

MAINTENANCE RESPONSIBILITY

Rank	Machinery Items	Responsibilities
Electro-technical Officer	<ul style="list-style-type: none"> • ICCP • Chloropac (MGPS) • Batteries • Lighting • Engine Room & Accommodation fans • Switchboard and starters • Galley & Laundry Equipments • Elevator • Fire Alarm System • Alarm & Monitoring System • Oil Mist Detector • UV Sterilizer • Navigational Equipments 	Responsible for maintaining the electrical system on board in order.
Third Engineer	<ul style="list-style-type: none"> • HFO Purifiers • ME LO Purifiers • DG LO Purifiers • Oily Water Separator • Bilge & Sludge System • HFO Filters including Backwash filter • Main Air Compressors • GS & Control Air compressors • F.W. Hydrophore & Rehardening Filter • Sewage Plant & Vacuum toilet system • Fresh Water Generator 	Responsible for the proper functioning of various auxiliaries under his machinery list. Also in charge of the Oil Record Book-Part 1, Chemical inventory, oil and grease inventory.
Second Engineer	<ul style="list-style-type: none"> • Main Engine Fuel Pump and Fuel Injectors • Auxiliary Engines including Emergency Generator Engine • Inert Gas System 	Mainly responsible for auxiliary engines, auxiliary boilers and IG system. Takes weekly inspection of lifeboat and rescue boat.

	<ul style="list-style-type: none"> • Auxiliary Boiler • Life Boat & Rescue Boat 	
First Engineer	<ul style="list-style-type: none"> • Main Engine except Fuel pump and Fuel Injectors • Pumps and pumping system • Steering Gear • A/C & Reefer Compressors and plant • Incinerator 	The first engineer is in charge of the engine room. Supervises the work of other engineers under him.
Chief Engineer		The chief engineer is responsible for the safe operation of all machinery aboard the vessel. The Chief Engineer has custody of engine department records and is responsible for keeping records, machinery and equipment history up to date. The CE is also responsible for the development of cadets and officers.


 CHARLES GAJERE
 01 APRIL 2017





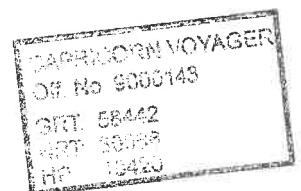
Air Conditioning Unit

Nadeep Lamba

Engine Cadet

Date:

Signature: *3/E KL*



AIR CONDITIONING PLANT

- ❖ Make a list of items you would check as a watch keeper to ascertain that the AC system is functioning properly.

- **Parameters to be checked are-**
 - Suction pressure of compressor.
 - Discharge pressure of compressor.
 - Oil pressure of compressor.
 - Oil level in the sump
 - Refrigerant level in receiver.
 - Cooling water Inlet/outlet pressure.
 - Any abnormal noise.
 - Condition of belt
 - Amperes and load on a compressor.

Air Conditioning Unit

- Manufacturer: Hi-Press Korea
- No. of sets: 2

➤ **Compressor**

- Manufacturer: York
- No. of sets: 2
- Type: 8 cylinder belt-driven at 1,670 rpm
- Refrigerant: R-404a

➤ **Condenser**

- Model: CRKC 501917
- Type: Horizontal shell and tube
- No. of sets: **2**
- Cooling water: Fresh water, 59.5m³/h

➤ **Accommodation Air Handling Units**

- Manufacturer: Hi-Press Korea
- No. of sets: 2 (each 50% capacity)
- Type: HPB-07
- Capacity: Cooling, 204kW
- Heating, 164kW

➤ **List of items to be checked as a watch keeper to ascertain that the A/C system is functioning properly**

- Suction pressure of compressor.
- Discharge pressure of compressor.
- Oil pressure of compressor.
- Oil level in the sump
- Refrigerant level in receiver.
- Cooling water Inlet/outlet pressure.
- Any abnormal noise.
- Condition of belt
- Any refrigerant leak
- Amperes on a compressor.
- Load on compressor

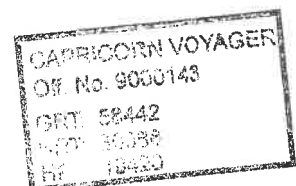


Capricorn Voyager

**BASIC MAINTENANCE
OVERHAULING A GLOBE VALVE**

Date :

Signature : *3/E KAL*



Globe Valve Overhauling

Job Done: Globe valve overhaul

Location: Engine Room Workshop

At anchorage

Time: Day

Weather conditions: fair

Outside temperature: Moderate

Nature of task: Routine task

Items involved: Medium

1. Describe the difficulties faced in carrying out the job:

No difficulties were faced in carrying out the job as such except a little bit of heat exhaustion due to high temperature.

2. What were the risks involved in carrying out the job and precautions taken?

- The primary hazards for the job were:
- Mechanical: equipment damage
- Chemical: lapping paste contact
- Pressure: air pressure
- The control measures taken for the same were:
- Mechanical: use correct tools, proper inspection
- Chemical: use appropriate gloves
- Pressure: use face shield , whip check, goggles

3. What were the problems involved in testing and trying out?

There were scratches observed on the valve seat. For removing it, we had to lapping. No problems were involved in testing and finally trying out the valve.

4. Give your opinion, with reasons, on the overall efficiency of the job done?

Overall, the job was performed in the right way taking care of the safety precautions with respect to the hazards that had been discussed prior to starting the job. Proper tools were used to overhaul the globe valve. The parts were properly secured so that they could be easily reassembled. Lapping was done in the proper technique using the lapping tool and the lapping pastes. First we used the coarse paste for lapping and after some time we used the fine paste. After lapping visual inspection was done and the parts were cleaned using diesel oil and air hose. Proper PPE was donned before using the air hose. Finally, the parts were reassembled.



Working on Deck Machinery

Nadeep Lamba

Engine Cadet

Date: 05/05/17

Signature:

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke.

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 88442
NRT: 30898
HP : 18430

Working on Deck

Job : Change of crane hydraulic oil tank gauge glass

Reason : Found leaking

Started on : 27 April 2017

Assisted by : 1/E Zoran

Hazards :

Chemical: Oil contact

Gravity : Slip and fall

Additional control measures :

Chemical : Use rubber gloves, good housekeeping

Gravity : Stand by person

OPS Procedures required :

SAF-02-01 – Managing safe work

SAF-02-02 – Permit to work

SAF-02-08 - Working at height

SAF-02-05 - Enclosed space entry

Rescue plan

Control procedures:

LOTO is required

Personal Fall Arrest

Enclosed space entry permit

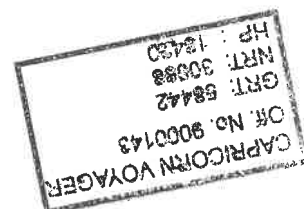


Description :

As on the port side crane hydraulic tank gauge glass was found leaking because of over tightening of bolts and rusty surface. So it needs to be replaced with a new one.

A new gauge glass was put on the hydraulic tank of crane and the the job accomplished successfully.

Date of completion:



Enclosed Space Entry Permit OPS-66

Permit No. CPV 170427 ZG02*

Permit not to exceed 12 hours

This permit is valid from:

Date 22 APR 12 1 13⁰⁰ Hrs. To: Date 22 APR 12 1 17⁰⁰ Hrs.

(Validity time to be entered by VMT Member after permit has been approved)

Location of space: Port hose handling crane

Job description: Level gas leak

Section 1: Pre-entry Preparation

All of the following in Section 1 are required to be completed prior to approval for entry.

The space has been isolated to prevent flooding (gas or liquid) or entrapment hazards. A Lockout/Tagout Work Permit (OPS-85) has been completed.

Rescue Plan is reviewed and understood by work team. Rescue equipment has been checked and is ready and available.

A Standby Person is assigned. Name: LANBA Rank: ETC

The enclosed space entry card system is used to track personnel in and out of the space at the worksite.

Communications procedures have been established. Communicate every 30 minutes with the Standby Person as agreed.

The space has been cleaned and ventilated safe for initial entry.

Complete the following information when gas freeing/ventilating enclosed space:

- Method of ventilation (mechanical or natural): NATURAL
- Number of blowers or space openings: 4/A
- Blower ratings: N/A
- Volume of space: 2 m³
- Estimated time to sufficiently ventilate the space based on space size, configuration and effective air movement in the space: 1 hour

Remote atmosphere tests have been taken with multiple-gas detector at the top, middle and bottom of space at each sample location.

Other toxic gas testing required:

Consider atmosphere temperature. If atmosphere temperature in space is above 85°F (29.4°C), then reference *Heat Illness Prevention Guidance* (SAF-03-01).

Respiratory protection required: None Half Mask APR Full Face APR EEBD* SCBA

*EEBD must always be carried by officer making initial inspection.

Additional PPE: SAFETY HARNESS

The OOW has been informed of the entry.

Access/exit is established and unobstructed.

Lighting is adequate and appropriate for safe entry.

SDS for the previous content of the space have been reviewed.

Valves on all pipelines serving the space have been secured to prevent accidental opening.

Enclosed space ventilation was stopped ten (10) minutes prior to gas testing the atmosphere in the space.

Use gas detectors (one per work team inside the space, one for remote testing outside the space).

Entering cargo block space. Complete Section 1A. N/A

Verified that all conditions specified on this permit are in place. Permit Approver can delegate this task (SAF-02-05)

Delegate Name (if applicable): G. J. TIC Rank: 11E Signature: [Signature]

Comments:

Section 1A: Pre-Entry Preparations for Cargo Block Entry

Only applicable for cargo block entry.

IG Mast Riser locked and tagged to prevent accidental release of vapors.

Adjacent and connecting spaces have been tested (in the case of inerted spaces these should be left inert but depressurized).

Do adjacent or connecting spaces contain hydrocarbon or toxic substances? Yes No

If yes, monitor IG pressure, PV valves, and enclosed space ventilation. Verify inert gas pressure is at minimum safe level.

Comments:

Section 2: Initial Gas Test Results

Gas detection equipment must be bump tested and/or calibrated as per SAF-04-03.

Multiple-Gas Detector Model: VENTIS MX4
Other Testing Equipment Model:

Serial No.: 131211E-382
Serial No.:

Time	%LEL	%O ₂	CO	H ₂ S	Benzene	Other _____	Gas Tester Initials
<u>13:00</u>	<u>0</u>	<u>20.5</u>	<u>0</u>	<u>0</u>	<u>/</u>	<u>/</u>	<u>EG</u>

Check if continuous gas testing is required.

Required frequency for logging gas test results (if applicable):

Section 3: Approval and Acceptance Section

To be completed after Section 1 & 2 are complete.

I agree the scope of work can be carried out and verified that all conditions specified on this permit are in place.

Permit Approver (VMT Member):

E.T. Young

Signature: [Signature]

Date/Time: 27/4/2017 13:15

I understand and agree that all permit conditions have been met and communicated to the work team.

Responsible Person:

DAVID 21E

Signature:

I understand and agree to my responsibilities.

Work Supervisor:

20RAN 11E

Signature:

[Signature]

I understand and agree to my responsibilities.

Standby Person:

ERIC

Signature:

[Signature]

Complete this section if the Standby Person changes throughout the job.
I understand and agree to my responsibilities.

Standby Person (Replacement):

Signature:

Standby Person (Replacement):

Signature:

Section 4: Permit Revalidation Section

Permit must be revalidated when:

- Jobsite is left unattended for any period of time.
- Standby Person leaves the area without a qualified replacement.
- Gas testing results exceed Safe for Workers limit.
- Equipment failure occurs.
- An incident and/or near miss occurs.
- Entry begins more than 30 minutes after initial gas testing is performed.
- When cargo vapor or inert gas pressure venting is required.
- Changing environment conditions outside the space that could impact personnel inside the space.
- Changes in the work scope.

All requirements and conditions of this Enclosed Space Entry Permit and Job Hazard Analysis have been verified and remain in effect.
Record gas test results on this permit.

Responsible Person Signature:

Date/Time:

Section 5: Post-entry Checks

All equipment verified removed from the tank.

All personnel verified out of tank.

All internal tank hatches have been closed and verified tight. Time secured: 16:30

Comments:

Section 6: Ongoing Work Atmospheric Gas Test Results

Multiple-Gas Detector Model: VENTIS MX4
Other Testing Equipment Model:

Serial No.: 131211E-382
Serial No.:

Time	%LEL	%O ₂	CO	H ₂ S	Benzene	Other _____	Gas Tester Initials
<u>14:00</u>	<u>0</u>	<u>20.5</u>	<u>0</u>	<u>0</u>	<u>/</u>	<u>/</u>	<u>EG</u>
<u>15:00</u>	<u>0</u>	<u>20.5</u>	<u>0</u>	<u>0</u>	<u>/</u>	<u>/</u>	<u>EG</u>

Lockout/Tagout (LOTO) Work Permit

OPS-85

No. CPV 170427 ZG02*

STEP 1: Lockout/Tagout Planning (Work Supervisor)

Date: 27 Apr 17

Time: 13:00

Work location, equipment and reason for isolation:

STB hose handling crane level gauge leak

Work Supervisor Name:

1E Zoran Grzetic

Isolation method and location of isolation point. *Note: If more than eight energy isolation devices are required, attach list.*

1. Switch off main breaker f 5.
2. 6.
3. 7.
4. 8.

Explain method for releasing stored energy: Multimeter

Explain method of testing for Zero Energy State: Multimeter

Check box, if unable to fit a lockout device. Explain method of securing isolation:

LOTO Responsible Person (nominated by VMT Member)

Name: _____

Rank: _____

VMT Member Name:

VMT Member Signature: _____

STEP 2: Lockout/Tagout Execution (Work Supervisor, Responsible Person, Contractor)

NOTIFY: Affected personnel/departments of isolation and impacts to operations.

SHUTDOWN: All applicable equipment has been properly shutdown. Energy isolation devices listed in step 1 are in the closed, off or safe position, isolating all hazardous energy.

APPLY LOCK & TAG: Work Supervisor has secured each energy isolation device with a _____ lock & tag.

VERIFY: Responsible Person has applied a **BLACK** lock to each lockout device. (Contractors use _____)

GAS TEST ISOLATION POINTS (if applicable): Required when there is a potential for hazardous material release including flammable/combustible liquids or gas and toxics above permissible exposure limits.

EQUIPMENT PREPARATION (for isolation): Release all stored energy as per plan agreed to by the chief engineer/master.

Note: Be aware that machines could store energy internally such as spring, pressure accumulators, rotating masses, flammable liquids and gasses.

ZERO ENERGY STATE: All equipment/system hazardous energy sources have been tested to ensure Zero Energy State.

STEP 3: LOTO Execution Verification (Work Supervisor, Responsible Person, Contractor)

Steps 1 and 2 have been completed successfully. Work area is safe and ready for work to begin.

Work Supervisor:

Initial: _____ Date: _____ Time: _____

Contractor Name:

Initial: _____ Date: _____ Time: _____

Responsible Person:

Initial: _____ Date: _____ Time: _____

STEP 4: Testing of Equipment/System

Note: If lockout/tagout devices must be temporarily removed, and the machine or equipment energized to test or reposition machine components, follow the following sequence of actions:

- Notify all affected personnel/departments & clear the machine/equipment of tools and materials.
- Remove the lockout/tagout required for testing or positioning.
- On completion of testing or positioning, return energy isolation devices to closed, off or safe position.
- Re-apply lockout devices, padlocks, and tags.
- Release all stored energy, re-test for Zero Energy State, & continue with servicing or maintenance.

STEP 5: Returning Equipment/Systems to Service (Work Supervisor, Responsible Person, Contractor)

Equipment safe to energize.

All locks and tags have been removed.

System(s) returned to desired state with all alarms reset.

If moved to long-term isolation register, explain reason:

Work Supervisor:

Initial: _____ Date: _____ Time: _____

Responsible Person:

Initial: _____ Date: _____ Time: _____

Contractor:

Initial: _____ Date: _____ Time: _____

Remarks:

Notes:
Keep in ECR or OCR/Bridge when in force.
File and maintain in centralized location when done.

*See procedure MGT-02-04 for numbering instructions.

OPS-85 (14 Nov 2016)
Required by SAF-02-02, SAF-02-05,
SAF-02-06, OOS-04-02, OOS-06-01



Capricorn Voyager

WATCHKEEPING PROCEDURE

CAPRICORN VOYAGER
Off No. 8000143
GRT: 58442
NRT: 50385
HP: 15420

3/E *MA*
1/4/17

WATCH KEEPING PROCEDURES

1. List basic steps in taking over an Engine watch while the ship is in port.

- Chief Engineer's standing orders and Instructions related to operation of the ship's systems and machinery.
- Hazards analysis and good working nature must be there.
- Bilges, Ballast tanks, slop tanks, reserve tanks, fresh water tanks, sewage tanks level to be checked.
- Fuel level and other fuel storage facilities to be checked properly.
- Sewage disposal should not be done at ports.
- Adverse conditions resulting from bad contaminated or shallow water resulting in low suction of main cooling water pumps.
- The reports of engine-room ratings relating to their assigned duties.
- Fire – fighting appliances availability.
- Engine-room log to be completed.
- No soot blowing to be done at ports.
- High sea chest is used at ports so that no mud is sucked in.

2. List additional steps in taking over a watch when the ship is at anchorage.

- Main Engine and Generator Engine readiness notice should be kept in mind and it should be prepared within the time given.
- Fresh water generator level to be maintained as it is not running.

- The overboard valves for bilge and sewage should be locked shut.
- No discharge to be done in restricted areas.
- Any deformity in machinery and fire fighting appliances should be rectified and must be functioning before departure.

3. List additional steps in taking over a watch when the ship is at sea.

- Main engine Jacket temperature and expansion tank level to be monitored well.
- Economizer should be soot blown to be done 4 times a day (to prevent sparks in case fire occurs)
- The bilges if being pumped out should be below 15 ppm at all times.
- Emission control regions to be noted as per regulations.

4. List additional precautionary measures to be taken under adverse conditions of :

a. Rough sea:

- Load on Main Engine should be reduced as engine may trip due to overspeeding.
- Steering system to be regularly checked.

b. Restricted Visibility:

- OOW ensure that permanent air or steam pressure is available for sound signals .

c. Coastal and congested seaways:

- Emergency steering and other auxiliary equipment shall be ready for immediate operation.

d. Rough weather while at anchorage:

- Steering equipment should be tested before such condition occurs.
- Readiness of main engine and auxiliary engine to be there.

A. List the conditions in which you must not hand over the watch.

- If the relieving officer have consumed alcohol and is not capable to carry out watchkeeping duties.
- If any important operation is going on then the officer on watch cannot hand it over till the operation ends.

B. List the responsibilities of the Watch Keeping officer towards the persons in the engine room as assistants or engaged in maintenance work.

- The OOW should be informed of all preventive maintenance, damage control or repair operations to be performed during the watch.
- The officer should have a clear understanding of the isolated and by passed machinery being worked on.
- Appropriated log to be filled in engine room log book.
- Repaired machinery to be tested and make it functional.

C. State the roles and responsibilities of the Watch Keeping Officer should there be Chief Engineer/1st Engineer in the engine room during the watch.

- Any matter of concern is to be brought to C/E or 1st engineer immediately.
- Any alarm or any change in speed is to be told to C/E or 1st engineer when present in Engine room.
- The OOW must be guided by Chief Engineer's standing orders and VMT's (Vessel Management Team) night orders.
- The ACCU Inspection Check list is also to be followed for the daily rounds of the engine room..



Emergency Situations

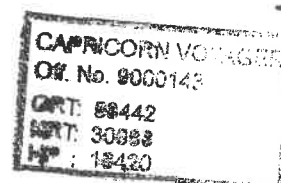
Nadeep Lamba

Engine Cadet

Date: 20/09/17.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over the "Signature:" label. Below the signature, the initials "CTO" are written in black ink.



EMERGENCY SITUATIONS

<u>Situation</u>	<u>Most appropriate Immediate action (First two or three steps only)</u>
1. In case of a massive leak or flooding from a sea water line in the engine room	<ul style="list-style-type: none"> • If possible Isolate the line. • If isolation of valve is not possible locally ,use hydraulic remote operated valve. • Start the bilge pump and pump the water to the bilge holding tank • Keep two generators on line
2. Fire in the generator platform due to leaky fuel pipe	<ul style="list-style-type: none"> • Raise the Fire alarm • Isolate Fuel oil and lube oil supply • Start the stand-by generator after stopping the running generator. • Inform bridge and locate fire • Start the fire pumps
3. Sudden grounding of the ship	<ul style="list-style-type: none"> • Ask bridge about the situation • Sound engineer's call alarm • Take E/R tank soundings • Take crankhaft deflection • Check for flooding and

	monitor parameters
4. Sea water cooling pressure drops suddenly when the ship is passing through shallow waters in fully loaded state	<ul style="list-style-type: none"> • Check for pressure locally • Change over to low sea chest • Blow air through high sea chest to clear any obstruction • open and inspect high sea chest immediately if time permits
5. Scavenge fire is noticed in one of the units of the main engine	<ul style="list-style-type: none"> • Inform bridge and reduce M/E rpm and call C/E and 1/E • Once permission obtained from bridge, stop engine and investigate. • Also If alarm activated at 120 degrees , engine will slow down automatically • If only alarm , monitor temperature • Shut down the scavenge drains
6. Seawater cooling pressure drops suddenly when the ship is passing through river in a very cold climate, and is in ballast condition	<ul style="list-style-type: none"> • Change over to low sea chest • Blow air through the high sea chest and blow steam to clear any ice
7. Bridge requests for immediate stop and crash	<ul style="list-style-type: none"> • Inform C/E • Monitor parameters

astern for M/E	
----------------	--



Self Development

Nadeep Lamba

Engine Cadet

Date: 20/04/17

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.



Q. Who is controlling your development now, and are the circumstances conducive enough for self development ?

As Capricorn Voyager is a cadet ship so CTO (Cadet Training Officer) is there for the development of the cadets.

It is the CTO who manages the duties and the schedule for each cadet so that he/she can inculcate good practical skills and have overall development on the vessel.

He takes care of well being and proper discipline of the cadets like behavior , hygiene , attitude , etiquettes etc.

He helped us everytime when in need and always there for clearing doubts and solving problems with the best examples . He always help us in completing our Training record book and also guide us how to perform tasks and involve us in tasks which he is doing and explains us each and everything regarding the task done.

He also ensures that all cadets are in appropriate PPE and are progressing everyday which helped us in developing safety aspects so that we can do each job without rush and no shortcuts.

The next person who helped us to develop the most onboard is the Chief Engineer who took out his valuable time and focusing on the cadets so that they can progress in right manner and in right direction with the help of interviews , safety meeting and asking questions.

The best part is that he asked us to prepare reports on each and every task which we perform and then to take signature from the authorized persons so that it is ensured that whatever we are doing is correct and we can learn something out of it . Also he also motivate us at each step to progress.

Rather not only that he always ask question but encourage us also to ask question and speak louder and also to note in notepads so that we cannot forget anything and always remain up to date.

The chief Engineer and the CTO both are putting their valuable time with their team of engineer officer and deck officer along with the captain for the development of the cadets.

Communication Skills

- Good – feedback of whatever is being understood , verbal communication
- Satisfactory – Telephonic conversation , clear voice , walkie – talkie communication
- Not Satisfactory – sign language to some extent

My plan of action that I have identified my weakness is to focus more on walkie – talkie communication, to be clear in the communication . I need to be precise and to the point while communicating with any senior officer . Amidst all the noise in the engine room non – verbal communication is the only mode of communication.

Sometimes one must be well aware of the different signs and actions done by the sender in order to have an effective communication.

I need to understand be familiar with the hand signs , facial expressions, body language, gestures.

I have to understand them clearly and if doubt is there they must be cleared and cross checked with the sender.

It is very important that the information is being exchanged properly.

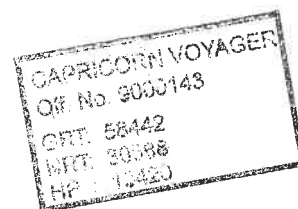
Communication is defined as the transfer of information from sender to receiver with relevant information being understood by the receiver .

According to me if the effectiveness of the communication is checked there will be very little or no chances of misunderstanding.

This can be done by prompt and proper feedback. Most of the accident onboard are a result of misunderstandings / lack of proper communication .

Also the co – workers are from different states and countries so their dialect or accent is different and understanding their accent is most important to support good communication and understand what they mean.

K/A 3/E

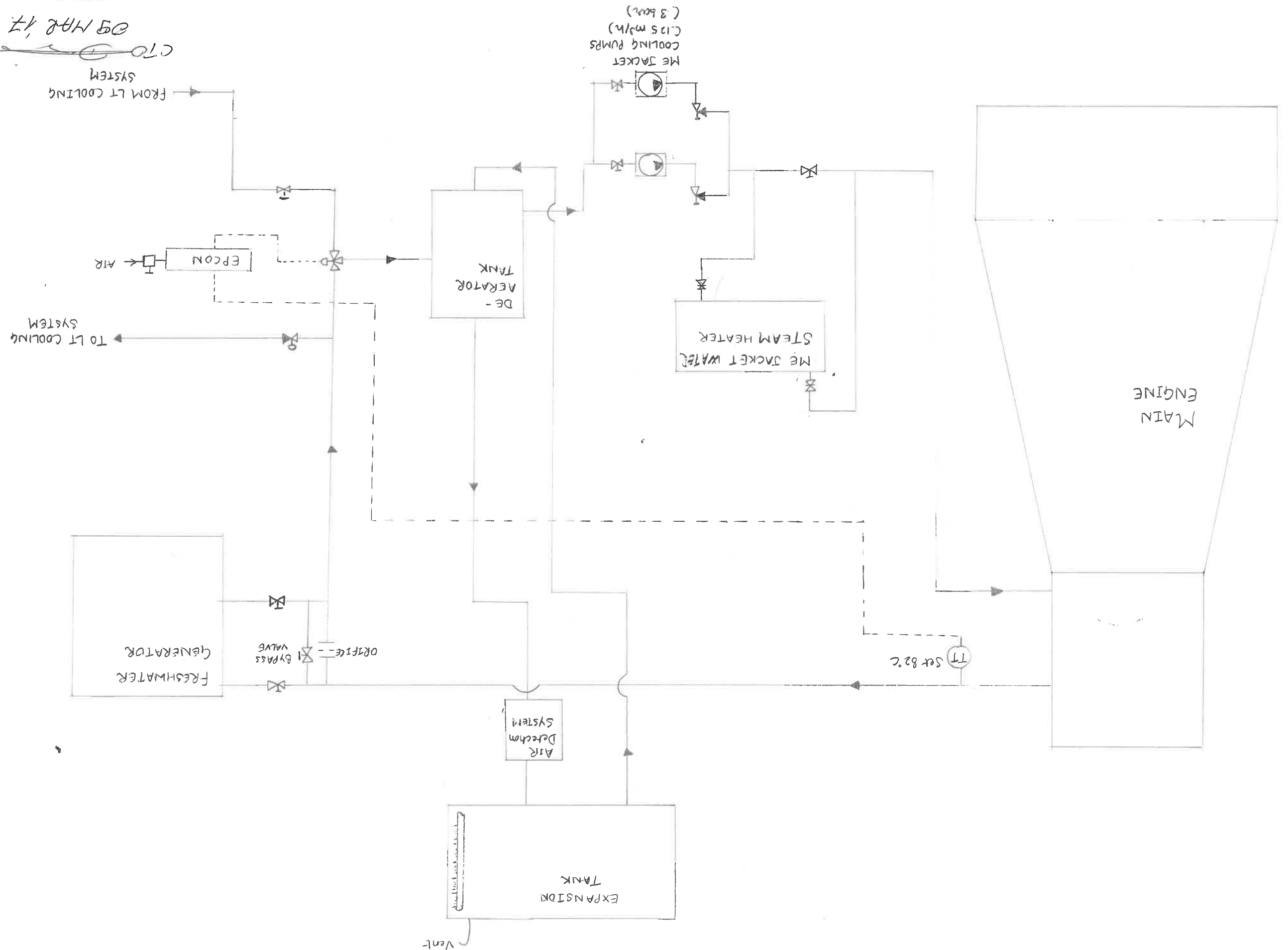


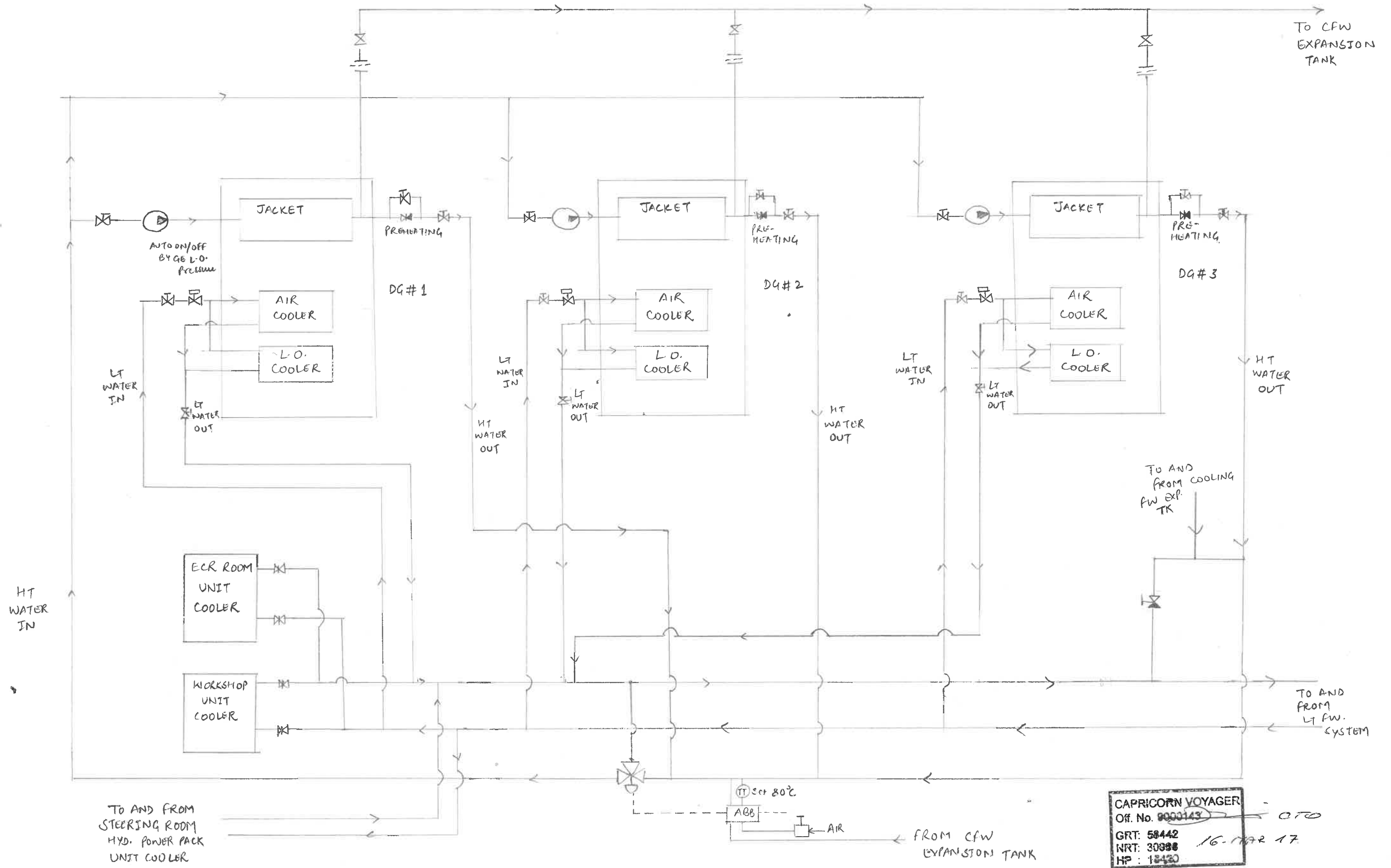
	REPORTS
2	Transfer Fuel oil
3	Pressure test on spare DG fuel injector
4	M/E Emergency Local Start
5	Boiler water Level DP transmitter
6	COPT procedure
7	Scavange space Inspection
8	Bunkering
9	ME performance Test
10	Me Exhaust Valve Overhauling

ME JACKET COOLING SYSTEM

CAPRICORN VOYAGER
 OR. No. 9000143
 GRT: 8442
 NRT: 30998
 HP: 14550

~~C/O~~
 09 MAR '17

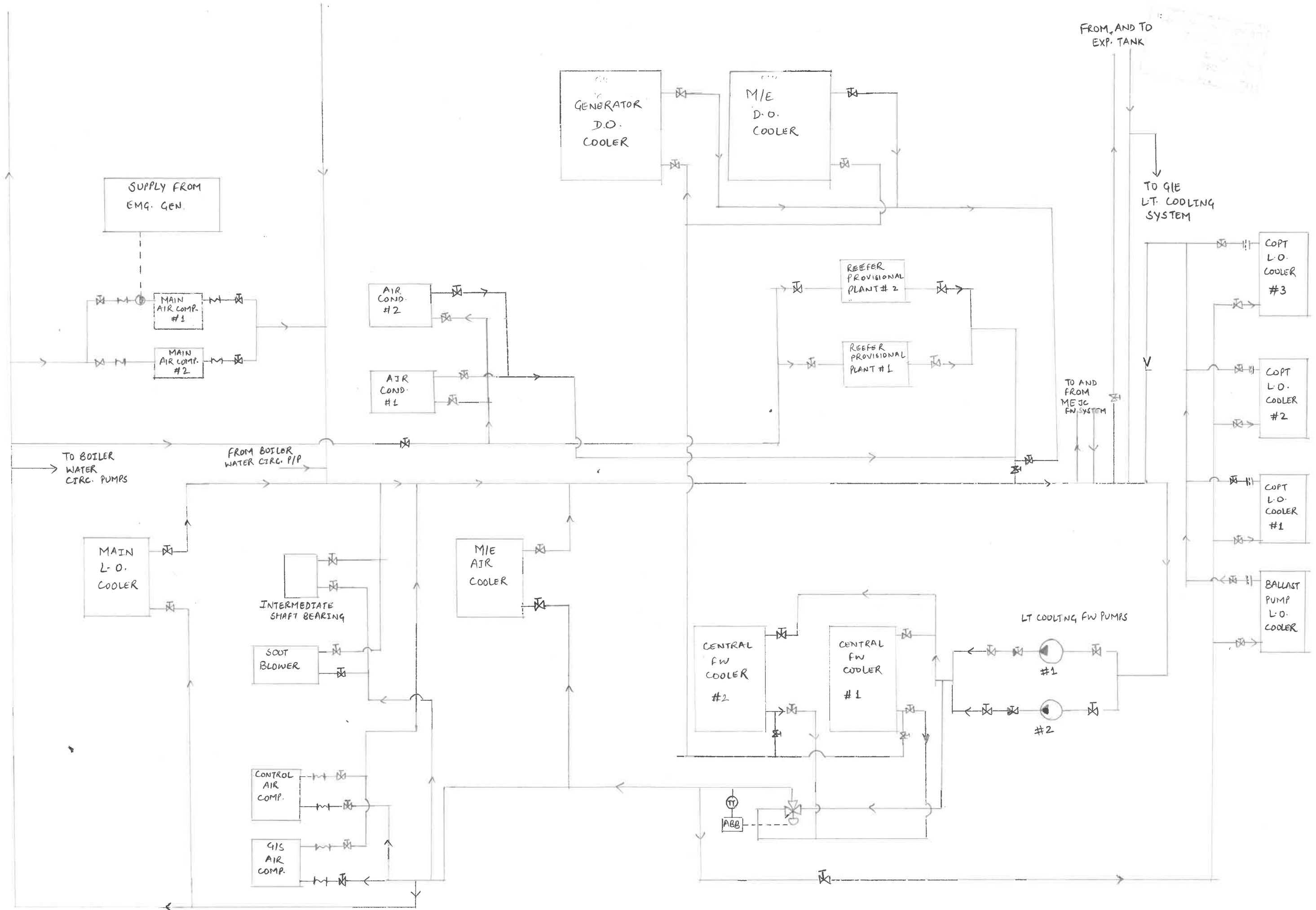


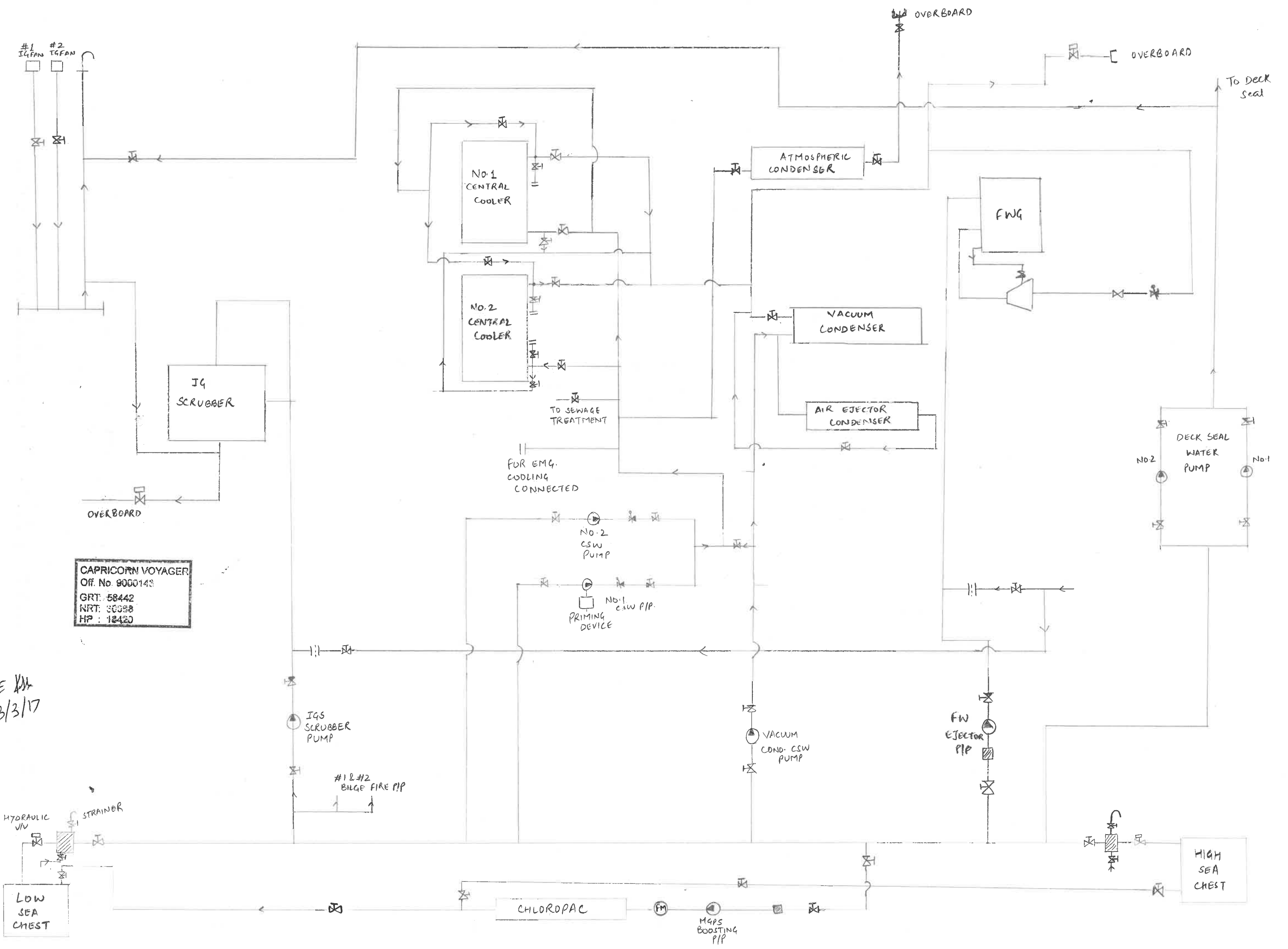


CAPRICORN VOYAGER
 Off. No. 9000143
 GRT: 58442
 NRT: 30986
 HP: 12430
 16-MAR-17

TO GIE LT FW SYSTEM

FROM GIE LT FW SYSTEM





CAPRICORN VOYAGER
 Off. No. 9000143
 GRT: 58442
 NRT: 50088
 HP: 18420

3/E ~~XX~~
 23/3/17

LOW SEA CHEST
 HYDRAULIC JN
 STRAINER

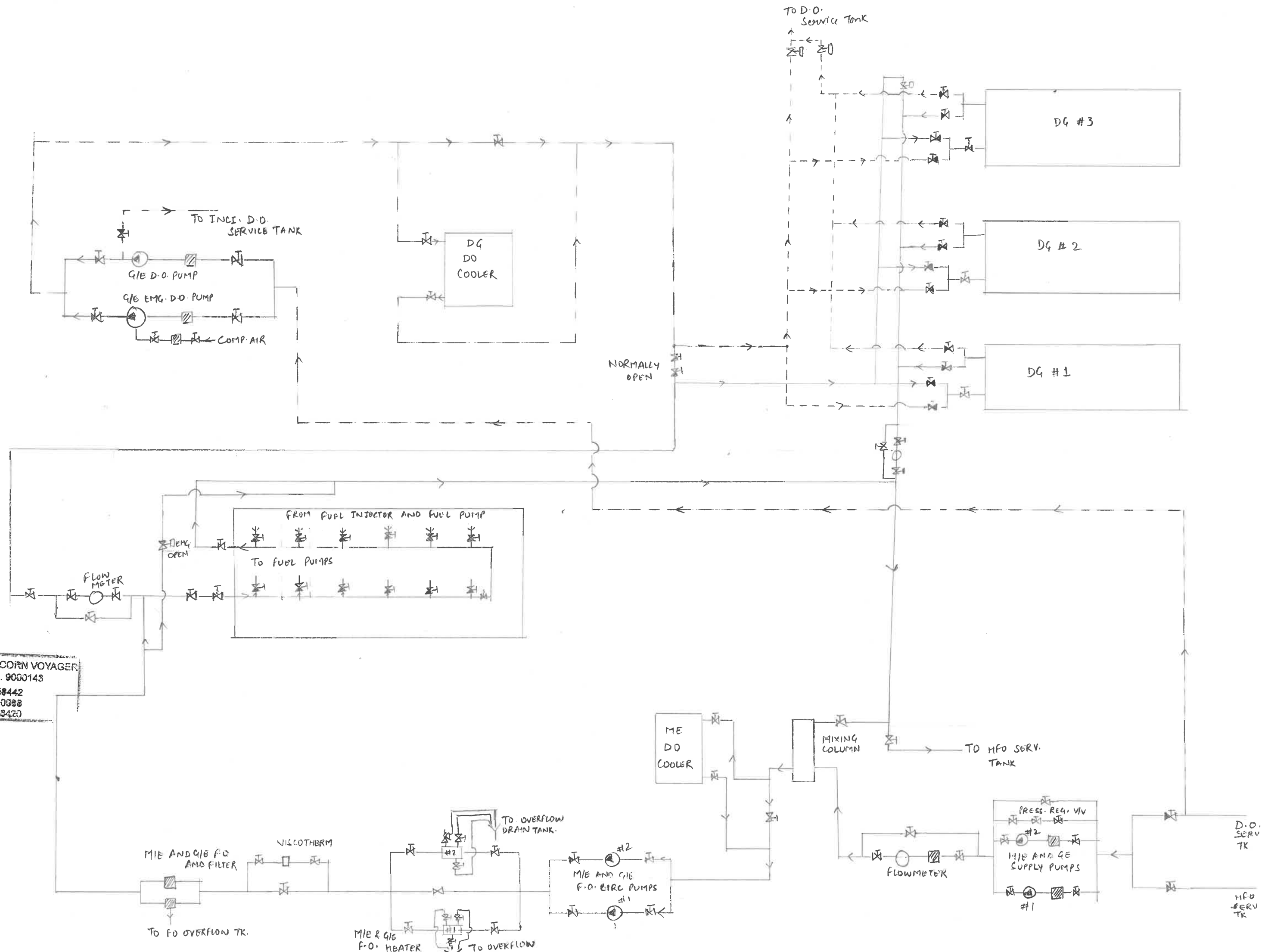
IQS SCRUBBER PUMP
 #1 & #2 BILGE FIRE PIP

CHLOROPAC
 FM
 MOPS BOOSTING PIP

DECK SEAL WATER PUMP
 NO. 2
 NO. 1

HIGH SEA CHEST

To D.O. Service Tank



CAPRICORN VOYAGER
 Off. No. 9000143
 GRT: 58442
 NRT: 30058
 HP: 18420

3/E VLL
 23/3/17

M/E AND G/E F.O. AND FILTER

VISCO THERM

M/E & G/E F.O. HEATER

M/E AND G/E F.O. BIRC PUMPS

M/E D.O. COOLER

FLOWMETER

PRESS. REG. V/V
 #2
 #1
 M/E AND G/E SUPPLY PUMPS

D.O. SERV. TK
 HFO SERV. TK

TO INCI. D.O. SERVICE TANK

G/E D.O. PUMP

G/E EMG. D.O. PUMP

COMP. AIR

D.G. D.O. COOLER

DG #3

DG #2

DG #1

NORMALLY OPEN

FROM FUEL INJECTOR AND FUEL PUMP

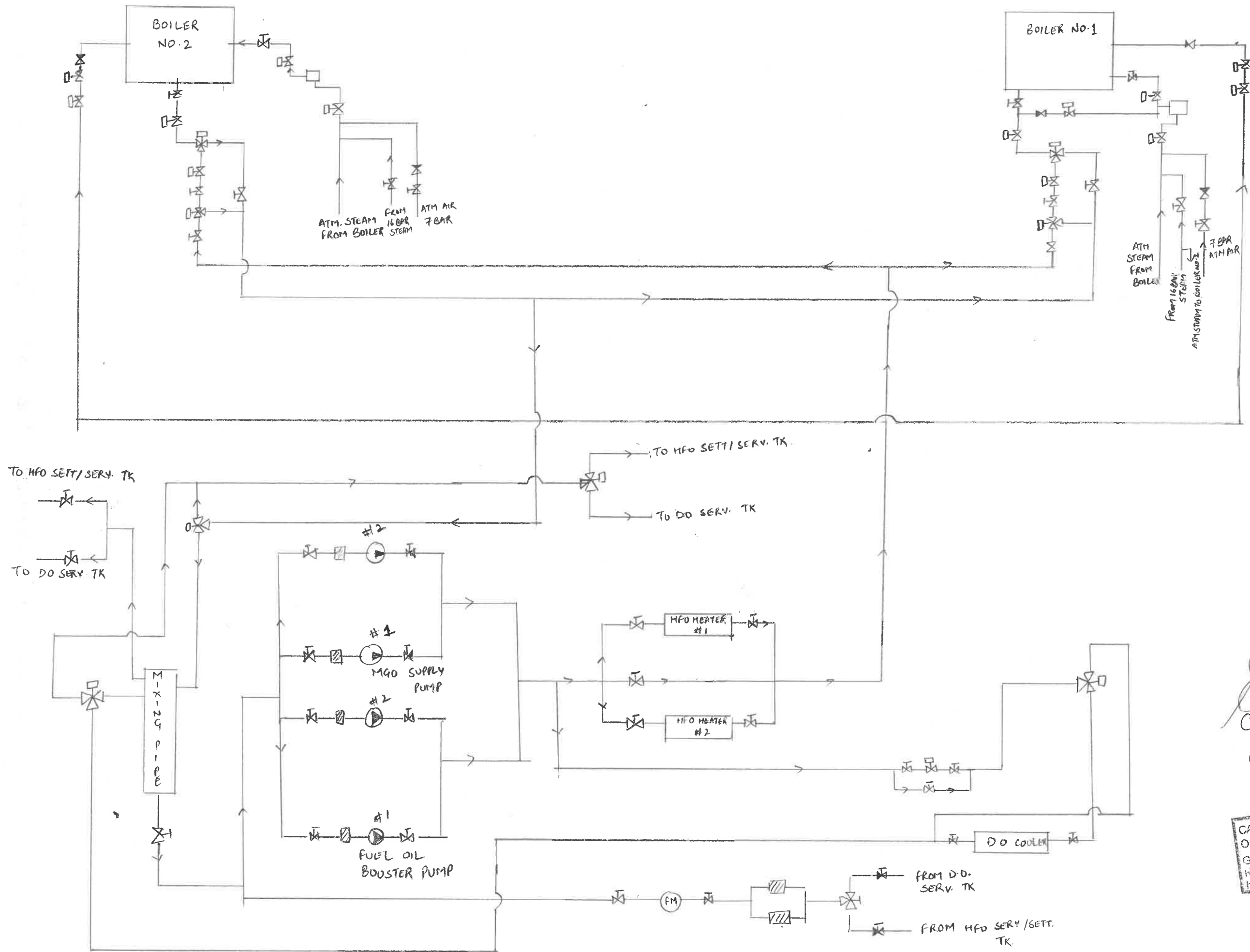
TO FUEL PUMPS

TO HFO SERV. TANK

TO OVERFLOW DRAIN TANK

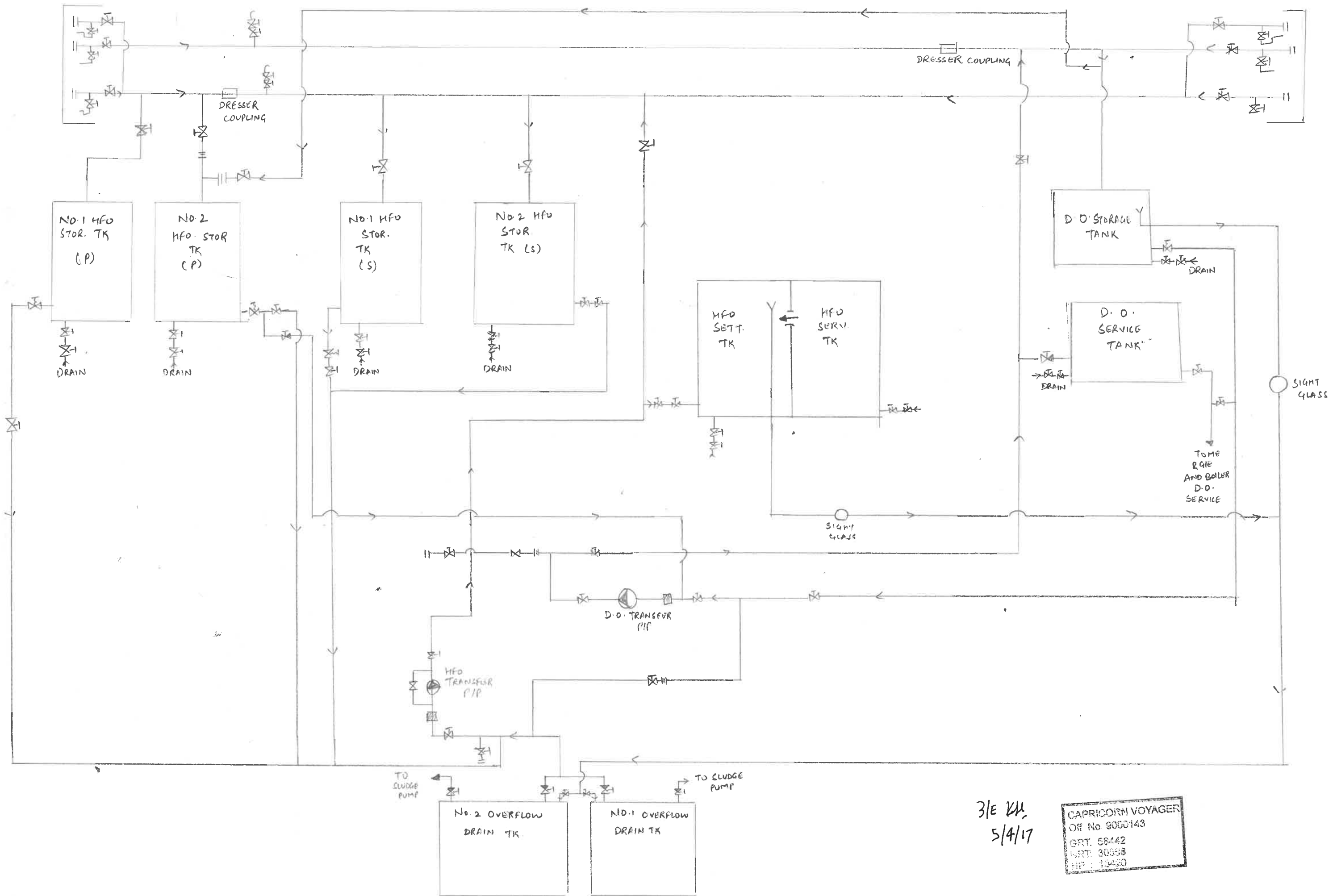
TO FO OVERFLOW TK.

TO OVERFLOW



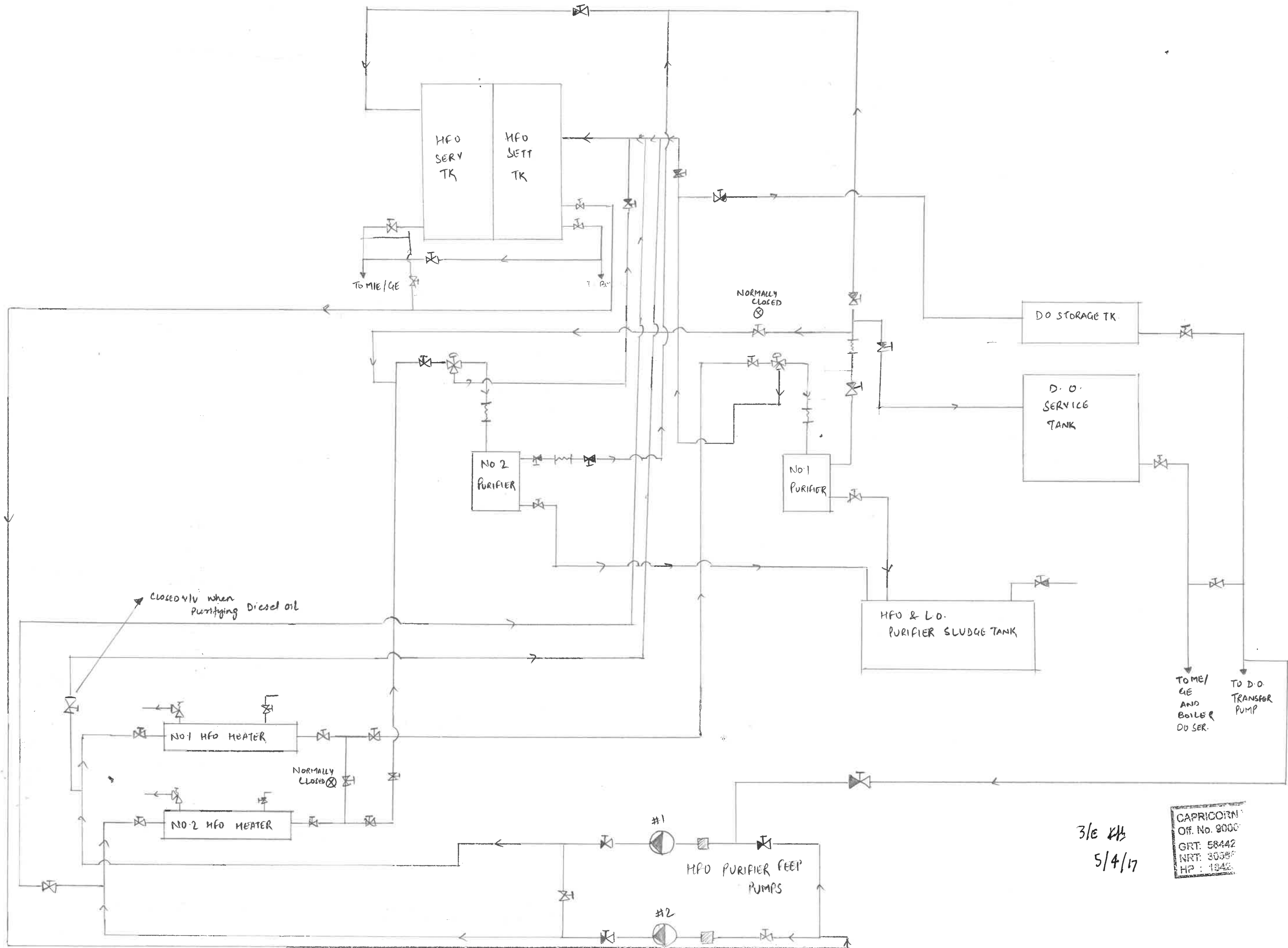
Sajith
Silva
 CHARLIE GUNTER
 06 APR 2017

CAPRICORN VOYAGER
 OFF. No. 9003143
 GRT: 58442
 NRT: 30088
 HP: 10450



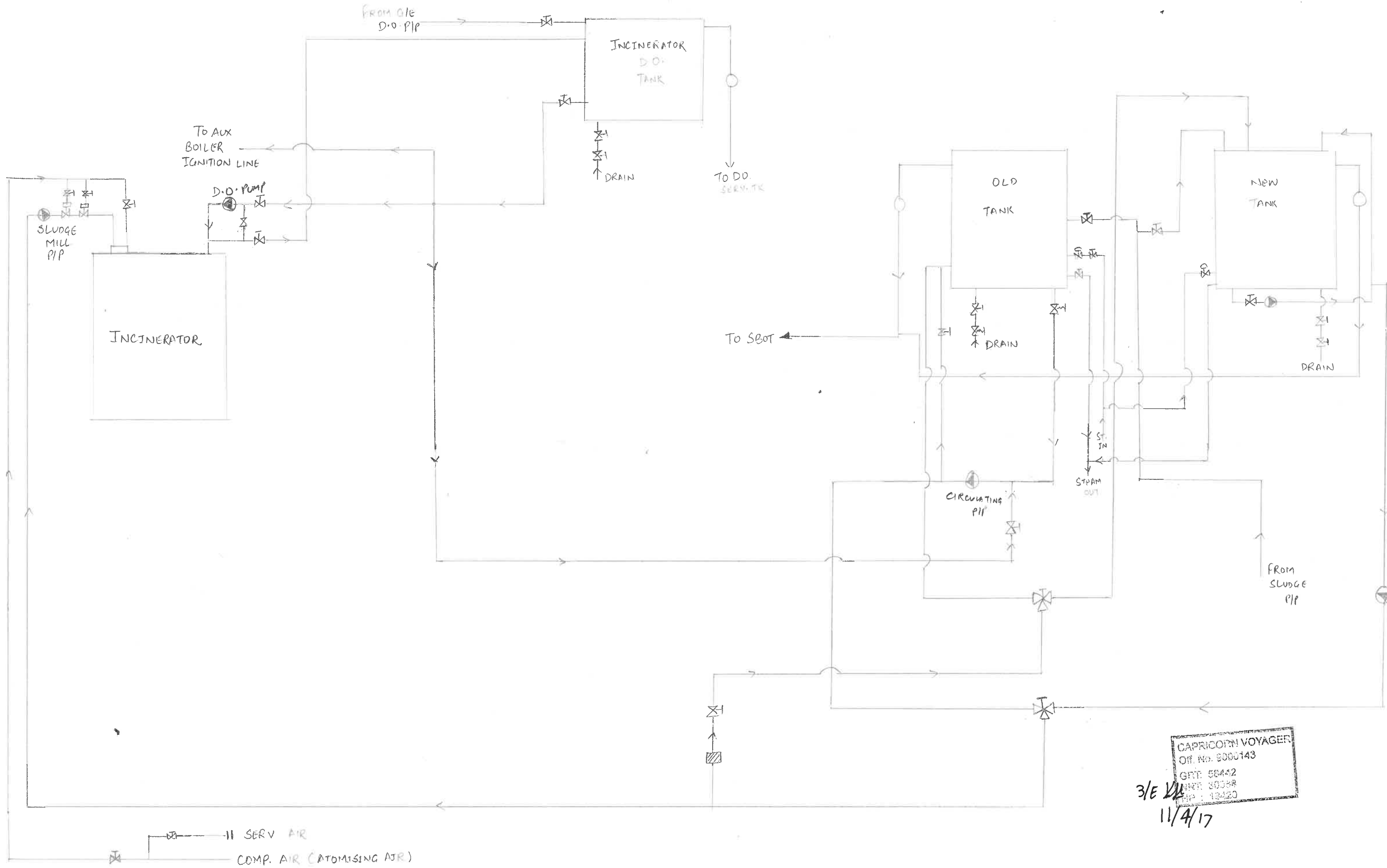
3/E KH,
5/4/17

CAPRICORN VOYAGER
Off No. 9000143
GRT. 58442
NRT. 30058
HP. 15420

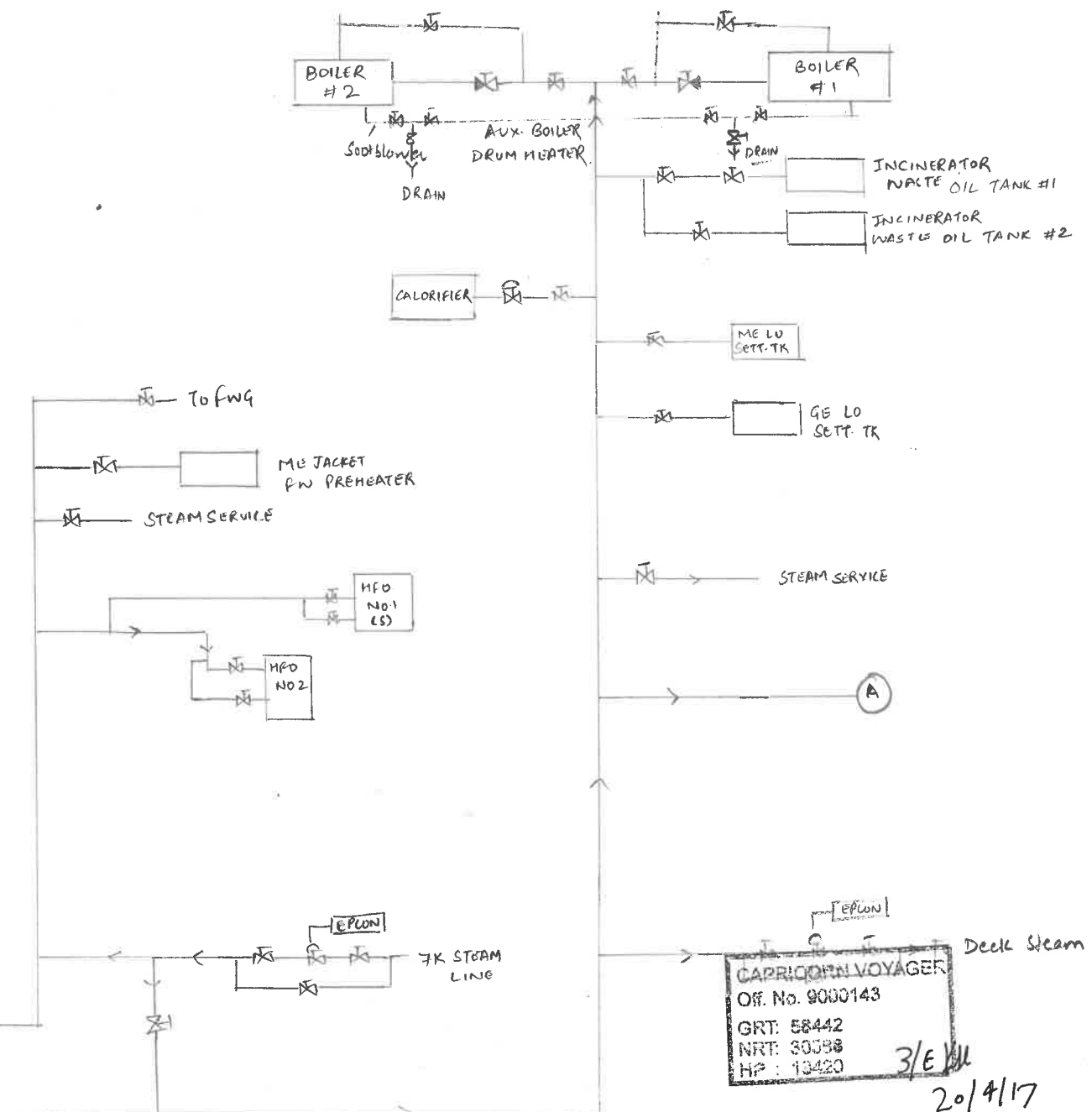
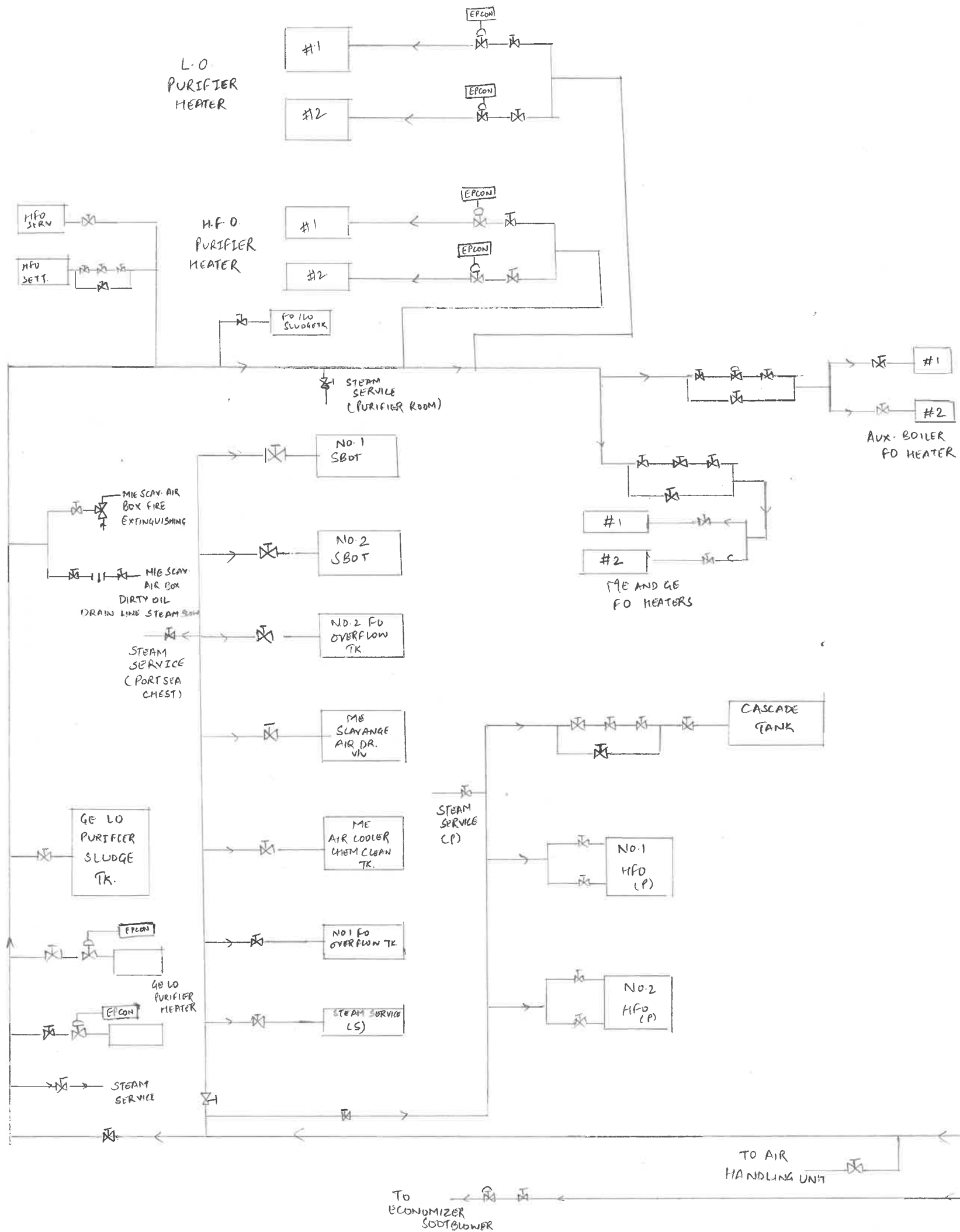


3/E H/S
 5/4/17

CAPRICORN
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 GRT: 58442
 NRT: 3038F
 HP: 1842

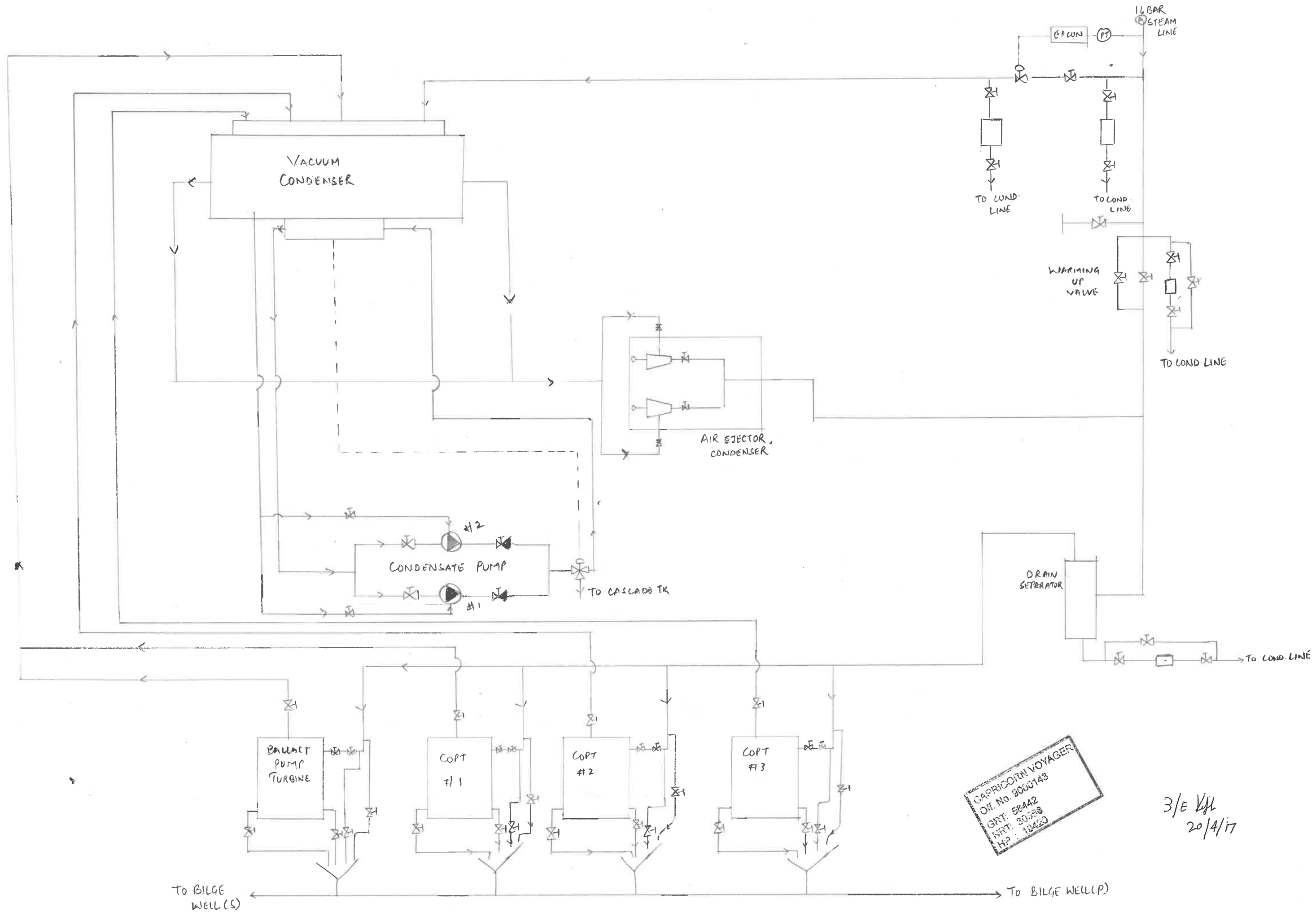


CAPRICORN VOYAGER
 Off. No. 9000143
 GRIT: 58442
 INCH: 30388
 PIP: 13420
 3/E 1/2
 11/4/17



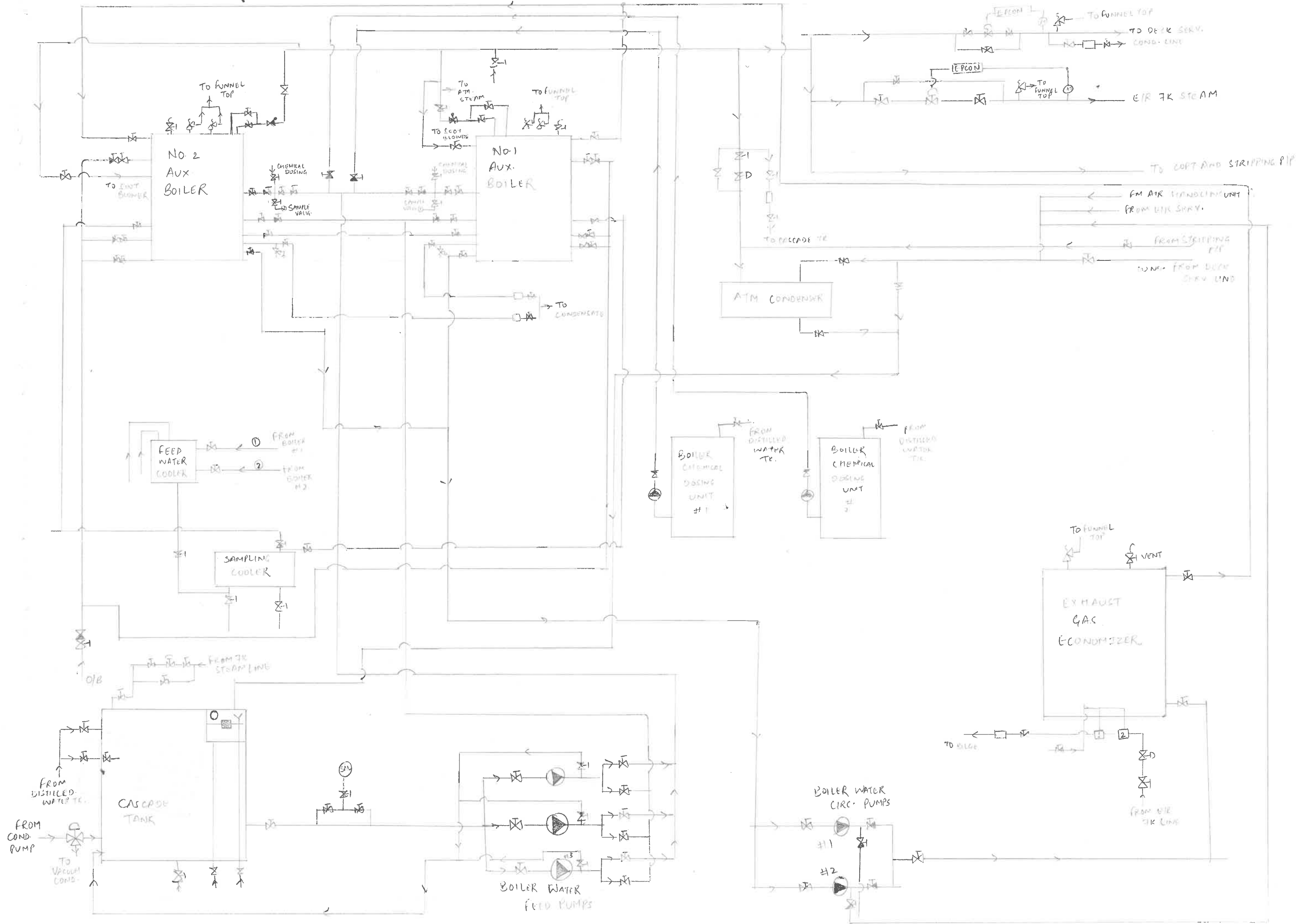
CAPRICORN VOYAGER
 Off. No. 9000143
 GRT: 58442
 NRT: 30098
 HP: 13420

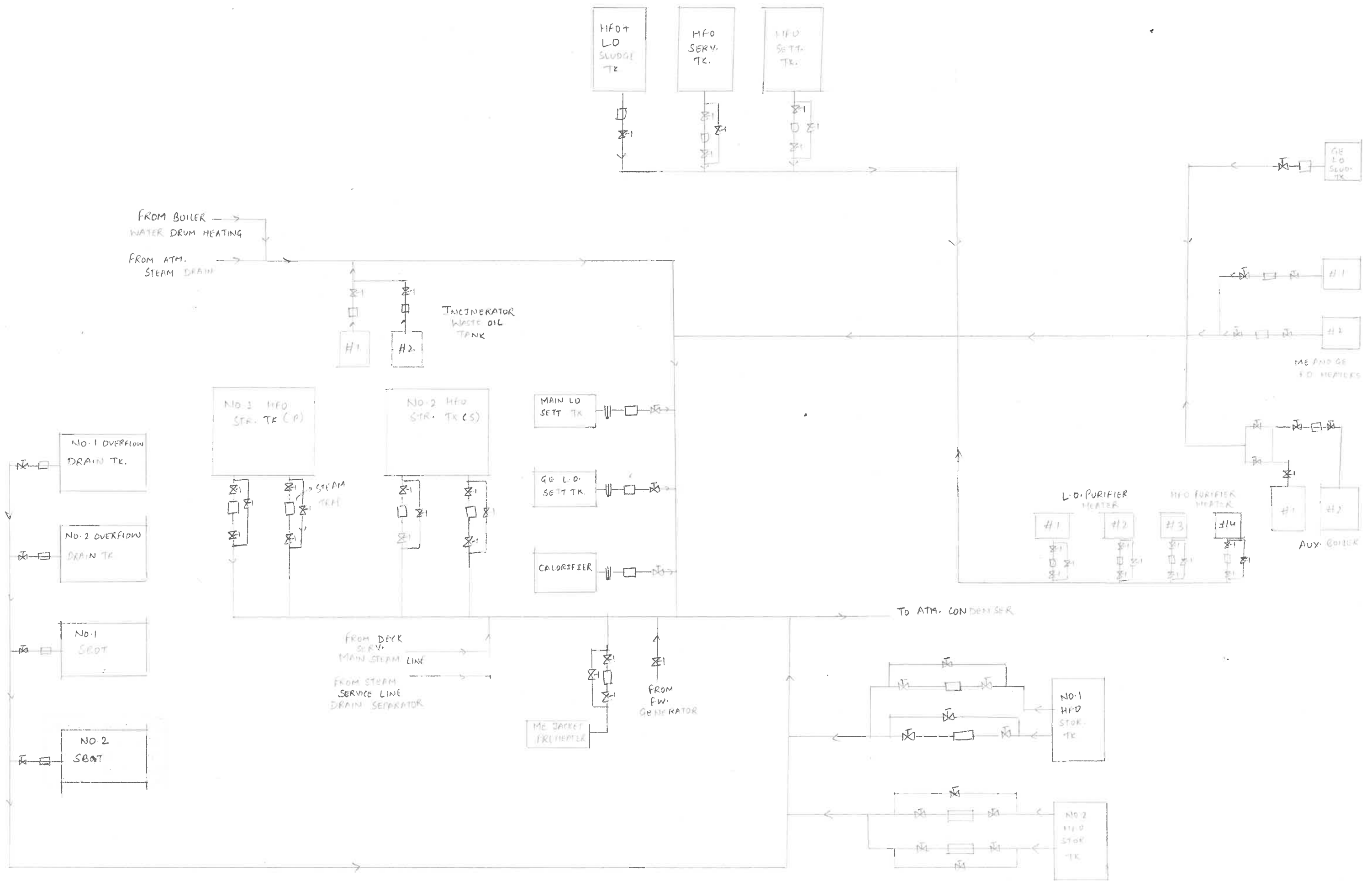
3/E
20/4/17

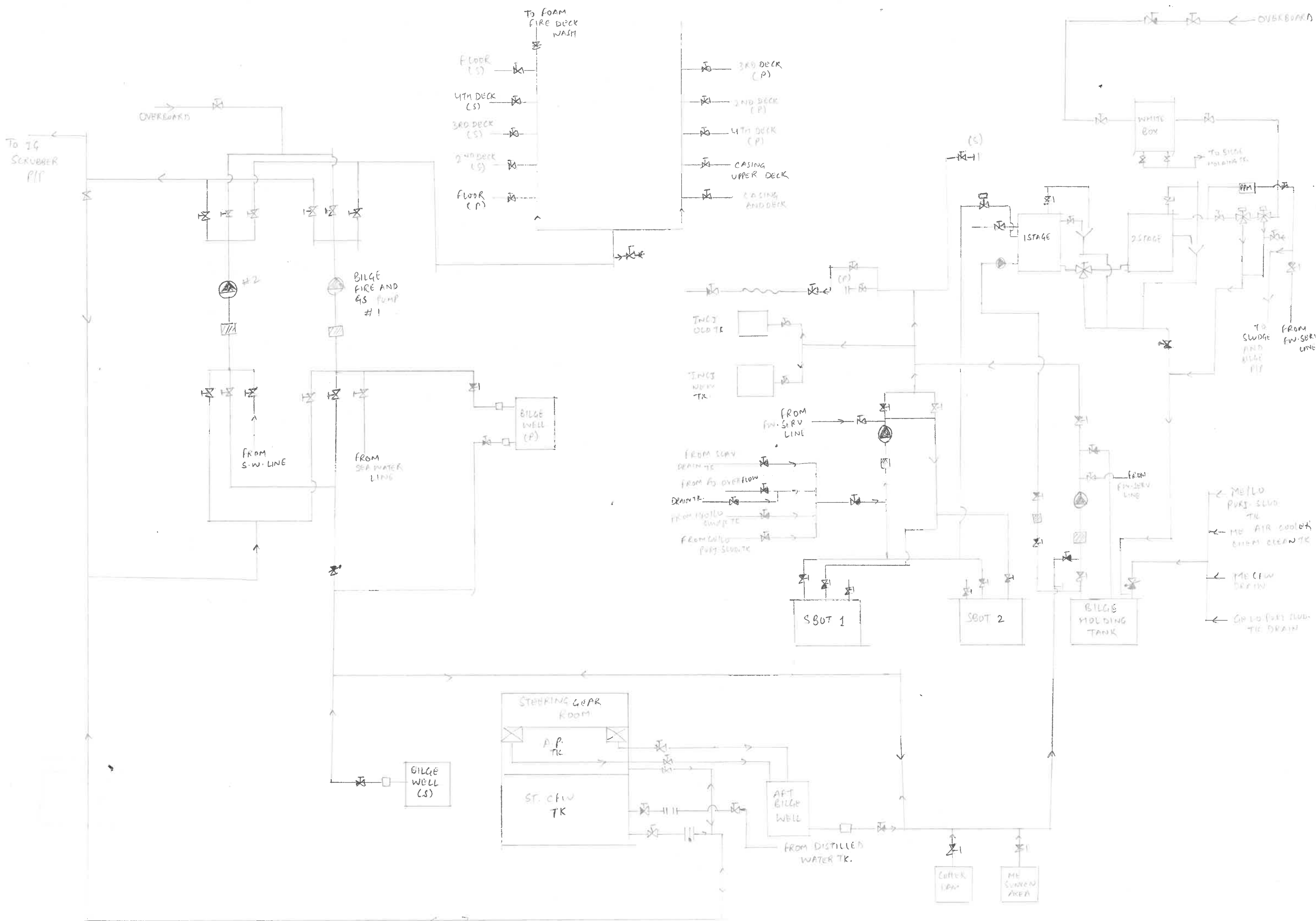


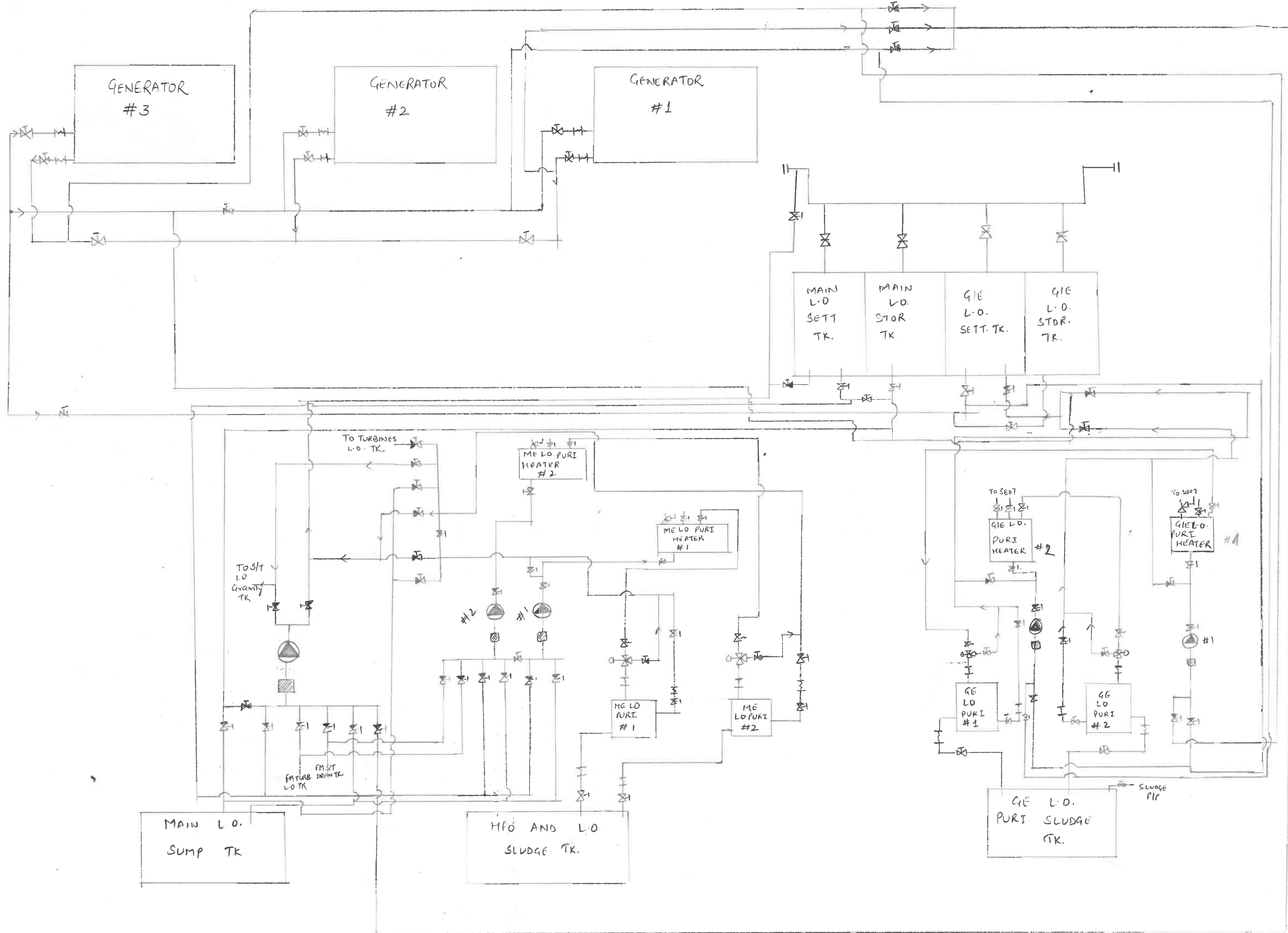
CARRICORN VOYAGER
 Off. No. 9000143
 GRT: 58442
 NET: 30395
 HP: 12420

3/E VHL
 20/4/17

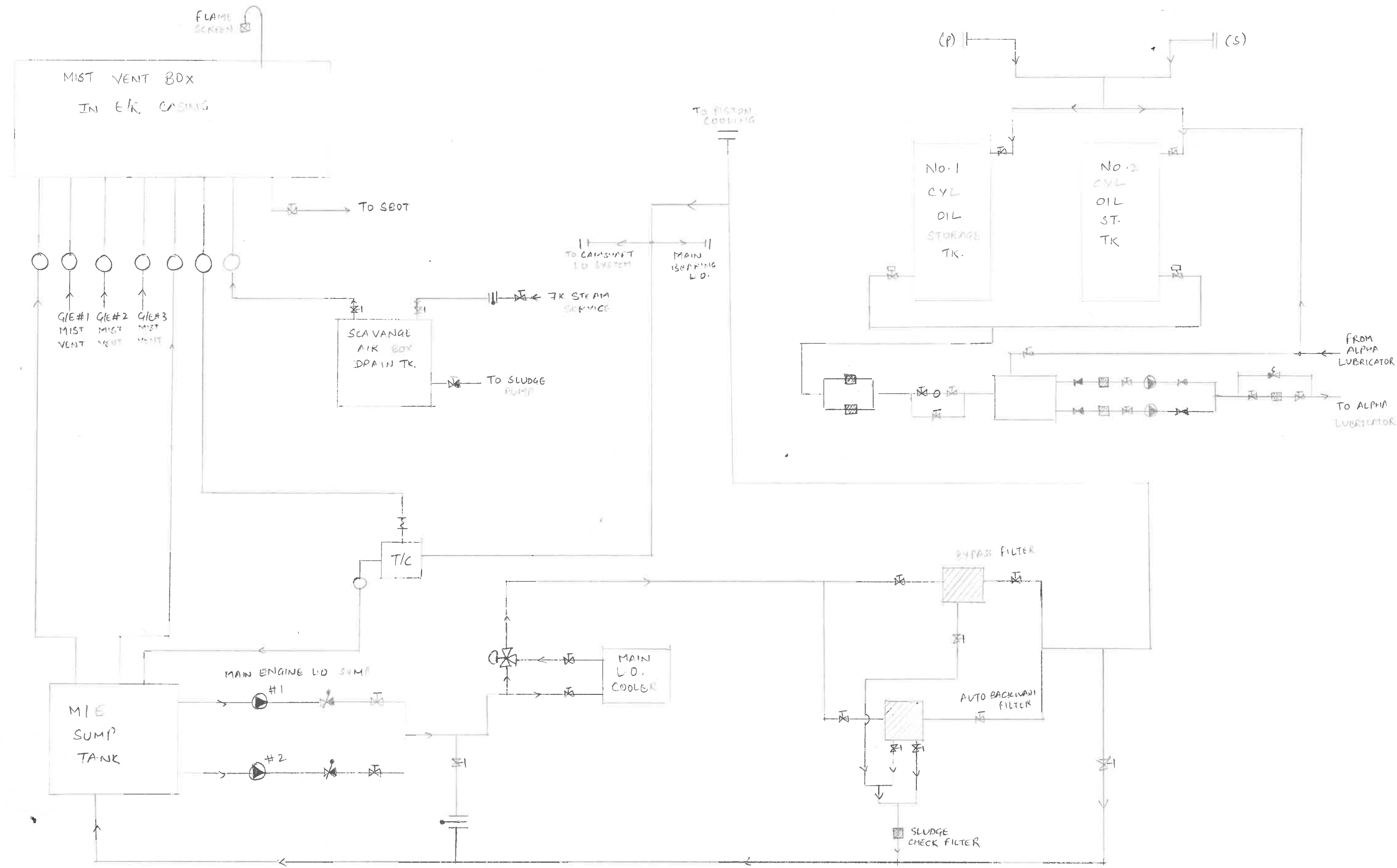


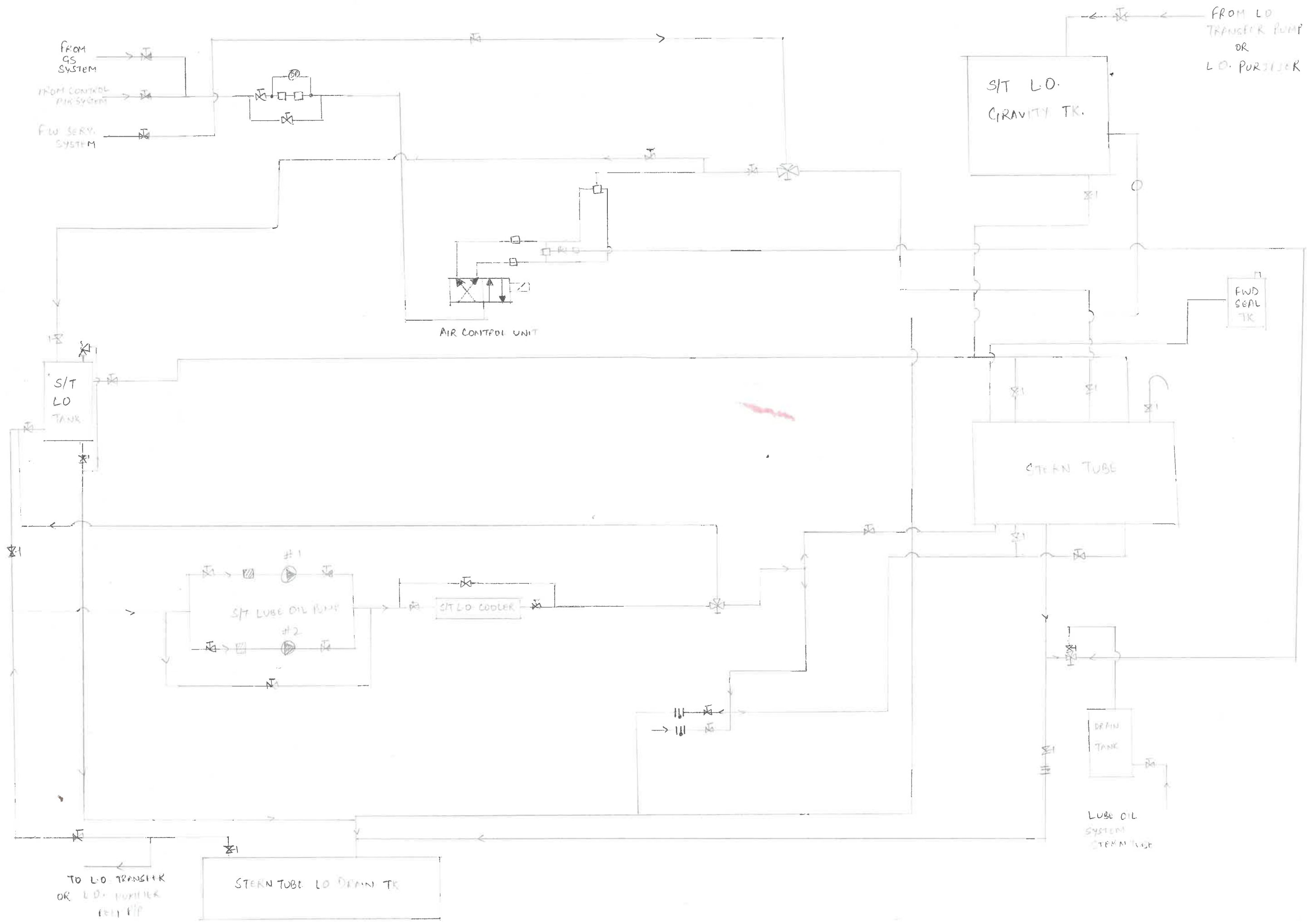


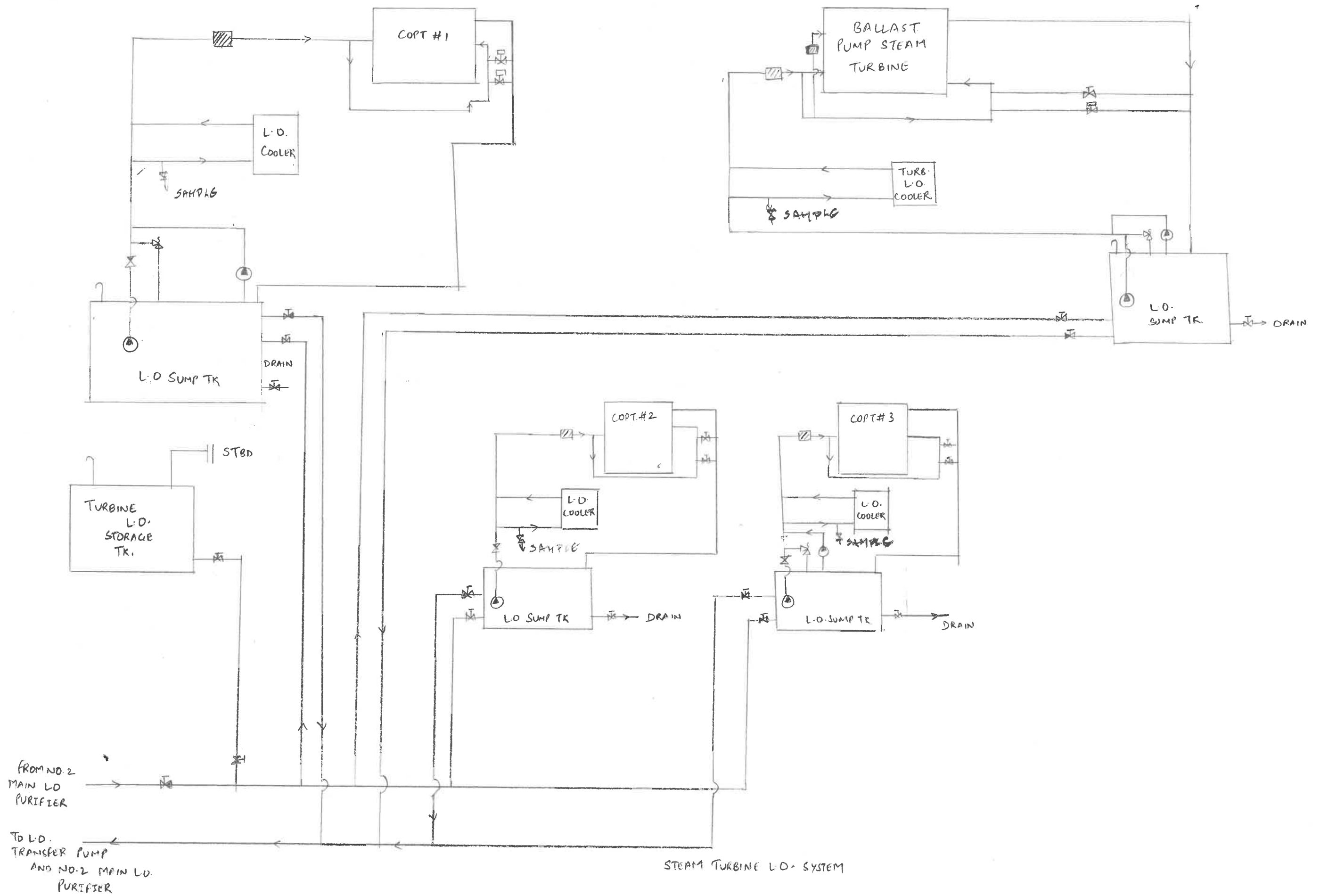




M.E L.O SYSTEM







JOB: Transfer fuel oil from No.2 overflow tank to No.1 Port side bunker tank

Primary hazards:

- Sound : miscommunication
- Mechanical: wrong line up
- Pressure: Oil spill

OPS Procedure: OPS 30, OPS 85, OPS 29

Control Measures:

- Lock out Tag out, OPS 85

Additional control measures:

- Sound : Good communication
- Mechanical: follow manual
- Pressure: oil spill gear in place, scupper plugs

Firstly with the help of CTO we traced the pipeline practically with the help of ship's theoretical manual drawings of manifold and fuel oil transfer line and all valves were identified which were to be closed and to be open. Then we went to engine room and to the deck for visual inspection and tested whether all the valves were appropriate as per requirement.

As the operation started first the recirculation of fuel oil from the No.1 H.F.O bunker tank (port side) valve was carried out so that pump suction pressure should be maintained then H.F.O tank no.1 valve was closed after opening of no.2 F.O overflow tank suction valve.

Following were the steps followed during the operation:

So make sure that the settling tank is full and if it is not then fill the settling tank before starting the transfer of fuel oil.

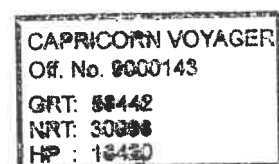
1. First we put the F.O transfer pump from auto mode to manual mode.
2. Closed the H.F.O settling tank valve (OF013F) and applied logout/tag out on the valve following OPS 85
3. Make sure all the outlet valves on the bunker tank are shut
4. Inlet valve need to be shut of all the other bunker tanks except No.1 port H.F.O bunker tank port side, because F.O will be transfer to other bunker tanks.

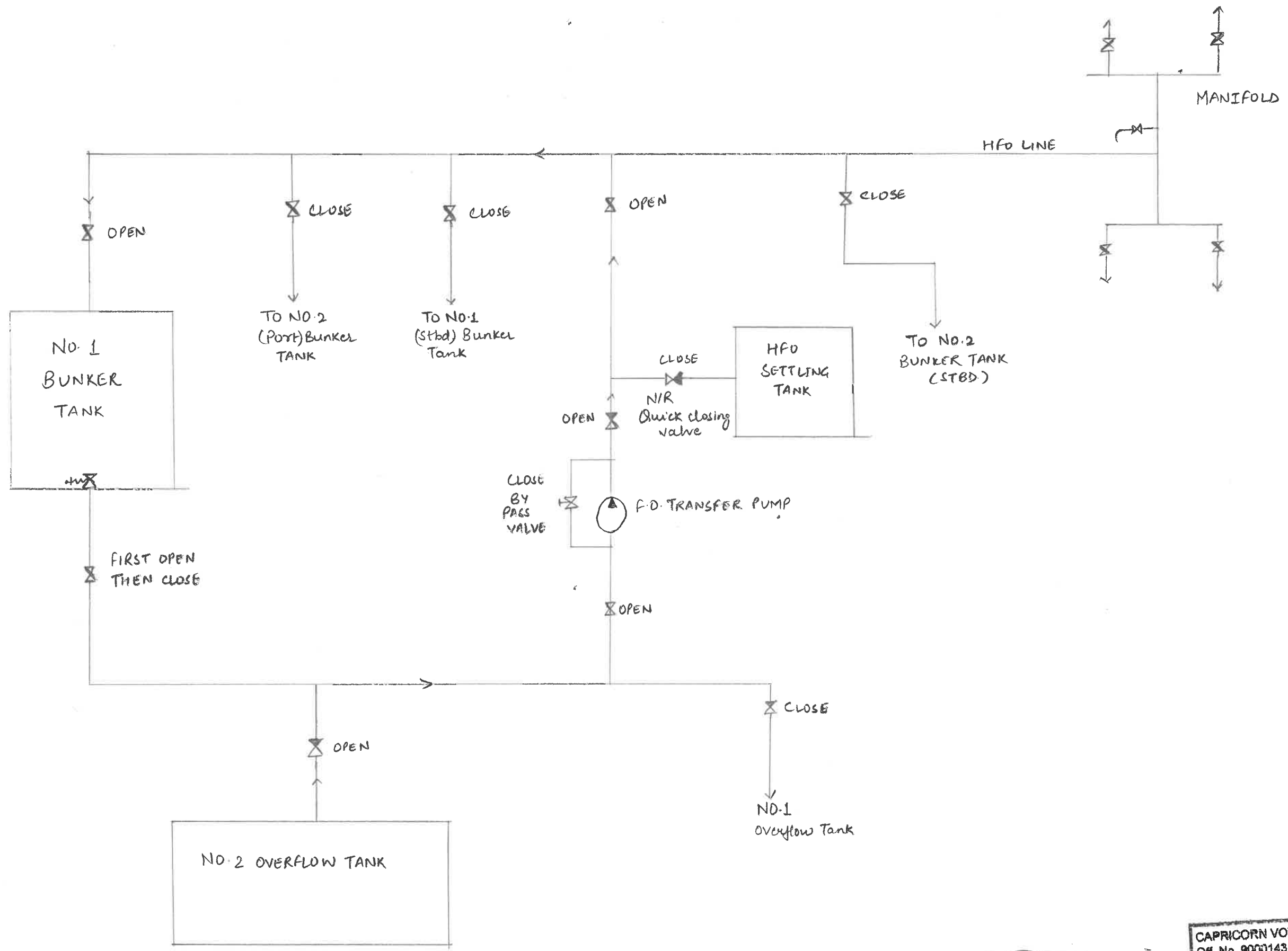
As I was given the responsibility to ensure that no spill should occur on the main deck starboard and port side, from fuel oil line flanges and through the whole fuek oil deck line.

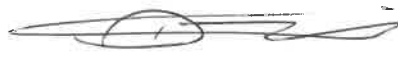
Hence we successfully accomplished the task with proper safety and procedures.

Signature: ^{CTO}

Date: 13 MAR '17.






 15 MAR 17

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30698
HP : 12430

Cargo, Ballast and Bunker Transfer Instructions

OPS-30



Date 09 Mar 17

Vessel CAPRICORN VOYAGER	Voyage	Port At Anchoring
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These instructions are part of the cargo transfer procedures required by 33 CFR, Chapter 1, part 155.720 and 155.750.

Internal Transfer of Bunkers (Transferring of #2 HFO Overflow tank to 1P HFOBanker Storage tank).

Quantity to be transfer: 14m3 from #2 HFO Overflow tank.

HFO transfer pump capacity: 20 m3 /hr X 3.0 kg/cm²

Officer in charge: CTO

Assisted by: CADETS

Communication: Radio (walkie-Talkie)

LINE UP BEFORE STARTING TRANSFER:

Ensure the HFO Settling tank is sufficiently topped prior transfer.

All LOTO points as mentioned in OPS 85 are secured.

Fuel oil transfer pump connection with deck bunker pipe v/v OF515F and 1P bunker tank inlet v/v OF514F are opened.

Follow the attached instructions for internal transfer of bunkers.

PREPRATION BY DECK DEPARTMENT:

Oil spill gear rigged up including scupper plugs in place, standby Wilden pump.

Bunker tank spill containment tank drains to be kept closed throughout operation.

PREPRATION BY ENGINE DEPARTMENT:

Ensure proper line up as mentioned below:

FO transfer p/p suction from overflow tank #2 (OF026F) - Open

FO transfer p/p discharge to settling tank OF013F shut.

1P-OF019F, 2P-OF014F, 2S-OF025F & 1S-OF024F bunker Tank's outlet to FO transfer p/p suction shut.

2P-OF512F, 2S-OF511F, & 1S-OF513F bunker Tank's filling v/vs are shut.

FO bunker manifold v/v's OF501F, OF502F, OF503F, OF504F are shut.

Vent v/v's OD509F and OD510F on FO bunker line SHUT.

Sample v/v 1 at each manifold OF523F, OF524F, OF521F, OF522F is SHUT.

Drain v/v 1 at each manifold - OF505F, OF506F, OF507F, OF508F is SHUT.

* check that overflow tank suction v/v to sludge p/p OF436F is shut *

Transfer p/p suction v/v OF032F, transfer pump discharge valve OF020F, suction from #2 HFO overflow Tank v/v OF026F, Transfer p/p discharge v/v to deck bunker pipe OF515F & 1P bunker tank loading v/v OF514F to be kept open.

When transfer is completed, line up the FO system for daily use.

NOTES:

Take soundings of 1P bunker tank before starting, during & at completion of transfer.

Engine department to ensure one person on deck watch(with radio) & one person stand by at the FO transfer p/p (with radio) throughout the transfer operation & will not leave this duty for any reason unless relieved or the operation has stopped with transfer system completely secured.

All pipelines to be checked regularly for any leakage.

ACTION IN CASE OF EMERGENCY:

1. Stop operation (ask the person standby at the p/p to stop the p/p immediately), inform the bridge of location of spill & raise alarm
2. Open supply air to "Wilden" pump & port slop tank filling v/v.
3. One person must guide the hose of "Wilden" p/p to suck the oil spilled on tank.
4. Carry out oil spill containment as per duties & procedures.

POSITION OF V/V'S AFTER COMPLETION:

1. KEEP BUNKER TANK V/V (1P) OPEN FOR THERMAL EXPANSION OF LIQUID.
2. SHUT V/V OF 515F (TRANSFER P/P DISCHARGE CONNECTION TO DECK BUNKER PIPE)
4. ENSURE TRANSFER P/P IS BACK TO AUTO mode.

I have read and understood the cargo transfer instructions:

Mark Star 3/E
[Signature] 2/E

Signatures of Watch Officers

Signatures of Watch Officers

[Signature]
Signature of Preparer

CTO
Position

Approved by [Signature]
Master

Designated Persons in Charge OPS-29



Post this list near the Declaration of Inspection during any cargo/bunker transfer operation.
List all deck and engine officers.

The persons on this list are qualified to be in charge of cargo/bunker transfer operation.

Date 09 Mar 17

Name

Position

Graeme Young

C/E

Dejan Dervenec

CTO

Zoran Kvrzic

1/E

Gajete Charlie

2/E

Sharma Kesh

3/E

CAPRICORN VOYAGER

Vessel

Master



Lockout/Tagout (LOTO) Work Permit OPS-85

No. CPV-170309-DD01*

STEP 1: Lockout/Tagout Planning (Work Supervisor)

Date: 09/MAR/17 Time: 10:00

Work location, equipment and reason for isolation:

PURIFIER ROOM, HFO settling tank filling valve from transfer pump, for internal bunker transfer.

Work Supervisor Name:

Dejan Dervenic CTO

Isolation method and location of isolation point. Note: If more than eight energy isolation devices are required, attach list.

1. FO Transfer p/p delivery to FO Setl. Tk OF013F_SHUT
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Explain method for releasing stored energy:

Explain method of testing for Zero Energy State:

Check box, if unable to fit a lockout device. Explain method of securing isolation:

LOTO Responsible Person (nominated by VMT Member)

VMT Member Name: C/E G.Young T.

Name: KASH

Rank: 3/E

VMT Member Signature:

STEP 2: Lockout/Tagout Execution (Work Supervisor, Responsible Person, Contractor)

- NOTIFY: Affected personnel/departments of isolation and impacts to operations.
- SHUTDOWN: All applicable equipment has been properly shutdown. Energy isolation devices listed in step 1 are in the closed, off or safe position, isolating all hazardous energy.
- APPLY LOCK & TAG: Work Supervisor has secured each energy isolation device with a **RED** lock & tag.
- VERIFY: Responsible Person has applied a **BLACK** lock to each lockout device. (Contractors use **BLUE**)

GAS TEST ISOLATION POINTS (if applicable): Required when there is a potential for hazardous material release including flammable/combustible liquids or gas and toxics above permissible exposure limits.

EQUIPMENT PREPARATION (for isolation): Release all stored energy as per plan agreed to by the chief engineer/master.

Note: Be aware that machines could store energy internally such as spring, pressure accumulators, rotating masses, flammable liquids and gasses.

ZERO ENERGY STATE: All equipment/system hazardous energy sources have been tested to ensure Zero Energy State.

STEP 3: LOTO Execution Verification (Work Supervisor, Responsible Person, Contractor)

Steps 1 and 2 have been completed successfully. Work area is safe and ready for work to begin.

Work Supervisor:

Initial: DD Date: 09/MAR/17 Time: 10:30

Contractor Name:

Initial: _____ Date: N/A Time: _____

Responsible Person:

Initial: KK Date: 09/MAR/17 Time: 10:30

STEP 4: Testing of Equipment/System

Note: If lockout/tagout devices must be temporarily removed, and the machine or equipment energized to test or reposition machine components, follow the following sequence of actions:

- Notify all affected personnel/departments & clear the machine/equipment of tools and materials.
- Remove the lockout/tagout required for testing or positioning.
- On completion of testing or positioning, return energy isolation devices to closed, off or safe position.
- Re-apply lockout devices, padlocks, and tags.
- Release all stored energy, re-test for Zero Energy State, & continue with servicing or maintenance.

STEP 5: Returning Equipment/Systems to Service (Work Supervisor, Responsible Person, Contractor)

- Equipment safe to energize.
- All locks and tags have been removed.

System(s) returned to desired state with all alarms reset.

If moved to long-term isolation register, explain reason:

Work Supervisor:

Initial: DD Date: 9/3/17 Time: 13:15

Responsible Person:

Initial: KK Date: 9/3/17 Time: 13:15

Contractor:

Initial: _____ Date: N/A Time: _____

Remarks:

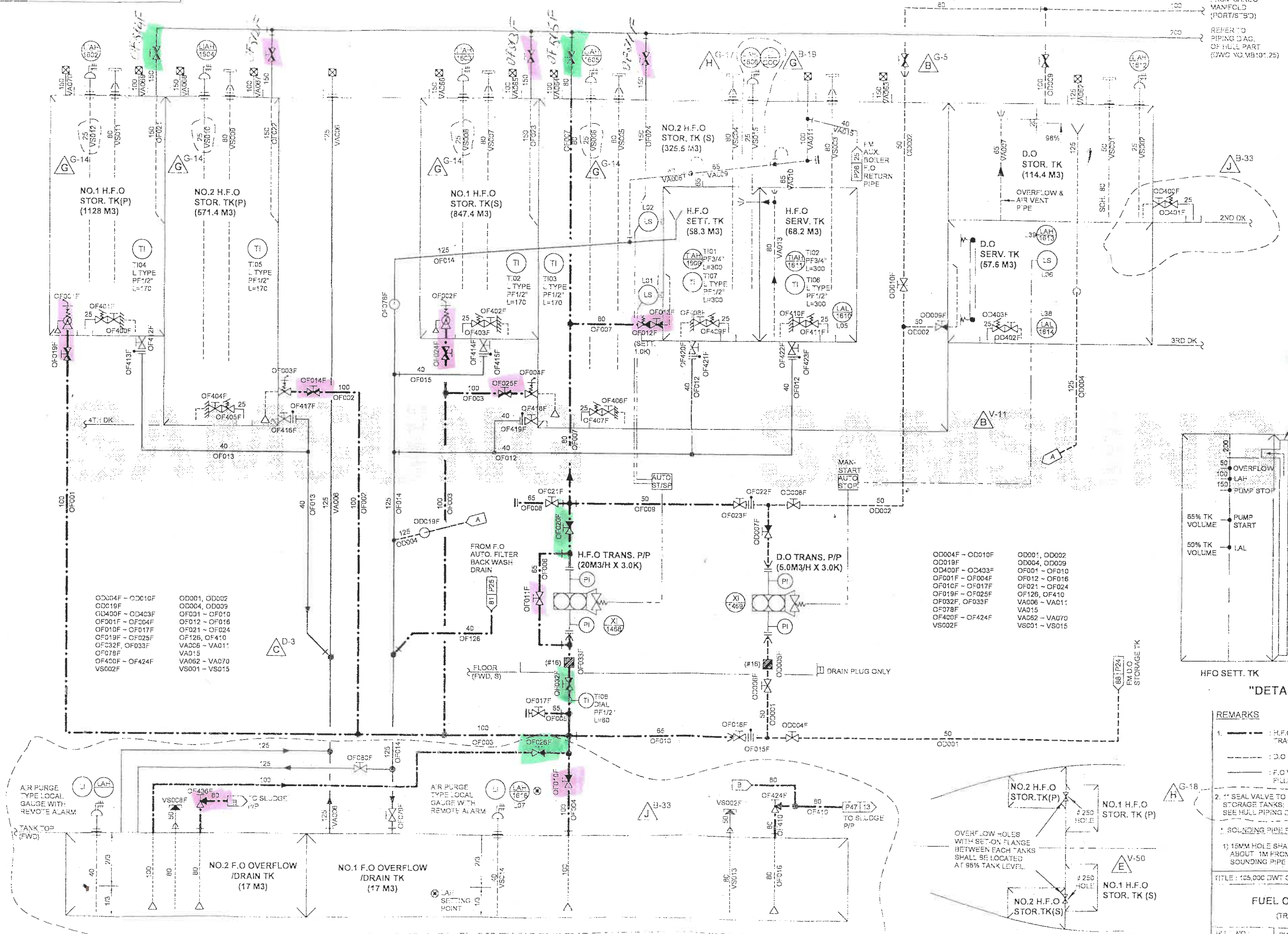
Notes: Keep in ECR or CCR/Bridge when in force

*See procedure VOP-01-01 for numbering instructions

OPS-85 (01 Sep 2015) Required by SAF-02-02, SAF-02-05.

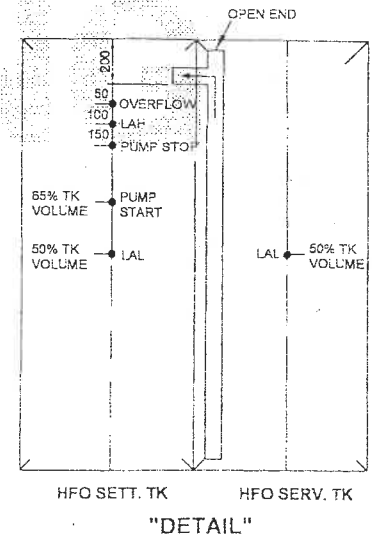
FROM CARGO MANIFOLD (PORT/SIDE)
REFER TO PIPING DIAG. OF HULL PART (DWG NO. MB101.25)

CLOSED
OPEN



- OD004F - OD010F
- OD019F
- OD040F - OD043F
- OF001F - OF004F
- OF010F - OF017F
- OF019F - OF025F
- OF032F, OF033F
- OF079F
- OF400F - OF424F
- VS002F
- OD001, OD002
- OD004, OD009
- OF001 - OF010
- OF012 - OF016
- OF021 - OF024
- OF026, OF040
- VA006 - VA011
- VA015
- VA062 - VA070
- VS001 - VS015

- OD004F - OD010F
- OD019F
- OD040F - OD043F
- OF001F - OF004F
- OF010F - OF017F
- OF019F - OF025F
- OF032F, OF033F
- OF079F
- OF400F - OF424F
- VS002F
- OD001, OD002
- OD004, OD009
- OF001 - OF010
- OF012 - OF016
- OF021 - OF024
- OF026, OF040
- VA006 - VA011
- VA015
- VA062 - VA070
- VS001 - VS015



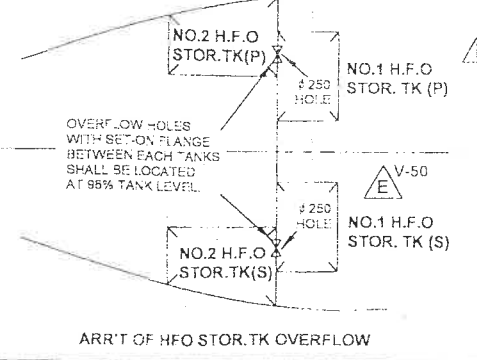
- REMARKS
- H.F.O. PIPE WITH STEAM TRACING & LAGGING
 - D.O. PIPE/TK INSIDE
 - F.O. VENT & DRAIN PIPE, FILLING
 - SEAL VALVE TO BE PROVIDED AT H.F.O. STORAGE TANKS. SEE HULL PIPING DIAGRAM (V35C1.71)
 - SOUNDING PIPE FOR H.F.O. STORAGE TANK:
1) 15MM HOLE SHALL BE DRILLED INTERVAL ABOUT 1M FROM BOTTOM TO TOP ON SOUNDING PIPE

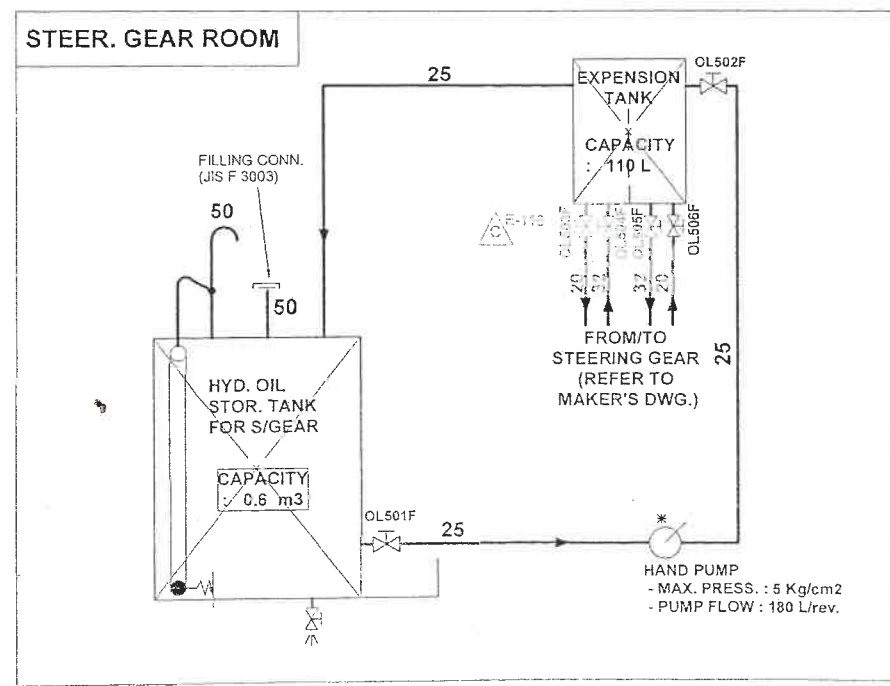
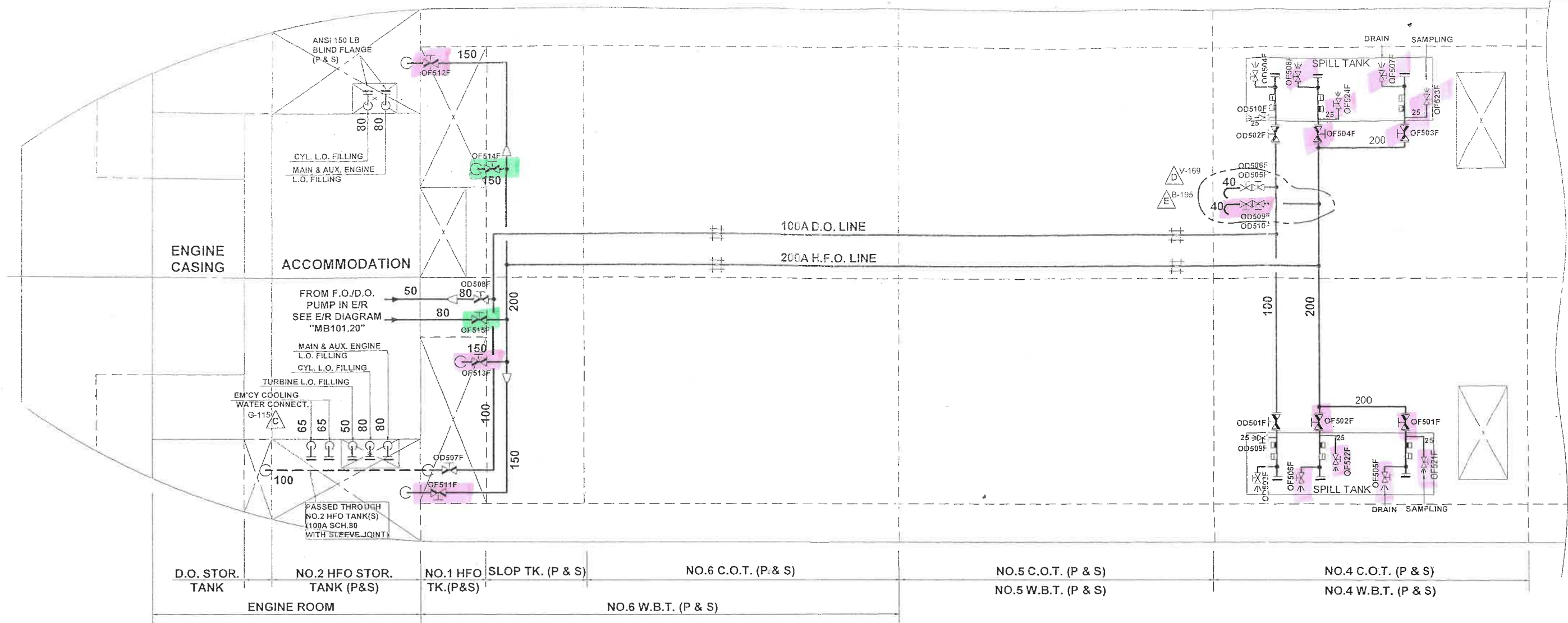
TITLE: 105,000 DWT CRUDE OIL TANKER

FUEL OIL SYSTEM
(TRANSFER)

REV. NO.	DWG. NO.	23	48
1584	MB101.20(1/7)		

SAMSUNG HEAVY INDUSTRIES CO., LTD.

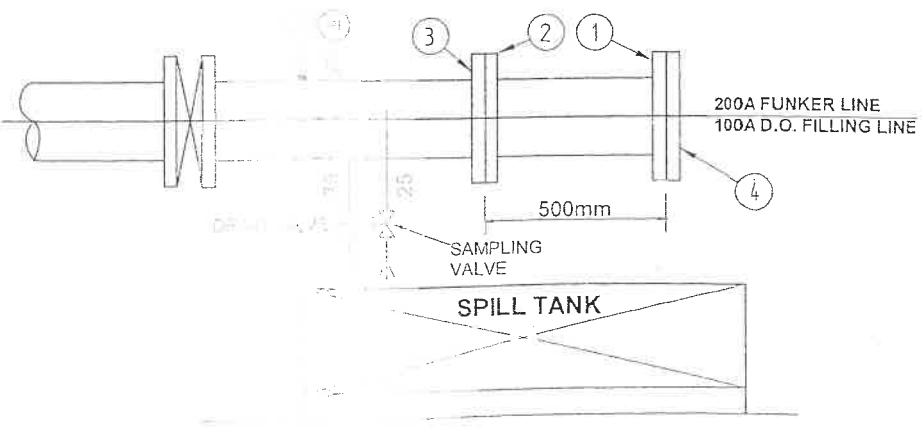




SHORE CONNECTION PIECES

SIZE	Q'TY	TYPE	SKETCH	① ② ③ FLANGES
8" x 8"	4	PRINCIPAL		-ANSI B16.5 150LB -FLAT FACE(NO RAISED) -CONTINUOUS SPIRAL GROOVE (BS1560) *REDUCERS WILL BE STORED INSIDE DECK STORE WITH ANGLE SEAT
8" x 5"	1	RESERVE REDUCER (STOCKS)		
8" x 10"	1			
8" x 12"	1			

④ BLIND FLANGE TYPE = ANSI B16.5 150LB



OPEN

CLOSED

- NOTE**
1. PRESSURE GAUGE FOR H.F.O./D.O. SYSTEM SHALL BE PROVIDED WITH GLYCERIN ISOLATION CUP.
 2. A PORTABLE PRESSURE GAUGE WITH COCK AND A THERMOMETER SHALL BE FITTED ON EACH OIL FILLING CONNECTION FOR H.F.O. AND D.O. (TOTAL FOUR(4) PRESSURE GAUGE AND FOUR(4) THERMOMETER)
 3. THE NUMBER & LOCATION OF COUPLING (EXPANSION JOINT) WILL BE DETERMINED ACC. TO DETAIL PIPING ARRANGEMENT.

TITLE : 105,000 DWT CRUDE OIL TANKER

F.O / D.O FILLING AND TRANSFER SYSTEM

PRESSURE TEST ON SPARE DG FUEL INJECTOR

➤ PRIMARY HAZARD:

- Pressure: oil pressure, personal injury

➤ CONTRAL MEASURES:

- Pressure: follow instruction manual, Face shield google, no testing while welding

❖ PRECAUTIONS:

- Ensure Proper PPE.
- Use rubber gloves.
- Face shield with safety goggles while using compressed air.

❖ MATERIALS TO BE USED:

- Hydraulic oil
- Injector testing apparatus

❖ TOOLS TO BE USED:

- Spanners
- Bucket
- Torque spanner

➤ PROCEDURES:



- Mount the fuel injection valve into clamping bracket on the pressure testing pump in such a position that the nozzle of the injector is pointing downward and loosen or tighten locknut to adjust pressure to 320bar. When doing the pressure test the uniform spray of fuel from the nozzle is to be observed.
- Ensure use hydraulic oil for testing.
- Tighten cap nut and bolt.
- Check and tight injection nozzle cap nut by applying torque of 320Nm as per instruction manual.



- At 300 bars no droplets from injector nozzles was observed.
- Adjust the pressure of 320 bar by cap nut and check for droplets as per instruction manual.
- Pressure test again to a pressure of 320 bars as per instruction manual.



- Tighten locknut completely using torque spanner and apply torque of 70N-m



Findings: The fuel injector was tested to a pressure of 320 bars and was found working satisfactorily.

Storing: After testing all the 7 spare DG Fuel injector are wrapped into clean plastic foils.

Date : 14 March 2017

Signature: 

CAPRICORN
Off. No. 9000
GRT: 58442
NRT: 30322
HP : 18420

L23/30H

<p>Safety precautions:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Stopped engine <input checked="" type="checkbox"/> Shut-off starting air <input type="checkbox"/> Shut-off cooling water <input checked="" type="checkbox"/> Shut-off fuel oil <input checked="" type="checkbox"/> Shut-off cooling oil <input type="checkbox"/> Stopped lub. oil circul. <p>Description:</p> <p>Dismounting, overhaul, pressure testing and mounting of fuel injection valve.</p> <p>Starting position:</p> <p>Top cover on the cylinder head and front cover on the fuel injection pump has been dismantled. Fuel injection pipe dismantled 514-01.05</p> <p>Related procedure:</p> <p>Manpower:</p> <p>Working time : 2 hours Capacity : 1 man</p> <p>Data:</p> <p>Data for pressure and tolerance (Page 500.35) Data for torque moment (Page 500.40) Declaration of weight (Page 500.45)</p>	<p>Special tools:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Plate no</th> <th style="text-align: left;">Item no</th> <th style="text-align: left;">Note</th> </tr> </thead> <tbody> <tr> <td>52006</td> <td>261</td> <td>20-120 NM</td> </tr> <tr> <td>52014</td> <td>013</td> <td></td> </tr> <tr> <td>52014</td> <td>108</td> <td></td> </tr> <tr> <td>52014</td> <td>204</td> <td></td> </tr> <tr> <td>52014</td> <td>300</td> <td>Extra tools</td> </tr> <tr> <td>52014</td> <td>361</td> <td></td> </tr> <tr> <td>52014</td> <td>407</td> <td></td> </tr> </tbody> </table> <p>Hand tools:</p> <p>Ring and open end spanner 12 mm Ring and open end spanner 24 mm Socket spanner 24 mm Socket spanner 30 mm Tools for cleaning. Clean kerosene or gas oil. Antiseizure product. (Copaslip, Molykote GN Plus or similar).</p> <p>Replacement and wearing parts:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Plate no</th> <th style="text-align: left;">Item no</th> <th style="text-align: left;">Qty/</th> </tr> </thead> <tbody> <tr> <td>51402</td> <td>116</td> <td>3/valve</td> </tr> </tbody> </table>	Plate no	Item no	Note	52006	261	20-120 NM	52014	013		52014	108		52014	204		52014	300	Extra tools	52014	361		52014	407		Plate no	Item no	Qty/	51402	116	3/valve
Plate no	Item no	Note																													
52006	261	20-120 NM																													
52014	013																														
52014	108																														
52014	204																														
52014	300	Extra tools																													
52014	361																														
52014	407																														
Plate no	Item no	Qty/																													
51402	116	3/valve																													

08028-0D/H5250/94.08.12

L23/30H

The fuel injection valve is the single component that has the greatest influence on the diesel engine condition. Various forms of operation and quality of fuel oil affect the overhaul intervals. In some cases it may be necessary to shorten the prescribed intervals.

Dismounting and cleaning:

1. Dismount the fuel injection valve from the cylinder head by means of the special tool as shown in fig. 1.

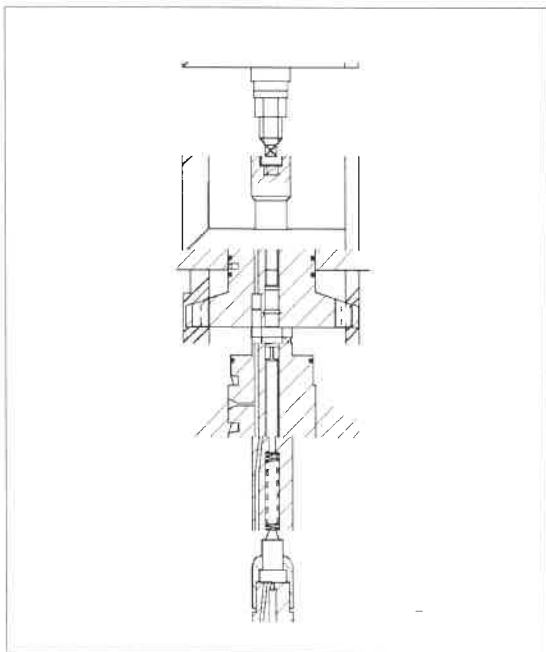


Fig 1 Dismounting of fuel injection valve from cylinder head.

2. Mount the fuel injection valve into the clamping bracket VTO-W020 (see plate 52014, item 025) on the pressure testing pump, and loosen the lock nut (B) fig 2. Unstress the nozzle spring by turning the adjusting screw (D).

3. Clean the lower part of the nozzle (J) from carbonized oil deposits before dismantling the nozzle nut (H). Remove the nozzle nut (H) and the nozzle (J).

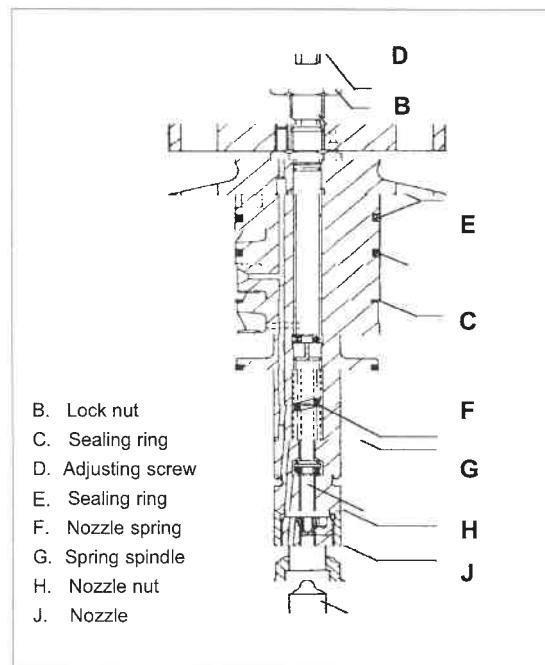


Fig 2 Fuel injection valve.

Attention!

Do not damage the lapped surface.

4. The nozzle spring (F) and the spring spindle (G), are to be taken out by loosening the adjusting screw (D), completely.

5. All parts must be cleaned with kerosene or gas oil and a hard brush (not a steel brush).

6. Clean the nozzle holes of charred coke by means of the supplied special drill (see plate 52014-01H item 108) with holder.

7. Clean the cooling chamber and the cooling ducts in the nozzle guide and injector body by placing these in a cleaning liquid and then blow through the parts with dry working air.

Inspection of the parts:

8. Nozzles are matched by lapping and are therefore only interchangeable as units. Insert nozzle needle with gas oil in the needle guide. It must be controlled whether the nozzle needle slides down by its dead weight on its seat.

9. If the holes are oval worn, which is checked with of a magnifying glass, the nozzle must be scrapped.

10. The best way, however, to check if the holes are worn out is to control the flow rate of the nozzle which, in general, only can be made at the manufacturer's works on a special test stand.

11. Every effort to refinish will result in alterations of these values and malfunction of the nozzle. If heavy abrasion symptoms, respectively damages are observed at the visual inspection of the parts, the parts in question must be replaced.

Reassembling:

12. When all parts have been overhauled, found in good order and carefully cleaned, assemble the fuel injection valve again.

13. When assembling the injection valve, proceed in the opposite order compared to the disassembly. Pay attention to the following:

A. Lubricate the threads on the adjusting screw (D) with lub. oil, and the threads of the nozzle holder for the nozzle nut. The shoulder of the nozzle which is in contact with the nozzle nut, must be lubricated with an antiseizure product.

B. The sealing plane surface of body and nozzle must be wiped dry with paper.

C. Renew the sealing rings (C) and (E).

D. Tighten torque for nozzle nut (see page 500.40.)

Pressure testing of fuel injection valve:

14. The most effective checking of the fuel valves is obtained through pressure testing, preferably carried out after each overhaul and also in case of irregularities in operation. The pressure testing is carried out in the following way by means of the pressure testing apparatus supplied.

15. Mount the fuel injection valve in the bracket VTO-W020 (see plate 52014 item no. 25) again. The bracket to be in such a position that the nozzle of the injector is pointing downwards.

16. For test of the injection pressure and atomizing mount the test pipe VTO-W021 (see plate 52014 item 049), increase pressure by means of the lever on the test pump, and adjust the opening pressure to 320 bar, by the adjusting screw (D), see fig 2, then tighten lock nut (B) and check opening pressure again.

Do not expect chattering, but make sure that the nozzle spray from all holes in the same angle. The nozzle might chatter if the lever is worked very fast, actually by hitting it.

Do not expect a nozzle tip with more than 1000 running hours to perform like a new nozzle in the test pump.

Then increase the pressure to 300 bar and keep the pressure by working the lever slowly downwards. When the pressure is kept at 300 bar, there should be no more than one drip from the nozzle tip for approx. 3-5 sec.

WARNING: Keep out of the fuel jets as they will penetrate the skin. Fuel which has penetrated the skin can cause painful inflammations (blood poisoning).

L23/30H

Mounting of the fuel injection valve in cylinder head:

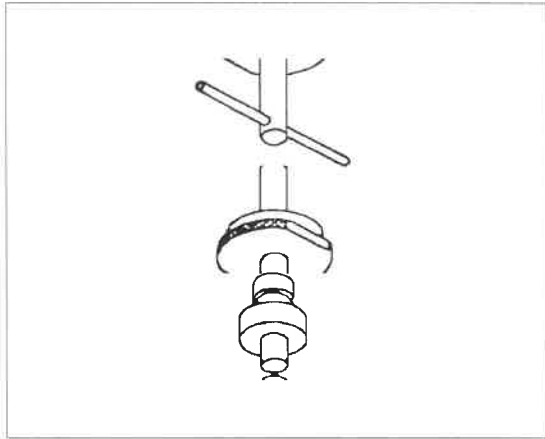


Fig 3 Grinding tools for seat and liner for fuel injection valve.

17. Before mounting the fuel valve, clean and inspect the valve sleeve in the cylinder head. If necessary, grind the seating face with the grinding tool (see fig 3).

18. Coat the O-rings and the lower part of the valve with an antiseizure product, place the valve in the cylinder head and press it down to the seat.

19. Mount the high pressure pipe before tightening the nuts then it is easier to fit the threads.

20. Put on the distance pieces, fit the nuts and tighten up with a torque spanner (for torque moment, see page 500.40).

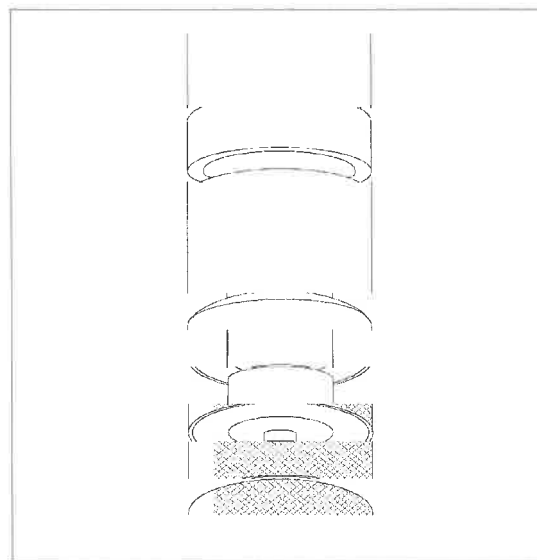


Fig 4 Grinding tools for fuel injection valve (extra tools).



500.25 Edition 01H	Planned Maintenance Program	Description Page 4 (4)
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L23/30H
720/750 RPM

Description	Check new/overhauled parts after hours	Time Between Overhaul										Working Card No	
		50	200	2000	8000	16000	32000	Daily	Weekly	Monthly	3rd month		Observations
Fuel Oil System and Injection Equipment:													
Fuel oil filter - dismantling and cleaning												●	514-01.15
Fuel oil feed pump												●	514-10.00
Fuel oil injection pump - dismantling and cleaning												●	514-01.05
Fuel injection valve - adjustment of opening pressure	200		■										514-01.10
Fuel oil high-pressure pipe - dismantling and check			■										514-01.05
Adjustment of the maximum combustion pressure												●	514-05.01
Fuel oil system - check the system												■	514-01.90
Fuel oil - oil samples after every bunkering, see sec.504													
Lubricating Oil System:													
Lubricating oil pump - engine-driven					■								515-01.00
Lubricating oil filter - cleaning and exchange												●	515-01.10
Lubricating oil cooler												●	515-06.00
Prelubricating pump - el. driven					■								515-01.05
Thermostatic valve												■	515-01.20
Centrifugal filter - cleaning and exchange of paper												●	515-15.00
Hand pump												●	515-10.00
Lubricating oil - oil samples, see section 504												■	
Lubricating oil system - check the system												■	515-01.90
Cooling Water System:													
Cooling water pump - engine-driven (sea water and fresh water)					■								516-04.00
Thermostatic valve												■	516-04.00
Cooling water system - check the system												■	516-01.90
Cooling water system - water samples, see sec. 504									■			■	

08028-0D/H5250/94.08.12

Description Page 1 (1)	Data for Torque Moment	500.40 Edition 01S
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L23/30H
720/750 rpm

Section	Description		Thread	Tightening		Lubricant	
				Torque Nm	Pressure bar		
505	Cylinder cover stud(in frame)	Stud	M 48	200	750	Copaslip	
	Nur for cylinder cover stud	Nut	M 45			Copaslip	
	Cooling jacket cylinder cover	Screw		22		Copaslip	
506	Connecting rod(see section 506)						
507	Camshaft assembly	Nut	M12	50	750	Copaslip	
	Intermediate wheel shaft	Nut	M 20 x 1.5	250		Copaslip	
	Intermediate wheel gear	Nut	M12	40		Copaslip	
	Gear wheel on camshaft	Screw	M12	50		Unimoly	
508	Housing for valve gear	Screw	M 12	60	750	Copaslip	
	Valve gear bracket rocker arm	Nut	M 16	150		Copaslip	
510	Main bearing stud (in frame)	Stud	M 48	200	750	Copaslip	
	Nut for main bearing stud	Nut	M 45x3			Copaslip	
	Main bearing side screw	Screw	M 24	300		Copaslip	
	Countweight on crankshaft	Screw	M 30X2	200		Copaslip	
				+ 60° turn			
	Vibrationdamper on crankshaft	Nut	M 27	400		Copaslip	
	Frame / baseframe	Nut	M 24	500		Copaslip	
	Flywheel mounting (fitted bolt)	Nut	M 20 x 1.5	200		Copaslip	
	Gear rim on flywheel	Screw		34		Copaslip	
	Gear wheel on crankshaft	Nut	M 10	40		Copaslip	
514	Fuel pump distribution piece	Screw	M 8	25 - 30	750	Copaslip	
	Fuel pump top flange (barrel)	Screw	M 10	55 - 65		Copaslip	
	Fuel pump caviation plugs	Plug	M 20 x 1.5	100 - 120		Copaslip	
	Fuel primp mounting (bottom flange)	Screw	M 16	150		Copaslip	
	Fuel valve (nozzle nut)	Nut	M 26 x 1.5	100 - 120		Copaslip	
	ruel valve mounting	Nut	M 16	40		Copaslip	
	Fuel vale (cap nut)	Nut		70		Copaslip	
	Fuel vale adjusting (lock nut)	Nut		100		Copaslip	
	High pressure pipe	Nut	M 18 X 1.5	40		Copaslip	
	515	Gear wheel on lub. oil pump	Nut			300	Copaslip
519	Conical elements mounting	Screw	M 20	150	750	Copaslip	
	Upper mouthing	Nut	M 20	320		Copaslip	
	Lower mounting						
	Conical elements mounting				750		
	Upper mouthing	Nut	M 27	300		Copaslip	
	Lower mounting	Screw	M 16	205		Copaslip	

08028-0D/H5250/94.08.12

Main Engine Control from the Emergency Maneuvering Position



Primary Hazard:

- Sound: Miscommunication
- Motion: Ship motion

Additional Control Measures:

- Sound: Good close loop communication, follow instruction manual
- Motion: Inform officer on watch

Date:08 March 2017

Signature:


CTO

CAPRICORN VOYAGER
Off. No. 9000149
GRT: 58442
NRT: 30028
HP : 18420

❖ SO WHY AND HOW ?

M/E local control is used in emergency situation, it may be:

1. Control system failure on bridge.
2. Control system failure in ECR.
3. Governor failure.
4. Pneumatic system failure.

Procedure :



- Establish communication with bridge



- Ensure that blowers are running.
- Test lamps.



- Unlock and disconnect the fuel rack linkage from the governor by turning wheel anti-clock side.
- confirm that control is switched to ECR from the bridge and C/O to Local side.
- Inform the bridge that the engine is ready.



- Select the console according to the bridge command ahead or astern.
- Acknowledge the direction audio visual alarm by pressing reply



- Take the fuel index to Start by the help of the hand wheel.
- Push the start button, as rpm reaches to 9 to 13 release the button.

BOILER WATER LEVEL DP TRANSMITTER AND LEGS BLOWDOWN

NOTE : Ensure that the boiler where the transmitter to be blow down belongs to is not in service and in “stopped” mode.

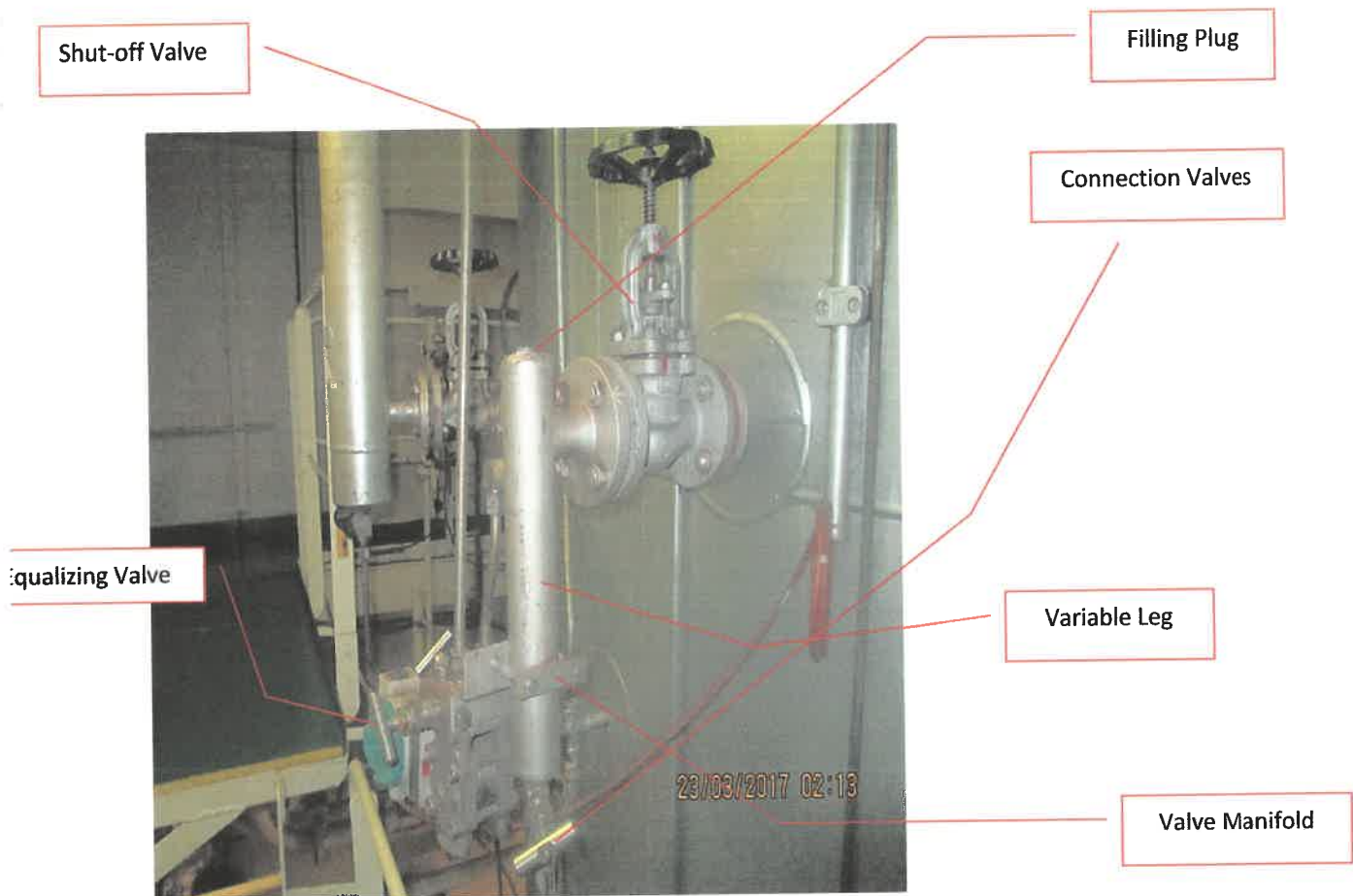
After a while, when the water level is seen stabilized, check the correct / equal boiler water level shown through the water level gauge glass and the boiler local / remote control panel screen. Both should show equal figures, if not, follow the separate procedure on how to calibrate the DP transmitter for such setting change.



Procedure:

- Close the shut off valves of Reference and Variable Legs.
- Open drain valves of both legs.

- Blow down each leg by crack opening the shut off valve until clear flow of water/steam is seen.
- Close the shut off valve of both legs (ensure zero energy from the drains).



- Open filling plug of both legs.
- Shut drain valve of both legs.
- Open the DP transmitter equalizing valve (keep open the two connection valves).
- Open drain plugs of the DP transmitter.
- Flush the system by pouring fresh water through the filling hole of the reference leg until clear water comes out of the DP transmitter drain holes.
- Plug up the drain holes of the DP transmitter.
- Pour fresh water to the reference leg until full flow (i.e. no bubbles) of fresh water comes out of the variable leg filling hole.
- Shut the DP transmitter equalizing valve.



- Place back the filling plug of both legs.
- Open the shut off valve of both legs together gradually.

Date: 24 MARCH 2017

Signature: *Chanue Capete*
CHANUE CAPEYE

CAPRICORN VOYAGER
Off. No. 9000143
GRT: 58442
NRT: 30088
HP : 13420



COPT Procedure

Date: 3/4/17

Signature: 3/E KM

CAPRICORN VOYAGER
Off. No. 8000143
GRT: 58442
NRT: 30328
HP: 12420

CARGO OPERATION



Manufacturer: TAIBONG

Design pressure: 6 kg/cm²

Design temperature : 100°C

Plate pack Length : 164mm

Material:

Plate : SUS304 Gasket:NBR

➤ **COPT and WBPT Preparation Procedure**

1. Ensure two generators are on load and load sharing is on auto.
2. Open the vacuum condenser and steam air ejector condenser sea water outlet valves
3. Start the vacuum condenser SW cooling pump. The suction valve is normally kept open while the pump discharge valve is normally closed.
4. After the vacuum condenser pump starts open the discharge valve slowly .
5. Open the COPT and WBPT steam drain valves Open the steam air ejectors' supply inlet valves. Ensure that the air/vapor intake valves are already open.
6. Open the warming through bypass valve of the 16 kg/sq.cm COPT steam supply line.
7. . Do not open the drain hoppers as sudden steam rush may cause burns. Once steam starts coming out from the drain hoppers shut the drain valves.
8. Check the vacuum in the vacuum condenser and once -65 mm Hg vacuum is achieved then open the vacuum condenser manual dump valve.
9. Adjust the atmospheric and vacuum condensers' EPCONs as follows:
 - Vacuum condenser automatic dump valve set point to be set at 15.3kg/sq.cm.
 - Atmospheric condenser automatic dump valve set point to be set at 17.3kg/sq.cm.
10. Gradually open the gland sealing steam to the COPTs and WBPT to a pressure of 0.4 kg/sq.cm.
11. Start condensate pump
12. Open the COPTs' and WBPT's steam exhaust valves.
13. Before starting COPT or WBPT ensure that boiler is running on high mode and dump valve is operating correctly. Open the main 16K steam valve and close warming up valve. When more than one COPT is required to be run both boilers are put on load in auto mode due to increased demand of steam.
14. Ensure CCR has the COPT/WBPT governors throttled to a minimum.
15. Open the governor steam inlet valve to the COPT and then gradually open it completely.
16. Gradually open the steam inlet valve and initially maintain a RPM of 200 for a couple of minutes for warming up and then gradually increase the RPM till the governor takes control and confirm to CCR that trip test can be performed.
17. Once tripped the governor valve and inlet valve must be fully shut and only then the alarm must be reset. Open the governor valve for making it ready for trip
18. Now restart the COPT by opening the steam inlet valve.
19. Check that the auxiliary oil pump has tripped and check all parameters and that the LO coolers are correctly lined up.
20. The speed of COPT can now be controlled from CCR.

IG Plant preparation

1. From the IG blower room shut the IG blower's casing drain valve and open the suction valve.
2. Open the sampling valve from the IG blower to the Oxygen analyzer. Calibrate the O₂ analyzer every time before starting the IG plant. Check the water level in the container of O₂ analyzer is up to mark.

For O₂ analyzer calibration:

- A. On the O₂ analyzer panel put one knob on test gas position and the one below it on zero gas position.
 - B. Open the nitrogen gas bottle valve and use the regulator to adjust gas pressure on the outlet. Beware of over pressurizing the O₂ analyzer sample bottles.
 - C. Open the zero gas regulator on the O₂ analyzer panel and adjust the flow such that slow and steady bubbles are obtained. Once the value on the analyzer is stable Press E and down arrow key on the panel simultaneously for 5 seconds and save zero value.
 - D. Change the knob to span gas. Close nitrogen bottle valves and calibrate for span gas by opening the air regulator on the O₂ analyzer. The air supply valve to the O₂ analyzer from service air is kept open.
 - E. After the value on the analyzer is stable Press 'E' and up arrow key simultaneously for 5 seconds after the indicated value has settled down and save the span value.
 - F. Change the knob position from test gas to sample gas.
 - G. Record in log book that the O₂ analyzer was calibrated.
3. Put the boilers on 'HIGH' mode and select 'FORCE IG ON' for the boiler whose flue uptake will be used for generating IG. Set the minimum load to 25%. This limit can be gradually increased later just enough to maintain oxygen content of IG below 5%.
 4. Call CCR and inform which uptake and IG fan is to be used and give the permission to start the IG.



Scavange Space Inspections

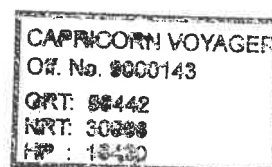
Nadeep Lamba

Engine Cadet

Date: 21/04/17

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line. Below the signature, the letters "CTO" are written in a simple, blocky font.



SCAVANGE SPACE INSPECTION

❖ Primary hazards:

- Chemical: oil contact, hazardous atmosphere, Gravity: heavy cover, Pressure: Air pressure

❖ Control measures:

- JHA, Enclosed space entry permit: OPS-66, LOTO work permit: OPS-85, Rescue plan

❖ Additional control measures:

- Chemical: Proper ventilation, stand by person, atmosphere check, Gravity: use assistance, Pressure: whip check, face shield

❖ Brief description:

- As the inspection of Scavange space was carried out and we inspected the piston , the rings and lower part of the cylinder liner through the scavange ports.

Any traces of oil sludge and carbon deposits should be removed to reduce the risk of scavange fire.

PREPERATIONS:

- Spare SCABA and EEBD are kept for any emergency (standby).
- Plastic Cover on shoes ,Rags, paper to be laid out to keep the floor clean.
- Blower rigged for continuous ventilation.
- Ventis for atmospheric check (LEL, oxygen, H2S, CO)
- Tools(piston template, camera, depth gauge, feeler gauge)
- Boots, light for illumination, covers for auxiliary blowers' discharge ports.
- Caution tape for securing area.
- Turning gear engaged and control for its remote operation.

- Radio for communication with the OOW by stand by person (2 Persons).
- Pneumatic gun, air hose connection with whip check.

PROCEDURE:

- Lockout/Tag out of the following equipments done:
 - Main air start valve - shut, 3rd deck
 - Distributor valve - shut, 3rd deck
 - M/E throttle - locked, ECR
 - Aux. Blowers breaker for #1 & #2 - OFF, ECR
 - Steam smothering valve - shut, 3rd deck
- The scavenge manifold hatch and under-piston space door of cylinder unit 6 were opened.
- Along with cooling provided, after placing a blower at the entrance to the scavenge manifold, forced ventilation of the enclosed space was ensured.
- After allowing sufficient time for cool down and ventilation, the atmosphere was checked (for oxygen content, CO, H₂S, LEL).
- After the 'enclosed space entry' permit OPS – 66 were completed and readings of the atmosphere recorded, permit from C/E approved, two persons entered the space to commence inspection. The first person to enter is the responsible person. But the first thing which goes in is the light. One person is stand-by outside whose job is to communicate to the Bridge (inform them about the names of the crew-members who entered and the condition of atmosphere continuously every 15 minutes).
- Monitoring of the atmosphere inside the space was being carried out continuously.

- After satisfactory inspection of the condition of things inside, all crew-members exited the space after ensuring nothing was left behind. The last person to come out is the responsible person and he takes out the light. He is responsible to ensure that no rags or any other objects are left behind.
- The hatches and doors were closed and bolted, to prepare the engine and keep it ready.

Duties of stand by person:

- To establish good communication with the OOW.
- To record the readings on the multi gas detector every 30 minutes.
- To inform OOW of every entry and exit to the enclosed space.
- To establish means of communication and interval of communication with the persons entering and exiting the enclosed space.

INSPECTION:

The following must be carried out during the scavenge port inspection:

- Visual examination of all six units in accordance with requirements of MAN
- Measurements of the remaining depth of the Pressure Relief grooves (CL grooves), ring groove clearance and piston burn-away (by using a template) in accordance with MAN Condition Monitoring Report form.
- Inspection the cylinder liner running surface through the scavenge ports.
- Inspection of non-return flaps.

Cylinder No.1

As there were 6 Cadets so everybody got opportunity to see the inspection on individual Cylinders



Here we saw piston crown so that we can check that no any traces of oil should be there



Above here we hammered each piston rings and checked for its movement which means piston ring is in good condition and is not broken. Also we checked for deposit build up .Piston ring provide a gas tight seal between piston and cylinder liner wall.

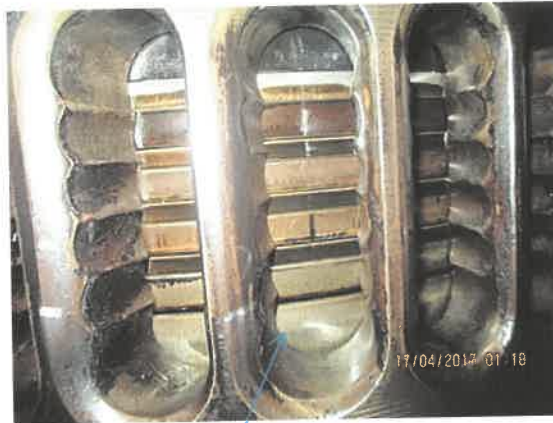
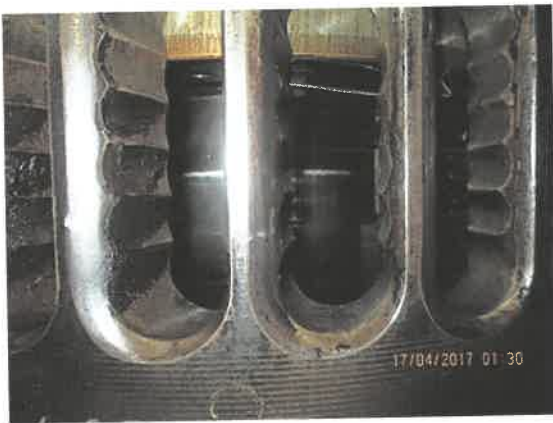
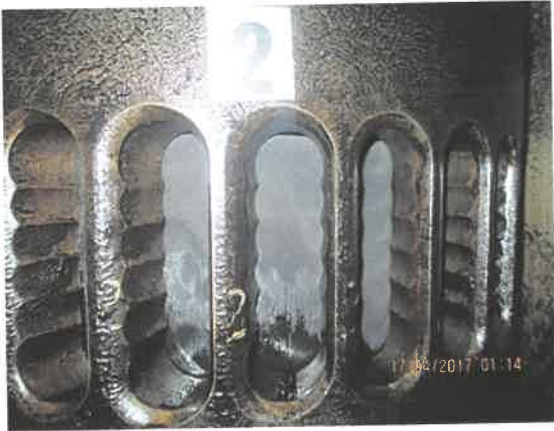


Here we checked the condition of cylinder liner to see condition of lubrication and if some visible marks



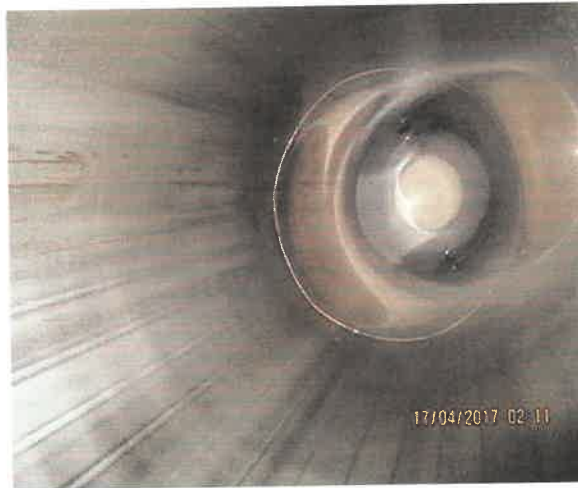
Also with the help of feeler gauge we checked piston rings clearances so that we can find out the worn out on the rings. Also Carbon deposit on then ring glands indicate lack of sealing at respective rings

Cylinder No .2

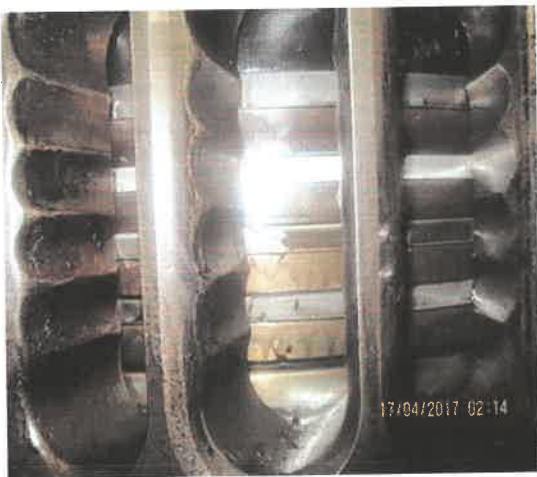


Running surfaces of the rings are worn bright ,smooth clean,without scratches move freely in the grooves and are well oiled.

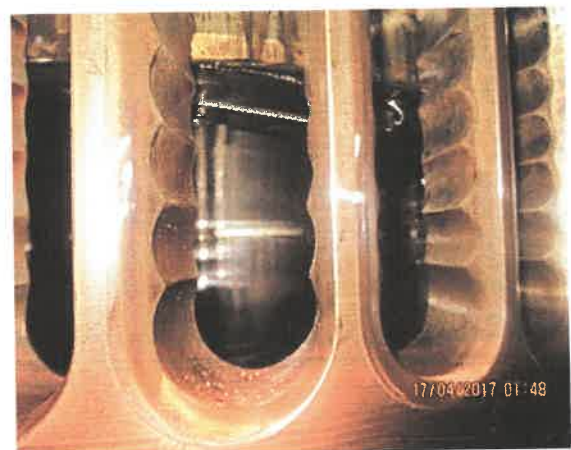
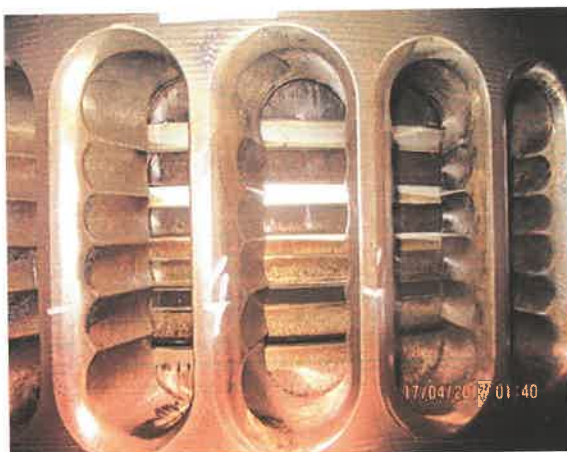
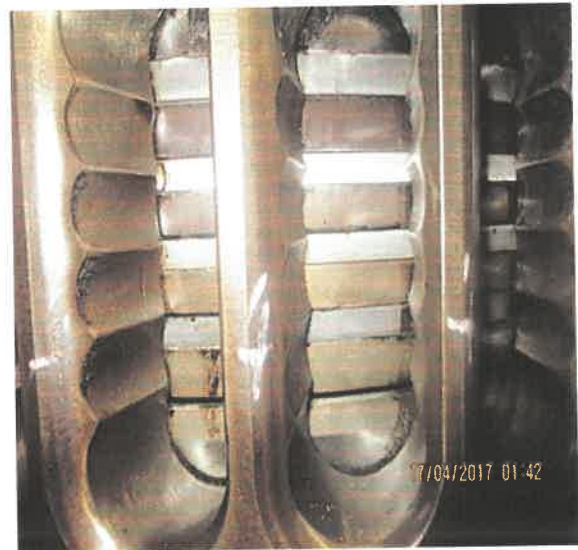
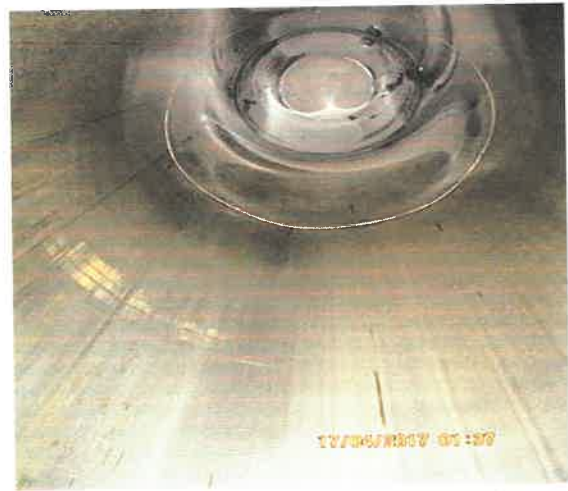
Cylinder No.3



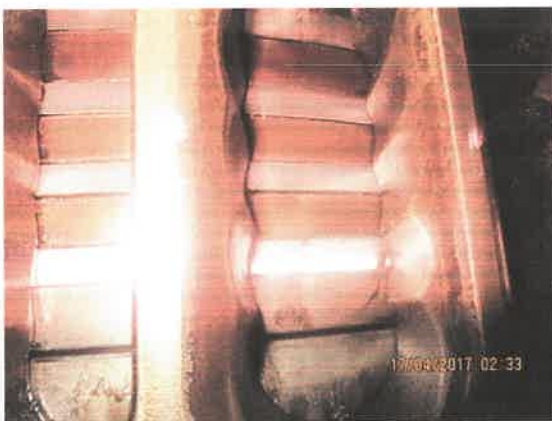
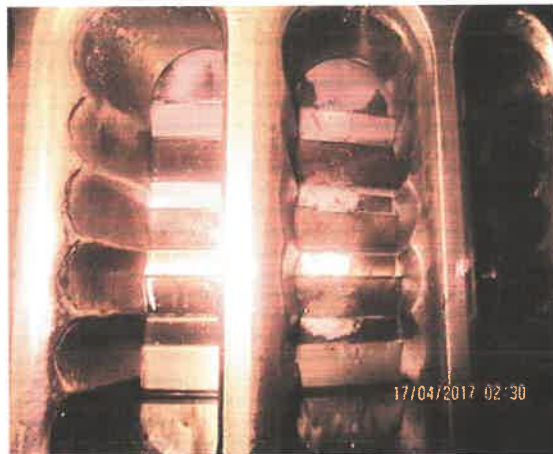
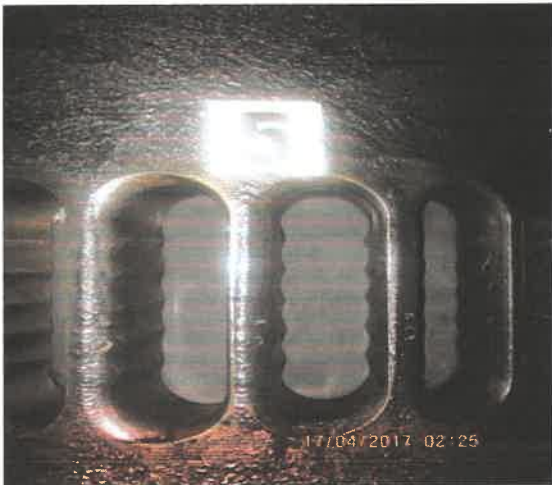
If oil is found on the top of piston determines that it is fuel or lube oil. Fuel oil will be black and sticky which indicates a leaking fuel valve. Lube oil will be brown and non-sticky indicating it could be from an exhaust valve



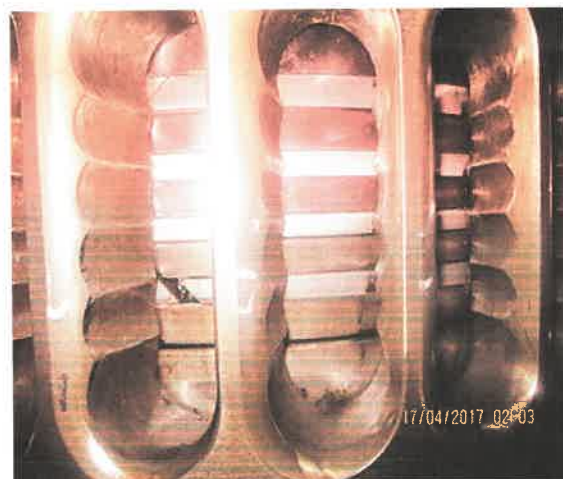
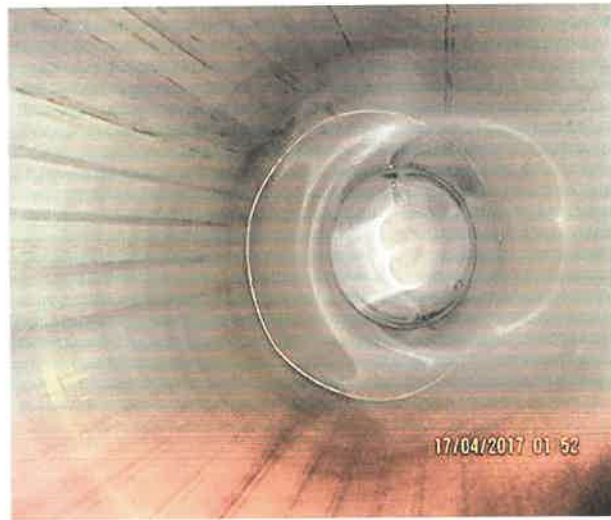
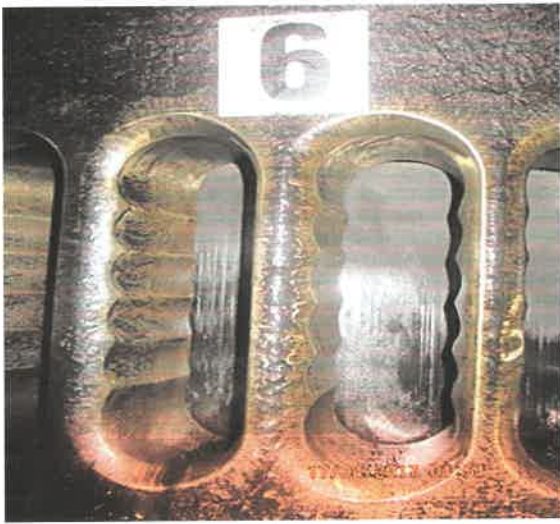
Cylinder No.4



Cylinder No.5



Cylinder No.6



❖ **Piston Crown and Deposit:**

- If oil is found on the piston (Check fuel or lube oil) :
 - if Fuel oil is black and sticky, which indicates a leaking fuel valve.
 - If Lube oil will be brown and non-sticky, indicating it will be from the exhaust valve.

- Water on the piston indicates a cooling system leak. If water is found, it is important to determine what the cause is and to immediately inform the chief engineer and superintendent that water was found on a piston.



No.3 cyl unit Fuel oil leakage from fuel oil injector on piston crown



No.4 cyl unit Fuel oil leakage from fuel oil injector on piston crown

❖ Piston Rings:

- As we strike the piston rings which results that if the piston ring is moving then it is not broken and also with the help of sound of piston ring we can say about its condition.
- As Piston rings provide a gas tight seal between the piston and the cylinder liner wall. The seal occurs by gas pressure above and behind the piston ring forcing the ring down and out towards the cylinder wall. To create this seal, free ring movement is essential.
- There are three types of piston ring movements:
 - Loose – ring should move and spring back freely in ring groove when pushed
 - Sluggish – when handle is pulled away there is a momentary delay before the ring springs back out
 - Sticking – when handle is pulled away ring does not spring back out



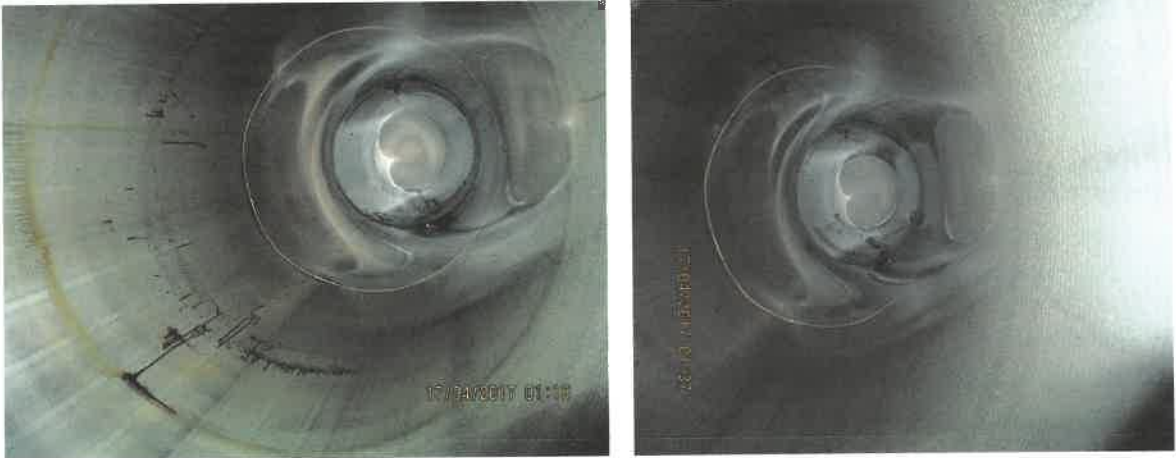
❖ **Measuring Pressure Relief Groove (CL groove) depth:**

- Measuring the depth of the pressure relief groove gives an indication of the piston ring wear.
- This is measured using a depth gauge. Adjust zero error of depth gauge and take readings 2-3 times to ascertain.

❖ **Measuring the top and bottom clearance between the ring and the ring groove:**

- Using a feeler gauge the top and bottom clearance between the ring and ring groove is measured.
- The total of the top and bottom clearance must not exceed the value specified on the Piston Data plate
- The ring grooves wear faster in two areas:
 - The Chromium plating on the floor of the ring groove.
 - The outer edge of the ring groove.

❖ Cylinder Liner



The above condition of the cylinder liner is good since its 'wave cut' machining marks are visible on the complete running surface. The wave-cut surface is a single spiraled 0.03mm deep groove. The groove acts as a pocket for the cylinder lubricating oil to maintain a proper oil film so that when the piston rings move across the groove, oil is deposited on the rings. If the wave cut pattern is worn away or the cylinder wall microstructure changes, the cylinder liner will not properly distribute cylinder oil and scuffing can occur.

Clover Leafing formation in a liner is described by heavy wear patterns in the cylinder liner between the lubricating quills, with less wear outside of the heavy wear areas. In extreme cases the liner bore may resemble a clover leaf, thus the name. Clover-leafing can be the result of micro-seizures, misalignment, polished deposits, improper lubrication or water disrupting the oil film on the cylinder wall. Too much cylinder lubricating oil can create calcium deposits on the pistons. Calcium deposits rubbing against the liner can lead to mechanical 'bore polish' and destroy the oil film, leading to scuffing.

Over lubrication also suppresses corrosion completely. Controlled corrosion is necessary to continuously refresh the liner surface to counteract bore polish.

Inspection through Scavenge Port



Vessel: Capricorn Voyager		IMO no.: 9330604	Eng. builder: DOOSAN	Engine no.: ML1689
Number of cyl.: 6	Eng. type: S60MC-C	Eng. hrs.: 57624	Checked by: CTO	Date (yyyy-mm-dd): 4/17/2017
Weeks per port calls:	Normal service load (% of MCR): 85	Lub. control: ####	Lubricator: ####	
Cyl. oil consump. (l/24 hrs): 200	at load % 84	Cyl. oil type: Taro Special HT70	Position: <input checked="" type="checkbox"/> Exh. <input type="checkbox"/> Manoeuvre	

	Condition and Symbol	Engine Part	Cylinder No.														
			1	2	3	4	5	6	7	8	9	10	11	12			
	Intact - * Burning - BU Leaking oil - LO Leaking water - LW	Piston crown	*	*	*	*	*	*									
Deposits	No deposit - * Light deposit - LC Medium deposit - MC Excessive deposit - EC Polished deposit - PC	Topland	LC	LC	LC	LC	LC	LC									
		Ringland 1	*	*	*	*	*	*									
		Ringland 2	*	*	*	*	*	*									
		Ringland 3	*	*	*	*	*	*									
Ring breakage	Intact - * Collapsed - C Broken opposite ring gap - BO Broken near gap - BN Several pieces - SP Entirely missing - M	Ring 1	*	*	*	*	*	*									
		Ring 2	*	*	*	*	*	*									
		Ring 3	*	*	*	*	*	*									
		Ring 4	*	*	*	*	*	*									
Ring movement	Loose - * Sluggish - SL Sticking - ST	Ring 1	*	*	*	*	*	*									
		Ring 2	*	*	*	*	*	*									
		Ring 3	*	*	*	*	*	*									
		Ring 4	*	*	*	*	*	*									
Surface condition	Clean, smooth - * Running surface, Black, overall - B Running surface, Black, partly - (B) Black ring ends > 100 mm - BR Scratches (vertical) - S Micro-seizures (local) - mz Micro-seizures (all over) - MZ Micro-seizures, still active - MAZ Old MZ - OZ Machining marks still visible - ** Wear-ridges near scav. ports - WR Scuffing - SC Clover-leaf wear - CL Rings sharp-edged Top/Bot. - T/B	Ring 1	*	*	*	*	*	*									
		Ring 2	*	*	*	*	*	*									
		Ring 3	*	*	*	*	*	*									
		Ring 4	*	*	*	*	*	*									
		Piston skirt	*	*	*	*	*	*									
		Piston rod	*	*	*	*	*	*									
		Cylinder liner abv. scav. ports	**	**	**	**	**	**	**								
		Cylinder liner near scav. ports	*	*	*	*	*	*									
Lubrication condition	Optimal - * Too much oil - O Slightly dry - D Very dry - DO Black oil - BO	Ring 1	*	*	*	*	*	*									
		Ring 2	*	*	*	*	*	*									
		Ring 3	*	*	*	*	*	*									
		Ring 4	*	*	*	*	*	*									
		Piston skirt	*	*	*	*	*	*									
		Piston rod	*	*	*	*	*	*									
		Cylinder liner	*	*	*	*	*	*									
Deposits	No Sludge - * Sludge - S Much sludge - MS	Scavenge box	S	S	S	S	S	S									
		Scav. receiver	*	*	*	*	*	*									
	Intact - *	Flaps and non-return valves	*	*	*	*	*	*									
Hours since last overhaul			7972	7972	7972	7972	8839	7972									

Lockout/Tagout (LOTO) Work Permit OPS-85



Job: CPV-170417-DD01*

STEP 1: Lockout/Tagout Planning (Work Supervisor)

Date: 17 Apr 17

Time: 0800

Work location, equipment and reason for isolation:

E/R emergency maneuvering stand / Underpiston space cleaning and piston inspection

Work Supervisor Name:

Dejan Dervenec CTO

Isolation method and location of isolation point. *Note: If more than eight energy isolation devices are required, attach list.*

1. M/E starting air valve shut - E/R 1st floor 5.
2. M/E distributing air valve shut - E/R 2nd floor 6.
3. #1, #2 MIE AIR BLOWER MAIN BREAKER 7.
4. OFF - ECR 8.

Explain method for releasing stored energy: Starting air pressure to be 0

Explain method of testing for Zero Energy State: Check remote control panel if M/E is prohibited to start

Check box, if unable to fit a lockout device. Explain method of securing isolation:

LOTO Responsible Person (nominated by VMT Member)

Name: KASH

Rank: 3/E

VMT Member Name: C/E G.T. Young

VMT Member Signature:

STEP 2: Lockout/Tagout Execution (Work Supervisor, Responsible Person, Contractor)

- NOTIFY: Affected personnel/departments of isolation and impacts to operations.
- SHUTDOWN: All applicable equipment has been properly shutdown. Energy isolation devices listed in step 1 are in the closed, off or safe position, isolating all hazardous energy.
- APPLY LOCK & TAG: Work Supervisor has secured each energy isolation device with a **RED** lock & tag.
- VERIFY: Responsible Person has applied a **BLACK** lock to each lockout device. (Contractors use **BLUE**)

- GAS TEST ISOLATION POINTS (if applicable): Required when there is a potential for hazardous material release including flammable/combustible liquids or gas and toxics above permissible exposure limits.

- EQUIPMENT PREPARATION (for isolation): Release all stored energy as per plan agreed to by the chief engineer/master.

Note: Be aware that machines could store energy internally such as spring, pressure accumulators, rotating masses, flammable liquids and gasses.

- ZERO ENERGY STATE: All equipment/system hazardous energy sources have been tested to ensure Zero Energy State.

STEP 3: LOTO Execution Verification (Work Supervisor, Responsible Person, Contractor)

Steps 1 and 2 have been completed successfully. Work area is safe and ready for work to begin.

Work Supervisor:

Initial: DD Date: 17 APR 17 Time: 08:20

Contractor Name:

Initial: N/A Date: N/A Time: N/A

Responsible Person:

Initial: XY Date: 17 APR 17 Time: 08:20

STEP 4: Testing of Equipment/System

Note: If lockout/tagout devices must be temporarily removed, and the machine or equipment energized to test or reposition machine components, follow the following sequence of actions:

- Notify all affected personnel/departments & clear the machine/equipment of tools and materials.
- Remove the lockout/tagout required for testing or positioning.
- On completion of testing or positioning, return energy isolation devices to closed, off or safe position.
- Re-apply lockout devices, padlocks, and tags.
- Release all stored energy, re-test for Zero Energy State, & continue with servicing or maintenance.

STEP 5: Returning Equipment/Systems to Service (Work Supervisor, Responsible Person, Contractor)

Equipment safe to energize.

System(s) returned to desired state with all alarms reset.

All locks and tags have been removed.

If moved to long-term isolation register, explain reason:

Work Supervisor:

Initial: DD Date: 17/04/17 Time: 11:05

Responsible Person:

Initial: XY Date: 17/04/17 Time: 11:05

Contractor:

Initial: N/A Date: N/A Time: N/A

Remarks: Turning Gear to be Engaged. OOW to be informed.

Notes:
Keep in ECR or CCR/Bridge when in force.
File and maintain in centralized location when done.

*See procedure MGT-02-04 for numbering instructions.

OPS-85 (14 Nov 2016)
Required by SAF-02-02, SAF-02-05,
SAF-02-06, OOS-04-02, OOS-06-01



Bunkering

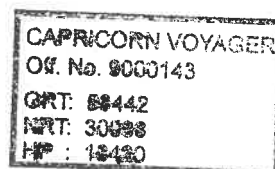
Nadeep Lamba

Engine Cadet

Date: 21/04/17.

Signature:

A handwritten signature in black ink, appearing to be "Nadeep Lamba", written over a horizontal line.



Bunkering

- The Chief Engineer is in charge of fuel oil & lube oil bunkering. The Chief Engineer may also delegate first engg or any other license holding officer.
- Prior to bunker operations from a barge at any exposed anchorage, a team meeting of the Master, Chief Engineer and deck officers should be held to discuss the expected weather conditions, duration of operation & the agreed maximum operating parameters. Clear guidelines should be discussed & agreed on for the cancellation/suspension of the operation.

Line up before arrival

- Fuel oil bunker port & st'bd manifolds must be checked for closed position, function & lash which is in place.
- Check bunker manifold pressure gauge & thermometer connections tight & working.
- Check all fuel oil manifold drain line v/vs are closed.
- Fuel oil pipe line vent v/vs must be kept closed thru' out the operation.
- Fuel oil transfer p/p connection w/deck bunker pipe to be closed
- Open fuel oil bunker tank filling v/vs of tanks to be filled.
- Fuel oil bunker tank overflow alarms tested as per OPS-24

Bunker Safety Meeting

A safety meeting is held prior to loading to discuss the dangers of H₂S exposure. At the meeting, involved personnel are instructed in the following subjects:

- The hazards of H₂S
- H₂S exposure limits
- The proper use of H₂S-measuring equipment
- The use of SCBAs & fifteen (15) minute EEBD breathing escape capsules.

- Control of shore/ barge personnel activities onboard, particularly during venting, connection, disconnection, and sampling.
- Emergency procedures such as setting up the initial boundaries of regulated areas, controlled barrier areas, and hazardous vapor concentration areas (these may change at the discretion of the VMT)
- Using control processes to limit the release of H₂S (e.g., loading slowly into only one tank at a time)

Based on weather forecast, Master should alert the Voyage Manager about the possibility of delays because of weather before arriving at bunkering location/port.

- Tug must remain with non-self propelled barges throughout the whole operation from approach to departure.
- Conduct all barge oil transfer at anchor, never underway.
- Barges must be fitted with adequate fenders.
- Mooring lines, bitts & cleats must be in good condition and adequate for holding the barge alongside in all anticipated weather and traffic situations.
- Evaluate weather consideration & passing traffic if in a channel or river prior to the commencement & should be monitored throughout the transfer operation. Any party may request additional tug assistance if deemed necessary.

❖ **Deck & engine teams work together in loading bunkers safely and efficiently.**

❖ **Deck department:**

- Securing & letting go barges. If applicable not moored in way of any ballast overboard discharges
- Connecting & disconnecting hoses
- Watching the manifold
- Preparing oil spill (including scupper plugs) & firefighting equipment
- Assisting in draining bunker lines

- Ensuring vessel stability & stresses are within tolerances throughout the duration of transfer
- Hoist bunkering flag
- Sampling & measuring of H₂S concentration before & during bunkering

❖ **Engine department:**

- Preparing transfer instructions & load plan
- Completing OPS-79, Oil, Ballast and Bunker transfer Checklist
- Completing Declaration of Inspection as required
- Measuring, sampling & testing, to be completed by competent engineer
- Sample bottle, wheel spanner & rags placed at manifold
- Watch engineer will make fuel oil compatibility test
- 1/E will ensure service tank full & all necessary LOTOs
- Machinist & engineer will sound/ullages of tanks & temperatures
- 2/E, cadets & machinist will keep deck watch during operation & taking sample & testing of oil
- Record results in engine log book
- Prepare OPS-71 for bunker surveyor

On Arrival

- Conduct contractor work permit i.e w/bunker surveyor
- Ask for Bunker Delivery Note (BDN) & check for specifications as requested (quantity & grade, barge name, sulphur, viscosity, water content, MARPOL seal #)
- Ask supplier/ surveyor to witness fuel oil remaining on board & for sampling procedure
- Insist supplier take fuel oil sample at receiving manifold & bottle must be sealed before operation starts
- Discuss rate & pressure of transfer

Before Loading Bunkers

Before commencing bunker loading operations, follow these principles to minimize the risk of personnel exposure to H₂S:

- All access doors, trunks & intake vents near regulated areas are closed.
- Engine room forced ventilation near the regulated area is stopped and dampers closed.
- Air conditioning is to be on full recirculation. Air conditioning systems should be adjusted to prevent the entry of petroleum gases, if possible by recirculation of air within the enclosed spaces. On some vessels, it may be necessary to trim the outside air intakes to maintain a positive pressure.
- Accommodation doors leading to external decks are clearly marked from the inside with a sign that states “Danger Loading high-H₂S bunkers. Do not go on deck.”

- Personal H₂S monitors (rattlers) are worn by the bunker tank sounder, the manifold watch keeper, & anyone else on deck.
- Additional precautions as required by the VMT.

During Loading

If an H₂S concentration higher than 10 ppm is present in the tank ullage space while bunkers are being loaded, monitor the concentration of H₂S on deck & in the accommodation & engine spaces to ensure H₂S concentrations are below 10 ppm.

To prevent spills in regulated areas when loading or transferring bunkers with high H₂S, the VMT & Marine Superintendent use good judgment to decide if personnel are needed to stand by at the tank gauge for topping off. If such standby personnel are deemed necessary, they use appropriate PPE at all times. On ships fitted with automatic remote readouts, check the tank gauge & the remote readout gauge & recalibrate if necessary before arriving at the bunker port.

Open gauging is not acceptable for high-H₂S bunkers.

After Loadings

- ❖ After loading or transferring bunkers, always do the following:
 - Monitor the H₂S concentration in the controlled barrier areas & regulated areas.
 - Measure the concentration of H₂S in the bunker tank ullage space.
 - If the ullage space H₂S concentration is greater than 10 ppm, ventilate the space to less than 10 ppm as soon as practical.
 - Check the controlled barrier areas & regulated areas before releasing a bunker barge to ensure H₂S concentrations are less than 10 ppm if mooring lines are secured within those areas.
 - Ensure that all crewmembers on deck wear a personal H₂S monitor & that fifteen (15) minute EEBDs breathing escape capsules are available during the unmooring operation.

Gas Readings 13th April 2017

Before Bunkering at 13:30

	O2	LEL %	H2S
1 Starboard	20.9%	0	0
1 Port	20.9%	0	0
2 Starboard	20.9%	0	0
2 Port	20.7%	0	0
D.O. Storage	20.9%	0	0

During Bunkering at 17:20

	O2	LEL%	H2S
1 Starboard	20.9%	0	0

After Bunkering at 20:30

	O2	LEL %	H2S
1 Starboard	20.3%	0	0
1 Port	20.7%	2	0
2 Starboard	20.7%	8	0
2 Port	20.9%	0	0
D.O. Storage	20.8%	3	0

Bunker Transfer Safety Checklist

OPS-117



Port: Singapore	Vessel: CAPRICORN VOYAGER	Master: Trevor Crowley
Date: 13 th April 2017	Terminal: Penjuru Terminal	Person Incharge: Graeme Young

Instructions: Safe operations require that all questions be answered affirmatively by placing checkmarks in the checkboxes below. When such an answer is not possible, the vessel and barge are to reach agreement on appropriate precautions to be taken to mitigate any risk of an incident. If a question is not considered to be applicable, describe the reasons for such a consideration in the remarks section.

Codes: Code letters in the code column indicate the following:
A— (Agreement). This indicates as an agreement or procedure that should be identified in the checklist or communicated in some other mutually acceptable form.
R— (Re-check). This indicates items to be re-checked at appropriate intervals, as agreed between both parties and stated in the declaration.

1. Bunkers to be Transferred

Grade	Tonnes	Volume at Loading Temp	Loading Temperature	Maximum Transfer Rate	Maximum Line Pressure
Fuel Oil	600 MT				3.5 kg/cm ²
Gas Oil / Diesel					
Lub. Oil in Bulk					

2. Bunker Tanks to be Loaded

Tank No.	Grade	Volume of Tank @ 95%	Vol. of Oil in Tank before Loading	Available Volume	Volume to be Loaded	Total Volumes Grade
1S HFO Storage Tk.	RMG 380	821.5m ³	131.2 m ³	690.3 m ³	616.7 m ³	747.9m ³
TOTAL						747.9m ³

3. Checks by Barge Prior to Berthing

Bunkering	Barge	Code	Remarks
1. The barge has obtained the necessary permissions to go alongside receiving ship.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
2. The fenders have been checked, are in good order and there is no possibility of metal to metal contact.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
3. Adequate electrical insulating means are in place in the barge- to-ship connection.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
4. All bunker hoses are in good condition and are appropriate for the service intended.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

4. Checks Prior to and During the Transfer


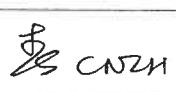
Bunkering	Ship	Barge	Code	Remarks
5. The barge is securely moored.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R	
6. There is a safe means of access between the ship and shore.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R	
7. Effective communications have been established between responsible officers.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	A R	(VHF/UHF Ch. 10). SHORE RADIO CH 1 Primary System: Ship Radio +65 63185483 Backup System: Air horn 63185439 Emergency Stop Signal: Long blast of horn
8. There is an effective watch on board the barge and on the ship receiving bunkers.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
9. Fire hoses and fire-fighting equipment ashore and on the ship are ready for immediate use.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Capricorn Voyager firefighting equipment ready for immediate use.
10. All scuppers are effectively plugged. Temporarily removed scupper plugs will be monitored at all times. Drip trays are in position on decks around connections and bunker tank vents.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
11. Initial lineup has been checked and unused bunker connections are blanked and fully bolted.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
12. The transfer hose is properly rigged and fully bolted and secured to manifolds on ship and ashore.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
13. A copy of the bunker hose pressure test certificate is received from barge.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Certificate must be less than 12 months old and show hose tested to 1.5 time MAWP
14. Overboard valves connected to the cargo system, engine room bilges and bunker lines are closed and sealed.	N/A			
15. All cargo and bunker tank hatch lids are closed.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
16. Bunker tank contents will be monitored at regular intervals.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	A R	At intervals not exceeding 15 minutes
17. There is a supply of oil spill clean-up material readily available for immediate use.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
18. The main radio transmitter aerials are earthed and radars are switched off.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
19. Fixed VHF/UHF transceivers and AIS equipment are on the correct power mode or switched off.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
20. Smoking rooms have been identified and smoking restrictions are being observed.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	A R	Nominated Smoking Rooms Tanker: Port Side Upper Dk Smoking Room Ashore
21. Naked light regulations are being observed.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R	
22. All external doors and ports in the accommodation are closed.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R	
23. Material Safety Data Sheets (MSDS) for the bunker transfer have been exchanged where requested.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R	
24. The hazards associated with toxic substances in the bunkers being handled have been identified and understood.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R	H ₂ S Content: LIMIT 5 PPM Benzene Content: LIMIT 5 PPM

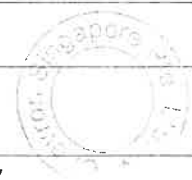
Declaration

We have checked, where appropriate jointly, the items of the checklist in accordance with the instructions and have satisfied ourselves that the entries we have made are correct to the best of our knowledge.

We have also made arrangements to carry out repetitive checks as necessary and agreed that those items coded 'R' in the checklist should be re-checked at intervals not exceeding ~~24~~ 4 hours.

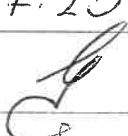

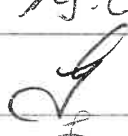



If to our knowledge the status of any item changes, we will immediately inform the other party.

For Ship	For Barge
Name: Graeme Young	Name: ZHAO CHUN LI
Rank: Chief Engineer	Rank: Operator
Signature: 	Signature: 
Date: 13 APR 17	Date: 13 APR 17
Time: 1250	Time: 1250 Hrs



Remarks:

Record of Repetitive Checks:

Date:	13 th APR 2017	13 th APR 2017	13 th APR 2017
Time:	17:20	18:10	19:00
Initials for Ship:			
Initials for Barge:			
Date:			
Time:			
Initials for Ship:			
Initials for Barge:			



BUNKER DELIVERY NOTE

CHEVE17TS0021

BDN No. 000125 Nomination Ref. No. _____

Port : SEA PORT Date : 13-04-2019

Delivery Location : SEA PORT Vessel's Name : MS. CANTON

Bunker Tanker's Name : _____ IMO No. : 9326004

SB No. : T548 Gross Tonnage : 5342

Alongside Vessel : 13-04-2019 / 1430HRS Owner / Operator : OMG SHIP

Commenced Pumping : 13-04-2019 ETD : 10/04/19

Completed Pumping : 13-04-2019 Next Port : _____

PRODUCT SUPPLIED

Fuel Characteristics		Quantity	
Product Name	<u>FUEL OIL 380 CST</u>	Gross Observed Vol (Litres)	<u>506.800</u>
Viscosity at 40°C or 50°C, mm ² /s (ISO 3104)	<u>357.5</u>	Gross Standard Vol (Litres)	<u>500.973</u>
Density at 15°C, kg/m ³ (ISO 3675 or ISO 12185)	<u>0.9904</u>	Quantity (Metric Tons)	<u>580.912</u>
Water Content % V/V (ISO 3733)	<u>0.05</u>	Barrels at 60° F	<u>3698</u>
Flash Point °C (ISO 2719)	<u>73.0</u>	Temperature, VCF & WCF	Refer to Bunker Tanker Measurement Report (SS 600 Annex F)
Observed Tank Temperature °C	<u>44</u>		
Sulphur Content, % m/m (ISO 14596 or ISO 8754)	<u>3.22</u>		

SUPPLIER'S CONFIRMATION

We declare that the fuel characteristics and quantity of the product supplied are correct.

For **CHEVRON SINGAPORE PTE. LTD.**
Company's Name and Stamp

[Signature]
Signature of Cargo Officer

ZHANG CHUNLI
Full Name in Block Letters

CHEVRON(S) PTE. LTD
Bunker Tanker's Stamp

MASTER'S / CHIEF ENGINEER'S ACKNOWLEDGEMENT

We acknowledge receipt of the above product and confirm that the following samples were jointly taken by continuous drip sampler at the vessel's manifold, sealed and numbered :

	Seal No.	Counter Seal No. (If any)
Vessel	<u>7327650</u>	<u>060194</u>
MARPOL	<u>7327650</u>	<u>060195</u>
Bunker Tanker(1)	<u>7538486</u>	<u>060196</u>
Bunker Tanker(2)	<u>7538485</u>	<u>060197</u>
Vessel Testing Programme :		
Surveyor		
Others		
Acknowledged by	(To specify)	(To specify)

[Signature]
Signature of Master / Chief Engineer

G. T. YEOH
Full Name in Block Letters

We certify that the bunker fuel oil delivered meets the requirement of regulations 14(1) or (4) and Regulation 18(3) of MARPOL 73/78 Annex VI.

REMARKS 17-6

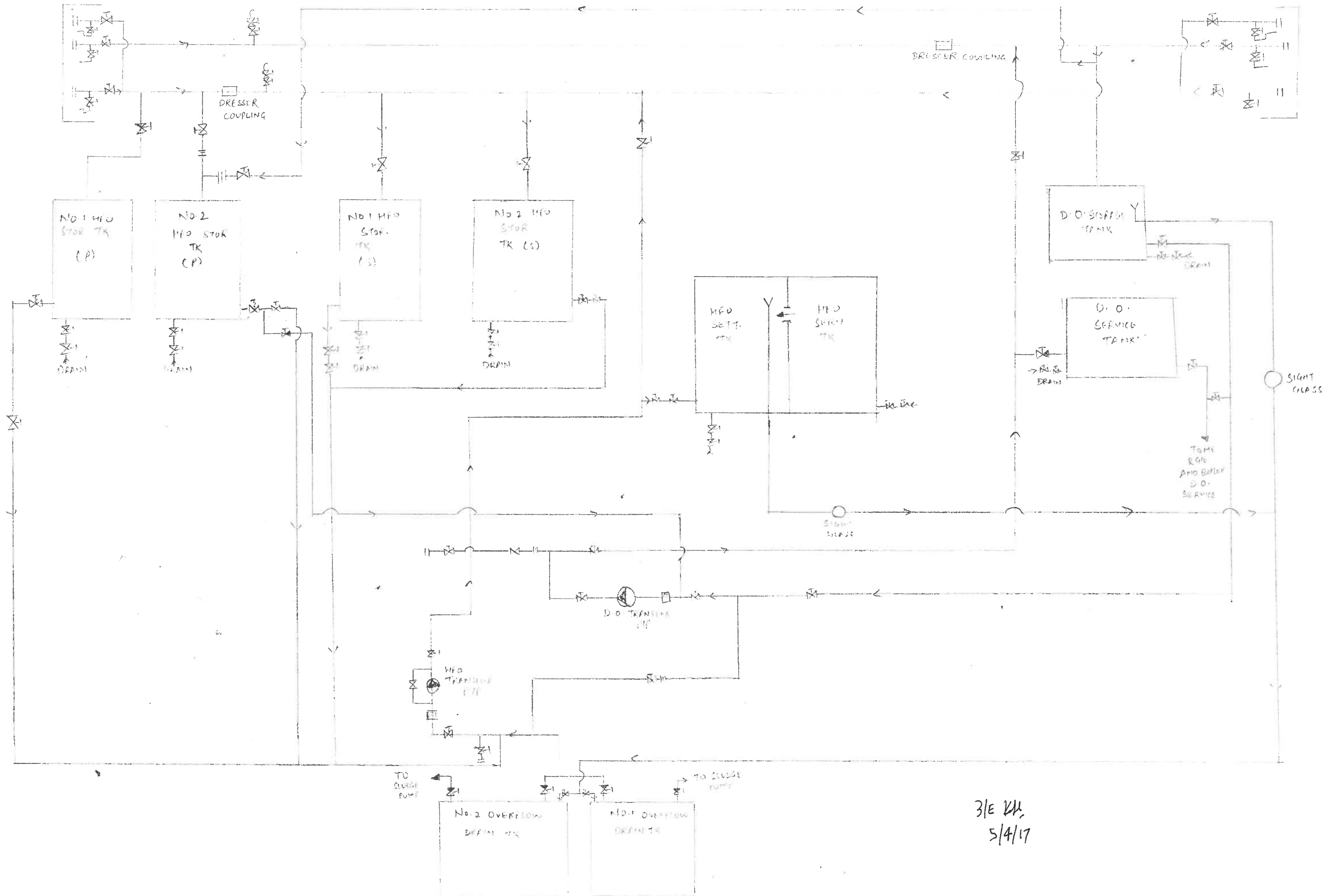
For MPA's purposes

The following rating is our satisfaction level of the bunkering operation :

1. 2. 3. 4. 5.

Very Dissatisfied Dissatisfied Average Satisfied Fully Satisfied

Was a Note of Protest Issued? Yes / No Signature of Master / Chief Engineer : _____



3/E KH,
 5/4/17

Cargo, Ballast and Bunker Transfer Instructions OPS-30



Date 13 Apr 17

Vessel CAPRICORN VOYAGER	Voyage 126	Port Singapore - Penjuru Terminal
-----------------------------	---------------	--------------------------------------

These instructions are part of the cargo transfer procedures required by 33 CFR, Chapter 1, part 155.720 and 155.750.

Vessel will load 600 MT of HFO.

Manifold to use : PORT ~~AFT~~ ^{FWD} manifold

Max Manifold pressure : 3.5 Kg/cm²

Officer in Charge : C/ENG

Assisted by: : CTO, 3x Eng Cadets

Sounding prior to loading:

HFO TK 1S - 12.250

Quantity: 136.34 m³

Soundings after loading:

HFO TK 1S - 2.20

Quantity: 736 m³

Line up of HFO oil bunker pipe line before arrival:

Heavy fuel oil bunker Port and Stbd manifolds valves must be checked for closed condition.

Check bunker manifold pressure gauge and thermometer connections are tight and in working condition.

Check all heavy fuel oil manifold drain line valves in closed position (Note: Spade blank inserted)

HFO oil pipe line vent valves must be kept closed throughout the operation. (On Main line)

HFO transfer p/p discharge valve OF515F to deck bunker line to be closed (location fwd of p/p room)

Filling v/v for 1 HFO (S) tank to be open

Bunker manifold valve will only be opened (or closed) as directed by Chief Engineer

Deck department requirements:

Ensure the OPS-29 Designated Persons in Charge form is updated with personnel loading bunkers,

Oil spill response equipment to be prepared, and ALL scupper plugs to be in place, and Wilden Pump ready for immediate use.

Bunkering operation flag to be hoisted (Red light during night operations)

Fire fighting equipment to be prepared at the manifold, and FWD & AFT foam monitors must be positioned towards the manifold until all operations have been completed

Bunker tank vent save-all's to be fitted with drain plugs at all times

Deck officers will conduct all mooring operations, hose lifting and connection.

Deck Officers to monitor weather conditions and barge moorings/damage etc.

Chief Officer to check trim and stability condition during loading of bunkers & re-position ballast to ensure SF/BM remain within permissible limits.

Perform tank atmosphere tests to establish concentration of O₂, H₂S & Benzene BEFORE, DURING & AFTER the bunkering operation, the results must be entered in Deck log book (C/Eng to be advised)

Chief Officer to assign personnel for hose connection / dis-connection & manifold at midship manifold watch as appropriate (must also ensure the sample flange is correctly fitted)

Distribution: Keep on board for at least one month.

OPS-30 (01 Sep 2015)
Required by CBH-04-04, CBH-01-02, CBH-02-01, CBH-02-03,
CBH-02-04, BKR-01-01, CBH-04-05, CBH-04-06, CBH-05-01, CBH-05-02

Preparation by Engine department:

2x sample container to be kept ready at manifold (1x 10ltr & 1x 5ltr) c/w wheel key, rags etc

Canvas covers on vents to be removed from bunker tanks that will be loaded

Watch engineer and duty cadet to make the fuel oil test equipment ready before bunkering

Before bunkering, Bunker tanks High Level alarm must be tested and recorded in both the OPS-24 & the Engine room log book.

HFO oil transfer pump to be switched to MANUAL stop

Duties to perform before Bunkering Commences:

Pre-transfer meeting will be held with the supplier's representative before bunkering

Complete signing of all paperwork including sample bottle labels where possible

Ensure a Bunker specification is received in order to confirm quantity & grade, barge (company & name) sulphur content, viscosity, water content etc

Request a copy of SDS.

Ask for a Copy of the Pressure Test Certificate of the Transfer Hose

Ask the supplier about a HFO oil sample. Is it being supplied by them or are we taking from the manifold with ours. If taking from ours, how many samples do they need

Invite the supplier to witness the sampling procedure.

Invite the supplier to witness the dipping of diesel oil tanks

Discuss the HFO oil receiving rate and stress that our receiving rate is dependant on the manifold pressure

Inform the supplier that at start up we require a low receiving rate to allow us to check lines and confirm fuel is going to the correct tank (one tank only) Also it will allow us to take an initial sample for carrying out onboard tests. We will not increase to full rate until our tests have been completed, approximately 40 minutes duration.

Confirm that only tank's is to be filled i.e. 1 HFO (S) tank

Inform the supplier that on completion we will be filling to a slack tank and there will be no problem with blowing through

Discuss communication set up

Discuss and confirm emergency stop procedures with supplier.

Notes:

The Chief Engineer will be in charge of the loading operation

C/E to check line up prior to starting

The C/E is to be present at the manifold for opening and closing of the manifold valve, except in the event of an emergency stop

Manifold valve will only be closed on C/E's instruction

Bridge / CCR to be informed when manifold valve is both opened & closed, and the time recorded

Bridge / CCR to be informed when flow at the manifold has been confirmed & when bunkering is complete

Tank levels are to be measured by manual dipping of tank ullages (remote level gauges are NOT to be relied on) Tank soundings are to be taken every 30 minutes

Final ullages will be indicated at the ullage ports of the respective tanks

C/E is to be informed when any tank is 2m from it's final ullage

All pipelines & tanks, including those not being filled, are to be checked regularly

At least one officer/cadet and one rating (at manifold watch) will remain on dedicated transfer duty at all times and will not leave his duty for any reason unless relieved, or the operation has stopped with transfer system completely

Distribution: Keep on board for at least one month.

OPS-30 (01 Sep 2015)
Required by CBH-04-04, CBH-01-02, CBH-02-01, CBH-02-03,
CBH-02-04, BKR-01-01, CBH-04-05, CBH-04-06, CBH-05-01, CBH-05-02

secured.

The drip sampling "cubitainer" is to be monitored to confirm that it fills at a proportional rate to that of the bunker quantity received onboard i.e. 50% sample should correspond to 50% total quantity being received

Bunkering is prohibited anytime LEL exceeds 50%

If H2S is >5ppm and/or benzene is >1ppm then regulated areas are to be set up and conditions controlled as per "BKR-02-02/Attachment 1 Controlled Barrier Area" and the bunkering operations must be halted.

Ventis are to be worn by all personnel directly involved with the operation

Communications by walkie talkie. ^{CCR} Bridge on ^{Ship radio} VHF.

Any valve operation is to be communicated to the barge at least 5 minutes before the actual v/v change.

No hot work is to be performed for the duration of the bunkering operation.

Air conditioning supply is to be controlled to maintain a slight positive pressure inside the accommodation

During bunkering operation, rain water collected on deck is to be drained by opening the scupper plugs, however, this MUST NOT to be done without the express permission of either the C/E or C/O

If any problems occur, contact the Loading Master (Bunker Barge) directly to stop the bunker operation

On start up the bunker system will be lined up to #1 HFO (S) tank

Transfer will continue at a reduced rate until onboard tests & analysis have been completed. C/E is to be advised of the test results with subsequent entries made in the Engine Room Logbook

On confirmation from C/E that test results are satisfactory. The rate is to be increased to correspond with a MAXIMUM pressure of 3.5kg/cm2 at the manifold

Rate to be confirmed by manual soundings.

Throughout the operation tanks and pipes to be regularly monitored to confirm correct procedure

No increase in oil level to be evident in tanks other than those being loaded in to

Transfer will be considered complete when advised by the bunker barge or in the event the required amount has already been received on board and C/E requests stop

On completion, Engineer / Cadet will check & record tank soundings / ullages and their corresponding temperatures

After completion of bunkering Manifold valves to be in shut position with blanks fitted

Ensure HFO oil storage tank filling valve remains open to accommodate thermal expansion of liquid

Quantities to be entered in the oil record book on completion. (By Person In Charge).

Bunker Safety Transfer Checklist OPS-117 to be completed.

OPS-79 transfer checklist to be completed during operation. Watch changes to be logged.

Please stay alert during the operation. If in any doubt stop the operation and call the chief engineer.

I have read and understood the cargo transfer instructions:

3/E *DMK SA*

2/E *Debut*

Signatures of Watch Officers

Signatures of Watch Officers

[Signature]

Signature of Preparer

CTO

Position

Approved by *T. Day*

Master

Oil, Ballast and Bunker Transfer Checklist OPS-79



Port Singapore - Penjuru Terminal	Operation HFO Bunkering	Date 13 APR 17
Voyage 126	Officer in Charge C/E Graeme Young	
A. Pre-Start-Up Checks		Time
1. Confirm tank level alarms are on.		12:30
2. Test fixed tank high level alarms (if fitted) and record on Tank Level Alarm Testing (OPS-24) & in Deck & Engine Logbook.		12 APR 17 08:35
3. Ensure that automatic tank gauges are working properly.		N/A
4. Mark final ullages on tank gauges.		13:05
5. Set tank level alarms.		13:05
6. Ensure manifold drain valves are fully closed.		11:45
7. Ensure shore loading arm/transfer hose drain valves are fully closed and drain plug for loading arm is tight.		15:15
8. Verify IG Recorder is on & cartridges have sufficient ink.		N/A
9. Double check line up and verify locally that remotely operated valves are in the intended position.		15:20
10. Verify the settings of all valves and blinds in the IG and vent systems.		N/A
11. Double check self stripping system is correctly set.		N/A
12. Confirm with shore personnel that shore loading arms/hoses and vessel manifold connections are appropriately matched for the intended grades to be transferred.		15:14
B. Start-Up and Transfer Checks		Time
1. Ensure that permission has been granted to open manifold valves and confirm with shore-ship transfer facility.		16:15
2. Ensure that the qualified individual/officer on deck has confirmed that the manifold valves are open.		16:26
3. Test pump trips on starting and log as required.		N/A
4. Confirm liquid flow in accordance with plan.		16:30
5. During self-stripping system line-up, ensure that the water seal tank is filled to normal level as per manufacturer instruction manual.		N/A
6. Ensure valves are set to prevent hydraulic shock in the pipelines.		16:15
7. Ensure Ballast Tank Remote Hydrocarbon Sampling System has been switched off prior to ballasting.		N/A
8. Keep portable tank gauging equipment in place for the first tank being loaded.		16:25
9. Verify and record ullages of all tanks throughout the operation.		16:50
C. Completion Checks		Time
1. Ensure permission given to close manifold valves & open drains.		18:30
2. Ensure facility has granted permission to disconnect cargo hoses/chicksans/cargo arms.		19:00
3. Pumps and lines to be thoroughly drained.		15 APR 17
4. Ensure valves are set correctly to prevent thermal expansion.		20:00
5. Ensure that the vapor system is set, segregation is complete and vapor recovery valves are closed.		N/A
6. Remove reducer and fit ANSI-rated blank.		15 APR 17
7. Ensure Ballast Tank Remote Hydrocarbon Sampling System has been switched on in empty ballast tanks.		N/A

Signature of Officer In Charge:



TEST RESULTS

017

WATER- 0.05%

DENSITY:- 0.987

VISCOSITY:- 229.9 CST (242.5,224.5,223.6,220.6,238.6)

COMPATABILITY :-GOOD



ME LO PURIFIER NO.2 BOWL OVERHAUL

Nadeep Lamba

Engine Cadet



Date:

Signature: 3/E *NL*

REPORT ON PURIFIER

PRIMARY HAZARDS:

Chemical: Oil, chemical contact, Mechanical: Equipment damage, hand fingers cuts from sharp plate edge

ADDITIONAL CONTROL MEASURES:

Chemical: Use of rubber gloves, face shield

Mechanical: Follow Instruction manual for proper dismantling, assembling procedure, focus on task while cleaning plates, leather gloves.

Procedure :

- ME LO purifier #2 breaker off
- ME LO purifier #2 sludge in/out from heater v/v- shut



- ME LO purifier #2 Clean oil outlet valve - shut
- Operating water valve shut
- ME LO purifier #2 Feed p/p-breaker off
- ME LO purifier #2 Sludge outlet v/v-shut
- ME LO purifier #2 steam inlet/outlet v/v- shut



PROCEDURE FOR DISMANTLING

- After putting LOTO, it must be checked by the double check officer.
- Disconnect water feed line.

- Unscrew the handle connection while holding the centripetal pump with socket wrench.

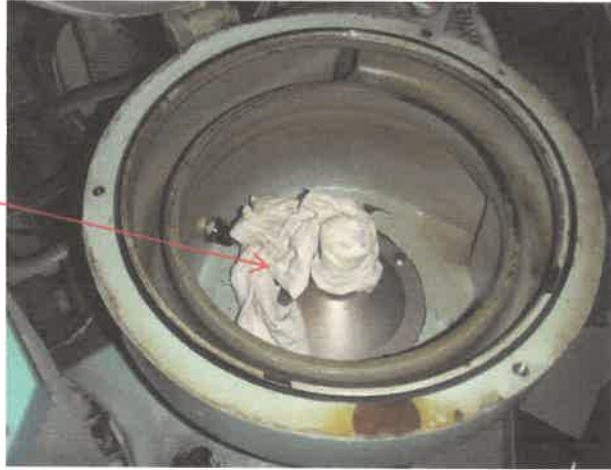


- Unscrew the hex heads screw with washers holding down the bow lid.
- Hinge up the hood. The stirrup must register properly.
- Take the gasket out of the upper section of the frame.
- Unscrew the lock ring by lightly striking the arm of the ring spanner using a mallet(left hand thread)
- Screw the lock ring off by hand and remove it
- Press of the centripetal pump chamber cover using a screwdriver.
- Screw handle connection piece into the centripetal pump (left hand thread)
- Lift off the complete centripetal pump and centripetal pump chamber cover together.
- Screw centripetal pump chamber lock ring onto bowl top.

- Position the complete centripetal pump with centripetal pump chamber cover onto lock ring.
Position wooden block. Detach the sensing liquid pump from the centripetal pump by striking lightly with a hammer.
- Remove the following parts :
 1. Sensing liquid pump
 2. Centripetal pump chamber cover
 3. Centripetal pump
 4. Unscrew the lock ring.

- Unscrew spindle screw. Unscrew using a socket wrench and ratchet (left hand thread) and remove it.
- Off the spindle cone with a jack and
- Lift out of the frame with the aid of a hoist

Place a cloth over the spindle



- Clean threads inside the distributor and screw on compressing device. Screw bolt into distributor.
- Compress the disk stack.
- Unscrew the two threaded pins out of the bowl lock ring. Make sure that the O mark is not covered by the ring spanner.
- Bolt pin spanner to the bowl lock ring. Firmly tighten the fastening screws of the pin spanner.
- Open the lock ring(left hand thread)

- Lift off the bowl ring with the pin spanner.



- Unscrew the complete eye bolt from the bowl bottom
- Remove the plate.
- Lift off the bowl top with fitted gaskets by hand.
- Mount the plate on the distributor neck.



- Mount the plate on the bowl top.
- Screw the centripetal pump chamber lock ring over the plate on to the bowl top.
- Screw in hex head screw M 24*75.

- Force off the bowl top.
- Remove the parts: hex head screw 1, lock ring, plate and disk.
- Lift off the bowl top with fitted gaskets by hand.
- Remove the separating disk.
- Lift out the distributor together with disk task.
- Insert the spindle screw
- Screw the complete eye bolt into the bell shaped piece



- Screw the bell shaped piece with eye bolt into the thread of the sliding piston.



- Force off the sliding piston with the aid of the eye bolt.
- Remove the sliding piston with bell shaped piece and eye bolt.
- Unscrew the four Allen screw holding the closing chamber bottom and bowl bottom together.
- Screw the complete eye bolt into the ball shaped piece
- Screw the bell shaped piece into the thread
- Force off annual piston and closing chamber bottom with the aid of the bolt.
- Unscrew the eye bolt and bell shaped piece from the annular piston.



- Unscrew the spindle screw
 - Remove gasket
 - Drive annular piston 1 and closing chamber 2 bottom.
- Add adjust:
- Turn bowl through 180 degree,
 - Unscrew the foul Allen screw from water chamber bottom
 - Press off with a screwdriver and remove it together with the gasket.

PROCEDURE FOR ASSEMBLING:

- Replace all the O-rings and polyamide gasket.
- Turn bowl bottom through 180 degree.
- Place water chamber bottom on the bowl bottom.
- The O marks must be aligned.
- Screw in the four Allen screws holding the water chamber bottom and bowl bottom together tight (Torque: 15Nm).



- Insert the closing chamber in the annular piston
- Place a wooden block on the closing chamber bottom.
- Drive the closing chamber bottom downwards by means of light hammer blows.
- Insert the spindle screw.
- Install the annular piston and closing chamber bottom together in the bowl bottom
- The o marks must be aligned

- Screw two hex head screws M 8*120 with butterfly nut and pipe
- Press the annular piston and closing chamber bottom into the bowl bottom with the aid of the butterfly nuts.
- Screw in the four Allen screws holding the closing chamber bottom and the bowl bottom together and firmly tighten (torque: 15Nm).
- Screw the complete eye bolt into the bell shaped piece. Screw the bell shaped piece with eye bolt into the thread of the sliding piston.
- Place the sliding piston with bell shaped piece and eye bolt into the bowl bottom.
- Lower the sliding piston by turning the eye bolt counterclockwise.
- Drive the sliding piston onto the seat of the bowl bottom by means of light hammer.
- Unscrew the complete eye bolt and bell shaped piece.
- Unscrew the spindle crew.
- Stack the disk stack on the distributor.

Be sure to fit the required total number of disks= 85.

- Install the distributor together with the disk task. The O marks must be aligned.
- Place the separating disk on the distributor neck.
- Place the bowl top on the bowl body match the O mark.
- Mount the plate on the bowl top and screw the complete eye bolt into the bowl bottom.

Compress the disk stack

- Screw the lock ring by hand into the bowl bottom (left hand thread).
- Bolt pin spanner to the bowl lock ring.

Make sure that the O mark is not covered by the ring spanner.

Firmly tighten the fastening screws of the pin spanner.

- Compress the disk stack again and screw the bowl lock ring with the pin spanner.

- Strike the bowl lock ring with a mallet until the O mark is reached.
- Unscrew the pin spanner. Unscrew the eye bolt from the bowl bottom. Remove the plate.
- Screw in the two threads pins. Screw the eye bolt into the bowl bottom.
- Carefully place the bowl using eye bolt and hoist on the spindle cone. Unscrew the eye bolt from the bowl bottom.
- Screw in the spindle screw (left hand thread, torque-50 NM)



- Install centripetal pump

- Mount the regulating ring.
- Install sensing liquid pump.
- Mount the centripetal pump chamber cover
- Screw tight the lock ring using the hook wrench (left hand thread).

Fit spacer ring.

- Screw in the three hex head screws M12*30 with washer for closing the hood
- Introduce the handle connection into the hood and screw it down to fasten the centripetal pump (Left hand thread)
- Connect water feed line





TAPPET CLEARANCE

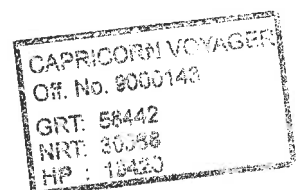
Nadeep Lamba

Engine Cadet

Date: 04 MAY 2017

Signature:

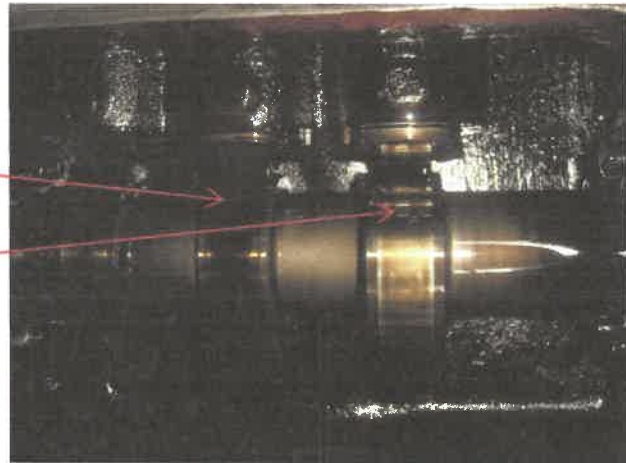
A handwritten signature in black ink, appearing to read "Nadeep Lamba".



TAPPET CLEARANCE

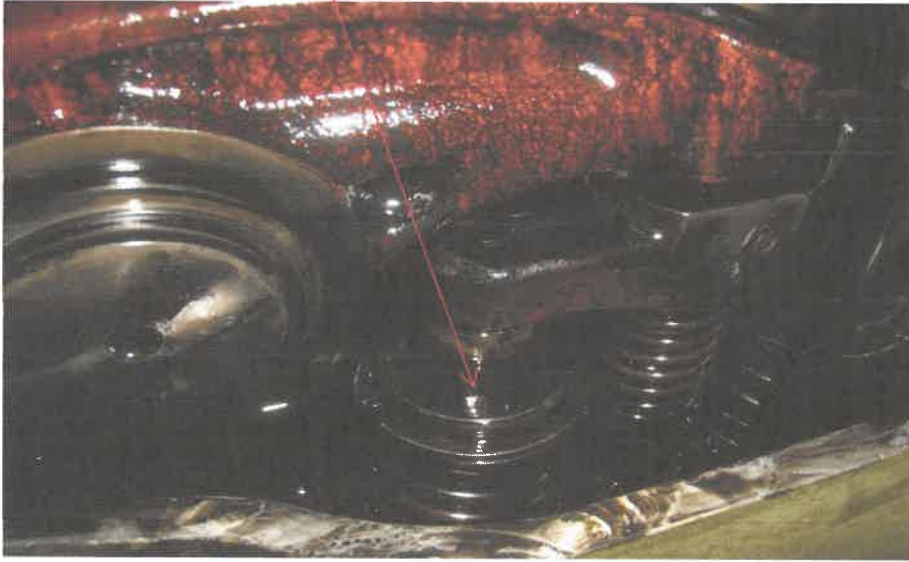


- Turn the engine so that the roller , rests on the circular part of the cam , i.e. the inlet valves and the exhaust valves are closed.



- Place the feeler gauge arked with “correct” 0.50 mm above the valve spindle nearest to the rocker arm bracket.
- Adjust the clearance between valve bridge and valve spindle by means of the adjustment screw on the rocker arm (above the push rod) and tighten the lock nut.
- The feeler gauge is to remain in this position when adjusting the clearance of the other valve.

- Place another feeler gauge ,at the same size 0.50mm above the other valve spindle



- Adjust the clearance between valve bridge and valve spindle by means of the adjustment screw on the valve bridge and tighten the lock nut.
- Check that the clearance is correct simultaneously at both valve spindles.
- Carry out adjustment in the same way as described for the inlet valves , but using the feeler gauge for exhaust valve clearance 0.90mm.
- The feeler gauges for checking the clearance have two gauges which are marked “incorrect” and “correct”, the latter to be used when adjusting the valve clearance.
- After tightening up the counter nuts on rocker arms and valve bridge , be sure that the feeler gauges marked “correct” can be inserted into the two clearances simultaneously as where it must not be possible to insert the gauges marked “incorrect”.

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Adjusting of Inlet Valve Clearance.

- 1) Turn the engine so that the roller, rests on the circular part of the cam, i.e. the inlet valves and the exhaust valves are closed.
- 2) Loosen the adjustment screws on valve bridge and rocker arm, see fig 1.

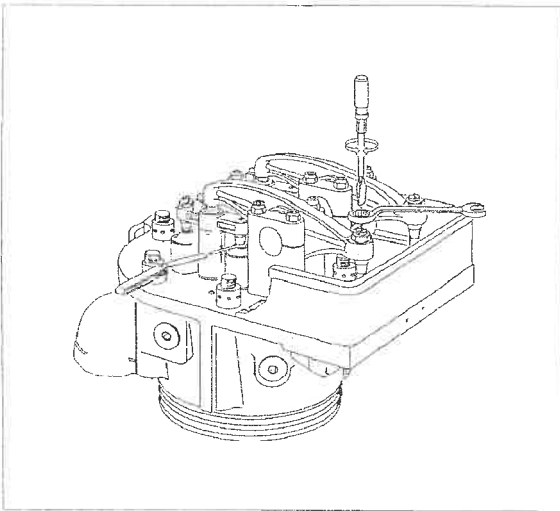


Fig. 1.

- 3) Clearance between valve bridge and valve spindle, see page 500.40.
- 4) Place the feeler gauge marked with "correct" 0,50 mm above the valve spindle nearest to the rocker arm bracket, see fig 1.
- 5) Adjust the clearance between valve bridge and valve spindle by means of the adjustment screw on the rocker arm (above the push rod) and tighten the lock nut.

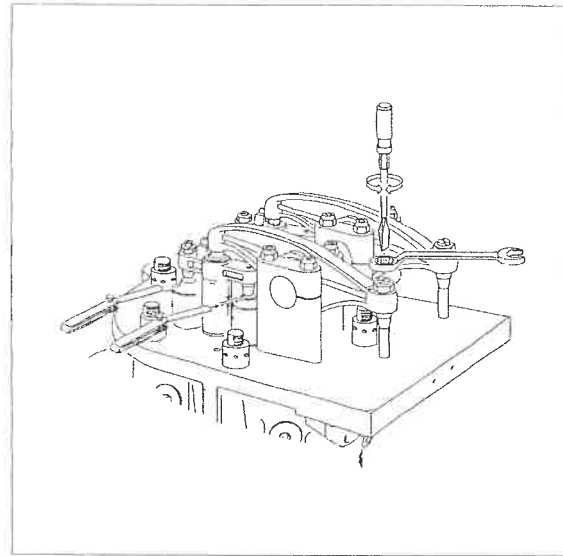


Fig 2.

The feeler gauge is to remain in this position when adjusting the clearance of the other valve.

- 6) Place another feeler gauge, at the same size 0,50 mm above the other valve spindle, see fig 2.
- 7) Adjust the clearance between valve bridge and valve spindle by means of the adjustment screw on the valve bridge, and tighten the lock nut, see fig 2.
- 8) Check that the clearance is correct simultaneously at both valve spindles.

Adjusting of Exhaust Valve Clearance.

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9) Carry out adjustment in the same way as described for the inlet valves, but using the feeler gauge for exhaust valve clearance 0,90 mm.

10) The feeler gauges for checking the clearance have two gauges which are marked "incorrect" and "correct", the latter to be used when adjusting the valve clearance, see fig 3.

After tightening up the counter nuts on rocker arms and valves bridge, be sure that the feeler gauges marked "correct" can be inserted into the two clearances simultaneously as where it must not be possible to insert the gauges marked "incorrect".

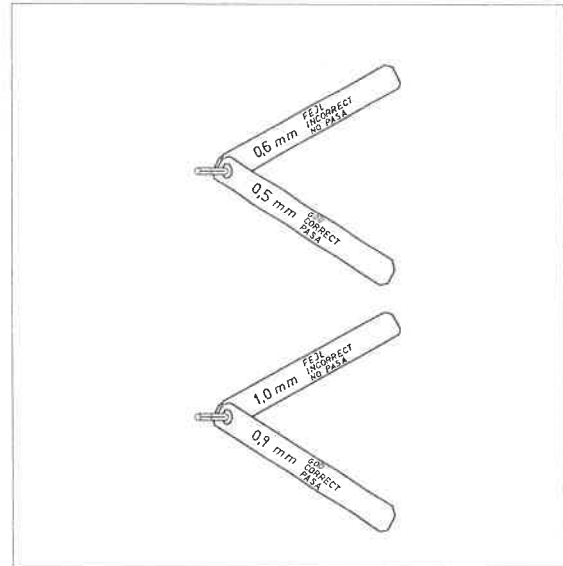


Fig 3.